buitendijkslaman

worldwide internal transport

MANUAL and COMPONENTS LIST

Pipe Rail Trolley TYPE MPT

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I INTRODUCTION/ GUARANTEE / DEFINITIONS / SYMBOLS

Congratulations on making the right decision in purchasing your pipe rail trolley. You can now benefit from an excellent machine designed and manufactured with the utmost care. You will gain maximum satisfaction from your investment by strictly observing the instructions for safety, use and maintenance outlined in this manual.

The pipe rail trolley operator must have access to the manual and it must be available on the pipe rail trolley when the vehicle is in use. The manual should be read by everyone that works on or with the pipe rail trolley and the instructions should be followed carefully.

Guarantee

Buitendijk-Slaman B.V. accepts responsibility for the products it manufacturers and the services it provides.

Claims under the guarantee can only be made if the client submits the complaint immediately and if Buitendijk-Slaman B.V. is given the opportunity to investigate these claims and rectify any faults.

Buitendijk-Slaman B.V. guarantees its products against material and construction faults. In the instance of defects arising that fall within the above, Buitendijk-Slaman B.V. will be obliged to provide replacement parts that it has manufactured free of charge. This is valid for a period of one year after delivery.
Different terms apply to the guarantees on second-hand goods.
The guarantee is not transferable to a new owner.
The terms of the guarantee are only applicable when a defect is acknowledged as such after being investigated by the manufacturer

Buitendijk-Slaman B.V. is not responsible for damage or consequential damage resulting from natural disasters, incorrect usage, lack of maintenance carried out by qualified personnel or any usage other than that described hereafter.

Buitendijk-Slaman B.V.'s liability is also nullified should you or a third party make any modifications or extensions to this machine or accessories without our written consent.

Buitendijk-Slaman B.V. continuously endeavours to improve its products and services. The company therefore reserves the right to modify any specifications outlined in this manual without prior notification.

Definitions

The following terms are used in this manual:

Operator:	The person that rides on the pipe rail trolley, controls and supervises its functioning and can stop and start etc. The company is responsible for ensuring that the operator receives sufficient training and education.
Dangerous areas:	These are the areas, in and around the machine that can cause injury.
Maintenance fitter:	The person that is familiar with all aspects of the pipe rail trolley, and can adjust safety guards and carry out maintenance on the trolley. The maintenance fitter is familiar with the pipe rail trolley's functions, the safety standards and is trained in its maintenance. The company is responsible for ensuring that maintenance personnel receive sufficient training and education.

Safety Symbols

Standardised safety symbols, as illustrated later, can be found at various locations on the pipe rail trolley / trolley.
The upper section warns against general or specific dangers.
The lower section indicates what the danger is or what action should be taken.

2 TECHNICAL DESCRIPTION

2.1 Names, identification, description and options

Type	Double scissor	Triple scissor	Quattro scissor	Hydr. Lifting wheels	Level indicator	Acoustic error indicator	Stabilizers
MPT-2	x			x	x	x	*
MPT-3		x		x	x	x	*
MPT-4			x	x	x	x	x

*=depending on pipe-rail size

Identification : Identification label on the frame, at the front underneath the operating pole or on the battery bin
Description : Vehicle with four wheels intended for independent movement inside greenhouses on a pipe rail system.
: Supplied with an adjustable height working platform
: On / Off switch, continuously variable speed

Work order
The work order determines which pipe rail trolley model is produced.
All important data can be found here, including any adjustments and extra equipment.
A copy of the work order for this vehicle has been added to the last section of this manual.

Options
The following parts are supplied loose with the pipe rail trolley:
- Manual
- Battery charger (optional)
- Acidimeter (optional)
- Manuals relating to other options

2.2 Technical information and dimensions

For technical information relating to the pipe rail system, see Chapter 2.4
= depending on the pipe rail system

MPT-2		
Length x width	mm	1964 x Track width+185mm##
Track width	mm	425 - 850##
Wheel base	mm	1780
Step height	mm	540
Pole height	mm	1200
Work platform, lxw	mm	1884 x 438
Work platform height max.	mm	3150
Carrying capacity	kg	150##
Weight	kg	475##
Motor capacity	kW	0.37
Voltage	volt	24
Driving speed	m/min.	0 - 50
Batteries	Amp	Full traction battery 110 Amp. (5c)
Stabilizers		Optional

MPT-3		
Length x width	mm	2027 x Track width+185mm##
Track width	mm	550 – 850##
Wheel base	mm	1780
Step height	mm	670
Pole height	mm	1200
Work platform, lxw	mm	1884 x 438
Work platform height max.	mm	4600
Carrying capacity	kg	100##
Weight	kg	500##
Motor capacity	kW	0.37
Voltage	volt	24
Driving speed	m/min.	0 - 50
Batteries	Amp.	Full traction battery 110 Amp. (5c)
Stabilizers		Optional

MPT-4		
Length x width	mm	2027 x Track width+185mm##
Track width	mm	550 – 850##
Wheel base	mm	1780
Step height	mm	715
Pole height	mm	1200 from the working platform
Work platform, lxw	mm	1884 x 438
Work platform height max.	mm	5950
Carrying capacity	kg	100##
Weight	kg	600##
Motor capacity	kW	0.37
Voltage	Volt	24
Driving speed	m/min.	0 - 50
Batteries	Amp	Full traction battery 110 Amp. (5c)
Stabilizers		Yes

2.3 Loading, unloading, towing, recycling

Instructions for transport

- The pipe rail trolley may never be towed.
  Attention! The pipe rail trolley is disproportionally top heavy.
  1 lift trolley at the "back side" (pole side).
  2 place the fork-lift truck's forks against the inside of the wheels.
  3 ALWAYS immobilise the pipe rail trolley during transport.

The pipe rail trolley may only be loaded onto or into a truck by using either extended forks on the fork-lift, a loading ramp or loading pit.
For any questions concerning transport, contact Buitendijk-Slaman B.V. Tel. 0031 -10 - 52 16 377.

2.4 The pipe rail system (Policy rules, Sector guidelines)

Based on the Dutch health and safety law, article 3.2, the pipe rail system must conform to the minimum standards given below, before it can be used.

The conditions in article 3.2 concerning pipe rail systems in greenhouses intended for use in combination with pipe rail trolleys having a working height exceeding 1.80 metres are met if points 2.4.3 to 2.4.6* in combination with point 2.4.1 or point 2.4.2* are adhered to.
*) Dutch health and safety law

2.4.1 Pipe rail system
Pipe rail systems that are used in combination with pipe rail trolleys that completely or partly lack the data necessary for safe usage.

2.4.1.1
The pipe rail system is set up in such a way that the stability of the pipe rail trolleys that are designed to be used on the pipe rail system, will not be compromised. Towards this end, pipes and pipe rail supports that are used must conform with the specifications in TABLE 1 and 2.

TABLE 1: Pipes

Category	Track width c.t.c. in mm.	Tube diameter / wall thickness in mm.	Support distance in mm.	Permissible axle pressure in kg for St 33) 1,2,3,
1	420 to 600	diam. 51 / 2,25	max. 1250	260) 4
2	550 to 600	diam. 51 / 2,25	max. 1670	220) 4
3	420 to 600	diam. 45 / 2	max. 1000	221) 4
4	420 to 600	diam. 45 / 2	max. 1250	177) 4
5	420 to 600	diam. 38 / 2	max. 1000	157) 4
6	420 to 600	diam. 38 / 2	max. 1250	126) 4

1) When using St 37 the permissible axle pressure can be increased by a factor of 1.2.
2) The permissible axle pressure is determined by the length of the pipe rail trolley's wheel base in respect of the distance between supports: The axle pressure given in the table is valid for pipe rail trolleys with a wheel base that is less than 62.5% of the distance between supports or that is greater than 125% of the distance between supports.
3) In instances where the pipe rail trolleys have a wheel base that is greater than 62.5% of the support distance and is less than 125% of the support distance, the permissible axle pressure is increased by a factor of 1.3.
4) The permissible axle pressure applies to a track width of 420. The permissible axle pressure is increased with the following correction factors for wider tracks: 1.08 for track width 500, 1.13 for track width 550 and 1.17 for track width 600 mm.
5) The permissible axle pressure applies to a track width of 550. The permissible axle pressure is increased with a correction factor of 1.04 for a track width of 600 mm.

