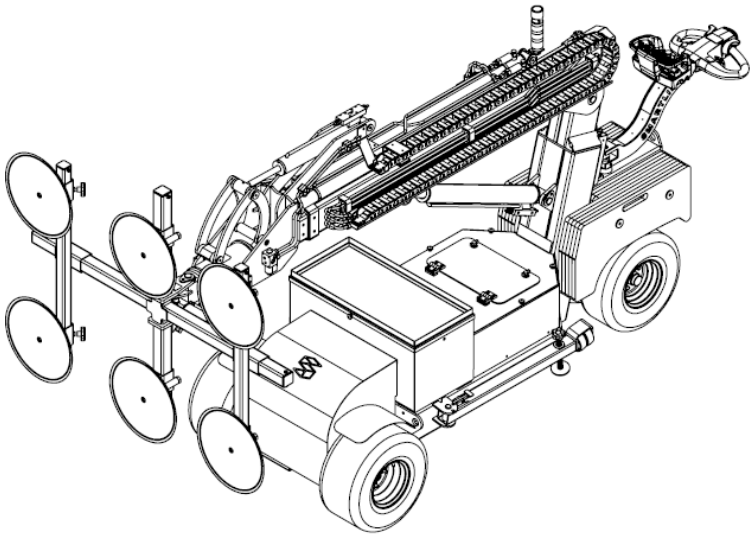
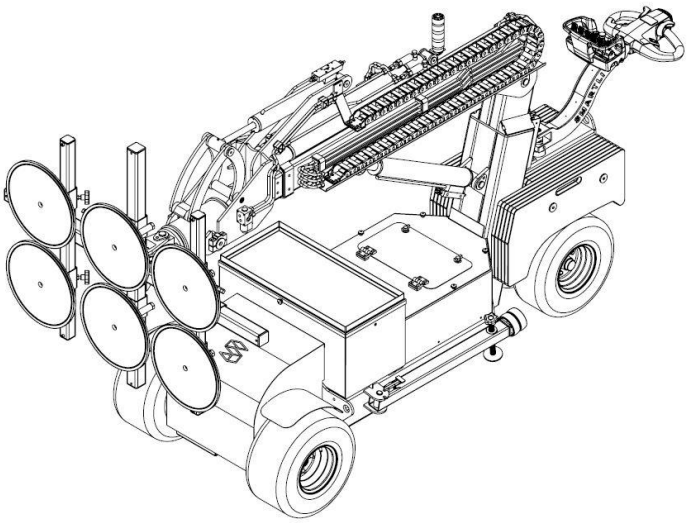
SMARTLIFT

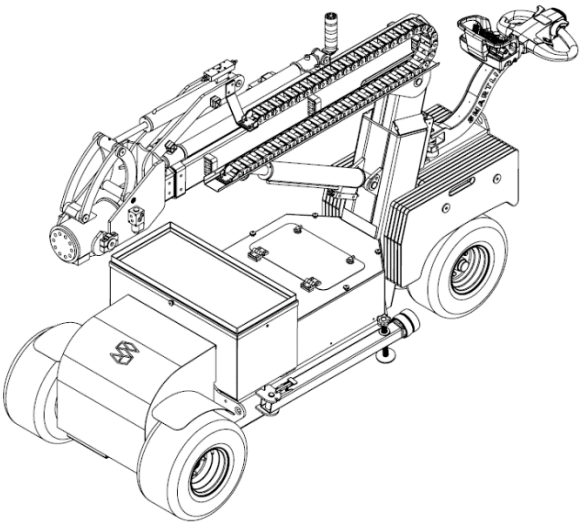


SL 809



SL 1009

(SL 1008 New Gen)



SLI 1009

(SLI 1008 New Gen)

User Manual

English

Issued by:	Date:	Approved by:	Document name.:
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Table of contents

1 Introduction

Smartlift A/S is an innovative company which develops and manufactures smart lifts, which are marketed worldwide. A Smartlift is characterized by the highest levels of precision, reliability and quality.

The **SL machines** are designed for transport and installation of heavy window elements on construction sites and in industry, without exposing the user to heavy gruelling lifting. The machines have been developed with a focus on user-friendliness and flexibility, and can thereby solve most tasks.

The **SLI machines** are based on the basic structure of a similar SL machine, but are built without the vacuum system in favour of specially adapted solutions.

A Smartlift is a utility tool, designed for lifting glass with a controlled and fixed vacuum yoke. The machine's application possibilities can be increased by purchasing accessories like lifting hook and pallet forks, but the machine must not be compared to a crane or a forklift. The machine is not designed to comply with any crane and truck regulations.

1.1 Smartlift customer service

Smartlift customer service
tel. +45 97 72 29 11
email: Customerservice@smartlift.com

1.2 Reading guide

These instructions have been prepared in accordance with DS/EN ISO 20607:2019 Safety of machinery – Operating instructions – General principles for design, and they are the manufacturer's original operating instructions for the machines.

The operating manual provides the user with the information necessary to operate the machine effectively and safely throughout the machine's service life. General safety instructions and conditions are described in a separate section, after which the machine and its intended use are described.

The operating manual is aimed at all users of the machine and is structured according to the user's functions and interactions with the machine. Security-related information and instructions appear either as sections or as general information for all users.

When reviewing the operating manual, the following approach is recommended:

- Identify yourself as belonging to one or more user groups before using the machine.
- Read and understand the contents of the operating manual, including information and instructions. If applicable, you only need to read those which are aimed at your particular user type.

In case of uncertainty regarding the above, contact your immediate supervisor.

Headings followed by (**SL**) only apply to machines with vacuum. The manual mainly contains illustrations of SL machines.

1.3 About the operating manual

The operating manual has been divided into a user manual and a service manual.

 **User manual Includes:**	 **Service manual Includes:**
Machine overview	Parts lists
Safety instructions	Advanced troubleshooting
Operation of the machine	
Service forms	

The user manual must be stored in a place which is known and accessible to the user and to maintenance personnel.

The service manual must be stored in a place which is known and easily accessible to maintenance personnel.

It is the obligation of the employer (machine owner) to ensure that everyone who services, cleans, operates, maintains or repairs the machine has read the user manual and service manual, or at least the parts of them which are relevant to their work.

Additionally, anyone who operates, services, maintains or repairs the machine is under an obligation to seek information in both the user manual and service manual.

1.3.1 The user

"User" refers to an everyday user who is not a skilled worker in the particular field. The user is assumed to have been instructed in the safety and operation of the machine, and to be able to perform tasks within its field of work. For example, for operation, it is expected that the person is able to start and stop, check the proper centering of the vacuum yoke and remove items during normal operation.

It must be ensured that the person in question has been adequately instructed about the operating instructions and trained so that the work can be performed safely.

1.3.2 Maintenance personnel

Maintenance personnel must be qualified, either through having trained as e.g. blacksmiths, electricians or mechanics, or by being trained in a way that makes them equal to these professional groups. In addition, they must be familiar with the machine's operation and safety, and know the location of the emergency stop.

Maintenance personnel must have read and understood the user manual, service manual, instructions, workplace instructions, etc.

Before commencing work, repairmen and maintenance personnel must be instructed about the machine’s safety situation.

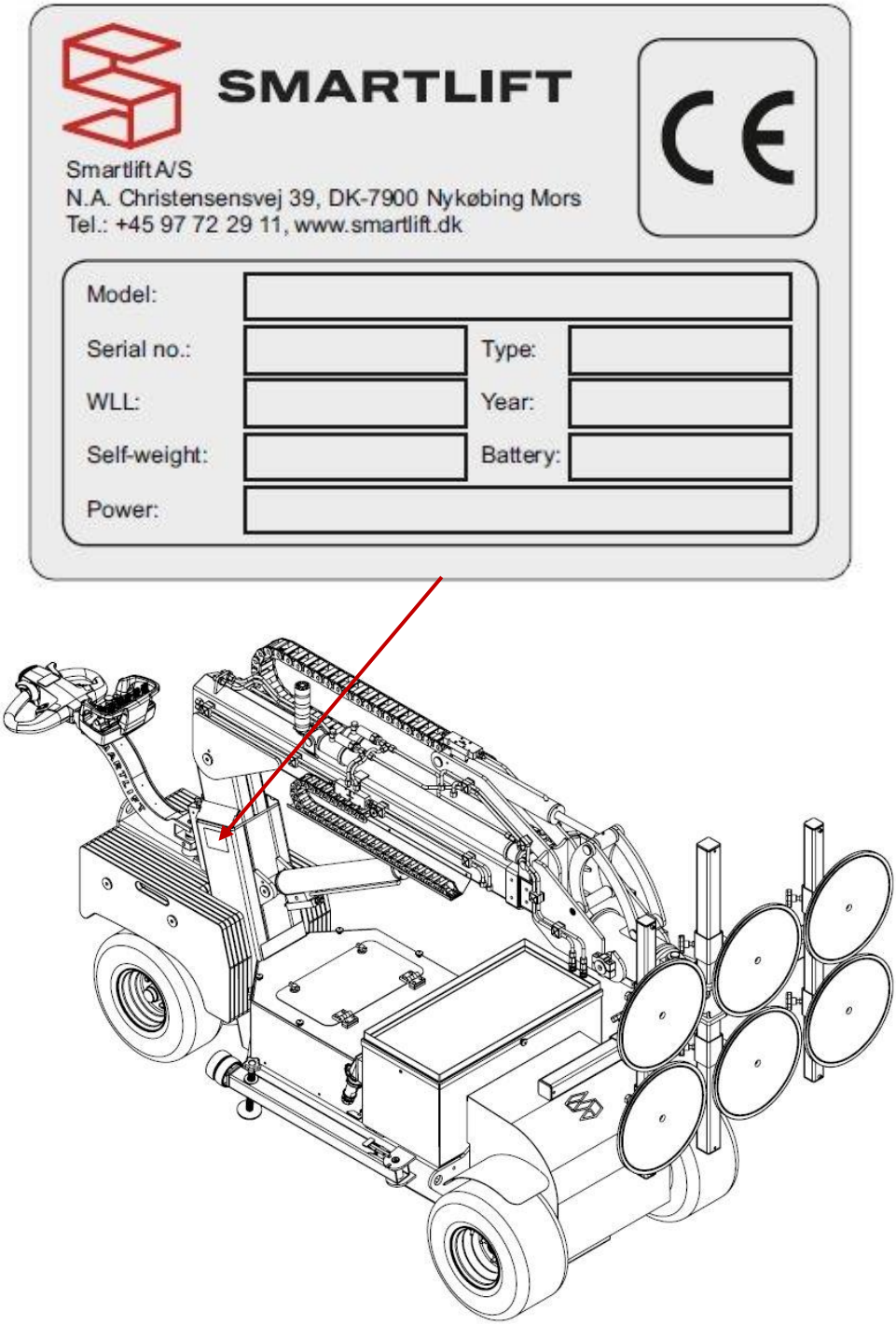
New maintenance personnel must be trained by an experienced colleague.

1.4 Machine types covered

The user manual covers the machines SL 1009 and SLI 1009. The SL series is part of the Smartlifts Outdoor series, which has been developed to handle work tasks on construction sites, outdoors as well

as indoors. SLI is based on the SL series, but is suitable for tasks where lifting with a vacuum cannot be used, but instead uses a special tool.

1.5 Nameplate



2 Safety and residual risks

2.1 Safety instructions

The machine may only be used by persons who have received competent training in the use of the machine's functions and who understand the risks involved in using the machine. The user must have read and understood this user manual before using the machine. The user is always responsible for ensuring that the machine is used correctly and safely.

When using special equipment (forks, lifting hooks, etc.), the user must have read and understood the user manual for this equipment, and must hold the relevant certificates required by law.

It is forbidden to

- modify the machine.
- lift or transport people.
- be under or in front of the machine when it is loaded.
- be under the machine if it is hoisted.
- exceed the WLL of the machine or any accessories.
- exceed the load chart of the machine.
- use and charge the machine at the same time.
- lift underneath the machine using a forklift or the like.
- use the machine without wearing safety shoes.
- drive at high speed down slopes.
- handle loads on slopes of more than 2°.
- use fewer than 6 suction cups when using the vacuum yoke.

WARNING! Risk of danger!

- Never use the machine without having read this manual.
- Never use the machine without having read and understood all labels on the machine.
- Never use the machine in case of visible damage or defects.
- Never use the machine without first considering the surroundings, the surface and the weather.
- Never use the machine to lift dirty, dusty, greasy or wet items.
- Never use the machine to lift items that are not airtight.
- Never use the machine without exercising great caution.
- Using the machine involves a risk of overturning.
- Always drive down slopes at low speed and with great caution.
- Never leave the machine loaded or on a slope.
- Always stay a sound distance away from the machine and load.

WARNING! Risk of explosion!

- It is forbidden to use the machine in areas where there is a risk of explosion (ATEX zones).

2.2 Emergencies

2.2.1 The machine loses vacuum (SL)

⚠ **WARNING! If the machine suddenly loses vacuum, the load must be immediately lowered and placed on a solid surface!**

2.2.2 The machine overturns

If the machine has overturned, it must be raised by hoisting from the designated hoisting eyes. See section **5.3 Handling and lifting**.

⚠ **WARNING!**

- **The machine's batteries contain acid!**
- **If the machine tips over, there is a risk that battery acid will leak out!**
- **If skin or eyes come into contact with battery acid, rinse them with plenty of clean water and consult a doctor!**
- **As the machine contains hydraulic oil, this must be collected in the event of spillage.**

⚠ **WARNING! In case of a crash, the machine must undergo complete servicing!**

2.2.3 The machine catches fire

In the event of a fire in the machine, use a CO2 extinguisher.

2.3 Personal protection equipment

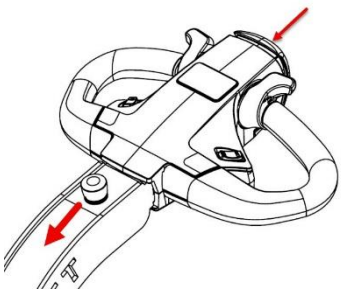
This section describes what personal protective equipment may be required when using the machine.

