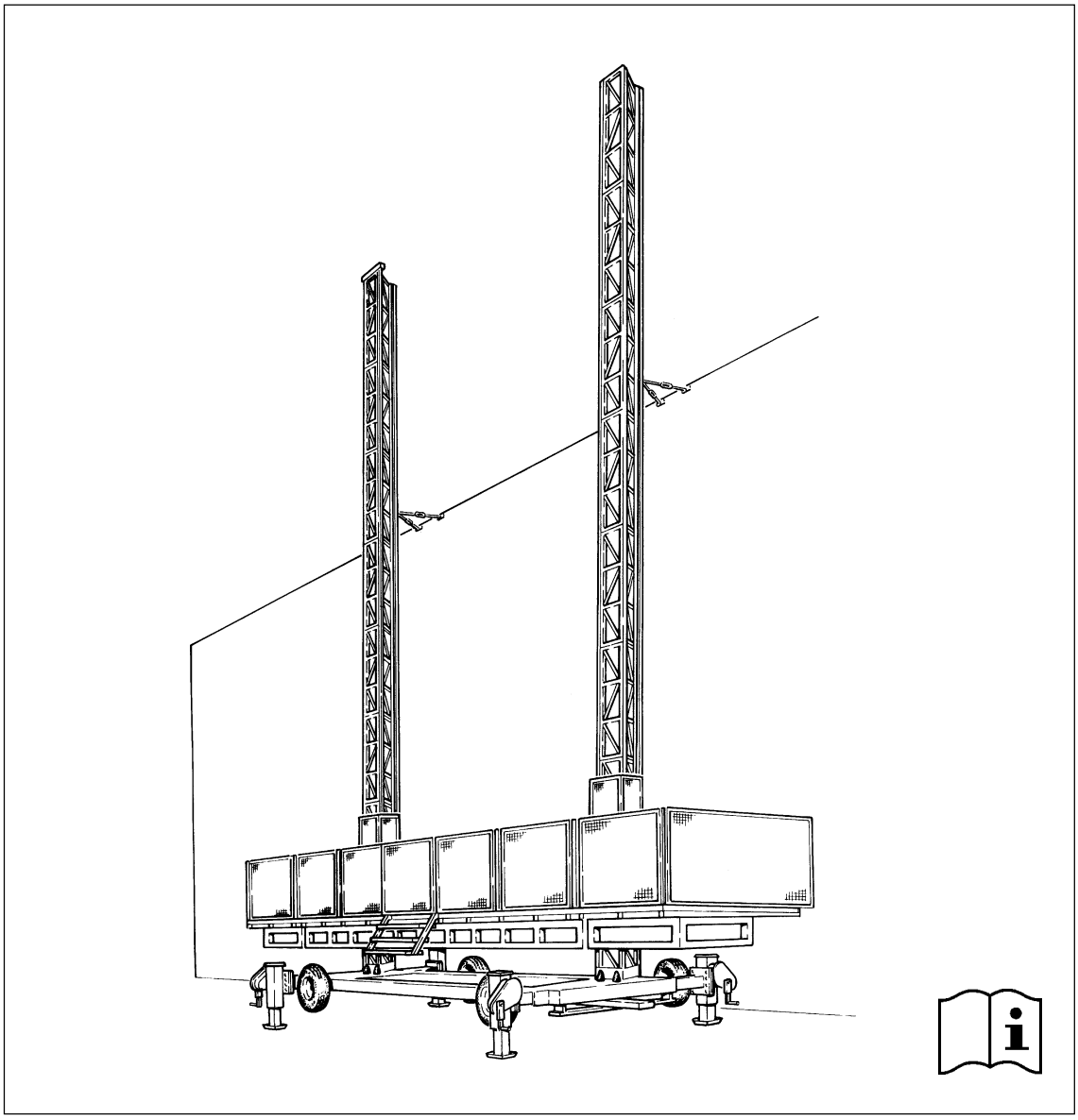
USER'S MANUAL

MS 3000

MAST CLIMBING WORK PLATFORM



This manual is assigned to:

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FOREWORD

The mast climbing work platform is provided with a rack and pinion drive.

The mast climbing work platform can be quickly moved and is easy to transport.

The mast climbing work platform can be freestanding or anchored.

The mast, which consists of separate elements, can easily be adjusted in height to match the height of the building work. The mast is easy to assemble from the platform.

The platform can be adjusted to the shape of the façade.
The MS3000 mast climbing work platform has a control system which makes it possible to stop at any desired height.

Every care has been taken in the construction of the mast climbing work platform to ensure that all safety aspects have been considered.

Depending on the application area, a choice can be made from different platform lengths, platform widths and permissible loading.

This instruction manual describes only the basic machine, in the standard form supplied by HEK Manufacturing BV.

Read this instruction manual carefully before using the mast climbing work platform. Take all the safety precautions as described in chapter 3 into account.

CONTENTS

SURVEY OF ILLUSTRATIONS

EC DECLARATION OF CONFORMITY

EC declaration of conformity for machines

(pursuant to Annex IIa of the Machine Directives 89/392/EEC)

We, HEK Manufacturing bv
Westelbeersedijk 18
5091 SM Middelbeers
The Netherlands

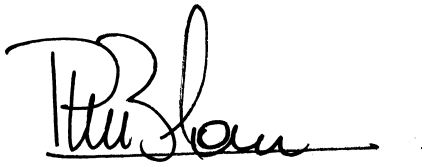
hereby declare that, on the basis of its design and construction, the mast climbing work platform named below and brought into circulation by us conform to the relevant basic safety and health requirements contained in the EC Machine Directives.

Changes made to the machine without our consent invalidate this declaration.

This declaration applies to the mast climbing work platform:

HEK MS 3000

In accordance with:	EC Machine Directives 89/392/EG, Annex IV, including 91/368, 93/44
EC number:	08/205/A 16-4912C, 06-01-1997
Certified by ('Notified Body'):	TÜV HANNOVER/SACHSEN ANHALT E.V. HANNOVER, GERMANY
Date/Manufacturer's signature:	Middelbeers, the Netherlands, November 1st 1999



Signatory: P.M. Blom, deputy manager

MEANING OF THE SYMBOLS USED

WARNING
Failing to (exactly) comply with the working or operating instructions may lead to serious injury, fatal accident, severe mechanical damage or operating losses.

During use, no person may stand **under** the machine.

Danger: High voltage.

Danger of falling objects.

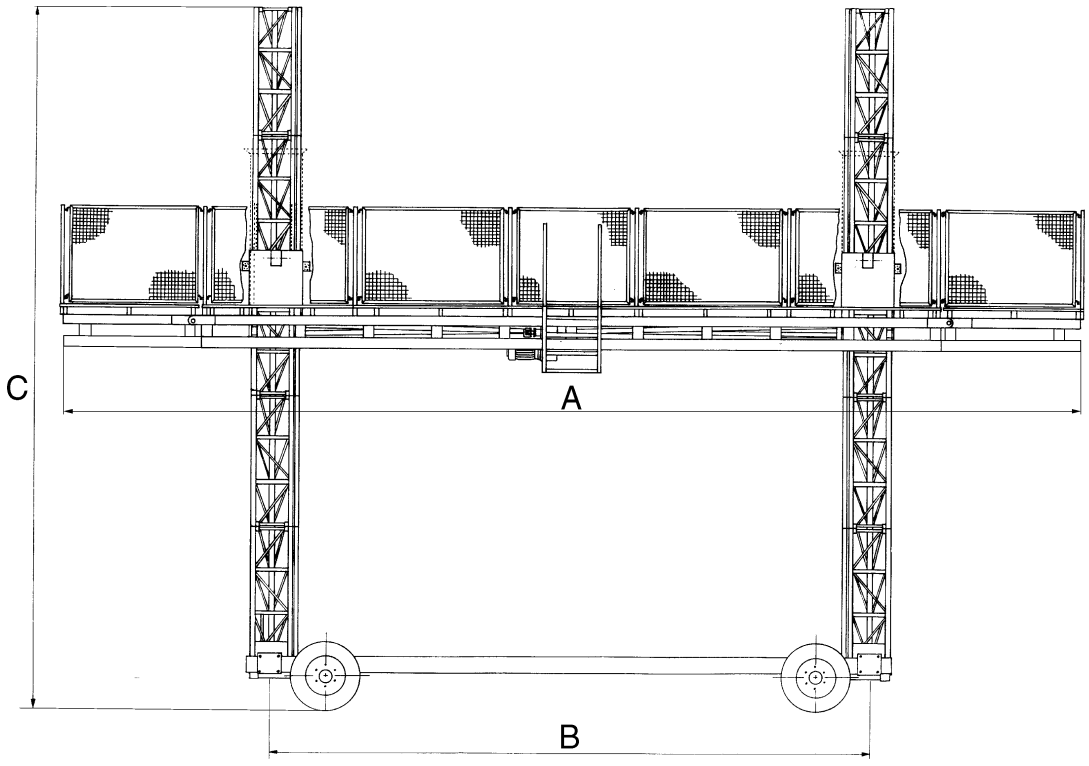


Fig.1 Dimensions

1. TECHNICAL DETAILS

1.1 General

Description	MS 3000
Platform length (A) [m]	8.5 - 15
Platform width [m]	1.5 - 2.5
Distance between mast centres (B) [m]	6.9
Max. anchor distance [m]	6
Max. mastheight free-standing (C) [m]	8
Max. mastheight anchored (C) [m]	100
Max. mastheight above last anchor [m]	0
Mast type	DRK500
Max. number of persons	3
Platform speed [m/min.]	4.7
Loading capacity [kg]	see section 1.4
Height of first anchor [m]	8

Note:
The details are based on standard applications. In special situations, it may be possible to deviate from these. This may only be done with the prior written approval of the supplier.

For accessories and options see the accessory book.