TABLE 2: **Pipe rail support** (base plate: steel, material thickness 1.5 mm with stiffener)

Category	Length base plate outside the centre line rim	Base plate width	Height in mm.)*
S1	minimum 70 mm.	minimum 115 mm	max. 150

* = distance from the underside of the pipe to the underside of the base plate

2.4.1.2
The pipe rail supports are rigidly fixed to the pipes
2.4.1.3
The pipe rail system is constructed on a flat base. The acceptable variance from the vertical for the pipe rail system, measured on the pipes may not exceed 2°.
2.4.1.4
The ground on which the pipe rail system is laid must have sufficient load bearing capabilities.
2.4.1.5
After a pipe rail system has been laid the pipe rail trolley's stability should be tested in a working situation, under circumstances that are most likely to cause it to topple over. To achieve this, the pipe rail trolley should be set on a section of the pipe rail system that, for the purposes of the test, has been laid with a lateral inclination of 2.5°. With the platform raised to its highest position, with a test load of 100 kg placed upon it, 110 N of lateral pressure should be applied, at a height of 1.10 metres above the platform in the direction of the inclination. The centre of gravity of the test load should be located at 100mm on the lower side of the inclined set-up measured from the inside of the fencing. Stability is sufficient if the pipe rail trolley can withstand this test for 60 seconds without toppling over. For purposes of simplification, the stability test may be carried out without applying 110 N of lateral pressure, if, instead of this, the test is carried out using a weight, that is fixed to the platform in such a way as to replicate the toppling moment on the pipe rail trolley. An expert should be present when this test is carried out.

2.4.2 Use of the pipe rail trolley on the pipe rail system
Pipe rail systems that are used in combination with pipe rail trolleys, where all data necessary for safe usage is available.
2.4.2.1
The pipe rail system is set up so as to conform with the specifications as given in the pipe rail trolley manufacturer's manual. The following specifications are always given: the required characteristics relating to the load bearing capacities of the ground on which the pipe rail system will be laid, the permissible degree of inclination for the pipe rail system, the track width, the pipe's specifications (diameter, wall thickness, material type and strength), the distance between pipe rail supports and their type (minimum distance from the base plate).
2.4.2.2
The pipe rail supports are rigidly fastened to the pipes.
2.4.2.3
The necessary tests must be carried out in the working situation, if these have been stated by the pipe rail trolley's manufacturer.

2.4.3 Pipe rail trolleys

2.4.3.1
The danger of falling with the pipe rail trolley is counteracted by using pipe rail trolleys that have been fitted with appropriate tilt hazard indicators.
2.4.3.2
The danger of falling from the pipe rail trolley's platform is counteracted by installing fencing around the circumference of the platform. The fencing is furnished with a breast rail at a minimum height of 1.10 metres above the platform with a further rail located halfway. If the horizontal distance between the breast rails on both the long sides of the platform is less than 0.5 metres, then a minimum breast rail height of 0.9 metres above the platform with a further rail located halfway, on both of the long sides is sufficient. In this instance, the rails on the short side of the platform should be set at a height of at least 1.10 metres and should extend for at least 2/3 of the length of the platform's short side.
2.4.3.3
A label is located on the pipe rail trolleys stating the maximum permitted load.

2.4.3.4
The pipe rail system's specifications and all important data relevant to safe usage of the pipe rail system

are set down in writing.

2.4.3.5
The provisions made and the measures that have been taken, that are relevant to the characteristics of the pipe rail system, its foundation, and the pipe rail trolley and the conditions that may have a negative influence on these, will be checked as often as is necessary, to ensure that they still function adequately. Defects that are found must be repaired as quickly as possible.
2.4.3.6
It must be possible to demonstrate that the foundation, the pipe rail system and the pipe rail trolley conform with articles 4.2.3,- 4- and 5 in combination with article 4.2.1 or article - 2

1 **The directive and an explanation thereof can be ordered from LTO Nederland, Postbus 29773, 2502 LT Den Haag or from Buitendijk-Slaman.**
2 **For further information relating to backgrounds and calculations, refer to: "Onderzoek pipe railssystemen" ("Research into pipe rail systems") June 2002, Ir. Ing. F.T.J. POOT. A report on this research can be ordered from LTO Nederland, Postbus 29773, 2502 LT Den Haag**
3 **NEN-EN 280:2001 Mobile elevating work platforms; Design calculations; Stability criteria; Construction; Safety; Examinations and tests.**

3 SAFETY PROCEDURES

The following symbols have been affixed to your pipe rail trolley.

Learn these symbols off by heart – know what they stand for!

3.1

Attention! Risk of severe injury. We advise you to read the pipe rail trolley manual thoroughly and in its entirety for full comprehension of the functions of all operating handles, settings and switches prior to working with the pipe rail trolley.

3.2
Attention! Risk of severe injury. Turn the pipe rail trolley off and prevent it from being started by removing the key from the ignition switch when carrying out maintenance activities on the pipe rail trolley. First remove the plug from the power point before commencing work while the batteries are being charged. This prevents dangerous situations from arising, such as the trolley suddenly beginning to drive. This also includes switching on due to an accidental misunderstanding, or by accident.

3.3

Toppling Over

As paths between plants must be small, the width, and hence lateral stability of the pipe rail trolley, is limited.

Attention! Risk of sustaining severe injury in the event of toppling over.

With regard to stability and the inherent risk of the trolley toppling over, please ensure your pipe rail system meets the requirements outlined in chapter 2.4 of this manual.

3.4

Getting crushed while adjusting the work platform.

Attention! Risk of sustaining severe injury in the event of being crushed by the scissors.

3.4.1

For pipe rail trolleys with hydraulic height adjustment;

Height adjustment may only be initiated if you are absolutely certain no one in the vicinity of the work platform can be crushed.

3.5 Getting crushed whilst driving.
Attention! Risk of sustaining injury from collision with trolley.

Ensure that no one is present in the driving area of the pipe rail trolley.

Ensure that any bystanders are stationed at least 2 metres from the driving pipe rail trolley.

<u>ALWAYS</u> halt the pipe rail trolley prior to loading and unloading.

Never get off or onto a moving pipe rail trolley.

3.6

Getting crushed by the drive.

Attention! Risk of sustaining severe injury in the event of getting crushed by the chain drive.

Only remove the protective cover if the trolley has stopped and the key has been removed from the main ignition switch.

ALWAYS replace the protective cover following maintenance activities.

3.7
Falling off the operating platform.

Pipe rail trolley activities such as pruning, tying, spraying, inspecting, harvesting, etc, are executed from a considerable height. Consequently, fencing has been fitted to prevent personnel from accidentally falling or stepping off the platform.

Attention! Risk of sustaining injury from falling off the operating platform.

Always ensure you hold onto the pole with the control panel when stretching out beyond the platform. Remain in the centre of the work platform. During work activities, always bear in mind the fact the operating platform is very small.

Never remove the safety rail from the operating platform.

3.8

Pipe rail trolley stability.

Attention! Risk of sustaining injury in the event of toppling over.

As well as the dangers of instability described in article 5.3 of this chapter on safety, there are other factors which influence stability, namely:

- Ensure that the maximum carrying capacity as given in chapter 4 is not exceeded.

- Ensure accurate and straight stacking;

- Distribute products evenly over the work platform.

Following inspection or maintenance of the batteries or drive, ensure the scissors frame is properly retracted and securely positioned into the lower frame.

Ensure on a regular basis that these procedures are being complied with.

3.9

Attention! Risk of sustaining injury – the pipe rail trolley may not be operated by:

- persons younger than 16 years of age

- persons lacking the requisite knowledge or understanding of safety and operating procedures

- persons suffering from balance problems, dizziness or fear of heights.

3.10

Attention! Risk of sustaining injury when recharging batteries due to the release of extremely explosive gas.

- Only recharge batteries in well-ventilated rooms.

- Open flames and smoking are strictly forbidden in these areas.

- Avoid any contact between the battery fluid and the eyes and skin as it is a highly corrosive acid – use protective clothing and equipment e.g. safety goggles. In the event of contact, immediately rinse the affected areas with soap and water.

- In the instance of contact with the eyes rinse immediately with running water for a minimum period of 10 minutes and seek medical assistance.

- When working with or near batteries, ensure that adequate supplies of water and soap are in close proximity and any potential assistance that may be required is readily available.

- Prevent short-circuiting (sparking) and ensure there is no likelihood of an electrical connection occurring between battery contacts.

- Ensure there is no possibility of metal objects falling onto the battery as this can cause short-circuiting or sparks and, consequently, an explosion. Remove all personal items such as bracelets, rings, necklaces and watches when working near the battery. A short-circuit current is capable of melting a ring and causing severe burns.

Extremely explosive gas is released during battery recharge. Ensure that no fire or sparks are near the batteries during the recharge. Make certain the area is well ventilated during battery recharge or battery storage.

3.11

Attention! Hydraulic system.

The hydraulic system operates under high pressure. Prior to executing work activities on the system, ensure the system is free from any pressure. A high pressure jet (up to 180 bars) can penetrate clothes and skin with relative ease and result in severe wounds and blood poisoning.

3.12

Attention!

Injury can be sustained or caused if:

- other users are not informed of the relevant safety procedures
- maintenance and repair activities are carried out by professionals not recognised by Buitendijk-Slaman B.V.

3.13

Attention!

One can sustain injury if the battery charger's electrical connections (such as cable diameter, fuses, earth connection, etc) fail to conform to the specifications.

3.14

Attention! Risk of sustaining severe injury.