⚠ **WARNING! It is forbidden to use the machine without wearing safety footwear!**

In addition, the following protective equipment is recommended: Safety helmet.

2.4 Safety switch - Belly button

If the machine is driven backwards and the belly button switch is triggered, the machine will automatically change the direction of travel for a short while. This reduces the risk of getting caught between objects and the machine.

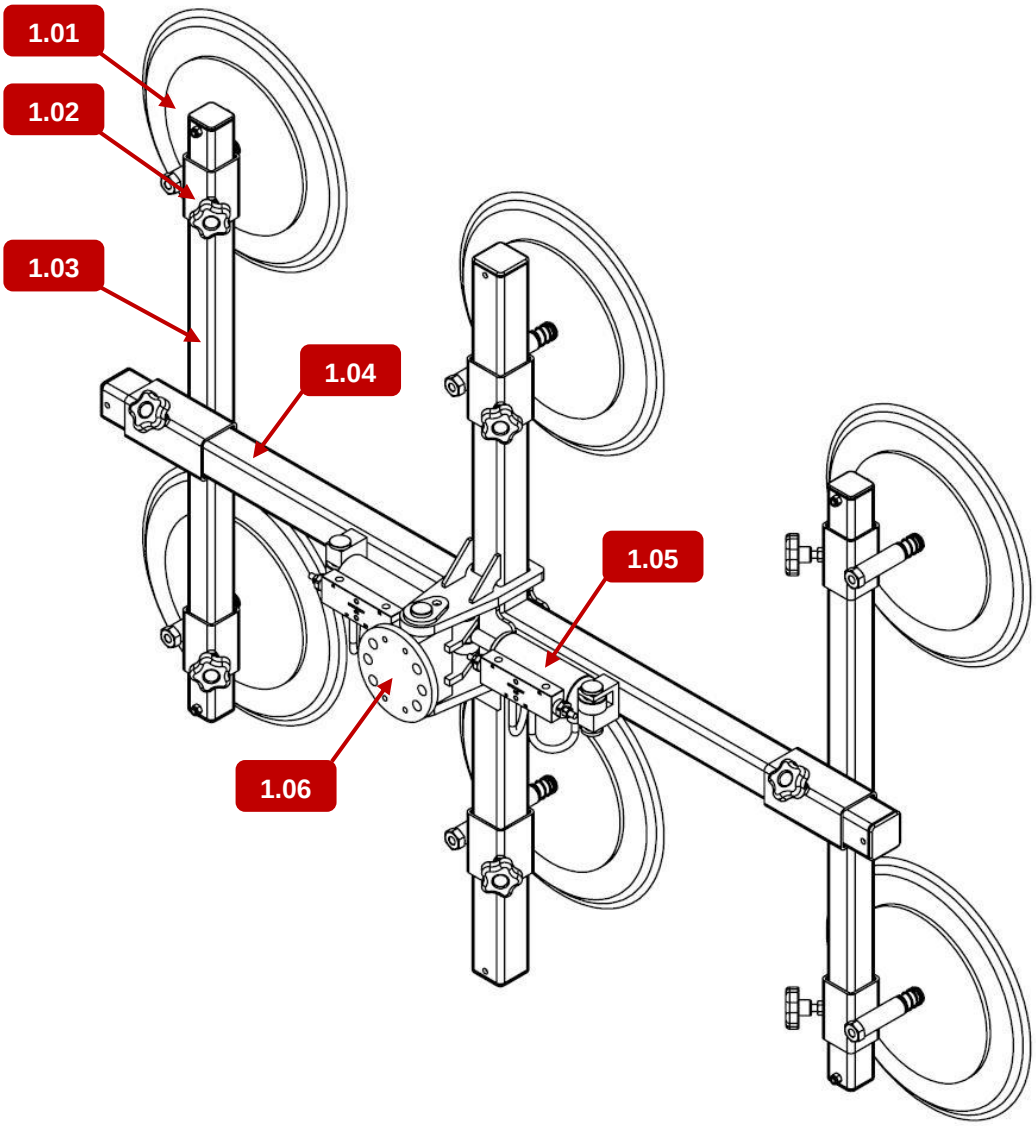


3 Overview and use

3.1 Machine overview

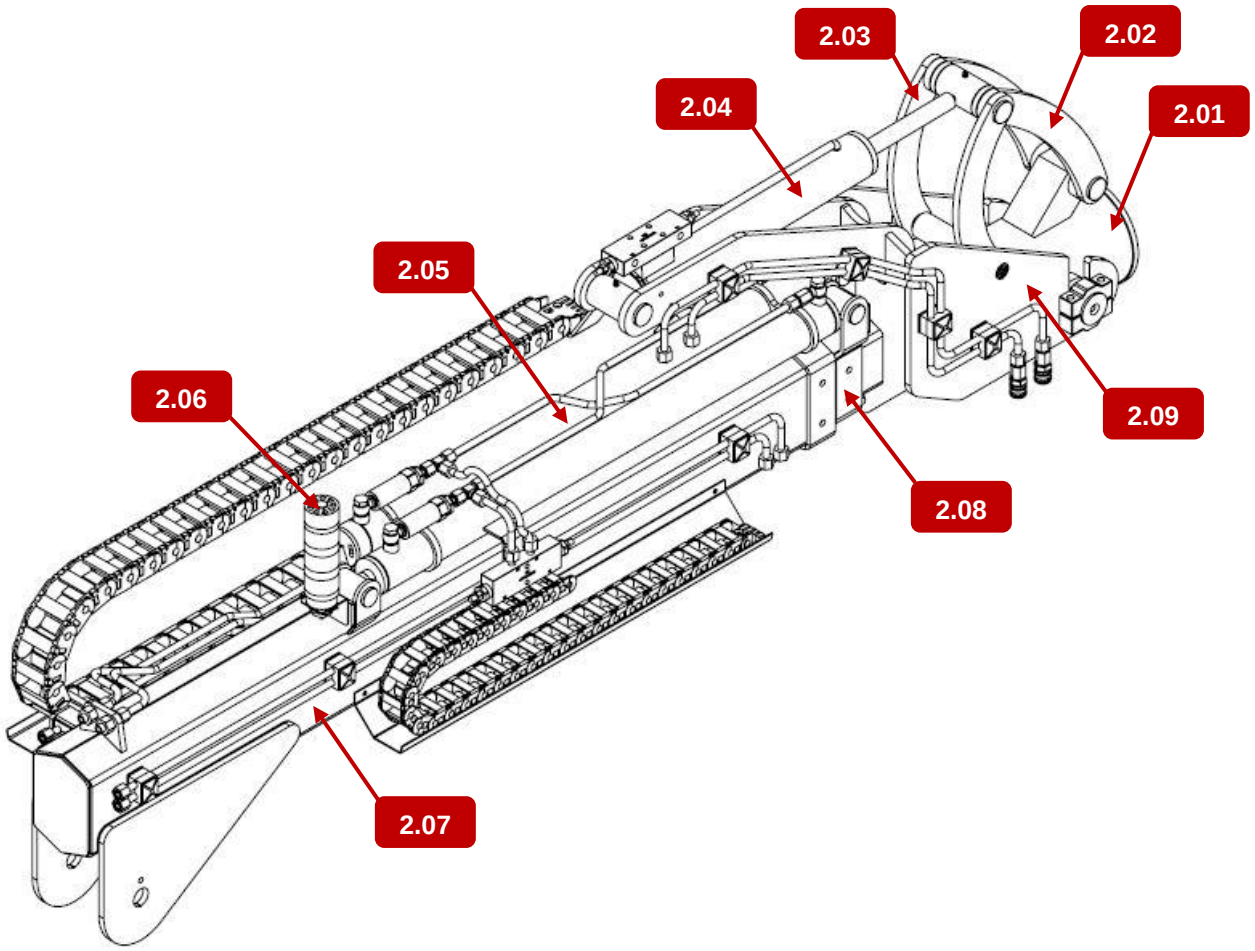
Here is an overview of the components that are mentioned in several places in this manual and which are often referred to in everyday situations.

3.1.1 Vacuum yoke (SL)



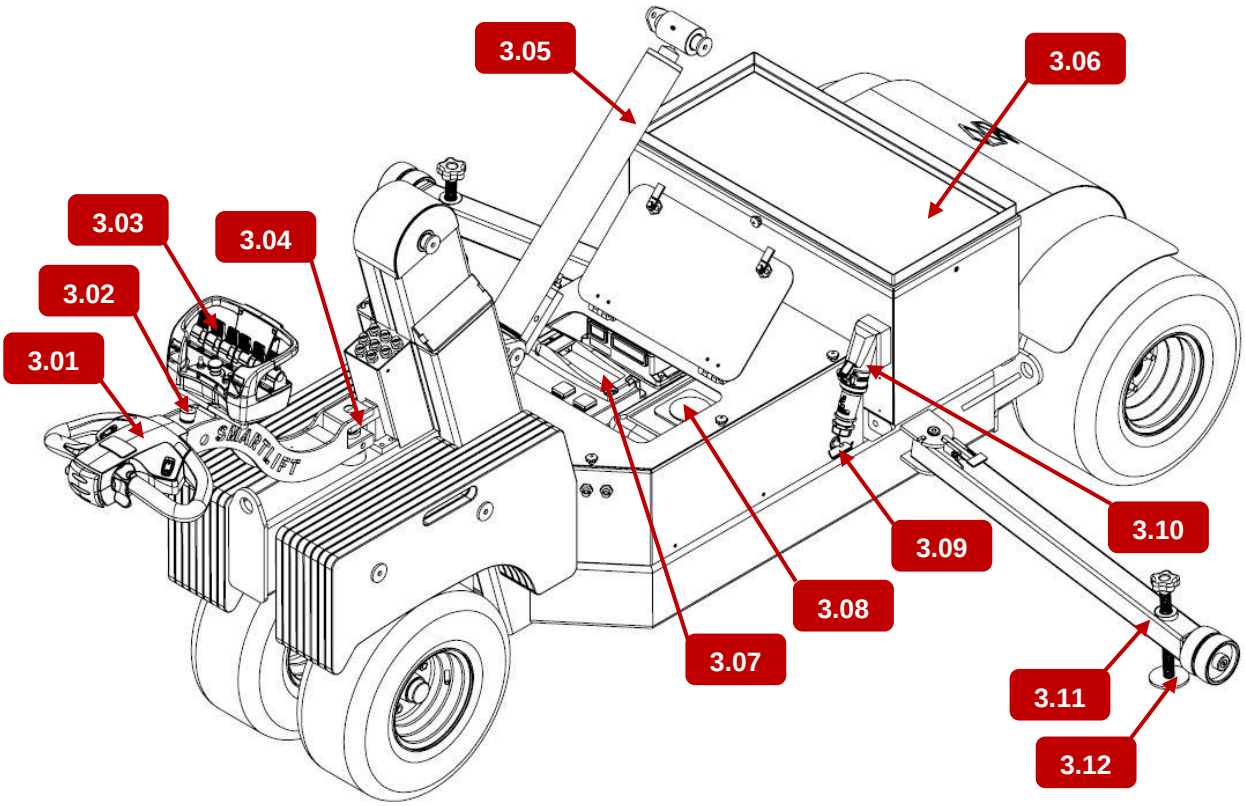
No.	Description	No.	Description	No.	Description
1.01	Suction cup	1.03	Crossbar	1.05	Turning cylinder
1.02	Suction cup holder	1.04	Yoke	1.06	Tilt head

3.1.2 Boom



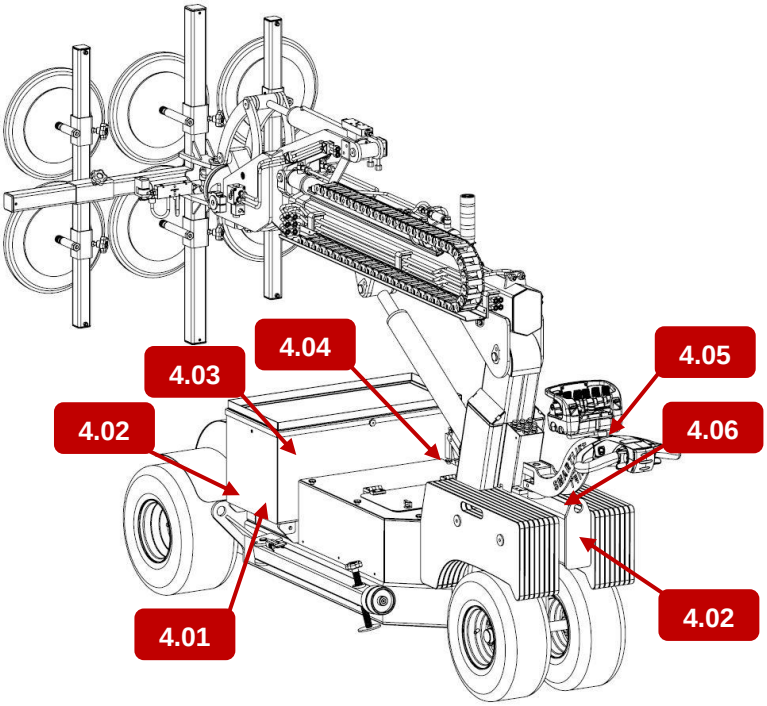
No.	Description	No.	Description	No.	Description
2.01	Rotator	2.04	Tilt cylinder	2.07	Main boom
2.02	Draw bar for rotator	2.05	Dbl. Extension cylinder	2.08	1. Extension boom
2.03	Draw bar	2.06	Tower light	2.09	2. Extension boom

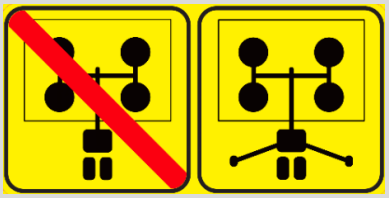
3.1.3 Base machine

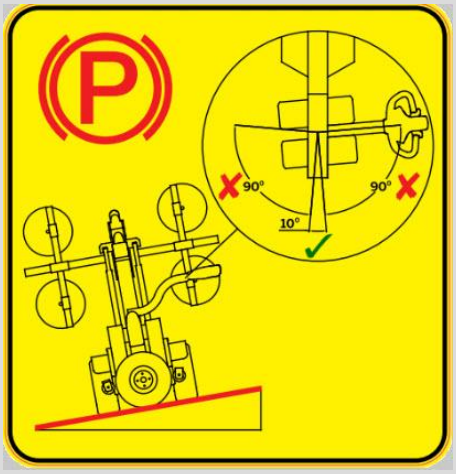


No.	Description	No.	Description	No.	Description
3.01	Control handle	3.05	Lifting cylinder	3.09	Main switch
3.02	Emergency stop	3.06	Battery case	3.10	Charging plug
3.03	Remote control	3.07	Charger - remote control	3.11	Support leg
3.04	Load cell	3.08	Charger - machine	3.12	Plate for support leg

3.2 Label overview



No.	Description	Label
4.01	Do NOT lift under the machine.	
4.02	Lifting and lashing eye.	
4.03	Support legs must be deployed and locked when lifting a load.	
4.04	Turn off when not in use. Charge after use. Minimum 8 hours.	