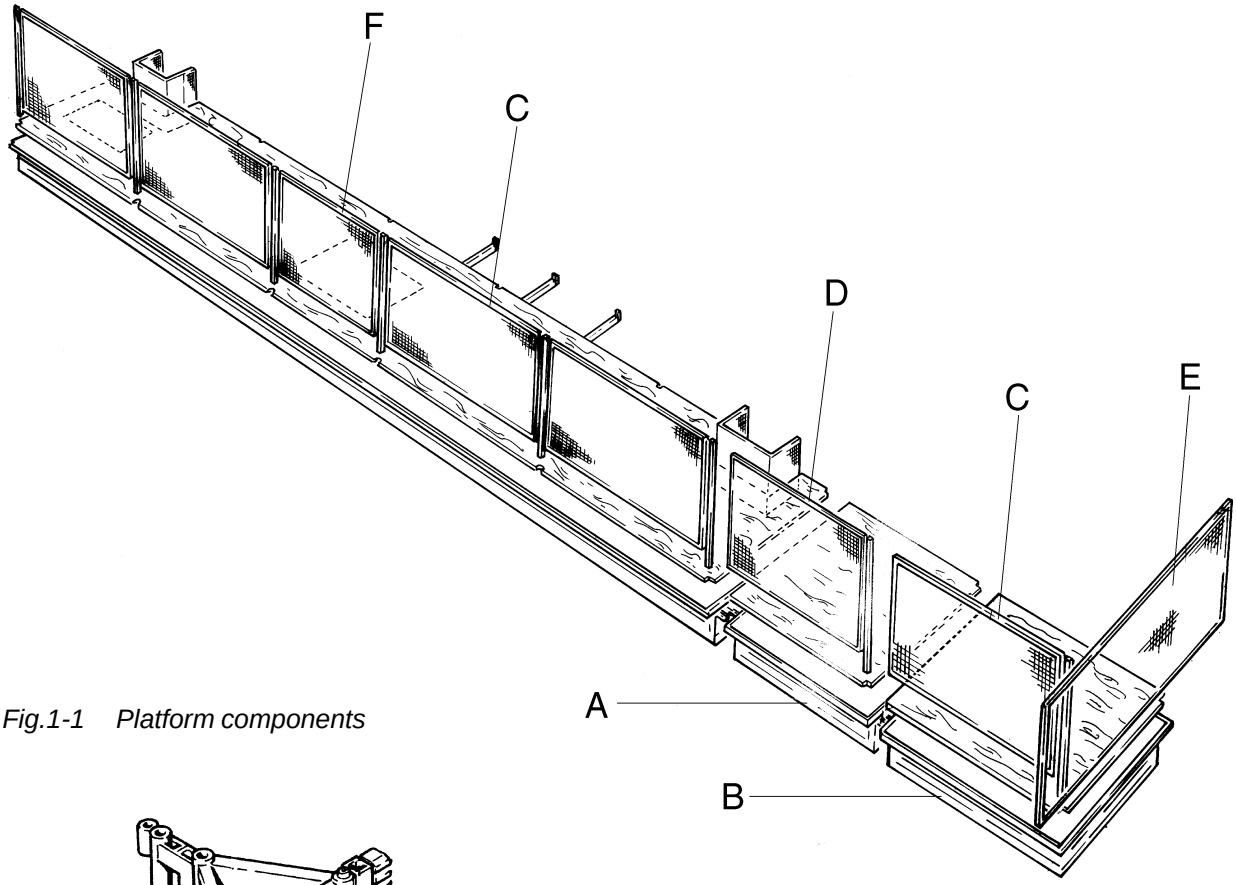


Fig.1-1 Platform components

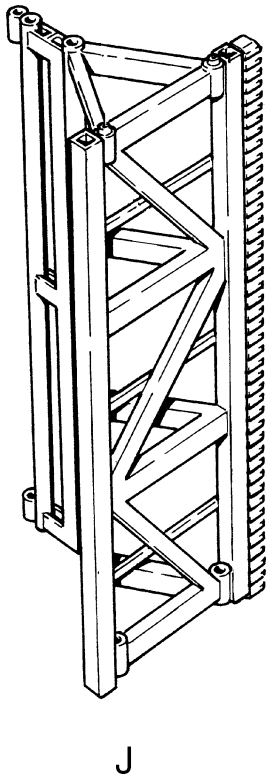


Fig.1-2 Mast element

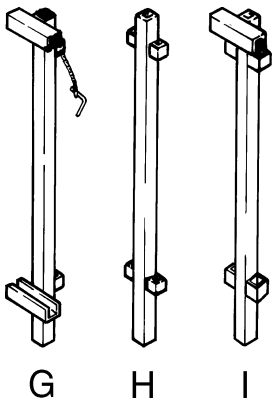


Fig.1-3 Fence posts

Part	l x b x h [mm]	weight [kg]	No. of bolts	bolt dim. & quality	torque [Nm]	other
Basic machine 8.5 m	8500x2350x1920	4415	---	---	---	Max. platform extension façade side 1000 mm
Mast element 150	1508x570x565	86	4	M16 x 150 qual. 8.8	150	Module 8
Platform element 150	1500x1500x500	198	---	---	---	Max. platform extension façade side 1000 mm
Platform element 175	1750x1500x500	205	---	---	---	Max. platform extension façade side 1000 mm
Plug-in fence 150	1425x30x1080	16.2	---	---	---	---
Plug-in fence 175	1605x30x1080	18.2	---	---	---	---
End fence	3000x30x1080	32.0	---	---	---	---
Gate	1605x30x1080	17.1	---	---	---	---
Lengthwise post	1195x45x120	3.2	---	---	---	---
Gate side post	1210x110x120	3.4	---	---	---	---
End side post	1245x118x100	4.0	---	---	---	---

Meaning of the letters page 2-1:

A = Platform element 150
B = Platform element 175
C = Plug-in fence 175
D = Plug-in fence 150
E = End fence
F = Gate
G = Lengthwise post
H = Gate side post
I = End side post
J = Mast element 150

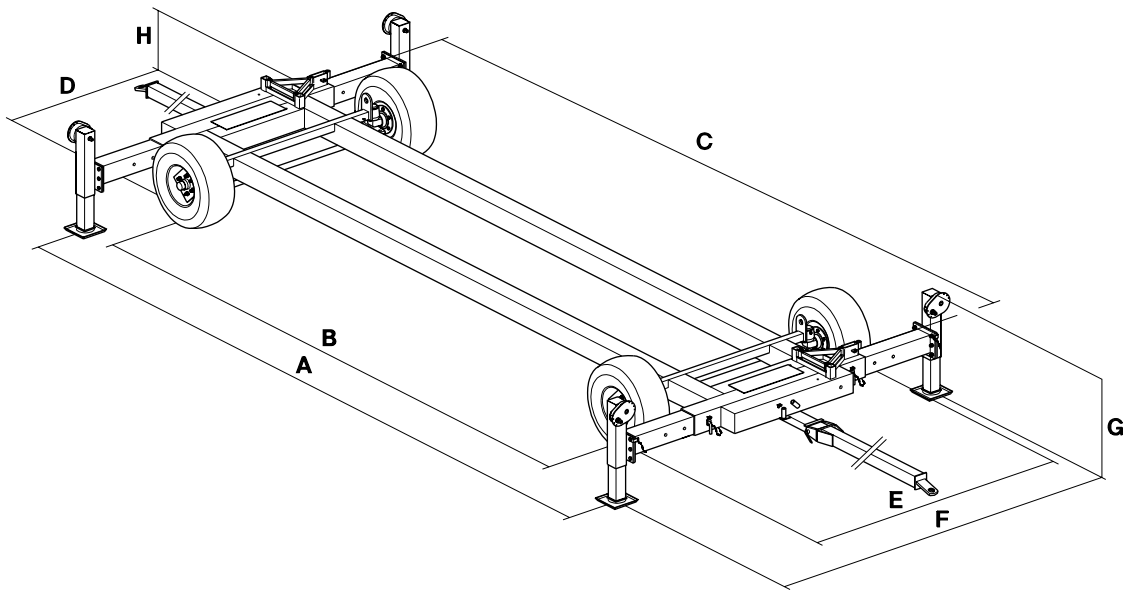


Fig.1-4 Chassis

1.2 Electrical installation

		MS 3000
Number of motors		2
Rated power mast climbing work platform		2 x 3 kW
Maximum starting current		± 70 A
Power consumption (based on S3-25%)		2 x 3.7 kW
Supply voltage		400 V
Minimum supply voltage		360 V
Phases		3 + N + Pe
Supply frequency (depending on the national conditions regarding to power supply)		50 or 60 Hz
Fuse at building site (slow)		32 A
Control voltage		42 Vac
Control voltage frequency		50 Hz
Power supply (to machine)	up to 80 m	5 x 6 mm²
	up to 150 m	5 x 10 mm²
Machine cable (weight)		5 x 4 mm², 0.47 kg/m
Single phase outlet		230 V / 16 A

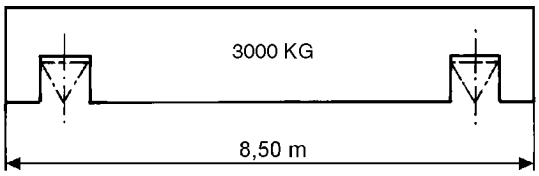
1.3 Chassis

Dimension A	6880 mm
Dimension B	5630 mm
Dimension C	6878 mm
Dimension D	1710 mm
Dimension E	2320 mm
Dimension F	2040 - 2810 mm
Dimension G	668 - 968 mm
Dimension H	490 - 605 mm
Weight	1480 kg
Tyre pressure	5 bar
Height of the platform from the ground	Depending of lower striker plate

1.4 Platform construction, loading diagrams and EMOS program numbers

On any platform element, no more than one platform element of 150 and one platform element of 175 may be attached. The permitted loading situations are described in sections 1.4.1 and 1.4.2.
The P numbers in section 1.4.1 are the EMOS program numbers.