Ensure that unauthorised people, and especially children, remain at a safe distance from the pipe rail trolley.

3.15

Attention! Risk of sustaining severe injury on being crushed between work platform and roof construction.

Always remain attentive to possible crush-related injuries during platform raising and driving. Ensure that sufficient distance is left between the platform, yourself and the roof construction.

NEVER drive the pipe rail trolley while raising the platform.

3.16

Attention! Risk of sustaining severe injury on the operating platform.

You risk severe injury if you, for example, slip due to irregular platform cleaning procedures.

3.17

Attention! Risk of sustaining severe injury.

Immediately replace safety symbols if they are damaged.

3.18

The pipe rail trolley user determines "safe operation" limitations.

Only use the pipe rail trolley for activities specified in chapter `Application and Options'.

Never take any risks.

NEVER permit unmanned driving of the pipe rail trolley.

4 PREPARATION

4.1 Application

*

The pipe rail trolley has been developed to:

- drive over a pipe rail system that meets the requirements outlined in chapter 2.4 of this manual.

In relation to stability and the chance of toppling over, special attention has to be given to:

- the pipe rail trolley's maximum load
- the requirements that the pipe rail and the pipe rail supports should meet
- the requirements that the support fixings to the pipe rail should meet
- the minimum load bearing capacity of the ground
- the levelling of the ground on which the pipe rail system is located
- the condition of the fencing around the work platform
- the operation of the tilt hazard indicators

See Chapter 2.4 The pipe rail system (Policy rules, Sector guidelines)

*

The pipe rail trolley has also been developed to;

- monitor and nurture crops at various heights (stages of their development);
- transport the worker to and from crops with relative ease;
- carry out harvesting activities (eg. for sweet peppers);
- transport the harvest;
- affix the climbing ropes for the crops to the steel wires (whereby the operating platform, with or without push-on table, may be not higher than 2.85 metres).
- be operated by one person.

Only use the pipe rail trolley for the work activities specified above.
CE marking is not applicable for alternative purposes.

It is strictly forbidden to drive the pipe rail trolley on public roads.

The pipe rail trolley may only be used by one person at a time.

The pipe rail trolley may not be employed as a tow truck.

All wiring and electric components are drip-proof. Consequently, the pipe rail trolley must be covered in the event of overhead irrigation or crop spraying. When idle, the trolley must be kept in a dry location.

The pipe rail trolley may only be equipped with "original" Buitendijk-Slaman components and options. Buitendijk-Slaman B.V. is exempted from any responsibility in respect of damage or consequential damage incurred as a result of using non-original parts.

4.2 Operator

Only personnel that have received a thorough internal, theoretical and practical training for operating the pipe rail trolley may ride on the pipe rail trolley.
The following must be included in the training programme;

- possible uses and limitations
- the operational and control components
- the safety procedures
- daily and periodic maintenance

The operator must also be completely familiar with the contents of this manual.
*
In order to prevent serious injury the pipe rail trolley may only be operated by:

- **authorised personnel**
- **personnel above 16 years of age**
- **personnel from whom it may be expected that they will be aware of the dangers associated with the pipe rail trolley**

4.3 Operator's responsibilities

The operator must follow all the safety procedures given in chapter 3 precisely, without when doing so, contravening other procedural rules given elsewhere in this manual.

4.4 Checks prior to initial use

1 Check the pipe rail trolley for external damage, such as dents. Do not use if any damage is found and notify the maintenance fitter immediately.
2 Reset the emergency switch and check the battery charge meter (this meter is optional on some models).
3 Check the different functions individually and pay special attention to unusual noises.
4 Check the area of operation, including the pipe rails and the surrounding area, is free from obstacles.
5 Check that the pipe rails are level over their entire length and that there is no subsidence as may be caused by leaks in the greenhouse.
6 Check that the tilt hazard indicators are working by applying lateral pressure to the pipe rail trolley until a beep is heard or, on certain models check that the tilt display reacts.

5 USE

5.1 General

*

Always pay attention to bystanders to prevent collision. Look well ahead in the direction that you are driving, be aware of bystanders and keep to the safety procedures.

*

Attention! Danger of serious injury due to accidental tilting caused by uneven pipe rails or lateral pressure. It is not permitted to apply lateral pressure to the work platform.

The pipe rails must be within 2° of level.

*

The work platform's working height is limited. Any increase to the height of the work platform may not exceed the limited height in total.

- Make sure that you are familiar with the pipe rail trolley and the operating and adjusting elements.
- Make sure that you, or the person that uses the pipe rail trolley, has read the safety procedures.
- Keep the trolley clean, remove build-ups of rubbish frequently and always ensure that the emergency switch has been pressed in before cleaning the pipe rail trolley.
- Maintain the machine on a regular basis and store it in a dry room if it is not going to be used for an extended period.
- Charge the battery as well and keep it in good condition.

*

Passengers are not allowed on the pipe rail trolley. Keep your arms and legs inside the pipe rail trolley fencing when it is moving.

*

The pipe rail trolley has been greased, adjusted and tested by your supplier.

*

The batteries are supplied with an 80% charge and can provide power for approximately 10 hours.
Check the battery levels and top up if necessary with distilled water.
The traction batteries are filled with a dangerous electrolyte that can cause serious burns.

*

Attention!
The pipe rail trolley may NOT be towed. This can cause serious damage to the drive. Always transport the pipe rail trolley with the push-up wheels set in the transport position.

*

Attention!
The lever on models with manual push-up wheels can spring up and cause serious injury if hit.

*

Place the foot switch(es) in the work platform.

*

Check the drive's oil level.

*

When leaving the pipe rail trolley, always ensure that the emergency switch and the main contact switch have been turned off.

*

Before using the pipe rail trolley check that the pipe rails over which you will ride are damage free, sufficiently level and that there has been no subsidence.

*

In case of injuring personnel or damaging property, contact your immediate superior.

5.2 Procedures for use

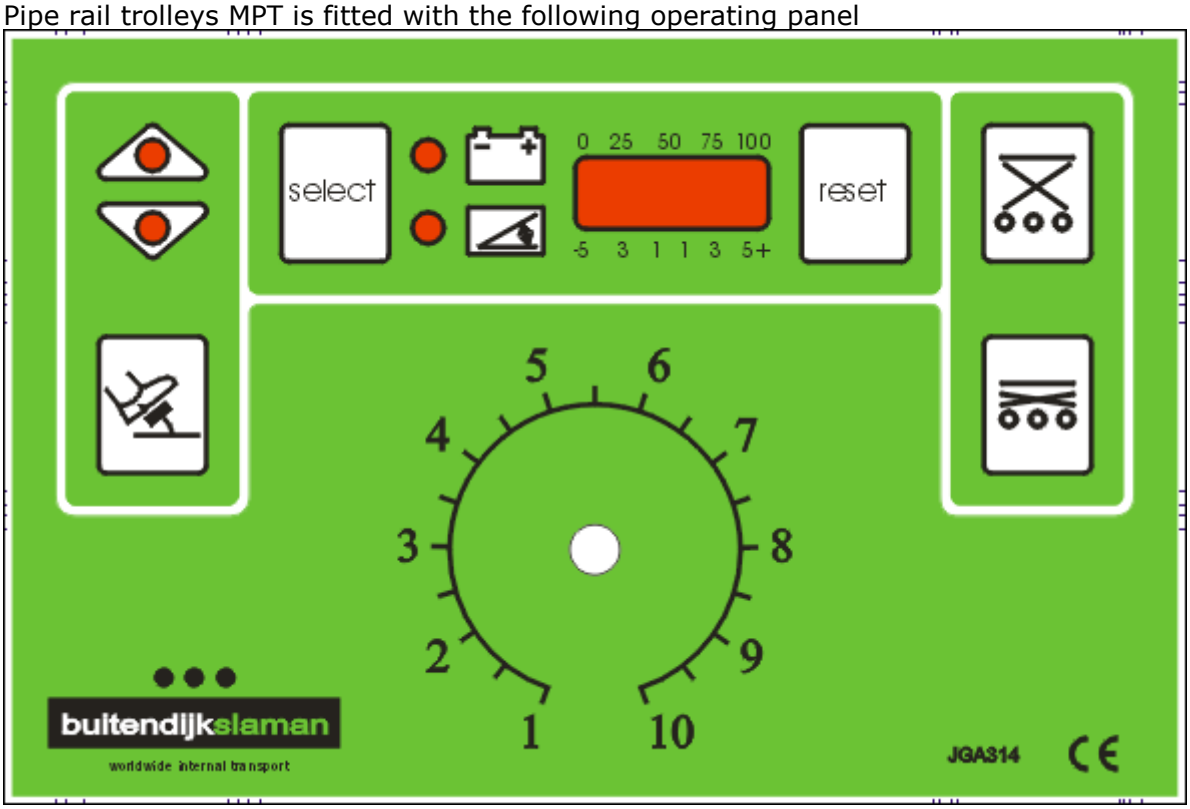
*

Keep to the safety procedures and keep a safe distance relative to your speed. In so doing, you can retain total control over the pipe rail trolley.