4.05	Emergency stop	
4.06	Parking on a slope	

ATTENTION! In case of illegible or unclear information and warnings on labels, load charts, etc., these must be replaced by new ones.

New labels can be ordered from Smartlift's customer service department on tel. +45 97 72 29 11 or via email: Customerservice@smartlift.com.

How to replace labels:

- Remove the old label carefully using a plastic scraper.
- Adhesive residues can be removed using alcohol.
- When the alcohol has evaporated, the new label can be applied.
- Increase durability by removing air bubbles under the label. Air bubbles can be removed by gently pushing them to the edges of the label.

3.3 Technical Specifications

Machine model	SL 809	SL 1009	SLI 1009
WLL	800kg 1760lb	1000kg 2200lb	
Self-weight	1510kg 3320lb	1480kg 3260lb	1400kg 3100lb
Total length	3,60m 11,81ft	3,30m 10,85ft	2,95m 9,70ft
Transport length	3,08m 10,17ft	2,85m 9,35ft	2,50m 8,20ft
Height	1,64m 5,38ft	1,50m 4,95ft	
Width	1,02m 3,35ft		
Width of vacuum yoke	1,52m 4,95ft		-
Driving speed, up to	6km/t 3,7mph		
Operating time, up to	10 hours		
Suction cups (diameters of)	6 x 400mm 15,75in		-
Vacuum level	-0,53 bar / -0,62 bar		-
Batteries (4 pcs.)	12V		
Charger	230V / 110V		
Charging time, minimum	8 hours		
Sound level	74 dB (A) 80 dB (C)		72 dB (A) 78 dB (C)
Expected service life	10 years		

3.4 Operating limits

It is the user's responsibility to be alert and vigilant in the environment in which the machine is used. The user must be aware of everything that could impact safety of both machine and people.

3.4.1 Materials (SL)

By default, the machine is equipped with SGF-type suction cups, which are intended for handling flat and smooth objects such as glass, plastic sheets and so on.

⚠ **WARNING! Never use the machine to lift dirty, dusty, wet or greasy items.**

⚠ **WARNING! Never use the machine to lift items that are not airtight.**

3.4.2 Lifting capacity

See the machine's lifting capacity (WLL) in conjunction with its reach in section **9.3 Load charts**.

3.4.3 Wind impact

Wind greatly impacts the stability of the machine, particularly when lifting large items. Therefore, it is important to assess the wind conditions before starting work. The table below can be used as an indicator of the percentage by which the lifting capacity (WLL) is reduced under certain wind conditions.

	Wind load index										
	Area		m²	1	2	3	4	5	6	7	8	9
	Speed		sqft	10,8	21,5	32,3	43,0	53,8	64,6	75,3	86,1	96,8
	m/s	mph										
Slight wind	1	2,2		100	100	100	100	100	100	99	99	99
	2	4,5		100	99	99	99	98	98	98	98	97
	3	6,7		99	99	98	97	97	96	95	94	94
Light wind	4	8,9		99	98	96	95	94	93	91	90	89
	5	11,2		98	96	94	92	90	88	86	85	83
	6	13,4		97	94	92	89	86	83	81	78	75
Brisk wind	7	15,7		96	92	89	85	81	77	74	70	66
	8	17,9		95	90	85	80	75	70	65	60	56
	9	20,1		94	88	81	75	69	63	56	50	44
Strong wind	10	22,4		92	85	77	69	61	54	46	38	31
	11	24,6		91	81	72	63	53	44	35	25	16
	12	26,8		89	78	67	56	44	33	22	11	0

An example using an SL 1009:

At a distance of *1.25 m (4.1 ft)* from the front wheel, an SL 1009 can lift up to *750kg (1650lb)* (see load chart in section **9.3.2**). At a wind speed of *8 m/s (17,9mph)* lifting an item with a surface area of *4 m^2 (43 sq ft),* the wind load index reads as *80%*

This means that the maximum load is reduced to *750 (1650lb)* x 0,8 = *600kg (1320lb)*.

As mentioned, the above table provides an indication of how to take wind impact into account, but it is the user's responsibility to assess the stability of the machine, as turbulence, wind direction, humidity, etc. also influence this.

3.4.4 Temperature and humidity

Permissible temperature range	From -20 C° to 40 C°
Permissible relative humidity (Non-condensing)	From 20 % to 80 %

3.4.5 Lightning

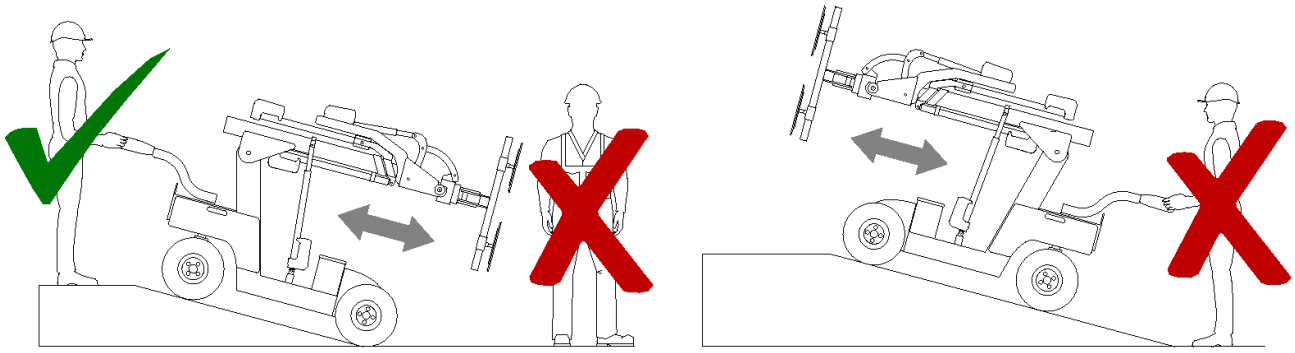
Workspace	Min 200 lux
Repair and maintenance work	Min 500 lux

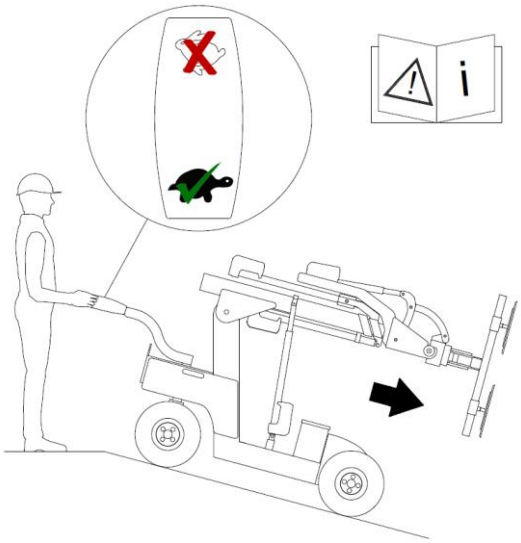
3.4.6 Surface

When using the machine, a solid surface is important. This applies during both the driving and handling of objects. If the surface is soft, it is a great advantage to use ground protection mats.

3.4.7 Slope – Location of the user and other persons

When driving on a slope, the user must be aware of their own and others' positions in relation to the machine.





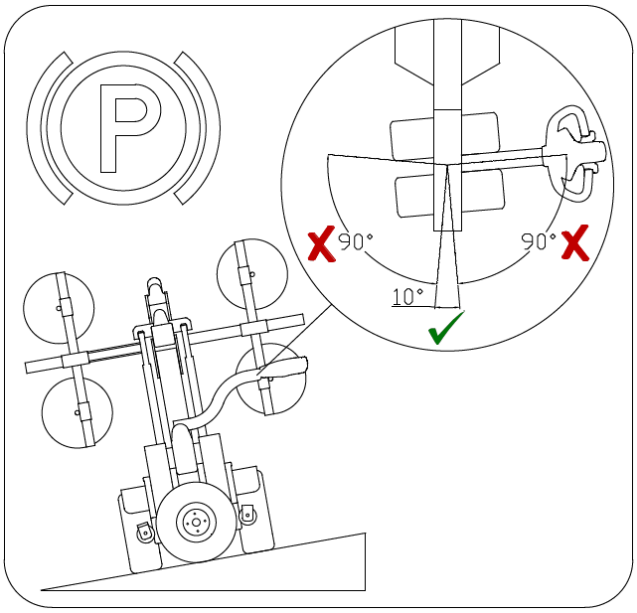
⚠ WARNING!

- **Never stand below the machine when it is moving up or down a slope!**
- **Always drive at low speed and exercise caution when going down a slope!**

3.4.8 Slope – Parking

When parking the machine across a slope, the handlebar must be aligned with the longitudinal direction of the machine ±5°.

⚠ If the handlebar is turned to the sides this could cause the machine to start rolling down the slope!

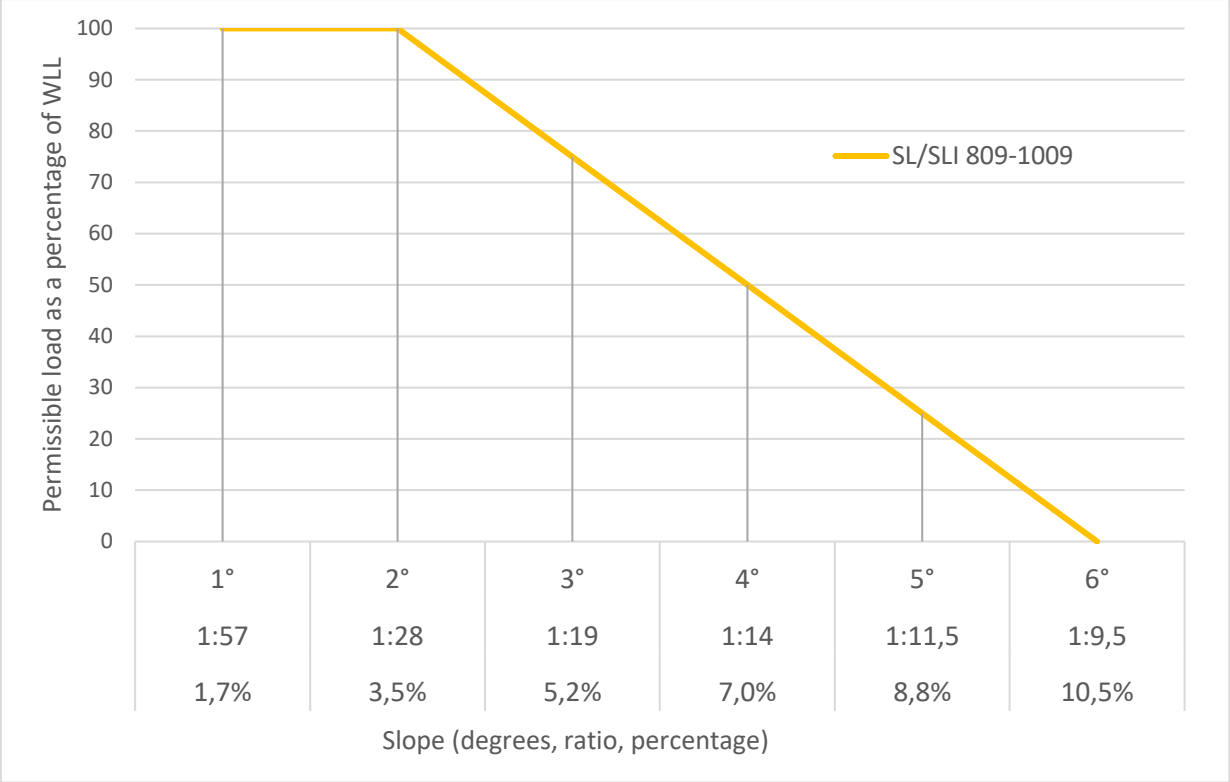


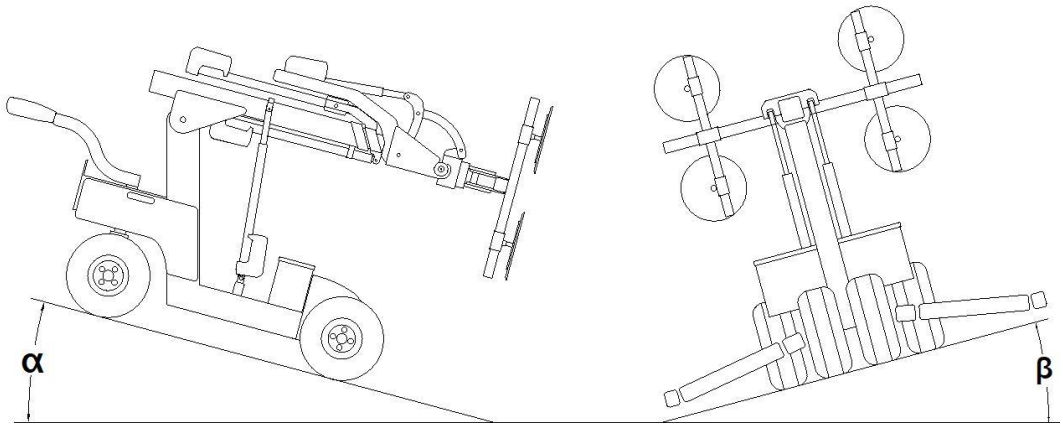
3.4.9 Slope – Driving with and without load

When driving a loaded machine on a slope, always keep the load as close to the ground as possible.