1.4.1 Maximum loading platform construction



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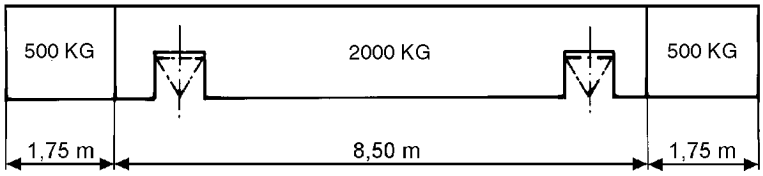

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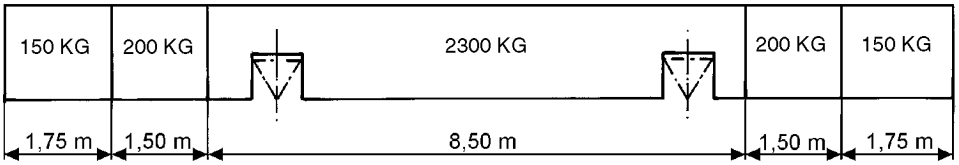

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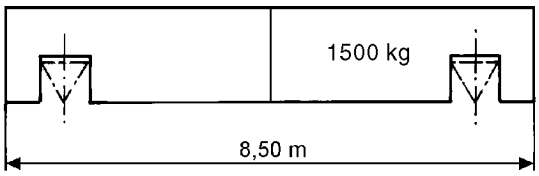
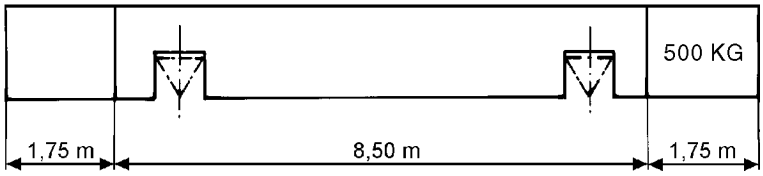
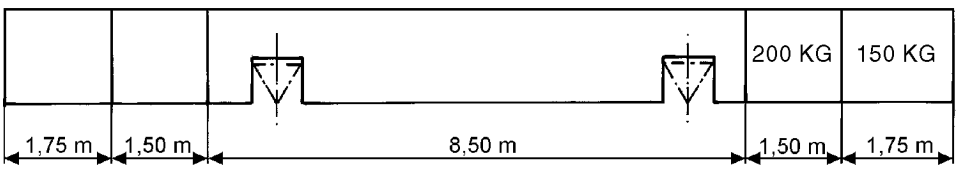
1.4.2 Maximum eccentrically loading platform construction



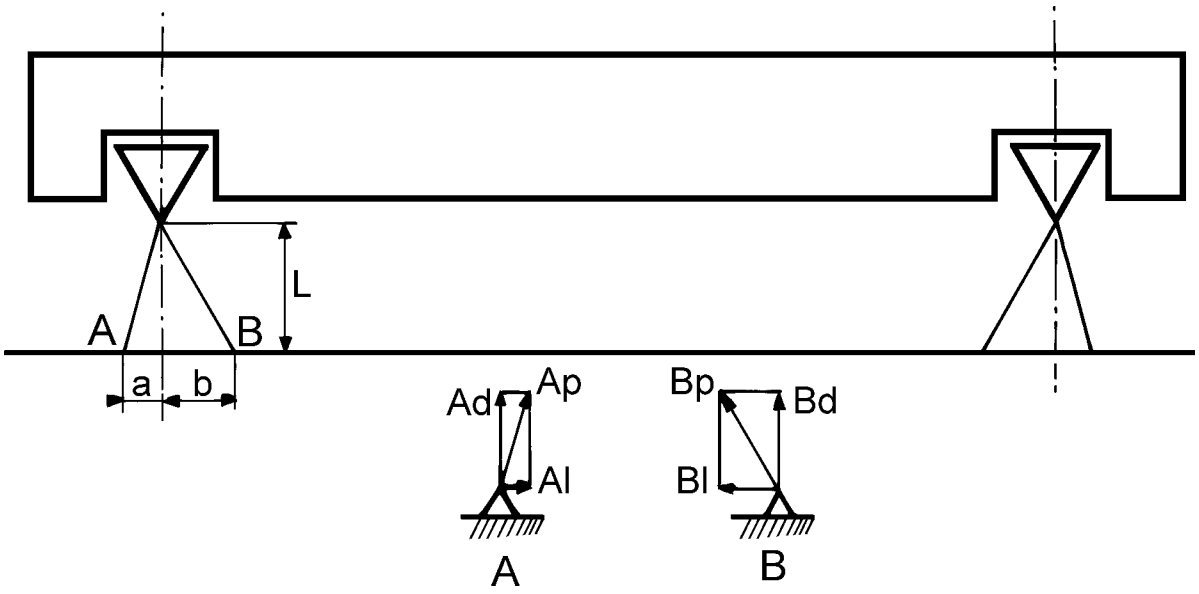




1.5 Anchor forces

Torque scaffold coupling: 50 Nm.
The anchor forces can be ascertained by referring to the following illustration and table.

Conditions:
a + b must be greater than or equal to L
a must be greater than or equal to 0
b must be greater than or equal to 0



Existing anchor forces

	L = 0.61 m			L = 0.91 m		
a (m)	0.25	0.51	0.51	0.25	0.51	0.51
b (m)	0.51	0.25	0.51	0.51	0.51	0.76
Ad (N)	5590	3780	4180	6620	4960	5020
Bd (N)	3870	5580	4180	5070	4960	3970
Al (N)	2790	3870	4180	2200	3300	3340
Bl (N)	3870	2790	4180	3380	3300	3790
Ap (N)	6250	5470	5910	6970	5960	6030
Bp (N)	5470	6240	5910	6100	5960	5620

The forces Al and Bl are calculated forces parallel to the facade.
The forces Ad and Bd are calculated forces perpendicular to the facade (these forces may either be in tension or compression).
The forces Ap and Bp are the calculated forces in the anchor tubes.

2. COMPONENT DESCRIPTION

2.1 General description

The basic set of the mast climbing work platform with rack and pinion drive consists of the following 5 main parts:

* drive
* masts
* platform fences
* chassis
* control system

The platform moves along the mast with the aid of Nylontron rollers.
The motors are fitted with centrifugal brakes which retard the platform if the speed of descent is exceeded.

The platform is driven up and down the mast by means of two electric motors acting through a differential gearbox, each motor having two pinions. The parallel movement of the platform is controlled automatically.

Much consideration has been given to simple and safe assembly and disassembly.

A crane on the platform (option) ensures that the mast elements can be positioned quickly and safely.

The platform can be adjusted to suit the required working situation with the use of separate platform elements. The width of the platform can be adjusted by means of outriggers.

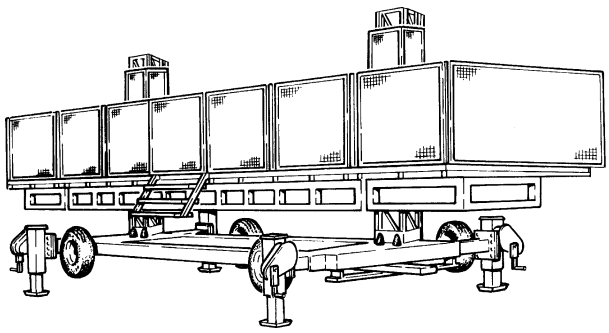


Fig.2-1 Basic set MS3000

All electrical connections, which must be disconnected for transport purposes, are be made by means of connectors.

The electrical installation is mounted inside the control box on the platform.

The simple construction ensures that only a minimum of maintenance is required.

The mast elements, the chassis, the platform and various other components are protected from corrosion by an appropriate surface treatment.

3. SAFETY

No changes or modifications may be made to the machine.

The ground surface must be sufficiently stable to support the weight of the machine and the mast.

The mast must ALWAYS be anchored in accordance with the instructions.

If during assembly and disassembly, the fences do not provide sufficient protection, suitable safety harness must be used at heights above 2 metres.

3.1 General

The machine is constructed to be safe, both during assembly and in use. The machine is thus provided with the following built-in and additional safety features:

- The motor brake works automatically if the supply voltage fails.
- If the TOP limit switch fails to operate, so that the mast climbing work platform continues to rise, an additional emergency TOP limit switch is operated.
- If the LOWER limit switch fails to operate, so that the mast climbing work platform continues to descend, an additional emergency LOWER limit switch is operated.
- If both upper limit switches are not actuated, the movement of the platform is stopped by the mechanical end stop on the mast.

3.2 Safety prior to use

- The chassis must be effectively supported.
- The working area around the machine must be free from obstacles.
- The machine must be securely anchored at the specified intervals.

3.3 Safety in use

In winds of strengths above 12,5 m/s (6 Beaufort) by a freestanding machine or 15,7 m/s (7 Beaufort) by an anchored machine, the machine must not be used and the platform must be set in the lowest position.

There must be no obstructions in the path of the machine.

During use, no person should stand **under** the machine.

While a mast element is being mounted, an anchor is being fitted or while maintenance activities are being carried out, the emergency stop must be active.

Material must never extend beyond the outer limits of the platform. Items which may roll must be properly secured. Materials must never be stacked against the fencing.

If work must be carried on close to high voltage cables, a minimum safety distance of 15 m must be maintained.

When materials and/or tools with a large surface area will be used contact your supplier in connection with wind sensitivity.