*
Ensure that your vision is not obscured.
*
Speed should always be adjusted to prevailing circumstances so as to ensure that you can stop in time if there is an obstacle in the way for example.
*
Never drive the pipe rail trolley onto a lift without permission. Drive up slowly, put the vehicle in the middle of the lift and turn the main contact switch "Off".
Ensure that there are no people on the lift when driving the vehicle onto it.
*
Only transport safe and stable loads.
Ensure that the weight of the loads fall within the capacity of the pipe rail trolley.
The maximum carrying capacity can be found on the identification label.
*
Insert the key in the main contact switch and turn it to the RIGHT.
Release the emergency switch by turning it to the right.
*
In order to achieve the most efficient energy usage from the batteries, it is recommended that the required average speed is set with the speed control knob on the control panel.

5.3 Functioning and operating

Pipe rail trolleys MPT is fitted with the following operating panel



Functioning (see diagrams, fig. 1 and fig. 2)

The pipe rail trolley has been designed for the cultivation (under glass) sector to nurture crops at various stages, execute harvesting activities and for the purposes of transportation. The trolley drives over (heating system) pipes which function as rails. The pipe rail trolley comprises a steel base with 4 steel wheels 2 of which are powered electronically. The electromotor is powered by batteries. The electromotor drives the wheels via chain transmission using a variable speed gear with a reduction gearbox.

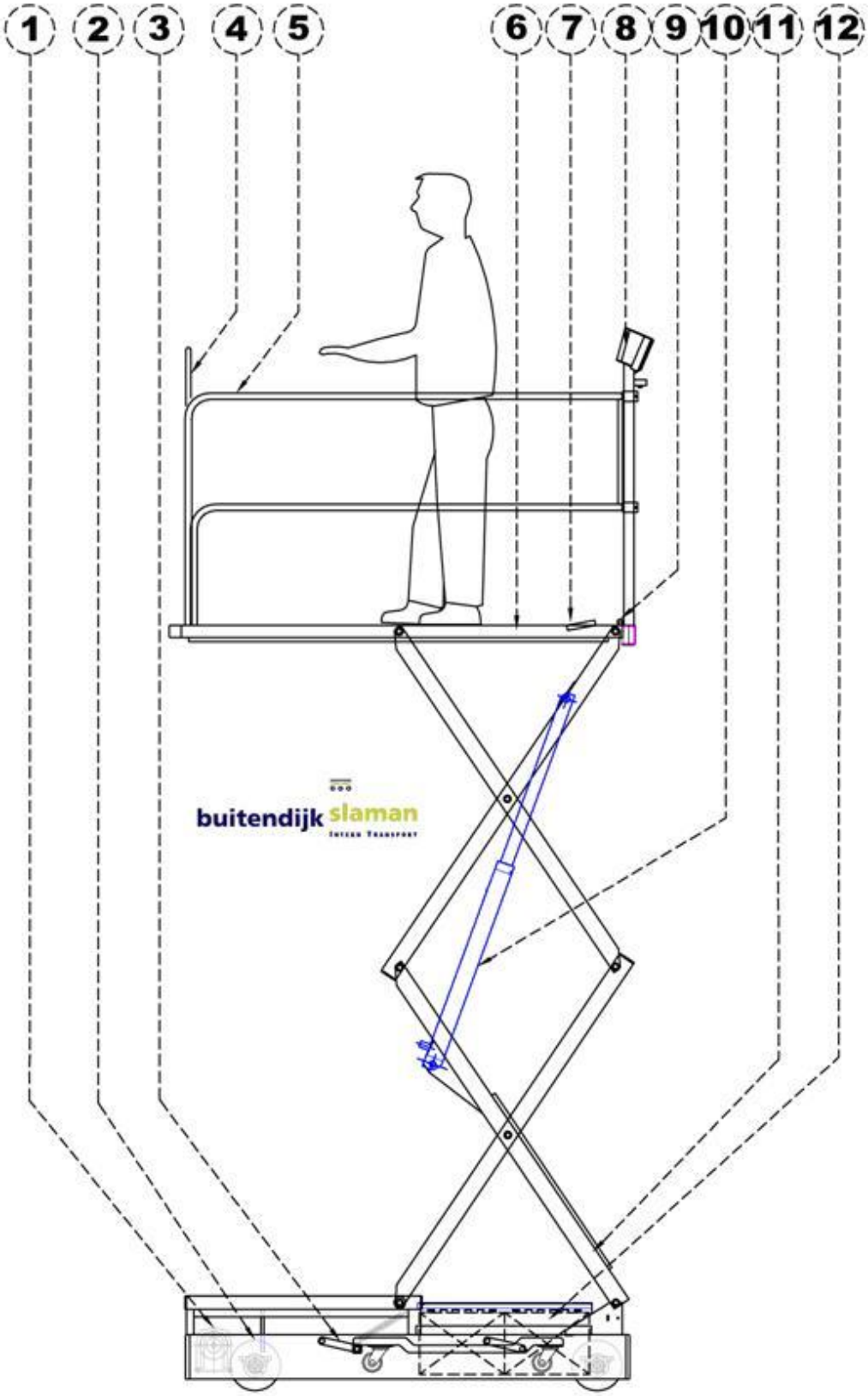
The trolley comes equipped with a height adjustable operating platform using a scissors construction. Contingent on the model, the height of the operating platform may be adjusted either manually or hydraulically. Also contingent on the model, the operating platform is furnished with 1 or 2 foot switches to drive the trolley or halt the trolley. Depending on the application, the trolley possesses either a double or triple or Quattro scissors construction.

All models come equipped with a vertical pole replete with operating panel to facilitate driving directly from a working position and adjust the height of the operating platform. The speed can be regulated at 1 locations, namely on the operating panel. For optimal energy use, it is recommended to put the speed in the desired precise speed on the operating panel.

The base is supplied with a supplementary pair of wheels that can be used to move the trolley on surfaces other than rails. A lever system or hydraulic cylinder allows the pipe rail wheels to be lifted above ground for moving the trolley through the pathways.

5.3.1 Parts pipe rail trolley MPT

1. Drive 0.37 kW
2. Wheels for pipe rail system
3. Hydraulic lifting wheels
4. Door safety fence
5. Safety Fence
6. Working platform
7. Foot pedal
8. Operating panel
9. Emergency stop
10. Lifting cylinder platform
11. Scissor construction
12. Battery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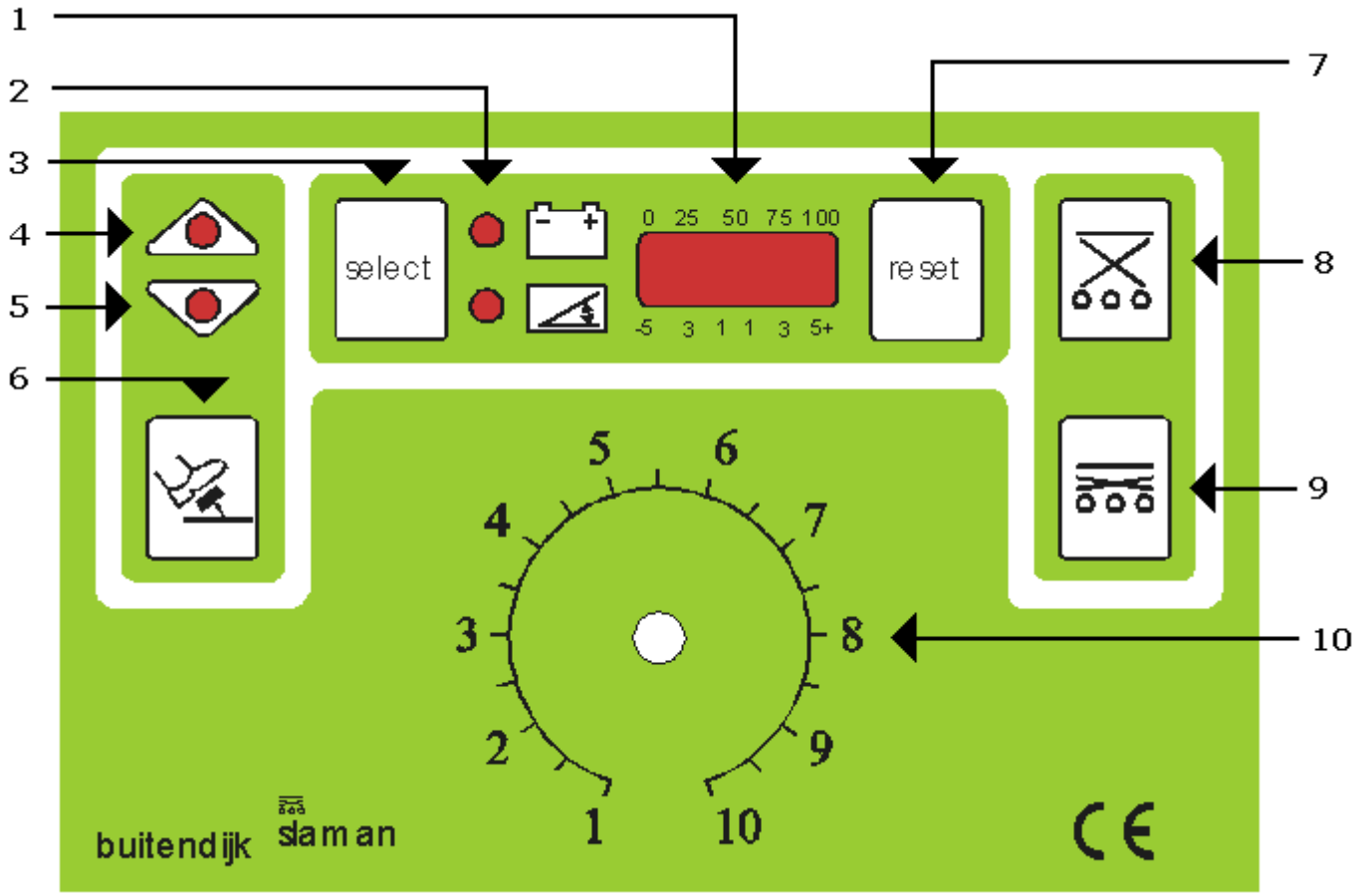
buitendijk slaman