The following chart can be used as a guide to calculate the WLL_{slope}.

⚠ WARNING! The shape and weight of the load, the speed of the machine, and weather conditions all affect the stability of the machine when driving on a slope. Therefore, always assess whether moving it is sensible!





Example of a load situation:

- Machine: SL 1009 with WLL 1000 kg (2200 lb)
- Surface sloping in the α direction: 3° / 1:19 / 5,2%
- Permissible load as a percentage of WLL: 75%

$$WLL_{slope} = WLL_{machine} * Permissible\ load\ as\ percentage$$

$$WLL_{slope} = 1000\ kg\ (2200\ lb) * 0{,}75 = 750\ kg\ (1650\ lb)$$

3.4.10 Slope – Handling a load

⚠ WARNING! When using the machine to handle a load while parked on a slope, be aware of:

- **The increased risk of losing control of the machine and overturning!**
- **The shape and weight of the load, as well as weather conditions, all affect the stability of the machine. Always assess whether moving it is sensible!**

It is forbidden to handle loads on slopes of more than 2° / 1:28 / 3,5%!

- **Maximum α direction slope: 2° / 1:28 / 3,5%**
- **Maximum β direction slope: 2° / 1:28 / 3,5%**

3.4.11 Height above sea level

When working with the machine at heights of more than 1000 m (3280 ft) above sea level, the table below can be used as a guideline.

Height above sea level		Vacuum level
Meters	Feet	Max. possible in height
< 1000 m	< 3280 ft	100 %
1000 m	3280 ft	87 %
2000 m	6560 ft	75 %
3000 m	9840 ft	65 %
4000 m	13120 ft	56 %

Eksempel when working at height:

- Machine: SL 1009 with WLL 1000 kg (2200 lb)
- Height above sea level: 2000 m (6560 ft)
- Max. possible vacuum level at height: 75 %

$$WLL_{height} = WLL_{machine} * Max.possible\ vacuum\ level\ at\ height$$

$$WLL_{height} = 1000\ kg\ (2200\ lb) * 0{,}75 = 750\ kg\ (1650\ lb)$$

4 Operating

This section describes which basic elements it is important to understand in order to maintain a high level of safety when using the machine. This section describes the steps it is necessary to know before, during and after use of the machine.

ATTENTION! The user is always responsible for avoiding irresponsible operating of the machine!

4.1 Before operating

⚠ WARNING!

- **Do not use a knife to remove the packaging materials!**
- **Never use the machine if visible damage or defects have been identified!**

Before operating the machine, it must be inspected for visible damage to the i.a. vacuum hoses, wires, suction cups and the vital parts of the steel structure. In addition, the machine must be inspected for any defects. If any damage or defects are identified, these must be repaired before using the machine.

Before operating the machine, the user must always conduct a thorough assessment of the machine's task, including, as a minimum:

- Operating limits (See section **3.4 Operating limits**)
- Load charts (See section **9.3 Load charts**)
- Battery level

4.2 Operating in general

The following describes a typical procedure for using the machine. For a more detailed description of functions, buttons, etc., see section **4.6 Functional overview**.

1. Turn on the machine at the main switch and wait for the green light.
2. Check the battery level.
3. Activate propulsion on the control handle On/off button.
4. Drive the machine to the object.
   ATTENTION! When driving on terrain, the support legs must be deployed and locked!
5. Centre the machine in front of the object.
6. Turn on the remote control by first deactivating the off button and activating the On button.
7. If necessary, fine-tune the position using the side shift function.
8. Deploy the support legs and adjust the plates to the surface.
9. Adjust the suction cups to fit the object.
   ATTENTION! The distance between the suction cups must be as great as possible!
10. Push the suction cups against the object using the extension function.
    WARNING! Never lift dirty, dusty, greasy or wet objects!
11. Activate the vacuum via the remote control.
    ATTENTION! An alarm signal sound when vacuum is being activated!
12. Lift and transport the object.
    ATTENTION! Transport the object as close to the surface and the machine as possible!
13. Place the item in the desired position and fasten.
14. Deactivate the vacuum via the remote control.
    ATTENTION! An alarm signal sound when vacuum is being deactivated!
    ATTENTION! Wait for the machine's suction cups to release the object!
15. When handling several objects, repeat steps 2 through 14.
16. Turn of the remote control at the off button.
17. Turn the machine off at the main switch.
18. Charge the machine at the end of the working day.

4.3 Tower light

A tower light (red, yellow and green) with a built-in acoustic alarm is mounted on the machine, which gives signals about the status of the machine. The table describes the signals:

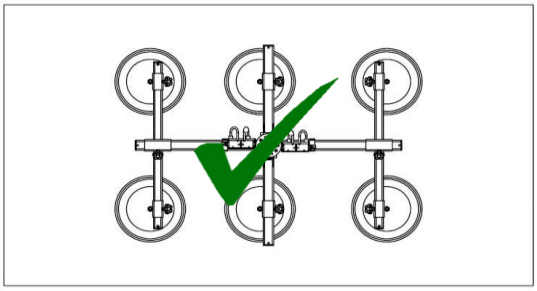
Tower light signals	
Signal	**Information**
Green - constant	The machine is in standby mode, no functions are used.
Green - flashing	The machine is in motion, functions are activated by the operator.
Yellow - constant	Warning / information about machine error.
Yellow - flashing	The machine is loaded with 90-99% of maximum capacity.
Red - constant with acoustic alarm	Serious machine error.
Red - flashing with acoustic alarm	The machine is loaded with 100% of maximum capacity.

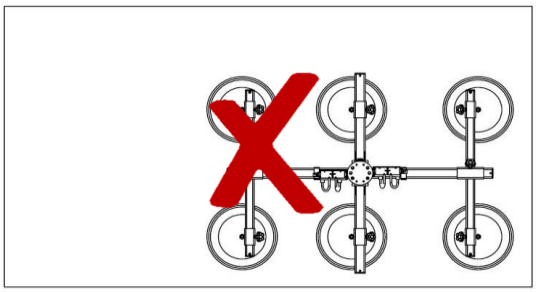
4.4 Operating functions

This section visualises where hazardous situations may occur when using the machines.

4.4.1 General:

- **ATTENTION! Before activating hydraulics for lifting, extending, tilting, turning and rotating, pay attention to the following:**
  - The vacuum yoke or load can hit the machine or the surface.
  - The vacuum hoses can get pinched or stretched.
- **ATTENTION! Before suction is applied to the load:**
  - The support legs must be deployed and locked.
  - Plates on support legs are adjusted to the surface. Distance to the surface between 15mm (0,6in) and 30mm (1,2in).
  - The star knobs on suction cup holders and crossbars must be tightened.
  - The vacuum yoke must be centred relative to the load's centre of gravity.





WARNING! If the yoke is not centred relative to the load's centre of gravity, there is a risk that the load will be pulled off the suction cups and the machine will tip over.

- **ATTENTION! Before the load is lifted:**
  - The machine must be level.
  - The positioning bolt for the vacuum must be engaged.
  - The vacuum pumps must stop, signifying sufficient vacuum.

4.5 After operating

4.5.1 Machine batteries

In order to ensure optimum preservation of battery capacity, use the following charging pattern.

- Connect the charger for at least 8 consecutive hours before using the machine.
- Connect the charger permanently when storing the machine. This maintains the batteries at a constant rate.

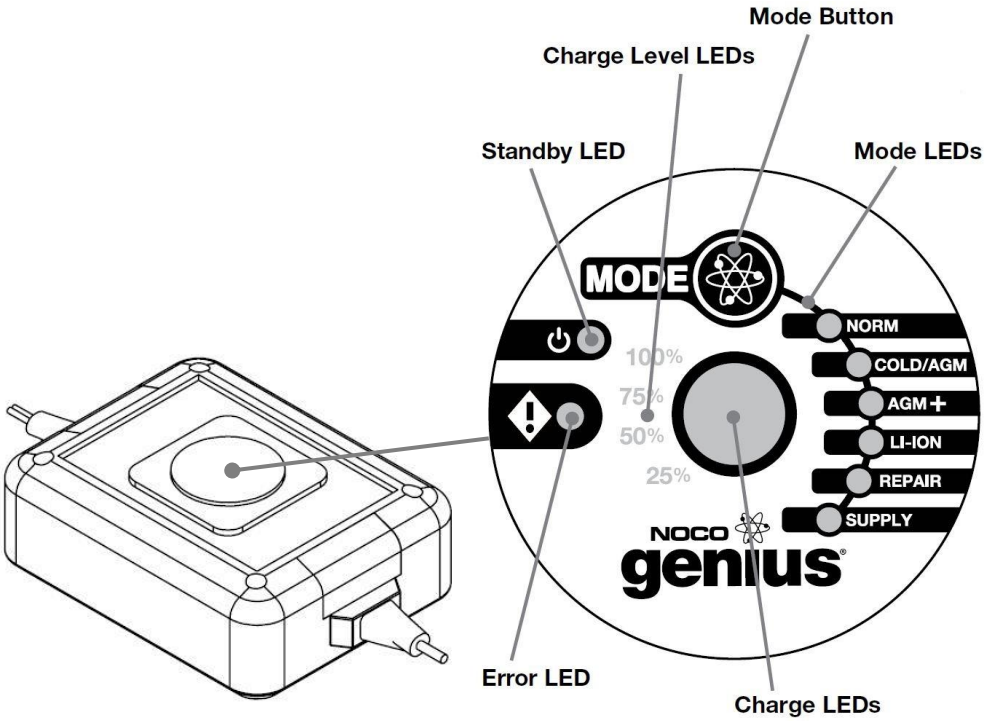
ATTENTION!

- **Charging must take place somewhere with good ventilation!**
- **Charging can never take place in a location where there are sparks, flames or smoking!**
- **The machine must be switched off at the main switch before charging!**
- **If the charger is connected for a period of time which is shorter than recommended, over time, the battery capacity will be reduced permanently!**
- **If the machine is stored for a long period of time without the charger being connected to a power supply, the battery capacity will be reduced permanently!**
- **The machine must be charged before the voltage on the batteries falls below 22V (while operating), otherwise the batteries will be permanently damaged!**
- **The machine cannot be used and charged at the same time. After disconnecting the charging plug, it can take up to 30 seconds before the machine can be used.**

4.5.1.1 Machine charger

See location on the charger in section **4.6.1 Power**.

ATTENTION! The charging "Mode" must be set to COLD/AGM!



Charge Level LEDs and Charge LEDs	
Charge Level LEDs	**Charge LEDs**
25% Charge Level LED illuminates when the battery is between 0% og 25% charged.	RED LEDs “spin” indicating that the batteries are charging.
50% Charge Level LED illuminates when the battery is between 25% og 50% charged.	
75% Charge Level LED illuminates when the battery is between 50% og 75% charged.	
100% Charge Level LED illuminates when the battery is between 75% og 100% charged.	GREEN LED illuminates indicating that the battery is fully charged.

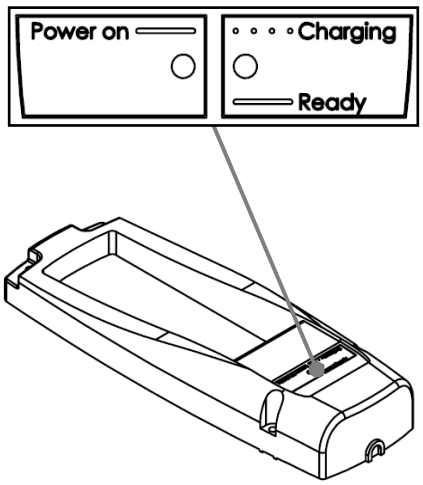
Error LED and Standby LED		
LEDs	**Cause**	**Solution**
Standby LED: 1 ORANGE flash Error LED: Illuminates RED	The battery will not hold charge.	Contact your nearest dealer or Smartlift Customer Service at tel. +45 97 72 29 11 or email: customerservice@smartlift.com.
Standby LED: 2 ORANGE flashes Error LED: Illuminates RED	The battery might be short-circuited.	Contact your nearest dealer or Smartlift Customer Service at tel. +45 97 72 29 11 or email: customerservice@smartlift.com.
Standby LED: 3 ORANGE flashes Error LED: Illuminates RED	The battery voltage is too high for the selected “Mode”.	Change “Mode” to ”COLD/AGM”.
Standby LED: 4 ORANGE flashes Error LED: Illuminates RED	Abnormal AC grid power: VAC<85V or >250V. Frequency: <45 or >65Hz	
Error LED: Illuminates RED	Reversed polarity.	Contact your nearest dealer or Smartlift Customer Service at tel. +45 97 72 29 11 or email: customerservice@smartlift.com.
Standby LED: Illuminates ORANGE	The battery voltage is too low for the charger to detect.	Check that “Mode” is set to “COLD/AGM”. Change “Mode” to “Supply Mode” for maximum 15-20 minutes. The switch back to ”COLD/AGM” again. Contact your nearest dealer or Smartlift Customer Service at tel. +45 97 72 29 11 or email: customerservice@smartlift.com.

4.5.2 Remote control batteries

In order to ensure optimum preservation of battery capacity, use the following charging pattern:

- Always keep the extra battery in the charger. See location on the charger in section **4.6.1 Power**.
    - The Charging cycle is approx. 3 hours.
- Place one battery in the remote control.
- Replace the batteries if necessary and at the end of the workday.