- If the machine is to be used during the hours of darkness, the area must be adequately lit, so that the user has a good view in all conditions.
- In order to ensure that no person unintentionally walks under the platform, the mast climbing work platform must be surrounded with suitable fencing.
- The machine may only be used for the purpose for which it was designed, that is, the vertical transportation of persons and materials with a maximum weight within the design limits of the particular construction.
- Loads (materials, persons, etc.) must be distributed in accordance with the loading diagram.
- Operations on the mast climbing work platform may only be carried out by persons with adequate knowledge and qualifications to do so.
- Inspection and maintenance must be carried out as given in this instruction manual.
- During assembly and maintenance, the mast climbing work platform may not be used for other purposes.
- Keep hatches in the base of the platform clear. From the platform it must be possible to get, to the emergency descent controls via the hatches.
- The competence and sense of responsibility of the operator or engineer are essential to the efficient use of the platform.
- Local safety laws and regulations must always be followed.
- Technical personnel must be in a position to deal with any difficulty encountered in every possible situation during assembly and disassembly. The operating personnel must be familiar with those situations which can occur during use.
- If operating or technical personnel report errors or dangers or are aware of the safety regulations, the owner or the person responsible must be informed immediately.
- The working area must be kept free from obstacles (building materials, dirt, snow, etc.).
- Fences must never removed during normal use.
- The platform must only be entered and/ or loaded when it is in its lowest position. The same rule applies to leaving the platform.
- When electrical storms are expected, work on the platform must be stopped in time to avoid the danger of lightening strikes. The power supply must be switched off and the connector withdrawn from the supply socket.
- Platform extensions on telescopic supports may only be used to carry personnel. Such personnel may only stand on these extensions when the machine is stationary.
- If erecting two adjacent platforms there must be a clear gap between the ends of the platforms of at least 0,5 meter.

3.4 Safety after use

- Transport on public roads must only be done with a truck intended for the purpose.
- The platform must be placed in the lowest position and the main switch must be secured.

3.5 Built-in and additional safety features

The MS3000 mast climbing work platform is provided with the following in-built and additional safety features:

- Phase control relay in the control box.
- "Emergency stop" push button on the control box.
- Electrical access protection.
- In the event of a power failure the motor brakes are operated automatically to prevent the platform descending unexpectedly.
- Centrifugal brakes ensure a controlled descent in the event of an emergency.
- The EMOS system locks the platform if the system is overloaded.
- In the event of a power failure it is possible for the platform to make an emergency descent by manually releasing the motor brakes.
- Audio Visual Warning. During descent of the platform, a buzzer will sound and a light will flash underneath the platform.

4. TRANSPORT

Transportation on the chassis over the public roads is not permitted.

The national valid traffic regulations must be observed.

Because of its limited dimensions, the basic implementation of the machine can be transported with a normal lorry. Ensure that, during transport, all securing devices are properly fitted and that the machine is lowered onto the buffers.

Disassemble the machine before transporting it as described in chapter 8.

For the transport dimensions, see chapter 1.

For transport, all fences, steps and mast protection must be removed. These components may be lashed firmly to the platform.

For transportation, secure the machine carefully onto the loading platform of the transport vehicle.

The machine can be loaded and unloaded from the transport vehicle using a crane mounted on the vehicle, a crane on the building site or a fork-lift truck. See figure 4-1 for loading and unloading points.
Set the machine down carefully to avoid damage.

See figure 4-1
A lifting point.
B Support points for the fork of a fork-lift truck (under the platform, with the forks placed as far apart as possible).

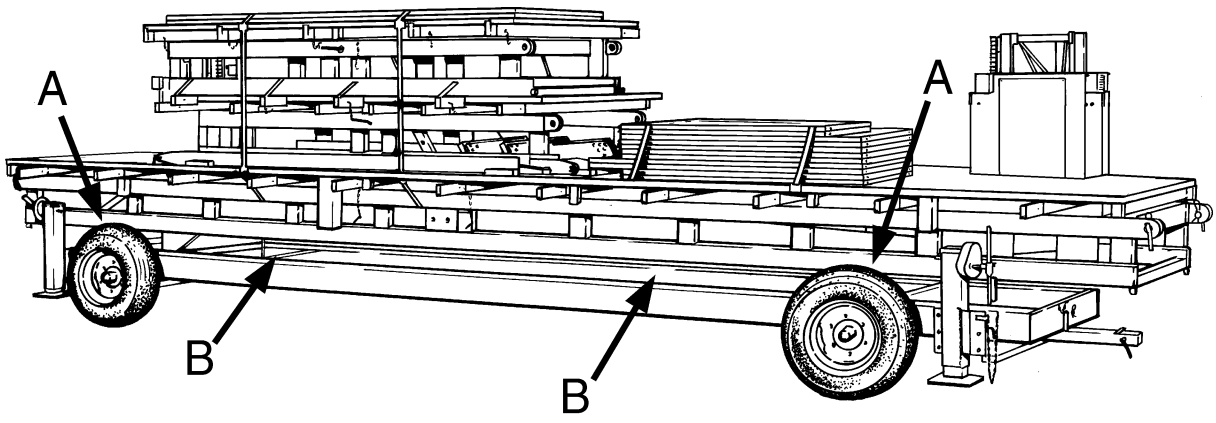


Fig.4-1 Transport MS3000

4.1 Repositioning on the building site

Ensure that trees, power cables etc., cannot be touched.

During movement there may be no load on the platform.

Once on the building site, the mast climbing work platform can be moved in the lowest position on its chassis.

The plug of the power supply must be removed.

On a hard flat horizontal surface and when there is no wind, the mast may have a maximum height of 8 m during repositioning. The platform must be on the buffers. The legs must be set out and secured. The jack must be screwed out until they are just clear the ground.

When the circumstances are unfavourable than the above mentioned circumstances, contact your supplier.

The chassis can be moved behind a vehicle.

The maximum speed at which the chassis may be towed behind a vehicle is 30 m/min.

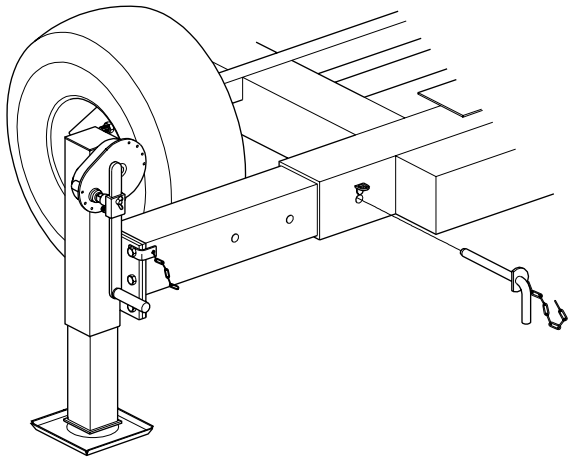


Fig.4-2 Locking pin outrigger chassis

4.2 Repositioning with a crane

During movement there may be no load on the platform.

At the building site the mast climbing work platform can be repositioned with a crane under the following circumstances.

A maximum of 4 mast elements may be mounted on the chassis or the ground frame. The eye hooks of the crane can be attached to lifting points of the chassis.

The total transport weight can be calculated on the undermentioned way.

No. of basic machines	x 4415	=	
No. of platform elements 150	x 198	=	
No. of platform elements 175	x 205	=	
No. of mast elements 150	x 86	=	
No. of plug-in fences 150	x 16,2	=	
No. of plug-in fences 175	x 18,2	=	
No. of end fences	x 32	=	
No. of gates	x 17,1	=	
No. of lengthwise posts	x 3,2	=	
No. of gate side posts	x 3,4	=	
No. of end fence posts	x 4,0	=	
			+
Total transport weight		=	kg

5. CONTROL COMPONENTS

5.1 Power supply socket for the platform

The power supply cable for the electrical supply between the building site connection and the mast climbing work platform must be connected to the socket. The connection socket is positioned in the centre of the platform. See chapter 1 for the cable specifications.

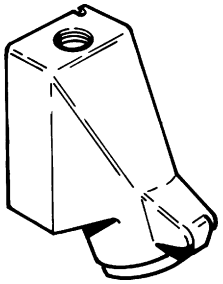


Fig.5-1 Platform power supply socket

5.2 Platform control box

The door of the control box is secured with two quick-release fasteners.
The control box is provided with the following push buttons:

1. Main switch.
2. Info panel.
3. Config panel.
4. Adjustment switch EMOS.
5. Push button UP.
6. Blue control light.
7. Push button DOWN.
8. Emergency push-button.
9. Keyswitch buffer.
10. Horn.

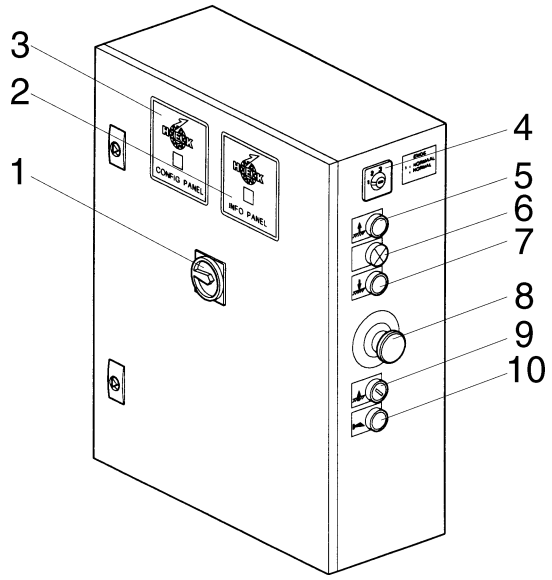


Fig.5-2 Control box

When the Emergency push-button is pressed it is locked in the depressed position. It can be unlocked by rotating it.

The main switch can be secured with a padlock to prevent unauthorized use of the platform.

The following components are mounted in the control box:
- the main switch
- the safety relay
- the control relay
- the transformer
- the automatic fuses

6. ASSEMBLY AND ANCHORING

Definition left and right in relation to positioning:

Left-hand: Viewed from the step side, the machine is fitted to the left-hand side.
Right-hand: Viewed from the step side, the machine is fitted to the right-hand side.