5.3.2 **Operating Panel** (see schematic diagram)

1 Display indicating battery capacity and * angle measurement.
2 Led indicator for battery or *angle measurement.
3 Selector switch battery or angle measurement.
4 Indication / led forwards.
5 Indication / led reverse.
6 Selector switch forwards or reverse and cruise control.
7 Reset=> voltage too low a signal is given, with this switch the signal is turned off for 15 minutes.
8 Work platform up
9 Work platform down
10 Speed control

(* if applicable)



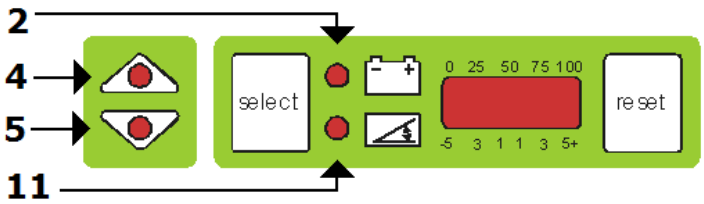
5.3.3 Cruise control

DUE TO SAFETY, CRUISE CONTROL IS STANDARD NOT AVAILABLE, ASK FOR MORE INFORMATION WITH YOUR SUPPLIER.

5.3.4 Modes and led's

In this paragraph the different pipe rail trolley modes are identified and further explained. The pipe rail trolley has different modes.

- A standard mode: (battery or delayed angle measurement), with cruise control on or off.
- A `sleep' mode.
- An options mode.
- A service mode.



The different leds indicate which mode the pipe rail trolley is in.
In the service mode beeps are also generated via the speaker. The explanation of these beeps can be found in section 8.1 "Fault codes, relayed via the speaker"

The illustration alongside shows a section of the control panel with the display and leds.

Standard mode
Once the pipe rail trolley has been started it will be in the standard mode.
Two leds are always on, in the standard mode.
These are led 4 or led 5, and led 2 or 11.
These leds indicate the following when they remain on:
- Led 4 indicates that the pipe rail trolley is in forward gear.
- Led 5 indicates that the pipe rail trolley is in reverse gear.
- Led 2 indicates that the battery charge is given in the led display.
  Display: 0% - 19V, 100% - 26V.
- Led 11 indicates that the (delayed) angle measurement in the led display is being given.
  Display ° 5 = the pipe rail trolley has an inclination of 5°, each led is thus 1°.

If in this mode led 4 or led 5 flashes slowly:
- Led 1 indicates that the pipe rail trolley is in forward gear and that the cruise control is on.
- Led 2 indicates that the pipe rail trolley is in reverse gear and that the cruise control is on.

Sleep mode
If nothing is done with the trolley for more than 5 minutes all the leds go out, except for the two leds for the battery and angle measurement. These remain flashing slowly. The trolley reacts immediately, as soon as any button or the foot pedal is pushed and displays the current battery reading or angle measurement again.

Options mode
In the options mode a range of information relating to the pipe rail trolley can be called up. One enters the options mode by pressing the `Select' button for 3 seconds.
One exits the options mode by pressing the `Select' button for 3 seconds once again.

There are 6 different settings in the options mode. A different measurement is carried out in each setting. The option that has been selected is indicated by one or more, quickly flashing, leds.

Measurement	Led	Description
1	4	The battery voltage from the control panel is displayed
2	5	The motor current that is being measured is displayed
3	2	The valve current that is being measured is displayed
4	11	The fault code is displayed
5	4+2	The status of the proximity sensors is displayed If the proximity sensor detects steel an OK beep is given and one led in the display is switched on
6	5+11	The angle measurement is displayed without delay

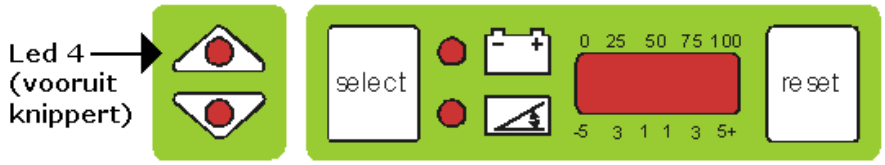
Option mode 1 – Battery voltage (Control Unit)
If led 4 flashes, then the led display is indicating the battery voltage of the Control Unit:
0% - 19V, 100% - 26V, each led is thus 0.7V
Option mode 2 - Motor current
If led 5 flashes, then the led display is indicating the current measured from the motor:
0% - 0A, 100% - 40A, each led is thus 4A.
Option mode 3 - Valve current
If led 2 flashes, then the led display is indicating the current measured from the motor:
0% - 0A, 100% - 4A, each led is thus 0.4A.
Option mode 4 - Fault codes (see 8.1)
If led 11 flashes, then a fault may have been detected. If a fault arises, then this will be transmitted by means of a fault code via the speaker. A fault code consists of a number of long and a number of short beeps. The number of long beeps indicates in which category the fault has arisen, this is also given on the display. The number of short beeps indicates the specific fault.
The 3 categories are: 1 General faults.
2 Motor faults.
3 Valve faults.
Option mode 5 - Proximity control
Active proximity sensors are displayed with two leds in the display, from left to right
1 + 2 : Control Unit - proximity sensor 1
3 + 4 : Control Unit - proximity sensor 2
5 + 6 : Motor Unit - proximity sensor 1
7 + 8 : Motor Unit - proximity sensor 2
9 + 10 : Motor Unit - proximity sensor 3
Option mode 6 - Angle measurement
If in this mode the angle led is active, then this indicates the undelayed angle measurement, this is for adjustment:
-5° = the pipe rail trolley is inclined at 5°
+5 = the pipe rail trolley is inclined at 5°.
Each led is 1°.

5.4.1 Tilt indicator

Standard, a tilt indicator with alarm has been built-in in the pipe-rail trolley. This alarm warns the driver of the pipe-rail trolley with use of an acoustic alarm if the pipe-rail trolley is 2° or more tilted. The signal sound with 1 long and 3 short beeps. Or with 1 long and 5 short beeps. When this alarm sounds, de driver of the pipe-rail trolley should stop the pipe-rail trolley, lower the platform completely and exit the pipe-rail trolley immediately. Before the pipe-rail trolley can proceed driving on the pipe-rail system, the pipe-rail system should be checked if it is level and stable enough to be driven with a pipe-rail trolley. Always be sure that the pipe-rail system is level and stable enough. When there is any doubt, do not enter the pipe-rail system with a pipe-rail trolley. For more information, we would like to refer you to chapter 2.4 in this manual.

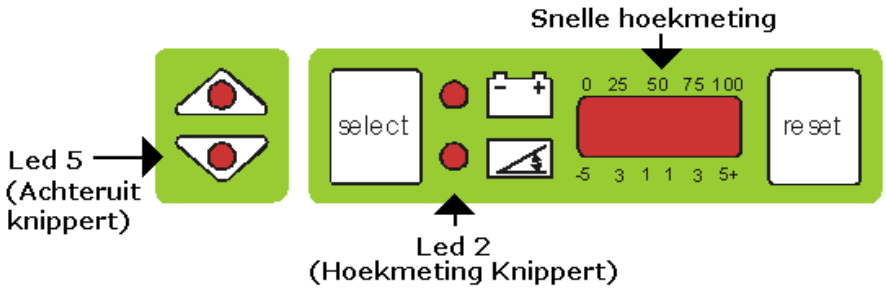
5.4.2 Calibrating the tilt indicator

1. Be sure that the trolley is standing flat on the concrete.
2. Switch off the emergency button, trolley starts up.
3. Press the '**select button**' en keep it in for 3 seconds



If you hear a BEEP; now you are in the option menu, Led 1 (forward) blinks.