4.5.2.1 Remote control charger

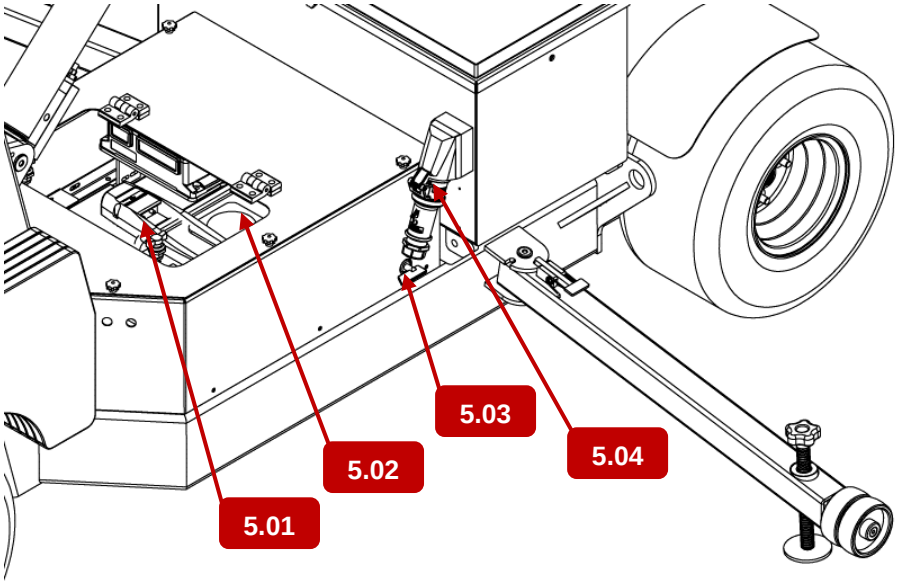


Power LED and Charging LED	
LED	**Decription**
Power LED: Illuminates RED	The charger is connected
Charging LED: Flashing GREEN	Charging battery
Charging LED: Illuminates GREEN	Fully charged / Storage-mode

4.6 Functional overview

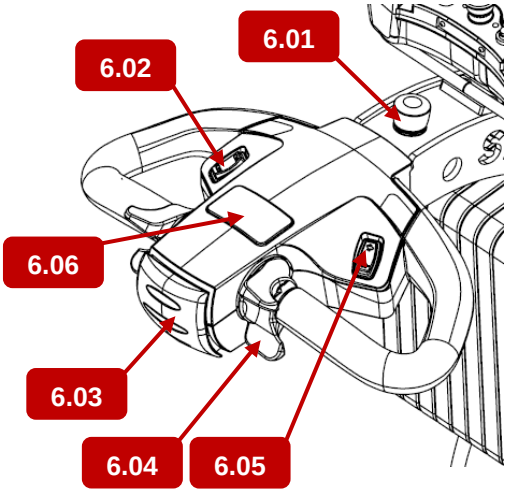
4.6.1 Power

No.	Decription	Function
5.01	Charger - Remote control	Charges the batteries of the remote control
5.02	Charger - Machine	Charges the batteries of the machine
5.03	Main switch	Disables all functions (including vacuum)
5.04	Charging plug	Connecting the mains socket for charging

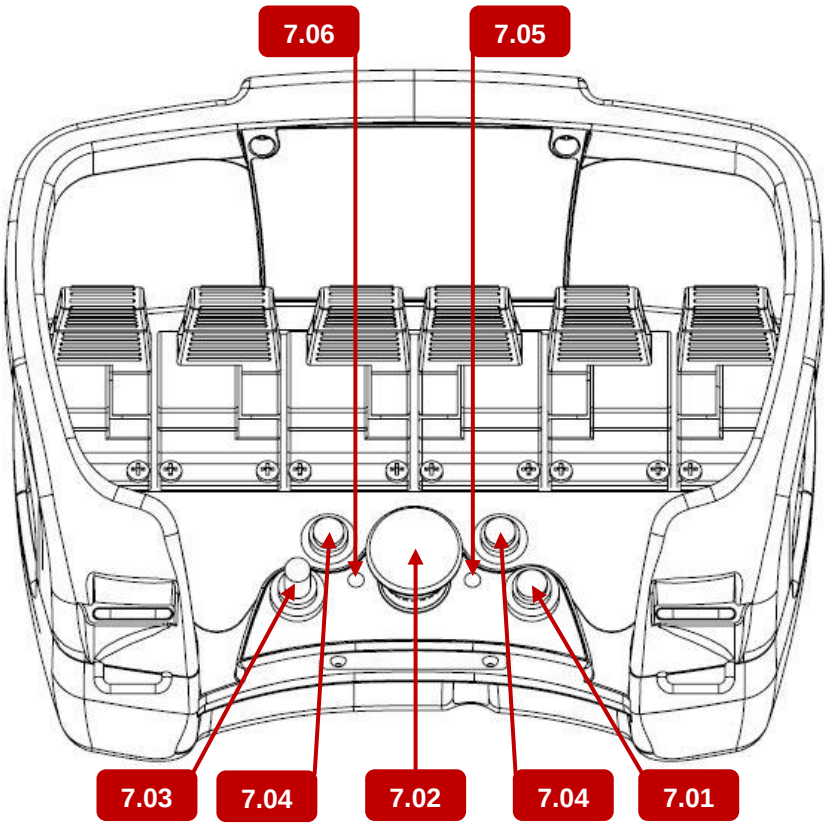


4.6.2 Control handle

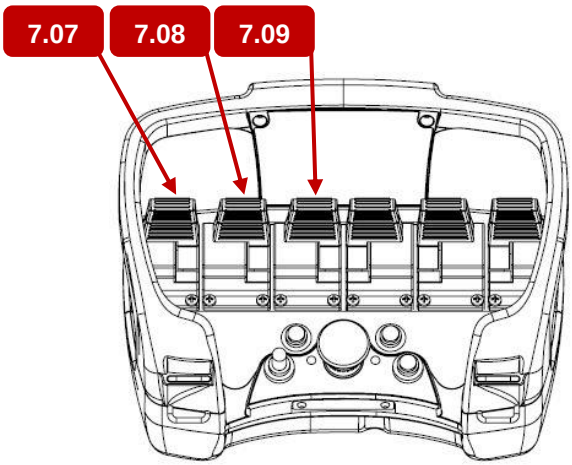
No.	Decription	Function
6.01	Emergency stop	Disables all function except vacuum
6.02	On/off button for propulsion	On: Propulsion can be activated Off: Propulsion is interrupted
6.03	Safety switch	”Belly button” Ensures that the risk of being squeezed between the machin and an object is minimized.
6.04	Speed and direction regulator	Used for regulating travel speed from 0 to max
6.05	High/low travel speed	High: High max Speed Low: Low max Speed
6.06	Horn switch	Signals when activated



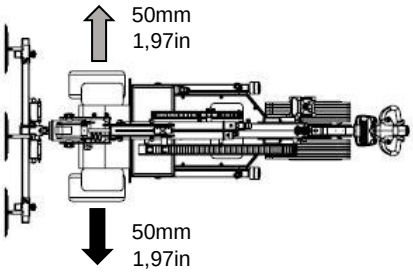
4.6.3 Remote control



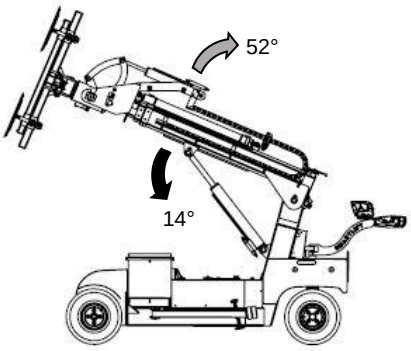
No.	Decription	Function
7.01	On / Reset	Turns on the remote control. Reset by holding down the button for approx. 5 sec.
7.02	Off	Disables all hydraulic functions.
7.03	Speed limiter Hydraulic functions	Left: Low mawimum speed. Right: High mawimum speed.
7.04	On / Off Vacuum	Activating the vacuum: Push one of the buttons until the audio signal sounds. Deactivating the vacuum: Push and hold down both buttons until the audio signal stops.
7.05	LED	Illuminates RED when the remote control is turned on.
7.06	LED	Illuminates RED if there is no connection to the machine. Flashes GREEN if Low speed is activated.



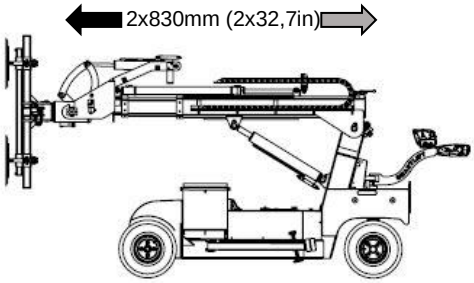
No.	Decription	Function
7.07	Sideshift	Forward: The machine shifts to the right Backward: The machine shifts to the left

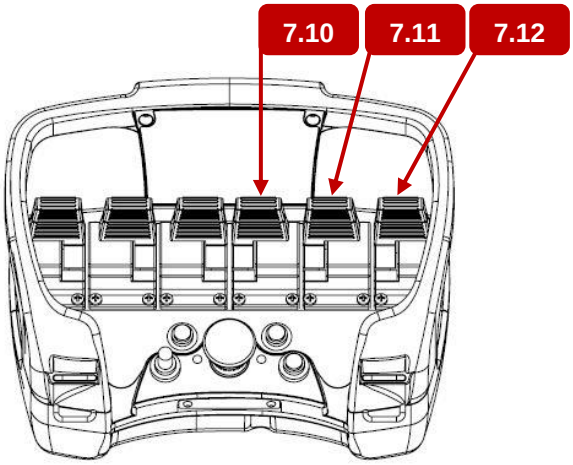


No.	Decription	Function
7.08	Raise / lower	Forward: The boom is lowered Backward: The boom is raised

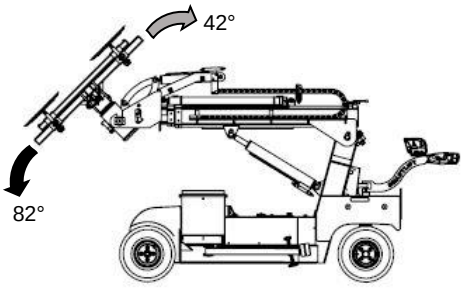


No.	Decription	Function
7.09	Extend / retract	Forward: The boom is extended Backward: The boom retracted

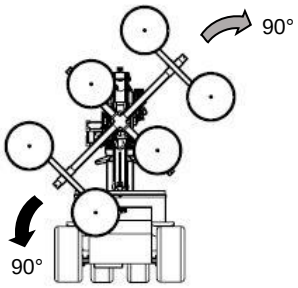




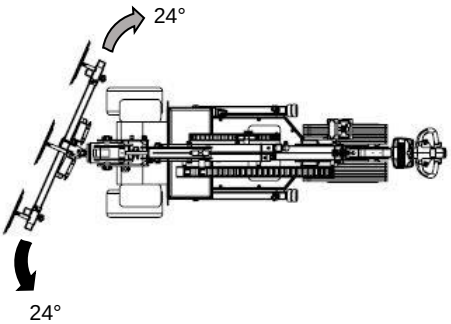
No.	Decription	Function
7.10	Tilt	Forward: The vacuum yoke is tilted forward. Backward: The vacuum yoke is telted backwards.



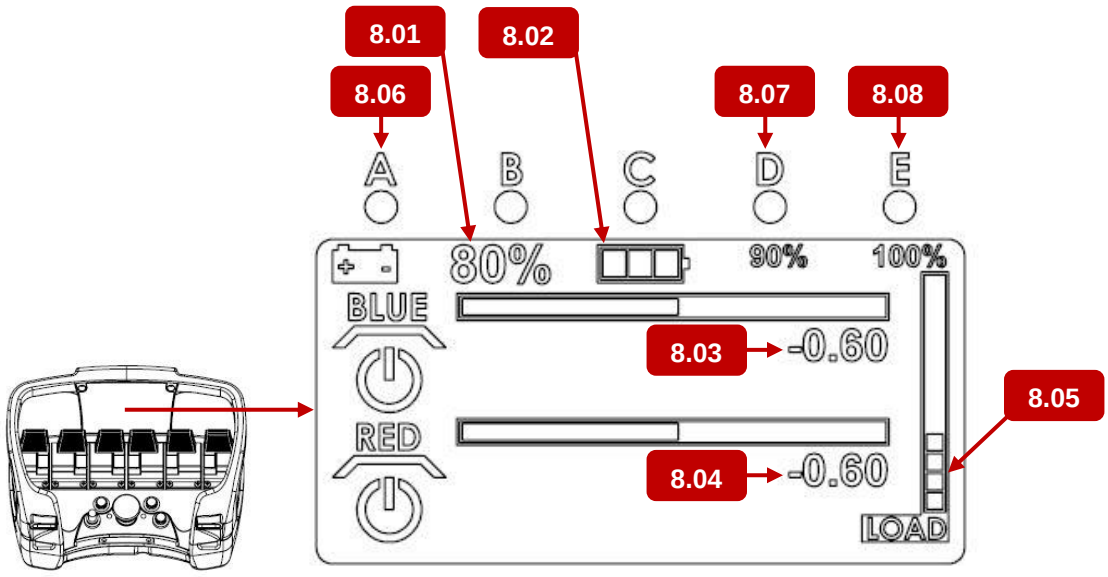
No.	Decription	Function
7.11	Rotation	Forward: The vacuum yoke is rotated clockwise. Backward: The vacuum yoke is rotated counterclockwise.



No.	Decription	Function
7.12	Turning	Forward: The vacuum yoke turns to the right Backward: The vaccum yoke turns to the left



4.6.4 Display remote control



No.	Decription	Function
8.01	Battery indicator - machine	Indicates the machine's battery level in percent
8.02	Battery indicator - remote control	Indicates the battery level of the remote control
8.03	Vacuum level	Indicate the vacuum level in the BLUE vacuum circuit (Bar).
8.04	Vacuum level	Indicate the vacuum level in the RED vacuum circuit (Bar).
8.05	Load level	Indicates what percentage of the machine’s lifting capacity is used.
8.06	GREEN LED (A)	Illuminates when the machine and the remotecontrol is powered.
8.07	YELLOW LED (D)	Illuminates when the machine is loaded with 90-99% of the lifting capacity.
8.08	RED LED (E)	Illuminates when the machine is loaded with 100% of the lifting capacity.

5 Storage, transport, handling and lifting

5.1 Storage

If the machine needs to be stored, storage must be done under the following conditions in order to preserve the machine's condition and functional capacity:

- Indoor
- Dry
- With good ventilation

ATTENTION!