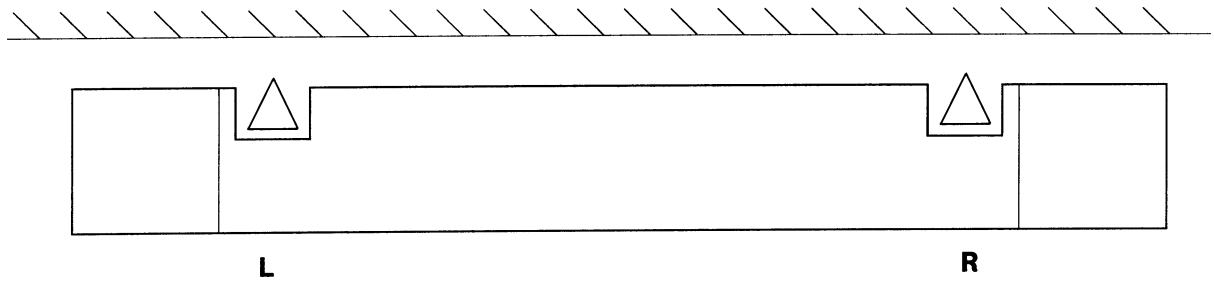


Fig.6-1 Position machine

If assembly work must be interrupted, this must be done in such a way that, when the work is restarted it is clear what stage had been reached when work was stopped. For this reason always complete a part of the assembly, for example, assemble collect or secure all the components for a connection, complete a ground support or completely assemble an anchor before stopping work.

While the mast is being erected, no more than two persons may be on the platform, so that no more than 75% of the lifting capacity is used.
The assembly must always be followed by a test run, as described in section 7.3. Until the test has been performed, the platform may not be used for any purpose other than transporting its own mast elements and anchoring components.

The loading of the mast climbing work platform must be planned so that when, in the assembly situation, the maximum distance between anchors is reached, the material load on the platform is a minimum.

6.1 Preparation for assembly

Ensure that the site where the mast climbing work platform will be assembled accords with the national requirements and that permission has been obtained from the relevant authorities for the assembly.

- Ensure that a suitable power supply, good lighting, lifting equipment and tools are available.

- Ensure that the building site is easily accessible to the vehicle which will deliver the mast climbing work platform.

- Prepare the site with suitable support and anchoring facilities.

- Ensure that the position where the mast climbing work platform will stand has good drainage.

- Plan the positioning of the mast climbing work platform so that where the mast needs to be anchored, it can be so anchored with the standard material.

- The components of the mast climbing work platform mast should be placed as close as possible to the place where it will be assembled.

- The electrical power supply connection must be placed as close to the mast climbing work platform as possible so as to reduce the voltage drop to a minimum. If the voltage reduction is too great the machine may not function correctly.

6.2 Ground support

Before the position for the mast climbing work platform is prepared a check must be made to ensure that the distance between the mast and the working surface can be spanned by the standard anchoring material.

1. Ensure that the forces are spread over as large an area as possible.

2. The soil must be able to withstand a ground pressure of at least 2 kg/cm². If this requirement is not met, soil improvement must be carried out such that the ground satisfies this minimum requirement.

3. The ground support must be flat and centrally loaded with a minimum ground support of 400x400 mm.

   The platform must be supported with suitable ground support placed under the extended outriggers on the chassis. If the height of the mast exceeds 20 metres, ground support must also be placed under the mast.

4. The ground support must be durable and of such a quality that the load can be transferred without plastic deformation.

5. If the machine is installed on a concrete foundation or on a hard road surface, the installation must be provided with wooden packing to prevent slipping.

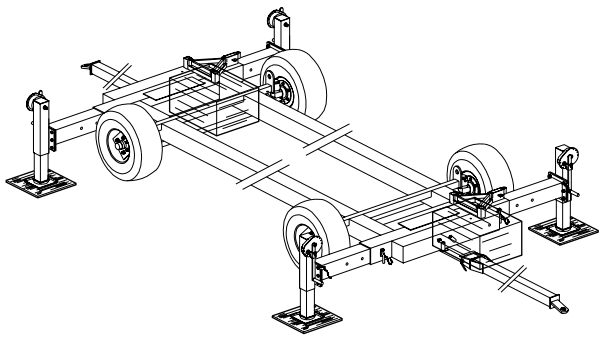


Fig.6-2 Ground support chassis

6.3 Positioning the mast climbing work platform

A fence (height 1.10 m) completely surrounding the platform is compulsory. If the distance between the platform and the facade is 0,3 m - 0,5 m a fence with a height of 0,7 m can be used. If the distance between the platform and the facade is less than 0.3 metre a fence is not compulsory but in this case a kick board with a height of 0,15m must be fitted.

Wheels of the chassis should not have a bearing function while assembly and operating the platform.

Distance to the facade with standard anchoring.
A = 726-916 mm
B = 526-716 mm
C = 200 mm

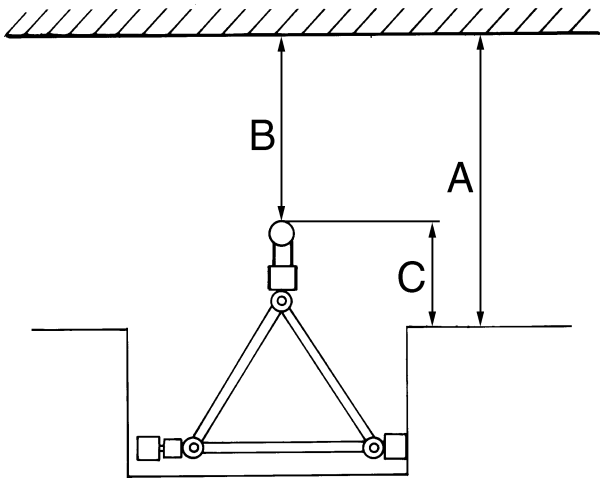


Fig.6-3 Distance to the facade

There are two ways in which the mast climbing work platform can be placed:

- freestanding on chassis
- anchored on chassis

6.3.1 Positioning the mast climbing work platform

1. Position the chassis parallel to the wall.

2. When the construction is to be free-standing, the outriggers must be fully extended and secured in position. For an anchored construction, it is possible to leave the outriggers in the retracted position. In this situation the outriggers must be properly secured and the first anchor must be placed at a height of four metres.

3. Place the ground supports.

4. Unscrew the jacks until the wheels no longer contact the ground and adjust the machine to level. The measurement must be done on two sides of the mast with a spirit level with a minimum length of 1 meter.

5. Check that the lower striker plate is mounted.

6. Assemble the platform components sequentially on both sides until the desired length is attained. The platform may not exceed the maximum length.

7. Secure the platform pins by means of "hairpin".

8. Adjust the platform elements so that they are horizontal with the aid of the adjusting bolts on the underside of the platform.

9. The width of the platform can be adjusted to fit the form of the façade. See section 6.6.

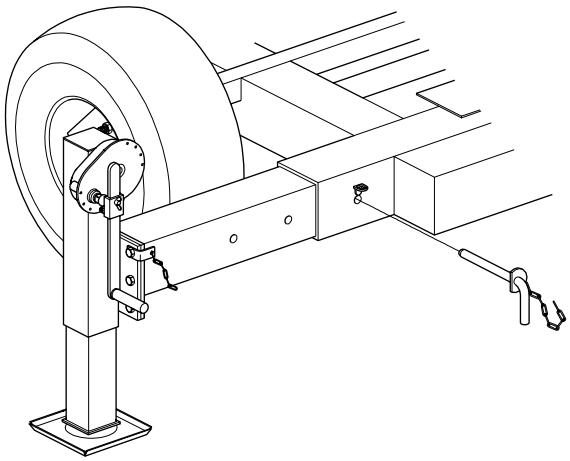


Fig.6-4 Locking pin outrigger chassis

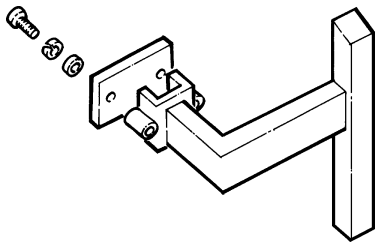


Fig.6-5 Lower striker plate

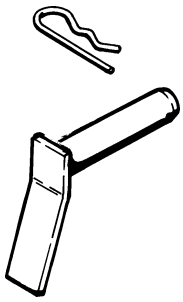


Fig.6-6 Securing platform elements

10. Mount the steps and secure them with locking pins.

11. Mount the platform posts on the upper side of the platform and secure them with "hairpins".

12. Mount the posts for the gate on the longer side of the platform and secure them with "hairpins".

13. Mount the platform posts on the longer side of the platform and secure them with "hairpins".

14. Mount the fencing and secure it with "hairpins".

15. Mount the gate and check that the gate safety switch is present on the underside of the platform.

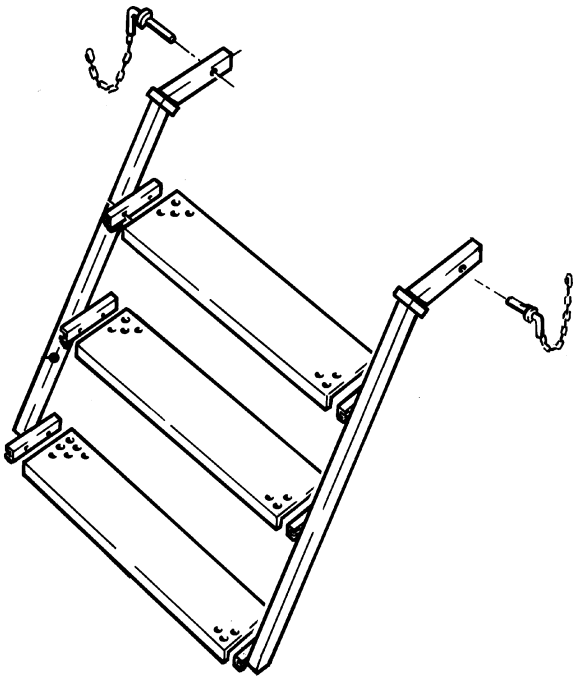


Fig.6-7 Locking pin step

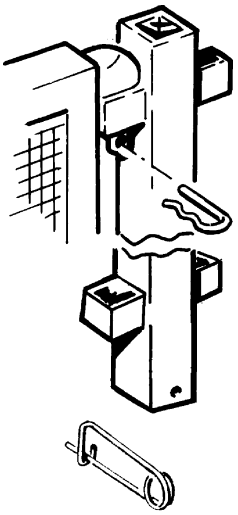


Fig.6-8 Securing platform posts and fences

6.4 Assembly of the mast

If work has to be stopped, always complete the phase being worked on. Tighten all the bolts used for the last attachment and switch off and secure the main switch so that the machine cannot be operated.