4. Press now shortly the '**select button**' 5 times,



Now you are in the option mode 6, led 2 and led 4 blinks. The display shows the position of the level.

5A. By the new version boards you can reset it automatic:
   a. Press the '**reset**' button in and keep it in, press directly after this the reversing button in and keep this also pressed.
   b. After 2 seconds you hear a beep -> 'OKE beep.
   c. The trolley is going to beep now; you can release the buttons now.
   d. The level indicator is now calibrating.
   e. The level indicator must be stabile for 3 seconds.
   f. If the calibration is oke, you hear an **'OKE beep**.
   g. If the calibration is fault, you hear a faulty **beep**.

6. **READY!** The level indicator is reset. Press the emergency button to come out of this mode.

Service mode
This mode may only be used by the maintenance fitter, after they have received full instructions from Buitendijk-Slaman BV.

5.5 Batteries (beware acid)

By the type MPT you have to remove the aluminium hedge to enter the battery
The traction (or semi-traction) batteries supplied are either Varta or Hawker batteries.

Some directions for the use and maintenance of your batteries
*
Check fluid levels on a weekly basis.
The battery fluid must be at least 1cm above the plates.
Only fill with distilled water.
*
Sulphation
Batteries gradually become empty due to self-discharge. If the batteries remain in a discharged condition they will sulphate and will be irreparably damaged.
We therefore recommend that the electro tractor / trolley be re-charged at least every three months if it is put in storage.
*
The specific gravity of the acid should be checked on a weekly basis using an acidimeter. The density of fully charged batteries is 1.28kg/l. (sin) 1.28 kg/1.

100% sm 1.	1.28 kg/1 =	25.4 volt	40%	1.17	24.2 Volt
80%	1.24	25.0 volt	20%	1.14	23.8 Volt
60%	1.21	24.6 volt			

*
Immediate recharging empty batteries substantially increases their lifespan. The lifespan is adversely affected if the batteries are discharged below the 20% level.
*
When recharging batteries always connect the batteries to the charger prior to turning the charger on. Conversely, when recharged, turn the charger off before disconnecting the battery.
*
The gases released during battery recharge are extremely explosive. It is therefore crucial to prevent open flames and sparks during the recharging process. Battery recharging may only be carried out in a well-ventilated area.
Excessive recharging may damage the batteries as the battery fluid boils for a long time. It is advisable to use a modern battery charger with automatic cut-out.
*
Never interrupt the recharging process until complete.
During battery recharge do not repair, clean or carry out any other activities to the pipe rail trolley. When disconnecting the batteries, first disconnect all power consumers in order to avoid spark formation.
*
The negative cable (-) needs to be disconnected first when disconnecting. Conversely, when installing, connect the negative cable (-) last.

Attention! Always connect the positive (+ = red) to the positive pole and negative (- = blue) to the negative pole.
*
Battery fluid is a corrosive acid – any contact with clothes, skin and eyes must be avoided
In the case of splashes on skin or clothes, wash immediately with water and soap. Subsequently rinse with plenty of water. Acid splashes in the eyes should be rinsed with clean water for at least 5 minutes and medical advice sought immediately.
*
When replacing batteries, your old batteries must be handed in to your supplier or local authority.

*
The pipe rail trolley may only be used if you have studied the preceding pages thoroughly and you have no questions.

6 MAINTENANCE

6.1 Greasing and maintenance schedule.

d = daily m= monthly o = oil
w = weekly y = once per year g = grease

	o / g	d /w / y
1 clean work platform, control panel and foot switch	-	d
2 check oil level in motor (VG220)	o	y
3 check oil level in hydraulic unit Hyd.46	o	m
4 check battery charges, depending on intensity of usage	-	d
5 check battery fluids / fill with distilled water	-	w
6 clean carbon brushes in electromotor	-	y
7 change carbon brushes	when shorter than 1 cm.	
8 lubricate hinges and pivoting points; lever, scissors, push-up wheel frame	o	y
9 lubricating nipples, bearings of the pipe rail wheels, push-up wheels	g	y

6.2 Technical maintenance.

Maintenance activities and repairs to the components stated below may only be carried out by a qualified professional who is recognised by the factory:
- All maintenance to electrical components and cabling.
- All maintenance to the hydraulic system.
- All maintenance to the drive motor with variator

You can carry out the maintenance stated below yourself.
- Check and top up oil level.
- Clean, re-adjust or change chain and chain wheels.

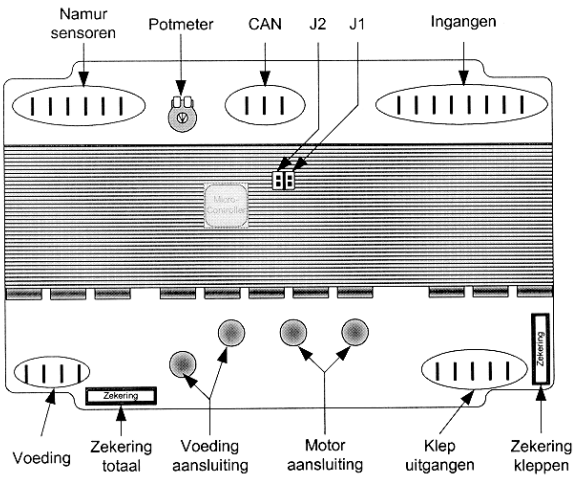
6.3 Connections on the motor unit (print at the bottom of the trolley)

The motor unit has 7 inputs and 2 jumper inputs.
The inputs are the second means of control.
So, the motor unit can still function without a control unit.

The Motor Unit's in- and outputs (in the panel)

The inputs
The inputs Table up, Table down, Wheel up and Wheel down, have the same function as on the control unit. The difference is the Mtr left (steer the motor left) and the Mtr right (steer the motor right) input.

The potentiometer
The potentiometer may only be adjusted by a service fitter recognised by Buitendijk-Slaman.



Further connections on the rear side:
Proximity sensors (namur)
The proximity sensors are connected here, ensure that the `+' and the `-` are properly connected.
CAN
This is where the CANbus is connected.
Main fuse (on the power supply)
This is to protect the pipe rail trolley to 50A.

Valve fuse (on the valves)
This is to protect the valves to 4A.
Microcontroller
This is the control chip that contains the software.

-

Jumper J1
Is for selecting the table's proximity sensor.
- No Jumper : the Motor Unit's proximity sensor 2 is used.
- Jumper : the Control Unit's proximity sensor 1 is used.

Jumper J2
Is for selecting the valve system 1 (including wheel chassis) or system 2 (without wheel chassis).
- No Jumper : the valve system is system 1.
- Jumper : the valve system is system 2.

Motor connection
This is where the motor is connected.
Valve outputs
The valves are controlled via these outputs.
Supply connection
This is where the battery is connected.
Supply
This is where the supply for the Control Unit is connected.

6.4 Annual maintenance
Depending on the maintenance schedule, chapter 6.1, and the intensity of use, it is advisable to carry out this maintenance at least once per year. Maintenance and repairs may only be carried out by qualified professionals recognised by Buitendijk-Slaman B.V.
If in doubt always consult your supplier.

6.5 Periods of inactivity
If the pipe rail trolley is not going to be used for a period of time it is necessary to connect the battery charger to keep the batteries in good condition.

7 ENVIRONMENT

7.1 General
Remnants of lubrication oil, hydraulic oil, oil cleaning rags and cleaning agents should be kept apart and disposed of as chemical waste.

7.2 Affects on the Environment

Lifespan
The lifespan of the pipe rail trolley is largely contingent on the level of maintenance, operating hours and conditions (dust, contamination, humidity, etc).
The lifespan of the trolley is in direct accordance with the level of maintenance.

Removal
It is preferable that removal and processing be executed by a recognised dismantling or scrap firm in possession of the relevant licenses. Assign a competent responsible staff member to supervise the removal process.

Waste removal
Assign a competent responsible staff member to supervise the removal process of waste. Sort out the dismantled materials according to material characteristics and contamination. Separate all materials classified as chemical waste such as oil, lubricants and certain electrical components, and dispose of accordingly.
Present remnants only to recognised waste processing firms in possession of the requisite licences.

8 TROUBLESHOOTING GUIDE

In the event of a fault, do not use the pipe rail trolley until all necessary repairs have been made.

8.1 Fault codes relayed via the speaker

If a fault occurs this will be indicated by a fault code relayed via the speaker. A fault code consists of a number of long and short beeps. The number of long beeps indicates which category the fault has arisen in, these are also indicated on the display in options mode 4 and service mode 4.
The number of short beeps indicates the specific fault.