- **Water, moisture and dust can affect the machine's functionality and reduce the service life of suction cups and the vacuum system!**
- **Drought, sunlight and temperatures below 0°C (32°F) or above 25°C (77°F) may reduce the service life of the suction cups and the batteries!**

How to store:

- Turn off the main switch.
- Connect the charger so that the batteries are constantly charged and maintained. See section **4.6.1 Power**.

5.2 Transport

When transporting the machine, it is recommended that a van, machine trailer, flatbed truck or similar with sufficient load capacity is used. Find the weight of the machine in section **3.3 Technical Specifications**. See location of lifting and lashing eyes in section **3.2 Label overview**

A method for secure fastening of the machine:

- Turn off the main switch.
- Strap the machine in place using the lashing eyes.
- Protect the machine's suction cups from rain, moisture and dust. Protective caps can be purchased in addition.

5.3 Handling and lifting

When handling and lifting the machine, use approved lifting equipment in the form of a crane or hoist with sufficient load capacity. In addition, approved lifting equipment must be used in the form of round slings, chains etc. with sufficient load capacity. Find the weight of the machine in section **3.3 Technical Specifications**. See location of lifting and lashing eyes in section **3.2 Label overview**.

Procedure for handling and lifting the machine:

- Turn off the main switch.
- Lift the machine in the designated hoisting eyes.

6 Maintenance and troubleshooting

6.1 Overview of service, maintenance and lubrication intervals

No.	Annually ⇩	Monthly interval ⇩	Daily	In addition to the dates listed, some components are subjected to ongoing wear and must therefore be replaced if necessary.	
1.0				**Machine log and labelling**	
1.1	X	12	X	The user manual is accessible and easy to understand.	Receipt of new user manual. State machine type and serial number when ordering.
1.2	X	12		Labels on the machine. Check that all labels are visible and intact.	Defective labels must be replaced if necessary. Load chart, WLL, attention/warning stickers.
2.0				**Battery and charger**	
2.1	X	12	X	Battery	Check the capacity of the batteries (minimum 24V on fully charged batteries).
	X	12		Battery	Battery indicator. Replace the batteries if the voltmeter reads less than 24 volts when the batteries are fully charged. The terminals must be lubricated (A).
2.2	X	12		Charger	Check the charging function: output must be 28 volts when charging.
3.0				**Vacuum System (SL)**	
3.1	X	12	X	The alarm function must be checked for each lift.	The red light and the acoustic alarm must be active when one or both vacuum levels are outside the limit values. See vacuum level in section **3.3 Technical Specifications**.
3.2	X	12		Vacuum control	Check red/green LEDs (does not apply to SL/SLI 208/1009) Display and protective glass are intact. Replace defective parts (only applies to SL 208 and 1009)
3.3	X	12	X	Vacuum pumps	Check vacuum level. See vacuum level in section **3.3 Technical Specifications.** If the pressure drops, check and remedy. Replace defective pumps.
3.4	X	12	X	Vacuum valves	Check the opening and closing function for the slider valves.
3.5	X	12		Vacuum filters	Remove and clean. Replace if necessary.
3.6	X	3		Vacuum system test	Check vacuum on a *test plate. Switch off the main switch and controller if the test plate remains stuck for a minimum of 10 min. If the test plate falls off, find the problem and remedy it.
3.7	X	12		Test vacuum sequences	The pumps start. See vacuum level in section **3.3 Technical Specifications.** The pumps stop. See vacuum level in section **3.3 Technical Specifications.**
3.8	X	12		Vacuum hoses	Check and replace if damaged.
3.9	X	12	X	Suction cups	Check for damage and replace if necessary.
3.10	X	12		Couplings	Clean and lubricate (A). Check for leaks. Tighten if necessary and replace if damaged.

4.0				**Actuator** (Does not apply to SL/SLI 1009)	
4.1	X	12		Check for suspicious sounds and full movement in all directions; lifting, extension, side shift, tilt and rotation.	Defective actuators must be replaced.
4.2	X	1		Reset lifting actuator	Move the lifting actuators all the way down. Press up and down simultaneously for 10 to 15 seconds. Restart
4.3	X	12		Cables, cable routes, connectors and connections.	Check all cables for breakage and fastening. Check all connectors and connections for poor connection and proper attachment.
5.0				**Mechanical equipment**	
5.1	X	12		Base machine	Visual inspection. Welds, damage or excessive wear on parts must be repaired or replaced.
5.2	X	12		Side shift	Visual inspection. Welds, damage or excessive wear on parts must be repaired or replaced.
5.3	X	12		Arm	Visual inspection. Welds, damage or excessive wear on parts must be repaired or replaced. Adjust the liner for the extension arm.
5.4	X	12		Yoke (SL)	Visual inspection. Welds, damage or excessive wear on parts must be repaired or replaced. Lubricate moving parts. (B)
5.5	X	12		Bearings and shafts	All moving parts must be checked for wear and clearance. Defective bearings must be replaced. Lubricate all shafts and grease nipples. (B)
5.6	X	6		Tighten all bolts according to the manual.	Make sure the bolts and screws are secured with Loctite. Bolts on the actuators cannot be retightened.
5.7	X	12	5	Main yoke (SL)	Visual inspection. Check the hand screw function. Checks: Nuts, washers and ring pins. It must be possible to remove and reinstall the yoke easily. Attach the yoke – rotatable. Add end sections and a stop screw if necessary. Damaged parts must be replaced. Lubricate all moving parts (B)
5.8	X	12	5	Traverser (SL)	Visual inspection. Check the hand screw function. Add end sections and a stop screw if necessary. Damaged parts must be replaced. Lubricate moving parts (B)
5.9	X	12	5	Holder for suction cups (SL)	Visual inspection. Check the hand screw function. Damaged parts must be replaced. Lubricate moving parts (B)
6.0				**Electronics and safety equipment**	
6.1	X	1		Main switch	Check the on/off function.
6.2	X	1		Emergency stop contact	Check the functionality. Repair or replace if necessary.
6.3	X	12		Remote control • ON/OFF switch	Check all functions.

				• Emergency stop switch • Function switches	Remedy if this does not work or is damaged, and repair or replace if necessary.
6.4	X	3		Function check of overload	Use a load to trigger an overload by moving the extension out. When the overload is triggered, all lifting except extension must be deactivated. Retract the load until the overload switch disconnects, and all functions should be functional again. Repair or replace if necessary.
7.0				**Propulsion system**	
7.1	X	12		Function test of the propulsion system	Test the throttle in both directions. Test on/off function on the steering gear Test slow/turtle and fast/hare Function test of belly button.
7.2	X	12	X	Check the brake system.	With the machine moving at full speed, release the throttle. The machine must stop completely within 2 metres. This must be done in both directions and at both speeds (turtle/hare).
7.3	X	12	X	Check the parking brake	When the machine is stationary, the parking brake must be applied. Test this by pushing and pulling on the machine. It should not be possible to move the machine manually.
	X	12		Check the mechanical brake	Check the function of the mechanical brake. Test on 8 degree slope.
8.0				**Hydraulics (only applies to SL/SLI 1009)**	
8.1	X	12		Check the oil level	The correct oil level is 4 cm below the filling opening, with all cylinders fully retracted.
8.2	X	12		Replace pressure filter	Replace pressure filter.
8.3	X	12		Check all hoses and connection for cracks and leaks.	Check all hoses and replace if necessary.
8.4	X			Check the pressure	The system should deliver 185 bar (2700 PSI) and then bypass to the tank.
8.5	X	12	X	Function test of all hydraulic functions.	Test all hydraulic functions in full motion and look for leaks and unusual movements.
9.0				**External and additional equipment for the machine**	
9.1		12		Battery charger for remote control	Visual inspection. Make sure the device is present and intact.
9.2		12		Extra battery for remote control.	Visual inspection. Make sure the device is present and intact.
9.3		12		Communication cable for remote control	Visual inspection. Make sure the device is present and intact.
9.4		12		Shoulder strap for remote control	Visual inspection. Make sure the device is present and intact.
10.0				**Static test load**	
10.1	X	12		Test with load Follow the load diagram according to the label/manual.	

The test plate is a plate which is big enough to allow all suction cups to be on the plate at the same time (approx. 1,5x1,5m). The plate must be airtight and can be made of plastic, steel, etc.

Lubrication schedule:

A = Silicone grease, Kema SC4 or equivalent
B = Calcium sulfonate grease
Bearings are made with Teflon surfaces or oil-rubbed bronze. Lubrication is intended for smaller moving parts.

6.2 Functional inspection

6.2.1 Vacuum system

A method for inspecting the vacuum system for leakages, referred to as a leakage inspection in this document.

ATTENTION!

- Suction cups should be inspected daily! See section **6.1 Overview of service, maintenance and lubrication intervals!**
- Vacuum hoses should be inspected monthly or quarterly, as needed!
- Leakage inspection of the vacuum system must be done according to section **6.1 Overview of service, maintenance and lubrication intervals!**
  1. Turn on the machine using the main switch.
  2. Check the battery level.
  3. Adjust the suction cups to fit the test object.
     WARNING! Never use a dirty, dusty, greasy or wet object!
     WARNING! Never use an object that is not airtight!
     WARNING! There is a risk that the machine will release the object in connection with the leakage inspection!
     ATTENTION! The object must be an airtight sheet, e.g. one of plastic, steel, glass or the like!
  4. Push the suction cups against the object using the extension function.
  5. Activate vacuum.
     ATTENTION! An alarm signal sounds until sufficient vacuum has been achieved!
  6. Monitor the machine's vacuum pumps for at least 10 minutes.
     WARNING! If the vacuum pump starts before 10 minutes have passed, the machine cannot be used! See section **6.4 Troubleshooting**.
  7. Disable vacuum.
     ATTENTION! Wait for the machine's suction cups to release the object!
  8. Turn the machine off at the main switch.

6.2.2 Safety functions

Procedure for inspecting security functions.

ATTENTION!

- **Security features must be inspected according to section 6.1 Overview of service, maintenance and lubrication intervals!**
- **Security features must always be available and functional!**
- **If an inspection of the security features cannot be completed and approved, the machine cannot be used until repairs have been completed and a new inspection has been carried out!**
- **Always inspect security features in an open space where there are no obstacles!**

- **Main switch**
  - Turn off the main switch.
  - Checks: All moving functions should now be inoperational.

- Activate the main switch.
- Checks: All moving functions should be operational again.

- **Emergency stop**
  - Activate the emergency stop by pushing the mushroom emergency stop button manually.
  - Checks: All moving functions should now be inoperational. Vacuum functions are not affected by emergency stop.
  - Deactivate the emergency stop by rotating the button.
  - Checks: All moving functions should be operational again.
- **Off – Remote control**
  - Activate off by manually pushing the mushroom button.
  - Checks: All remote-controlled functions should now be inoperational.
  - Deactivate the emergency stop by rotating the button.
  - Checks: All remote-controlled functions should be operational again.
- **Safety switch – Belly button**
  - Activate low driving speed
  - Activate the speed and direction regulator to put the machine in reverse.
  - Activate the belly button by pushing it manually.
  - Checks: The travel direction must be briefly changed, following which propulsion is interrupted.
  - Deactivate the speed and direction regulator and then repeat the procedure at a high driving speed.
- **Parking brake**
  - Turn off the main switch.
  - Checks: It must not be possible to push or roll the machine.
  - Turn on the main switch.
  - Checks: It must not be possible to push or roll the machine.
- **Support legs**
  - Checks: It must be possible to put the support leg in either position.
  - Checks: Locks for the support leg must be functional in both positions.
- **Load limit system – Method 1**
  - Lift the rear of the machine so that the rear wheels hover freely above the ground and the load limit switch is interrupted. It is recommended that the lashing eye at the rear of the machine is used to do this. Regarding requirements for lifting equipment see section **5.3 Handling and lifting**.
    - Tower light: Acoustic alarm and yellow light flashing indicates that the machine is loaded with 90-99% of the lifting capacity.
    - Tower light: Acoustic alarm and red light flashing indicates that the machine is loaded with 100% of the lifting capacity.
  - Checks: The following features must now be inoperational:
    - Side shift
    - Raise / lower
    - Extending
    - Rotation
    - Turning
    - Tilt
  - Lower the machine again and dismantle the lifting equipment.
  - Checks: All functions must be operational again.
- **Load limit system – Method 2**
  - Read the load chart on the machine to see what the lifting capacity is at fully extended position. See Load chart in section **9.3.2 SL 1009**.
  - For example, at fully extended position, the lifting capacity of SL 1009 will be 280 kg / 620 lb.

- Then lift a load which exceeds this, and extend this forward until the load limit system interrupts the functions.
  - Tower light: Acoustic alarm and yellow light flashing indicates that the machine is loaded with 90-99% of the lifting capacity.
  - Tower light: Acoustic alarm and red light flashing indicates that the machine is loaded with 100% of the lifting capacity.
- Checks: The following features must now be inoperational:
  - Side shift
  - Raise / lower
  - Extension
  - Rotation
  - Turning
  - Tilt
- Retract the load and unload the machine.
- Checks: All functions must be operational again.

6.3 Cleaning the machine

- Clean the machine with running water, soap and a soft brush.

  ATTENTION! Do not use a pressure washer to clean the machine.

  ATTENTION! Never direct the jet of water at the engine!
- Clean the control handle using a cloth with soap and water.

  ATTENTION! Never direct the jet of water at the control handle!
- Clean the suction cups with ethanol.
- Alternatively, the suction cups can be cleaned with hot water, soap and a soft brush.
  - Always rinse with clean water.
  - Let the suction cups dry at room temperature.

  ATTENTION!
  - **Never direct the jet of water at the suction cups!**
  - **Always make sure that water does not enter the vacuum system.**

  ATTENTION! Never use the following products to clean the suction cups:
  - **Pure glycerine.**
  - **The solvents trichlorethylene, carbon tetrachloride or hydrocarbons.**
  - **Vinegar-based cleaners.**
  - **Sharp objects, metal brushes, sandpaper etc.**

6.4 Troubleshooting

ATTENTION! In case of unexpected failure or malfunctioning of the machine, the machine must be stopped immediately, and the fault must be reported to Smartlift customer service immediately via tel. +45 97 72 29 11 or via email customerservice@smartlift.com.