As the assembly proceeds, place the anchor tubes and anchors as described in section 6.5

Note that the power supply consists of
3 x 400 V + neutral + safety earth.

The masts must always be assembled vertically.

In winds of strengths above 12,5 m/s (6 Beaufort) the machine may not be assembled.

While a mast element is being mounted, the emergency stop switch must be activated.

1. Connect the power supply to the machine. The power supply connection is in the centre of the platform.

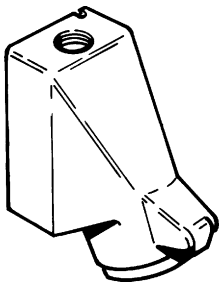


Fig.6-9 Power supply socket

2. Set the main switch in position I or II (the position depends on the direction of phase rotation of the power supply). If the display shows code 02 and the phaselight on the phaseguard relay does not burn, set the main switch in the other position. The display must show code 00 and the phase light will be burning.

3. When the mast climbing work platform is delivered it is in the buffer. In order to remove the mobile work platform out of the buffer, carry out the following procedure:

   1 Press the push-button "reset positioning" and keep it pushed in.
   2 Press the push-button "UP".

4. The mast climbing work platform is raised and lowered by pressing the UP and DOWN push buttons. When the push-button is released, the mast climbing work platform stops. In addition, an emergency stop push-button is provided. When this button is pushed, the power of the motors will be shut off.

5. Check that the proximity switch is mounted.

6. Load the platform with mast elements. Using a fork-lift truck or crane if neccesasary. Ensure that the maximum loading permitted during assembly is not exceeded.

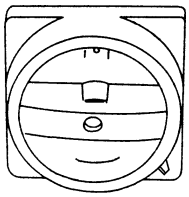


Fig.6-10 Main switch

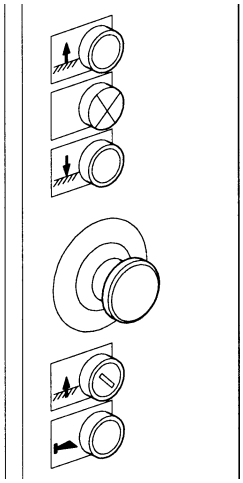


Fig.6-11 Control buttons

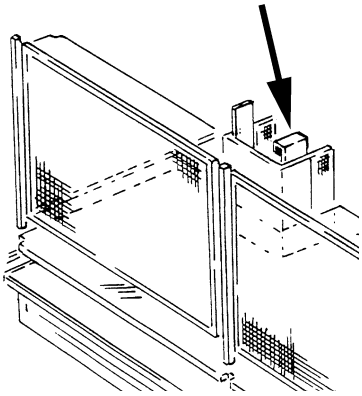


Fig.6-12 Proximity switch

7. Stand on the platform and place a mast element on the last element assembled using the crane if required. Secure the mast element with four bolts, washers and nuts. Tighten the bolts to the specified torque (See chapter 1).

8. Raise the platform towards the top of the mast element and repeat the procedure until another element must be assembled. Plan the procedure so that, when an anchor must be fitted, the loading of material and mast elements is a minimum.

9. Ensure that anchors are placed at the specified intervals.

10. Repeat this working method until the mast has reached the required height. Finally, the mechanical end stop must be attached to the left-hand mast. The maximum specified height must not be exceeded.

11. If a crane is available on the building site, the mast can be more quickly assembled. Up to four mast elements can be assembled on the ground and then raised into position with the crane.

12. The mast must not extend too far above the uppermost anchor (See chapter 1). To achieve good stability, it is always better to place an anchor as close to the top of the mast as possible.

13. Assemble the mast cover panels from the platform and secure them.

14. The assembly is now complete. The assembly must now be tested as described in section 7.1

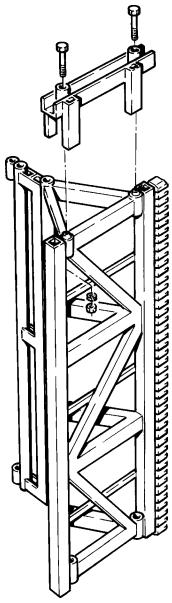


Fig.6-13 Mast element with mechanical end stop

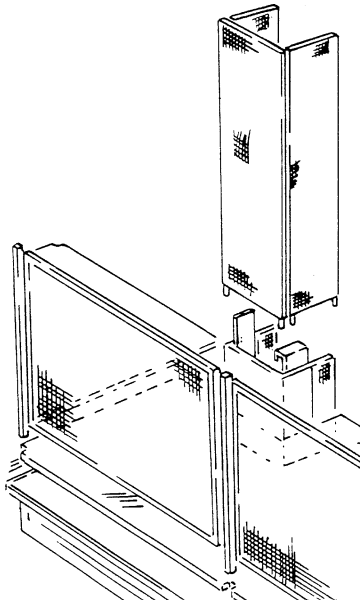


Fig.6-14 Mast cover

6.5 Anchoring the mast

If work must be stopped, always complete the current phase before stopping. Tighten all the bolts for the latest fixture and secure the main switch so that the mast climbing work platform cannot be operated.

Before starting to fix any anchors, ensure that the chassis is level.

The wall must be of such a quality that it can accept the forces applied to it via the anchors.

The platform extensions and the anchors must not come into contact during raising and lowering.

While a mast element is being mounted, the emergency stop switch must be activated.

The anchor forces must be approved by the owner or the person responsible for the building to which the machine will be anchored.

1. Check that each mast is vertical with a spirit level at least one metre long. Recheck as each anchor is secured.

2. The mast must be anchored to the building at the distances specified in chapter 1.

3. The anchors consist of horizontal anchor tubes with a stretcher arrangement, mast couplings and a wall plate.

4. Fixing the anchors:
   - If conditions make it necessary, use may be made of other approved attachment materials which are suitable for the forces present. (Consult your dealer).
   - Cemented-in anchors must be allowed to become fully secure (the cement must have time to harden) before the mast climbing work platform is assembled. The cement or concrete used must be in accord with the specifications.
   - If chemical anchors or expansion bolts are used, these must be approved and must be able to withstand the forces involved.
   - Specifications for these types of bolts are available from the supplier. Permission to use them must be obtained from the local authorities.

5. Securing an anchor:
   - Attach the coupling to the mast (1). Do not tighten it fully yet.
   - Attach the wall plate (2) to the building.
   - Secure the horizontal anchor tubes with stretcher arrangement (3) between the coupling on the mast and the wall plate.
   - Tighten the bolts securing the coupling to the mast and all the remaining bolts on the anchor with the correct torque loading.
   - Adjust the stretchers so that the mast is vertical and equidistant from the building.
   - Tighten the locking nuts (4) on the stretcher arrangement.

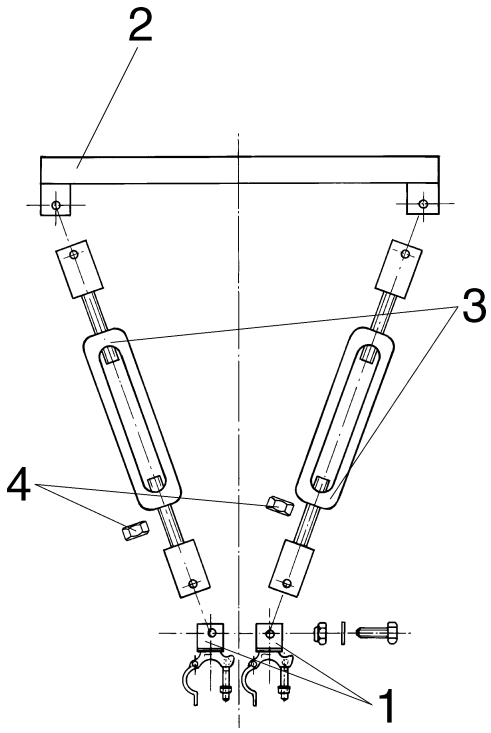


Fig.6-15 Anchor

6.6 Adjusting the platform width

The width of the platform can be adjusted to the shape of the building. As standard an extension of 1 metre is possible. In addition, there is a possibility to position the extension 46 cm lower. Adaptor tubes must then be mounted at the height of the motors and the mast.

In case work must carry out behind the mast an anchor ramp must be mounted.

The planks used for adjusting the platform must in every case be secured in every direction.

The platform widening and the mast anchors must not come into contact when the platform is raised and lowered.

A fence (height 1.10 m) completely surrounding the platform is compulsory. If the distance between the platform and the facade is 0,3 m - 0,5 m a fence with a height of 0,7 m can be used. If the distance between the platform and the facade is less than 0.3 metre a fence is not compulsory but in this case a kick board with a height of 0,15m must be fitted.

The platform extension must be in accordance with specification prEN1495. The platform extension must be fabricated from a non-slip, easily cleaned material. The extension must be self draining.

The width of any openings or gaps in the floor must be sufficiently narrow that a ball with a diameter of 15mm will not pass through.
The platform extension must be able to withstand a static load of 200kg on an square area of 0,1x0,1m on the least favourable part of the floor surface without causing any permanent distortion.