Long beeps	Short beeps	Fault description
1	1	Battery current too low (less than 22.8V)
1	2	Can communication error
1	3	Angle fault 3 degrees
1	4	Bad connection
1	5	Angle fault 5 degrees
1	6	Button on the front is stuck or broken.
1	7	Input active, knob or foot switch is stuck.
2	1	Lifting wheels not high enough cannot drive.
2	2	Motor needs too much current.
2	3	Defect print or motor incorrectly connected.
2	4	Temperature to high (>60°)
2	5	Fet is broken (part on circuit board)
2	6	Motor input active when the motor unit is started.
3	1	Lifting wheels not high enough, the table can't be raised.
3	2	Scissor table too high, the wheel chassis can't be lowered.
3	3	Battery current too low to operate the pump <17.1V
3	4	Operate Lifting wheels while driving.
3	5	Valve of hydraulic pump take to much power.
3	6	Hydraulic pump active when starting.

9 MOST REQUESTED COMPONENTS

If required you can ask for a comprehensive components list for your model.

DECRIPTION	ART. CODE
Battery clamp -/-	ACCUKLEM -/-
Battery clamp +/+	ACCUKLEM +/+
Battery traction PB 110 Amp.(5h)	ACC12120VPB
Box for main circuit board 225x175x100	KAST225X175
Cable 7 x 1,50 qmm.	KAB07X1,5QMM
Cap for battery clamp black	ACCUKLEMKAPZW
Cap for battery clamp red	ACCUKLEMKAPR
Cartridge 2/2 , EVH041/C5-24C-00-00	ZITTINGVENT AGG V2
Chain 5/8" single vernikkeld	KET5/8EV
Chain link 5/8	SCH5/8EV
Cilinder 20x115mm (lifting wheels)	CILP115
Cilinder 50x690mm.	CILP50X690
Circuit board JGA314 with angle indicator (control box)	PRIEBVV2HOEK
Circuit board motor JGA312K	REGEMOT
Connector strip 401/12 28mm. (Under the deck)	CON
Feet pedal	VOESCH
Flow regulator VCST-14	STRO
Front plate for control panel	PLAKFRONT314
Fuse 70 amp.	ZEK70
Fuse Holder 15.2001 70Amp.	ZEKHOU70
Grease nipple M6 -H1	SMEM6-H1
handle star model M6 x 16	HANSTERM616
Hydraulic unit complete with plastic tank 3,3l	AGGV-T3,3L
Jumbo derrick wheel 80x36 Alu/Poly	BOKW080X36
Key for main power switch	HOOSLEU
Main power switch incl. red key	HOO
Motor 370 Kw, 24 volt	MOTOB360
Motor reductor G11+0,37 kW. motor	MOTDRG11 EBV
Namur Sensor SI 18 N5 SC	SENNAMUY1X
Prop for cilinder Ø25	PROPCIL SPR
Push button galvanized short model	DRUVVK
Push button red (emergency)	DRUKRO 1
Rear contact ZB4-BZ102 NC	ACHK 102 1
Slewing Wheel 80x36 Alu/Poly	ZWEW080X36PB
Socket ceeform type 603	STOPPAARS
Sprocket 5/8 10T, hole 20	PLA5/81020
Stainless steel spring 160 bo.-26HoH-4mm	VEER160-26RVS
Swith on-on	SCHKKAN20-63 VEREND

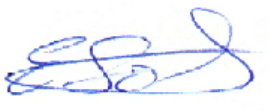
10 CE-DECLARATION OF CONFORMITY

Pipe rail trolley Model : MPT-2 ☐
MPT-3 ☐
MPT-4 ☐

Serial number .....

Final inspection date .....

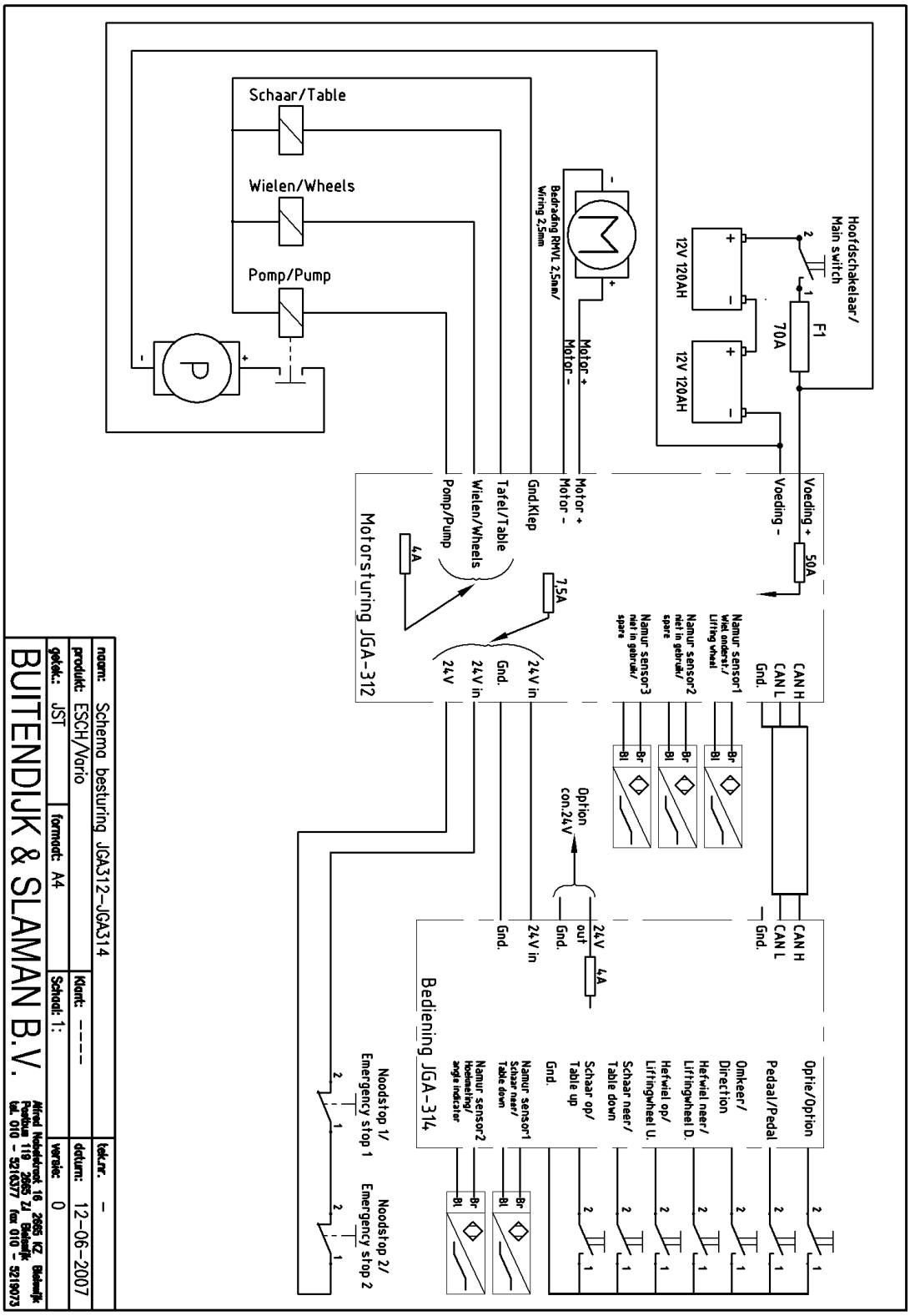
Buitendijk-Slaman B.V. Zernikestraat 2, 2665 JJ Bleiswijk hereby declares that the above pipe rail trolley fully meets the stipulations of the most recent 2006/42/EG Machinery Directive



E. Sol (Director)

Buitendijk-Slaman B.V. Zernikestraat 2 2665 JJ Bleiswijk

Appendix 1 : Electric schedule Pipe rail trolley type MPT



Appendix 2 : Battery charger pipe rail trolley type MPT

INSTRUCTIONS FOR MGX BATTERY CHARGERS

The battery chargers of the MGX series are controlled by an internal microprocessor that enables automatic recharging of batteries and stores the behaviour of the battery charger during its use.
This device has been developed for a professional use. For best results and safety, the user is required to read, follow and keep these instructions carefully.
The manufacturer is not responsible for any damage due to improper use.

BATTERY
The battery voltage has to correspond to the MGX rated voltage (see rating data, for example 24V).
A label on the MGX indicates the correct rechargeable battery type. Check that it matches the features of your battery. If necessary, it is possible to change the programming in order to adapt the MGX to your battery. Make contact with the supplier in order to carry out this change.

INSTALLATION
To ensure maximum safety, installation has to be carried out as indicated by the manufacturer.
Any work on the charger must be carried out by qualified and authorized technical personnel.
WARNING: There is risk of electric shock inside the box.
After unpacking be sure that the device is in perfect condition; in case of doubt, do not use it and contact the supplier. It is better to install the MGX indoors, in a room free of humidity, acids or dust, with room temperature between 0 - 40°C. During use do not obstruct the ventilation holes. Any overheating of the MGX will reduce the output current; if overheating continues, charging will be stopped (see SPECIAL SIGNALS).