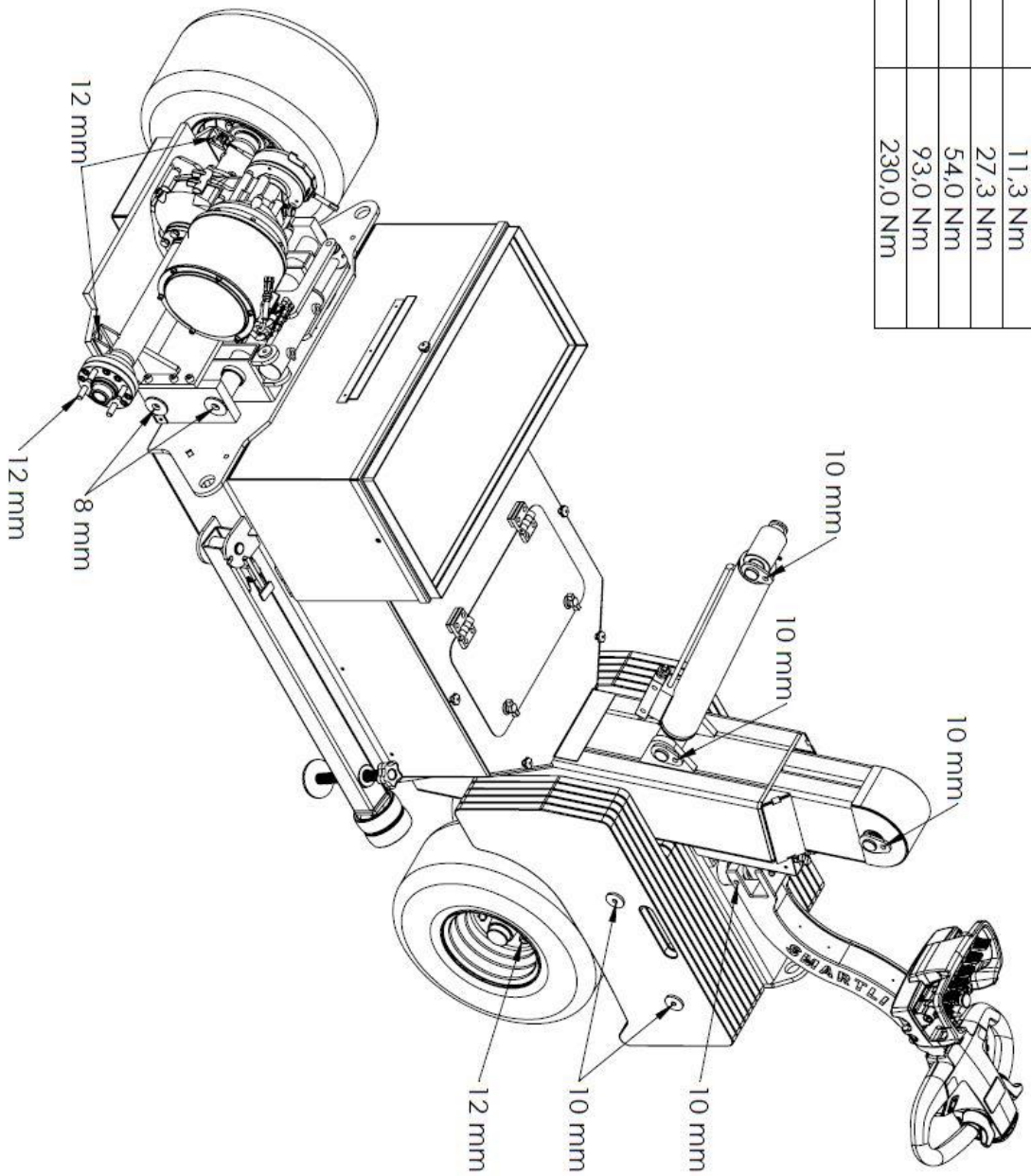
No.	Problem	Cause	Solution
1.	No response to: • Propulsion • Hydraulic functions • Vacuum system	• The power has been interrupted • The batteries have been discharged • The emergency stop has been pushed • Fuse has blown	• Turn the main switch • Check the battery level • Release the emergency stop • Check fuses
2.	No response to: • Side shift • Raise / lower • Tilt • Turn • Rotation • Extension	• The load limit system has interrupted the functions due to overload	• Retract the extension boom
3.	No response to: • Propulsion	• The engine has no electricity • The brake does not release • On/off witch is set to “OFF”	• Check point 1. • Press the “on” button ○ Check fuse for motor control
4.	• Vacuum pump(s) runs frequently or continuously	• Leak in the vacuum system. • ATTENTION! The vacuum level must be maintained for at least 10 minutes without the pumps running!	• Unload the machine immediately • Check that the suction cups seal tightly against the object • Check the vacuum hoses and suction cups for damage • ATTENTION! The vacuum pumps must restart.
5	No response to: • Hydraulic functions	• The pump does not start • The remote control is not connected (RED LED on the left side of the emergency stop is illuminating. • The machine is out of range (100m / 109yd)	• Check point 1. • Reset the remote control by holding down the “ON” button for 5 seconds.

6.5 Fuses

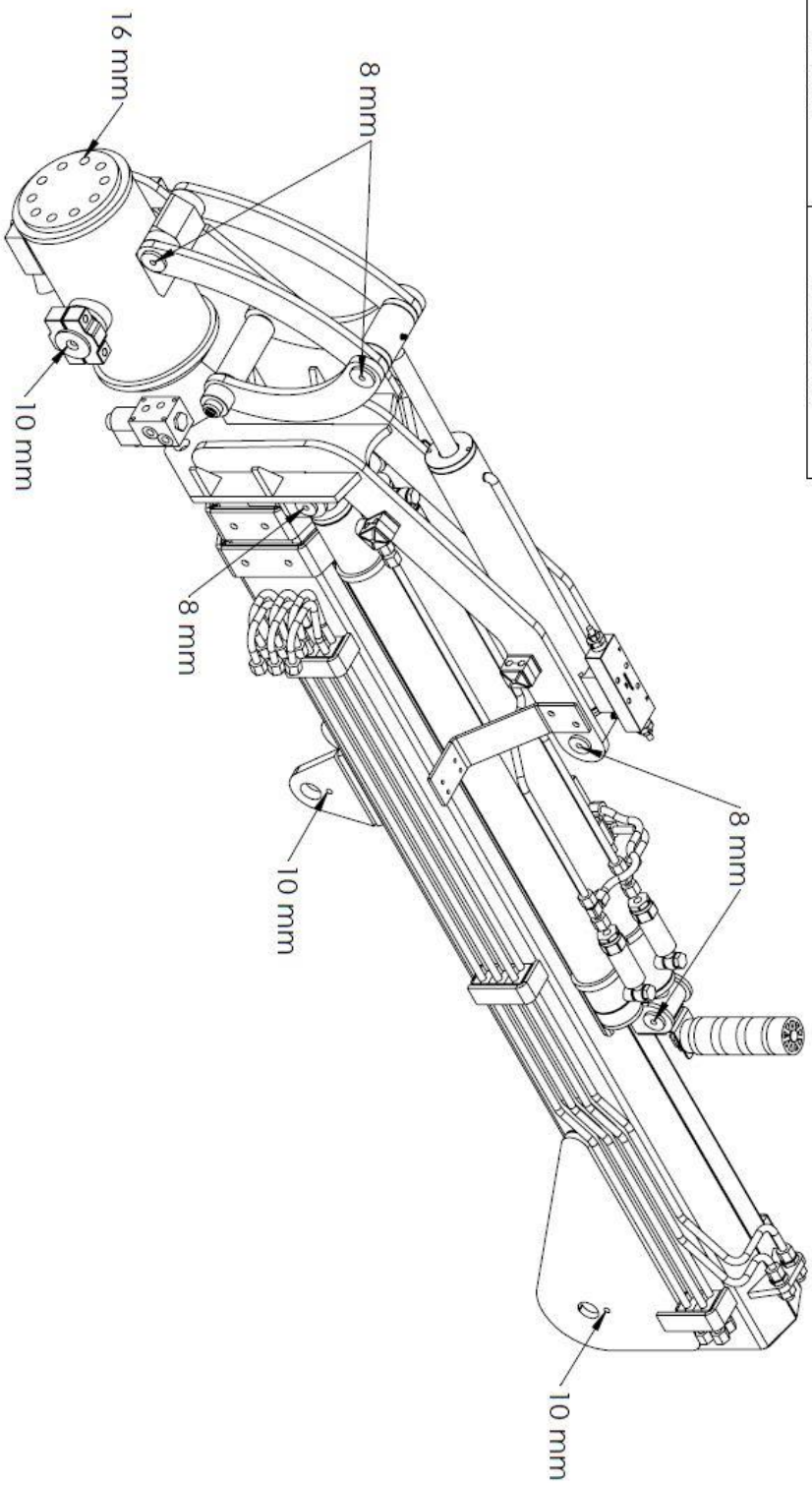
Fuse by the main switch		
Size	**Function**	**Position**
250A	Motor og hydraulik	By the main switch
Fuses in the battery case		
Size	**Function**	**Position**
50A	Charger	In the battery case
Fuses in the control box		
Size	**Function**	**Position**
5A	Vacuum pumpe	Slot F1
5A	Vacuum pumpe	Slot F2
2A	Controle handle	Slot F3
2A	Emergency stop	Slot F4
2A	Main switch	Slot F5
3A	Charger for remote control	Slot F6
10A	Remote control receiver	Slot F7
2A	Tracker	Slot F8
	Extra	Slot F9
15A	Supply for control	Slot F10
	Extra	Slot F11
	Extra	Slot F12
	Extra	Slot F13
2A	Start interrupt (while charging)	Slot F14

6.6 Tightening torques

Size	Tightening torque
6 mm	11,3 Nm
8 mm	27,3 Nm
10 mm	54,0 Nm
12 mm	93,0 Nm
16 mm	230,0 Nm



Size	Tightening torque
6 mm	11,3 Nm
8 mm	27,3 Nm
10 mm	54,0 Nm
12 mm	93,0 Nm
16 mm	230,0 Nm



6.7 Spare parts

If spare parts are needed, these can be ordered by contacting your nearest dealer or Smartlift Customer Service at tel. +45 97 72 29 11 or email: customerservice@smartlift.com

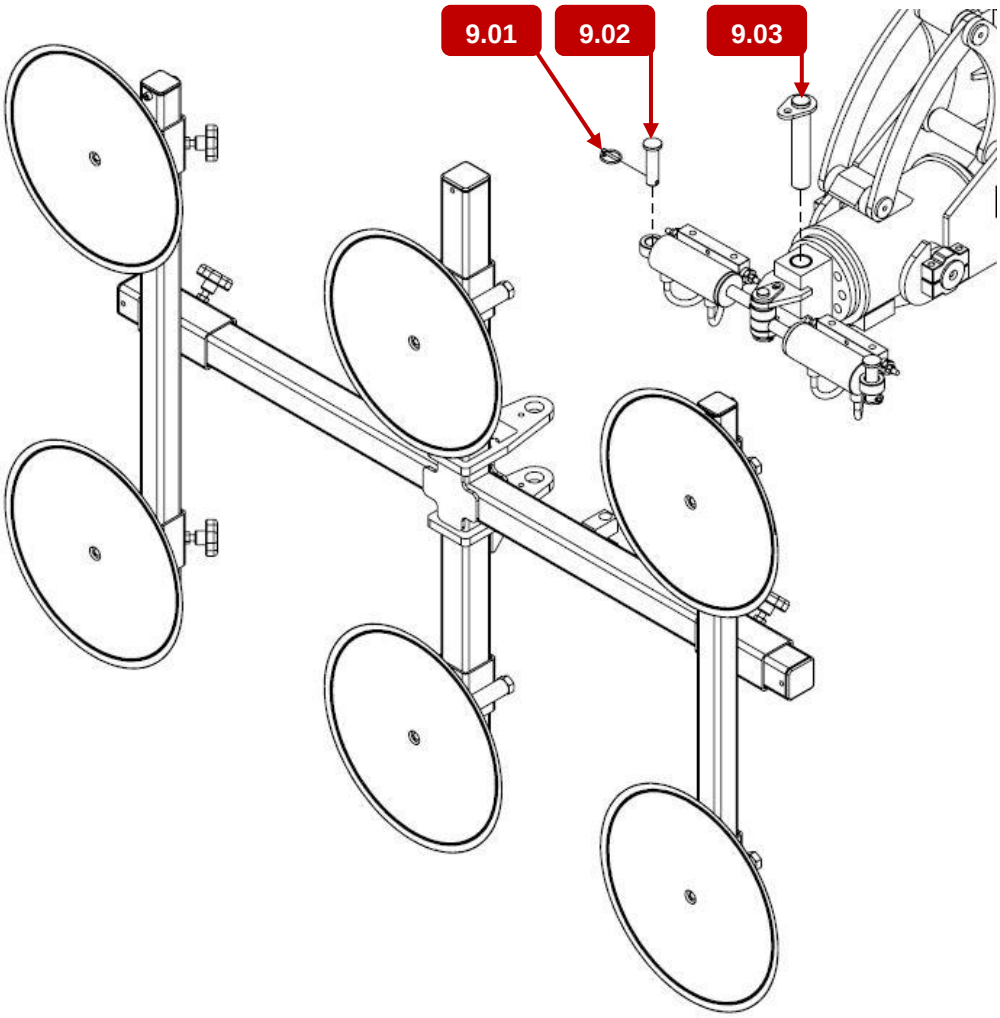
7 Scrapping and disposal

The machine must be scrapped and disposed of in accordance with local regulations.

8 Dismantling the vacuum yoke (SL)

This describes how the vacuum yoke is removed.

In order to remove the vacuum yoke, the following steps must be completed in the indicated order.