1. Pull out the outriggers to the required height and secure them with locking pins.

2. Cover the outriggers with planks.

3. Fix cross strips or a right-angle profile to the underside of the planking and secure them to the outriggers.

4. Mount the anchor ramp to the outriggers.

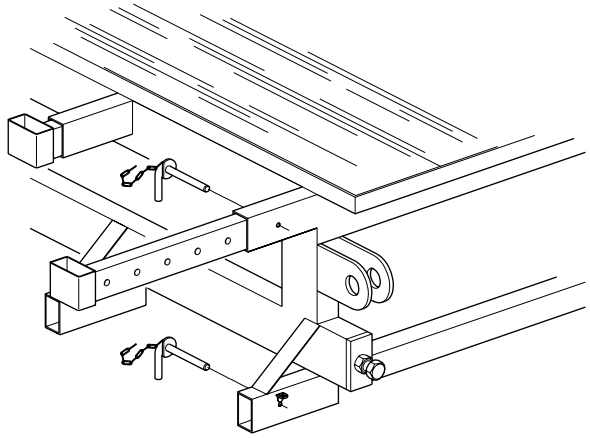


Fig.6-16 Outrigger platform extension

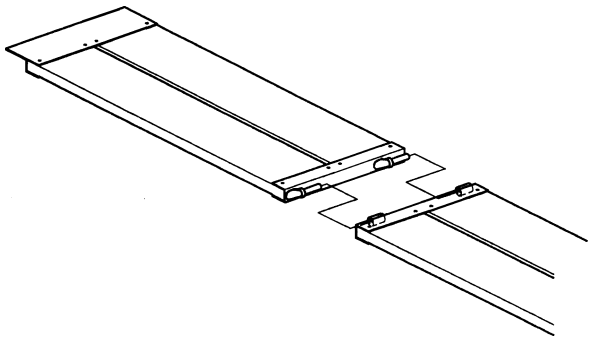


Fig.6-17 Anchor ramp

6.7 Adjusting the EMOS system

1. The switch can only been turned with the correct key. Set the EMOS switch (1,2,3) in position 2. The config panel starts to flash.

2. The program can be changed with the UP or DOWN button on the control box.

3. Set the desired program (See chapter 1.4).

4. Set the EMOS switch on position 1.

5. The config panel shows the adjusted value.

6. Remove the key.

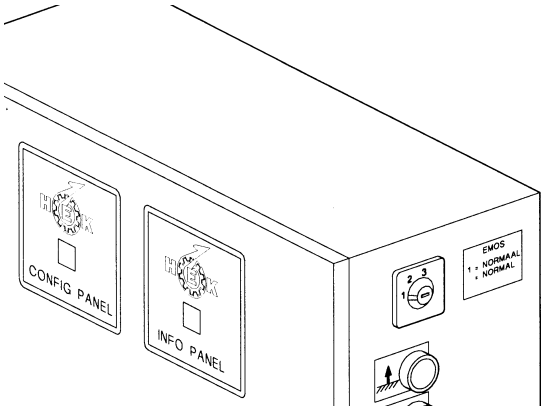


Fig.6-18 Adjusting EMOS

6.8 Lightning protection

1. Mount the connection between the chassis and the earth. This connection must satisfy the following specification:
DIN VDE 0185, part II, §5.2
The cable supplied (25 mm² cross section, 25 m long) must be connected to the terminal box on the building site.

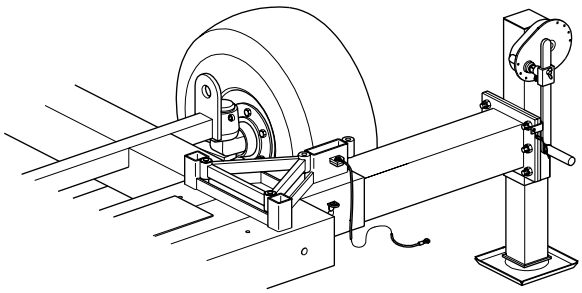


Fig.6-19 Lightning protection

7. OPERATION

7.1 General

No person may stand under the machine while it is in use.

Material may never extend beyond the edges of the platform. Items which can roll must be properly secured. The load may never be supported against the fencing.

The maximum reaction force (for instance caused by tools) of the platform with regard to the facade amounts 800 N.

When work stops for any reason, the main switch must be secured with the padlock.

During raising or descending no person may stand on the platform extensions.

7.2 Preparation

1. Before the mast climbing work platform is used it must be visually inspected (daily if it is used every day) for:
   - anchors
   - presence of all security devices
   - connection between mast elements
   - position of the masts
   - any loose components
   - ground supports and the quality of the ground
   - electrical connections

- protective covers (presence and securing)
- securing of the platform extension
- operation of the limit switches
- no obstacles in the path of the platform
- oil leaking from the drive units
- functioning of the motor brakes (section 7.4).

2. Connect the electrical power supply.

3. Close the gate.

4. Remove the padlock from the main switch.

5. Place the main switch in position I or II (the position depends on the direction of phase rotation of the power supply)

6. Check that the EMERGENCY push-button on the control box is switched off (the push-button must be pulled out).

7. If the display shows code 02 and the phaseguard light does not burn, the main switch must be set in the other position. The display will show code 00. If the electric safety circuit (gates, etc.) is closed the blue light on the control box will burn.

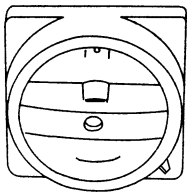


Fig.7-1 Main switch

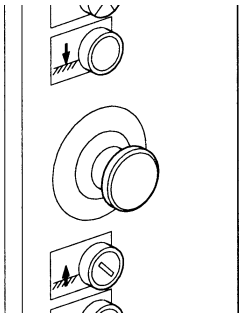


Fig.7-2 Emergency push-button

7.3 Testing

1. Test the platform and check the following:
   - all limit switches, striker plates and safety devices and ensure that everything is properly adjusted.
   - that the path of the platform is not obstructed.
   - the functioning of all the push buttons on the control box.
   - the free movement of the power supply cable.

   Also test the platform brakes! (see section 7.4)

7.4 Brake test

The brake test must be carried out daily.

1. Release the brake on one of the motors by pulling the lever on the motor. The platform should not descend. Release the brake lever.

2. Release the other brake. The platform should not descend. Release the brake lever.

If the platform descends, the mast climbing work platform must not be used. Consult the service engineer.

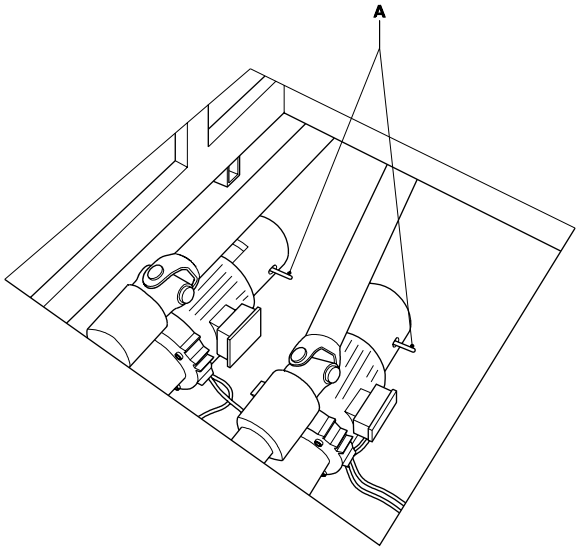


Fig.7-3 Brake lever platform

7.5 Operation from the platform

UP: If this push-button is pressed, the platform is raised. When the push-button is released, the platform stops immediately.

DOWN: If this push-button is pressed, the platform is lowered. When the push-button is released, the platform stops immediately.

EMERGENCY: When this push-button is pressed, the platform is locked.

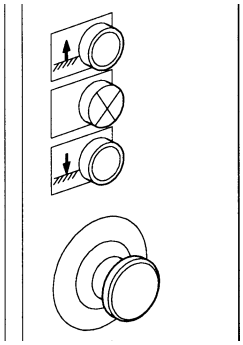


Fig.7-4 Push-buttons control box

7.6 Operation in an emergency situation

In an emergency, for example in the event of a power failure, the platform can always be lowered.

- Using the malfunction analysis in chapter 10, try to solve the problem. If the problem can not be solved it is possible to make a emergency descent in the following way.

1. Open the trap door in the platform.

2. Each motor is provided with a lever with which the motor brake can be released (A, Fig.7-5).

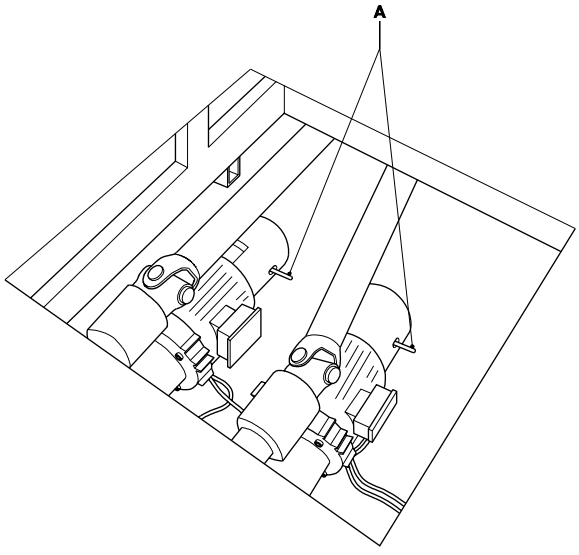


Fig.7-5 Brake lever platform

3. When these levers are operated, the platform will begin to descend. The speed of descent will be limited by the centrifugal brake.

After a maximum descent of 5 metres, stop the platform for 2 minutes in order to avoid the centrifugal brakes becoming overheated, which will result in their working less efficiently.

8. DISASSEMBLY AND TRANSPORT

Ensure that the maximum loading allowed during assembly is not exceeded.

In winds of strenghts above 12,5 m/s (6 Beaufort), the machine may not be disassembled.

1. Remove the mast covers.
2. Disconnect the uppermost anchor.
3. Together with the disassembly of the mast, the anchor tubes and the anchors must be disassembled.
4. If a crane is available on the building site, the mast can be more quickly disassembled. As many as four mast elements can be removed together and lowered to the ground with the crane. The mast elements can further disassembled on the ground.
5. Repeat this procedure until the mast, with the platform in its lowest position, has been completely disassembled.
6. Release the brakes and allow the platform to descend onto the buffers (A, Fig 8-1).
7. Disconnect the electrical supplies.
8. Raise the jacks and remove the ground supports.
9. Remove the control box.