ELECTRICAL SUPPLY
Be sure the rating data of the battery charger is compatible with the mains power supply (single-phase, voltage, frequency, power) . Plug into a socket equipped with protections that comply with local standard regulations. If you have to use an extension cable, contact the manufacturer for correct technical information.
The replacement of the supply cable has to be carried out only by qualified personnel.

BATTERY CONNECTION
Respect the polarity: red wire to + and black wire to -.
Do not use extension cables without the manufacturer's approval.

USE
Connect the battery and the power supply cable. LEDs light up for 2 seconds (PAN. 1), then only the RED LED stays on (PAN. 2). If this does not happen, check the connection on the battery and supply.
The MGX is unable to activate the charging if the voltage of the battery is lower than 0.3 V/Cell (i.e., 3.6V for a 24V battery).
If everything is functioning properly the charger performs the whole charge and stops with the GREEN STOP LED illuminating (PAN. 3).
The time of charge depends on the discharge level, the battery type and the programmed charge cycle.
For lead acid, gel or AGM batteries, 80% discharged, the whole recharge lasts 10-14 hours.

Shorter times are possible if the battery is less than 80% discharged.
Longer times are possible if the battery is more than 80% discharged.

SPECIAL SIGNALS
When the microprocessor detects a problem, it stops charging and signals this by flashing the two LEDs (PAN. 4). The different possible problems are:

- overheating: the thermal conditions interrupt the current in order to avoid damage
- defective battery: the voltage trend shows a possible failure of the battery
- incorrect battery: the battery has a higher voltage than the charger (36V battery on a 24V charger).

In order to determine the kind of problem it is necessary to read the internal MGX data memory (see DATA MEMORY section).
If the two LEDs remain lit (connecting the battery) (PAN. 6), means an internal problem has occurred. Only the manufacturer can solve this problem.

Appendix 3 : Battery charger for pipe rail trolley type MPT (built in)

INSTRUCTIONS FOR POWER-SWITCH BATTERY CHARGERS (PSW)

The battery chargers of the PSW series use the high frequency technology, which enables them to be compact, light and efficient and to have a constant and repetitive behaviour. An inner microprocessor enables the automatic recharging of batteries and stores the behaviour of the battery charger during its use.
This device has been developed for a professional use.
For best results and safety, the user is required to read, follow and keep these instructions carefully.
The manufacturer is not responsible for any damage due to improper use.

BATTERY
A label on the PSW indicates the correctly rechargeable battery type. Check that it matches with the features of your battery. If necessary, it is possible to change the programming in order to adapt the PSW to your battery. Take contact with the supplier in order to carry out this change.

INSTALLATION
To ensure maximum safety, installation has to be carried out as indicated by the manufacturer.
Any work on the charger must be carried out by qualified and authorized technical personnel.
Never open the metal container: it is not necessary to get inside for installing operations.
ATTENTION: danger of hard shocks inside the container.
After unpacking, ascertain that the device is in perfect condition; in case of doubt, do not use it and contact the supplier.
It is better to install the PSW indoors, in a room free of humidity, acids or dust, with room temperature between 0 e 40 °C. During use do not obstruct the ventilation holes. Any overheating of the PSW will reduce the delivered current; if overheating goes on, charging will be stopped (see SPECIAL SIGNALS).
Do not use extension cables without the manufacturer's approval.
Plug into a socket compatible with the voltage, frequency and power features required by the PSW (see rating plate).
FIXED INSTALLATION: considering the small weight, in order to avoid damages due to falls, we recommend to fix the PSW firmly to the wall. For the fixing holes see Fig.3.
ON BOARD INSTALLATION: fix the PSW in a well protected area of the vehicle, which enables a correct elimination of the produced heat. It is better to use vibration-damping supports. Connect the PSW cables directly to the battery poles; never use cables belonging to the vehicle equipment. Any non-compliance with this rule can cause malfunctioning or damages which cannot be attributed to the manufacturer.

BATTERY CONNECTION
More information are available in the ADDITIONAL FUNCTIONS section.
Respect the polarity: red wire to + and black wire to -.
Incorrect connection does not cause any damage, but prevents the charging cycle from starting.
Do not use extension cables without the manufacturer's approval.

USE
Connect the battery and the net cable. LEDs light up for 2 seconds (PAN. 1), then only the CHARGE LED stays on (PAN. 2). If this does not happen, check the connection to the battery and to the net.
The PSW is unable to activate the charging if the voltage of the connected battery is lower than 1 V/el (i.e., 12V for a 24V battery).
If everything is functioning properly the charger performs the whole charge and stops with the STOP LED lighting up (PAN. 3).
The length of the charge depends on the discharge level, on the battery type and on the programmed charge cycle.
For lead acid, gel or AGM batteries, 80% discharged, the whole recharge lasts 12-14 hours.
For lead acid batteries it is possible to reduce the time to 7-8 hours programming the fast cycle (not available on all models).
Shorter times are possible if the battery is less discharged than 80%.
Longer times are possible if the battery is more discharged than 80%.

SPECIAL SIGNALS
When the microprocessor detects a problem, it stops charging and signals it by making the two LEDs flash (PAN. 4). The different possible problems are:
- overheating: the thermic conditions make the current output stop in order to avoid damages
- defective battery: the voltage trend shows a possible failure of the battery
- wrong battery: the connected battery has a higher voltage than the charger (36V battery on a 24V charger).

In order to determine the kind of problem it is necessary to read the inner PSW data memory. Take contact with the supplier in order to carry out this operation.
If the two LEDs keep lighting (connecting the battery) (PAN. 8), it means that an inner problem occurred, which only the manufacturer can solve.

CHARGE INTERRUPTION
Power outages interrupt charging and all LEDs go out (PAN. 5); when power returns to the mains charging starts again where it was interrupted.
If charging has to be interrupted for any reason, switch off the charger through the button and disconnect the battery.
To activate the STOP, keep the button pushed until the STOP LED begins to flash (PAN. 6).
Never disconnect the battery if the charger is supplying current, as the break-off spark could ignite the gases produced by the battery and cause an explosion.
For best charging, disconnect the battery only when the microprocessor indicates STOP (PAN. 3).

HOLDING
If you leave the PSW fed and connected even during long inactive periods, it is possible to maintain the battery always 100% charged.
At the end of a charge cycle (device indicating STOP – PAN. 3) the holding starts: when the battery voltage falls under a minimum level the PSW goes into operation and supplies a small current in order to let the battery voltage reach a maximum level and then it stops. These charging pulses can be repeated when necessary without limit. The length of each pulse and the time among the pulses depend only on the battery condition. During the charging pulses the display indicates STOP (PAN. 3).
If charging is interrupted through the button (PAN. 6), the holding does not start.
We advise not to leave the PSW connected to the battery without net feeding for more than one week. If not fed, the PSW absorbs energy from the battery and may cause its total discharge.

DATA MEMORY
The inner microprocessor can store a remarkable quantity of information through the whole life of the PSW. These information can be read only by the supplier who owns the suitable terminal to be linked to the programming connector shown in Fig. 2.
Reading these information allows detecting the problems' cause: it becomes easy to understand whether they depend on a bad functioning of the charger or of the battery.
It is also possible to understand whether the problems are caused by the non-compliance of the user with the rules. Be particularly careful while reading the user's handbooks.

ADDITIONAL FUNCTIONS
This section contains directions for the on board-assembled PSW.
When the PSW is assembled on board, the LEDs are often not visible. It is possible to add an outer display in order to place the control LEDs in a visible area. Ask for it to the supplier and link it to the auxiliary connector indicated in Fig. 1.
The PSW has two auxiliary contacts , to be correctly connected to the vehicle equipment, with following functions:
- net presence: the contact is normally closed; it opens when the PSW is fed for the recharging. It has to stop the vehicle during the recharging phases (contacts 1 and 7 of the auxiliary connector to be seen in Fig. 1);
- discharged battery: the contact is normally closed; it opens when the battery voltage is lower than the programmed value. It has to stop the vehicle when the battery has exhausted 80% of its energy (contacts 3 and 5 of the auxiliary connector to be seen in Fig. 1).

When the PSW goes into operation for discharged battery, it makes the BLOCK LED (only visible on the outer display) light up and it stops the vehicle.
In order to remove this block it is necessary to carry out a complete recharging.
The PSW is able to signal to the user the need of a technical maintenance. When this happens, the PSW makes the two LEDs flash alternately (PAN. 7). Take contact with the supplier.

GENERAL RECOMMENDATIONS
Do not let the battery run down completely (maximum 80%); this will let it last longer.
Keep the battery contacts free of oxidation.
Keep the charging area ventilated.
If replacement of the feeding cable is necessary, it has to be carried out by qualified and authorized personnel.

MAINTENANCE
Keep the fan and the ventilation holes clean.
To clean the outside, use a damp cloth.
Use only original spare parts.