No.	Description
9.01	Remove the linch pins
9.02	Removing the shafts for the turning cylinders
9.03	Remove the shaft for the yoke

9 Annexes

9.1 Terms and abbreviations

Term	Text
Warning!	Things that can cause bodily injury or death
Attention!	Things that can cause bodily injury or property damage
The user	The person who operates the machine and is responsible for security
The machine	The entire basic machine unit and any equipment model
Vacuum yoke	A collective term for yoke, crossbars and suction cups
The load	The object to be lifted
Wind load	Effect of wind on the load and machine

Abbreviation	Significance
SL	Smartlift
WLL	Working Load Limit / Maximum lifting capacity

9.2 Declaration of conformity

Manufacturer and bearer of responsibility for the compilation of technical files:

CE

Morten Rosengreen
Head of Development
Smartlift A/S
N.A. Christensensvej 39
DK - 7900 Nykøbing Mors

Hereby declares that:

Model:

☐ SL 809
☐ SL 1009
☐ SLI 1009

Serie no.: _____

Date: _____ - _____ - 20_____

has been manufactured in accordance with the following EC directives:

The Machinery Directive 2006/42EC
The EMC Directive 2014/30/EU

The following standards have been used:

DS/EN ISO 12100	(Machine safety – General principles for design – Risk assessment and risk reduction)
DS/EN ISO 20607	(Machine safety – Instruction handbook – General drafting principles)
DS/EN ISO 14121-2	(Machine safety – Risk assessment - Part 2: Practical guidance and examples of methods)
DS/EN ISO 4413	(Hydraulic fluid power – General rules and safety requirements for systems and their components.

Date:_____ **Signature:**_____

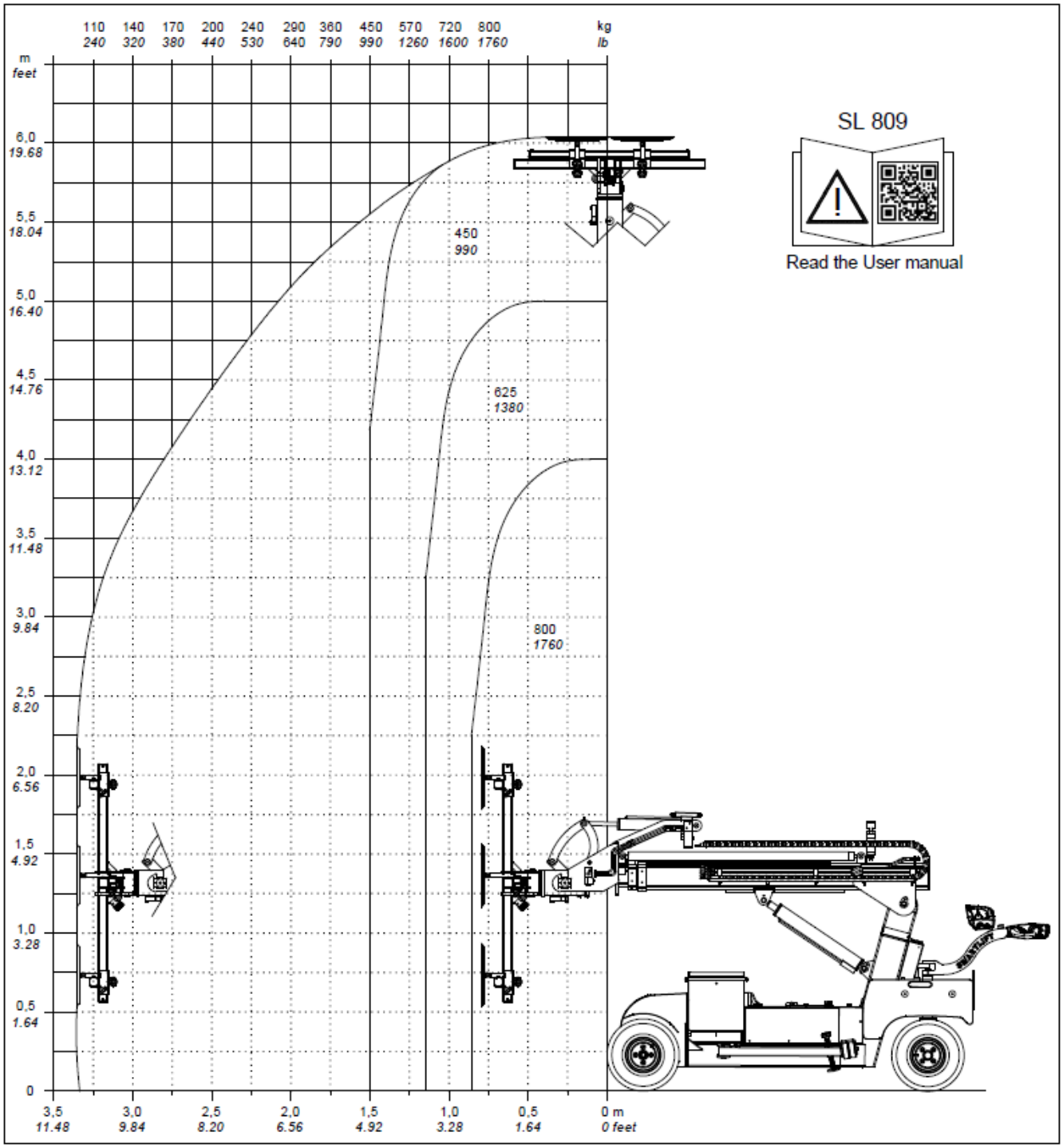
SMARTLIFT
N. A. Christensensvej 39, DK-7900 Nykøbing Mors
Tel. +45 9772 2911, E-mail: smart@smartlift.com

Nicolai Tange Jørgensen, CEO

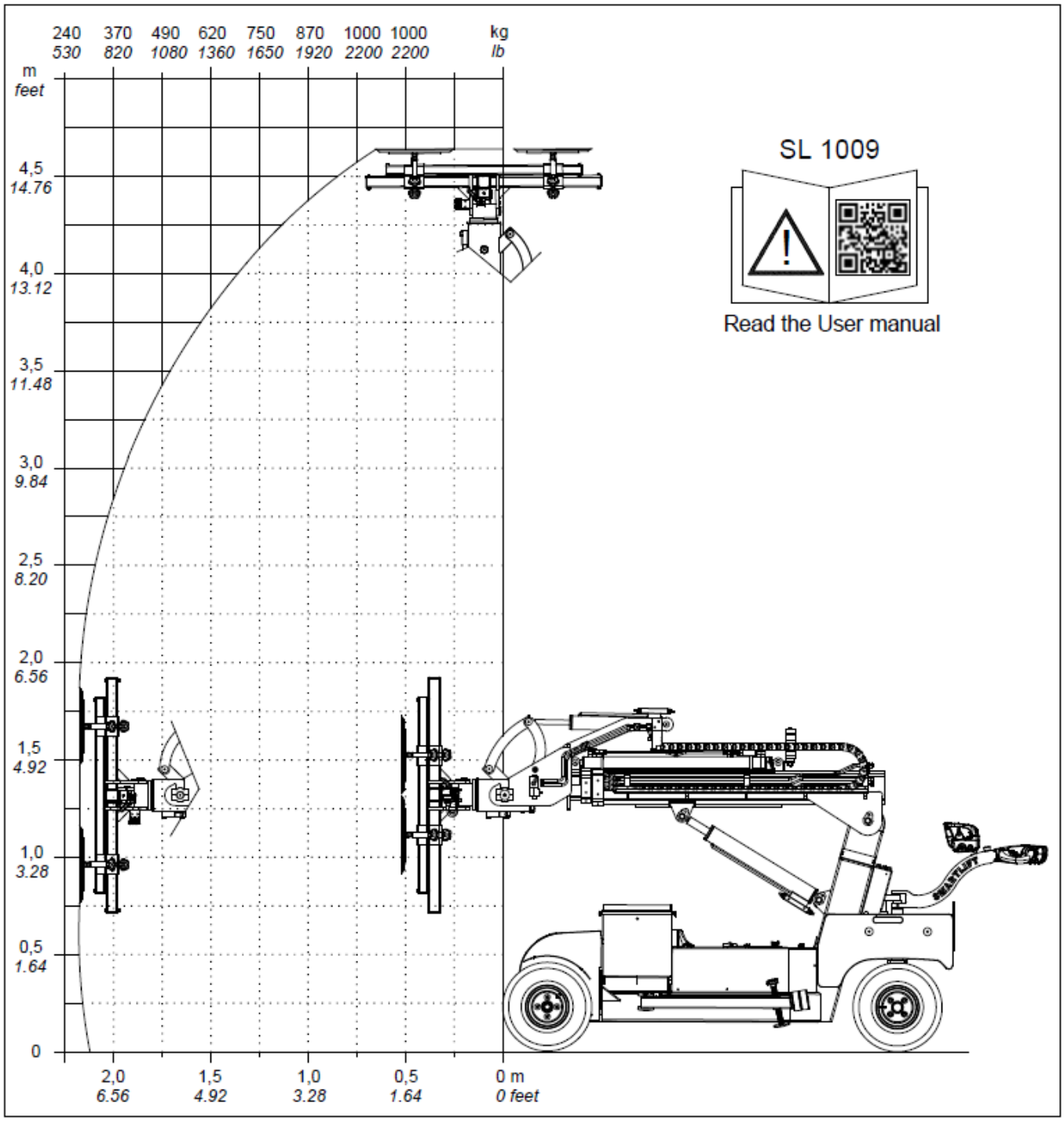
9.3 Load charts

Load charts only apply to machines with standard configurations.

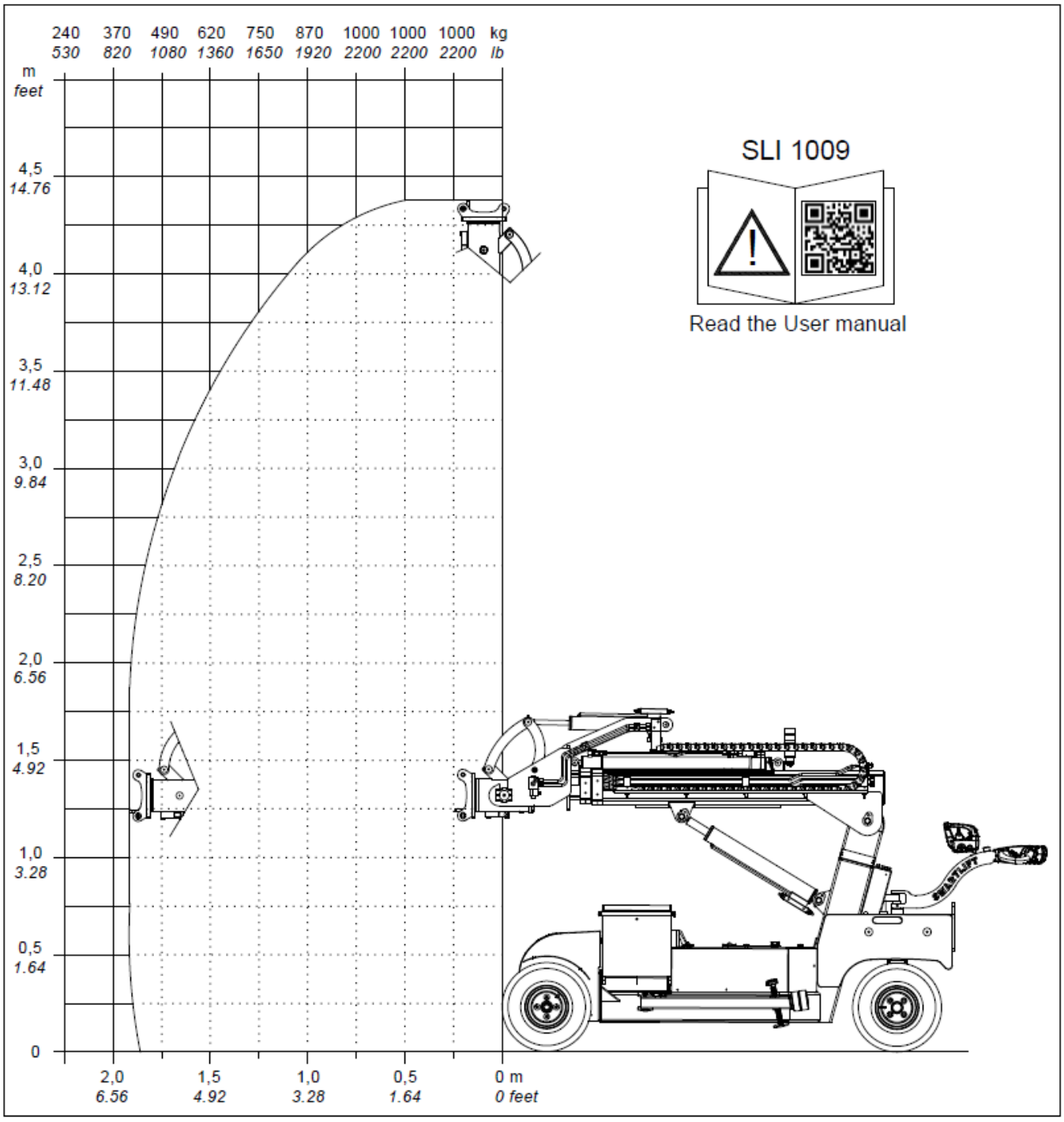
9.3.1 SL 809



9.3.2 SL 1009


240 370 490 620 750 870 1000 1000 kg
530 820 1080 1360 1650 1920 2200 2200 lb
m
feet
4,5
14.76
4,0
13.12
3,5
11.48
3,0
9.84
2,5
8.20
2,0
6.56
1,5
4.92
1,0
3.28
0,5
1.64
0
2,0
6.56
1,5
4.92
1,0
3.28
0,5
1.64
0 m
0 feet
SL 1009
Read the User manual

9.3.3 SLI 1009


240 370 490 620 750 870 1000 1000 1000 kg
530 820 1080 1360 1650 1920 2200 2200 2200 lb
m
feet
4,5
14.76
4,0
13.12
3,5
11.48
3,0
9.84
2,5
8.20
2,0
6.56
1,5
4.92
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3.28
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1.64
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1,5
4.92
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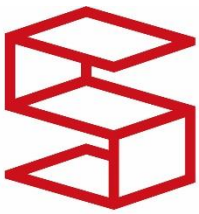
0,5
1.64
0 m
0 feet
SLI 1009
Read the User manual



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