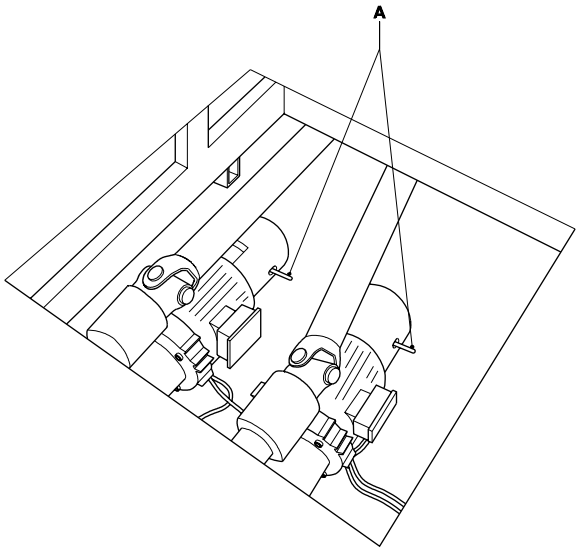


Fig.8-1 Brake lever platform

There are two possible ways to transport the basic machine. This can be done with or without the platform elements being attached. The transport method depends on the dimensions of the platform and the widths and lengths of vehicles permitted by national regulations.

If the basic machine is too large to be transported in one piece, take the following steps.

10. Disassemble the fencing, the fence posts, the access gate and the gateposts.

11. Disassemble the platform extensions. Slide in the outriggers and secure them.

12. Disassemble the platform elements.

13. Slide in the outriggers of the chassis and secure them.

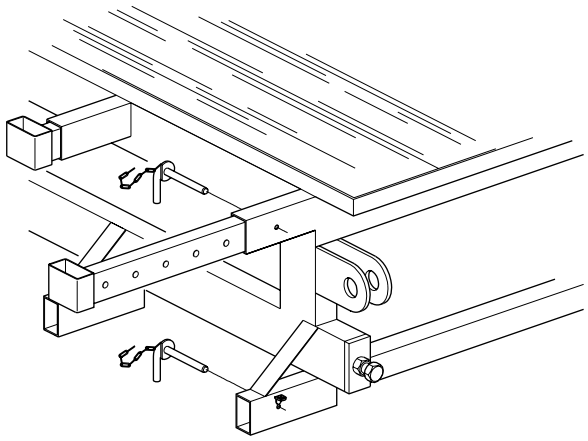


Fig.8-2 Locking pin outrigger

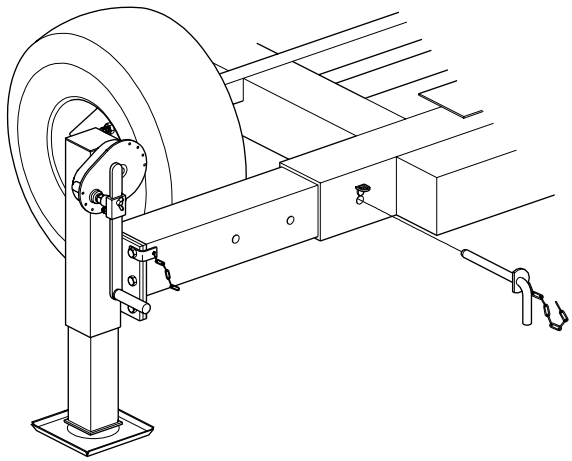


Fig.8-3 Locking pin outrigger chassis

9. MAINTENANCE

9.1 General

The simple robust construction of the machine ensures that maintenance can be kept to a minimum. Sensible use of the machine, regular checks for correct functioning and regular cleaning will result in a minimum requirement for maintenance. This will guarantee a long working life for the mast climbing work platform.

During maintenance activities, the emergency stop switch must be activated.

Parts must comply with to the technical specification of Hek Manufacturing b.v.!
Use only original parts of Hek Manufacturing b.v.

9.2 Maintenance intervals

The following maintenance activities are essential:

A. Weekly maintenance

- Grease the rack and pinion. If these are heavily contaminated with sand or grit they must be cleaned first.
  Specification for grease:
  - HEK-rack and pinion grease
  - Shell Rhodina 2
- Clean the platform and the drive parts.
- Carry out the checks detailed in section 7.2.
- Visually inspect the rack and pinion drive.

B. Monthly maintenance

- Inspect the guide rollers (visual inspection of security devices, gaskets and bearings).
- Check that all mast bolts are tightened with the correct torque.
- Check that all anchors are secure and re-secure any loose parts.
- Check the functioning of all limit switches.
- Grease the jacks and the king pins of the chassis.
- Grease the drive unit pressure rollers.
- Perform the activities listed at A.

C. Quarterly maintenance

- Check the motor brake (see section 9.3.2)
- Check the play in the guide rollers.
- Check the rack and pinion (visual).
- Perform the activities listed at A and B.

D. Annual maintenance

- Check the rack fixing bolts.
- Grease the universal joints on the drive mechanism for the differential gearbox.
- Grease the sliding tube on the drive mechanism for the differential gearbox.
- General inspection of paintwork, corrosion and welds.
- Check all welds of the mast climbing work platform.
- Check the oil level in the reduction box.
- Perform the activities listed at A, B, and C.

E. Biennial maintenance

- Change the oil in the platform reduction gearbox.
  Lubricant specification for Stephan motors:
  ISO Viscosity class: ISO VG 220
  - Aral BMB
  - Shell Macoma W71
  - Esso Vartan 220
- Perform the activities listed at A, B, C and D.

F. Maintenance during storage of the machine

- Inspect the machine in its entirety.
- Check all vital parts and replace any which have become damaged.
- Clean and grease the rack and pinion drive.
- Inspect the mast elements (with the racks) and check that all separate connection pieces are in order.
- Check the lowest mast bolts for corrosion and replace them if necessary.
- Cover the basic machine with a tarpaulin; in every case, cover the control boxes and the limit switches.
- Screw out the jack of the chassis so that it does not rest on its wheels.
- For long-term storage, consult your dealer.

9.3 The motor brake

The motor has a built-in electromagnetic brake. This brake functions according to the "normally ON" principle, that is, when the motor has no power supply the brake is active and the motor shaft will be braked. (n = 0 rev./min).
The braking effect is achieved by friction between several discs and the brake must be used "dry" (not greased).

9.3.1 Operation

The brake mechanism has a metal rotor (3) with friction material on both sides. Four pressure springs (7) in the stator exert an axial force on an anchor plate (4). This anchor plate is pressed by the spring force against rotor. The rotor is mounted on the motor shaft in such a way that it can slide in an axial direction along the shaft. Because the anchor plate presses against the rotor, the rotor is pressed against the friction plate (1). The contact between the friction material on either side of the rotor, the anchor plate and the friction plate results in the required braking effect.

The stator has a built-in braking coil (5) which produces a strong magnetic field when a DC current is applied to it.

When the brake is to be released, a current is made to flow through the braking coil. The resulting magnetic field "pulls" the anchor disc toward the stator, thus releasing the brake.

It is also possible to release the brake manually. If the manual release lever is pressed in the direction indicated by the arrow on the cover, the anchor plate is moved against the spring pressure with the aid of two ball bolts, so that it is pressed towards the stator, releasing the brake.

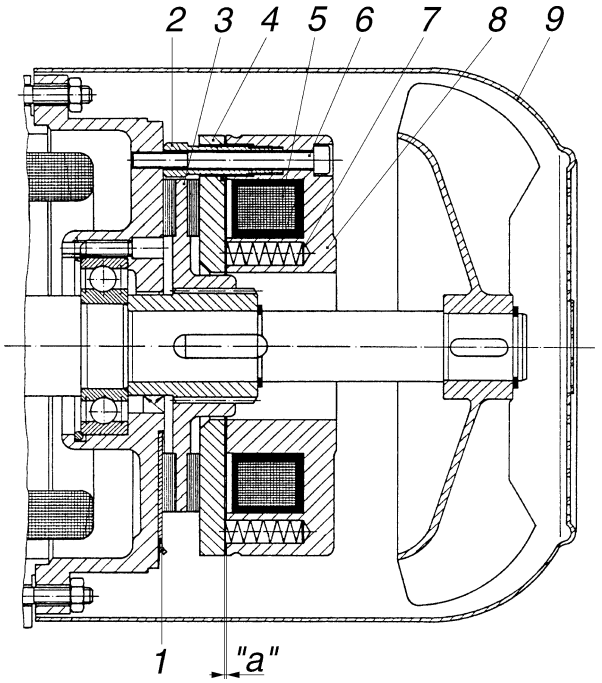


Fig.9-1 Motorbrake

9.3.2 Maintenance

In normal use the motor brake is more or less maintenance free. However, after frequent raising and lowering of the platform it may be necessary to adjust the air gap between the anchor disk and the stator, and if necessary, to replace the rotor.

In order to check the condition of the brake, the width of the air gap "a" and the thickness of the friction material on the rotor must be measured every three months.

The air gap "a" is adjusted by the manufacturer to 0.3 mm and must never be more than 1.1 mm.

To check:

1. Switch off the mast climbing work platform at the mainswitch and secure the switch with the padlock.

2. Remove the brake release lever using an open ended spanner.

3. Remove the fan cover (9) from the motor.

4. Use a feeler gauge to check the width of the air gap "a" adjacent to the hollow threaded collars (2).

The width of the air gap "a" must be adjusted as follows:

6. Remove the device securing the fan and remove the fan from the shaft.

7. Unscrew the hexagonal bolts (6) by a ½ turn.

8. Screw all the threaded collars (2) equally far into the stator (8).

9. Turn the hexagonal bolts (6) equally until the air gap "a" has the correct width.

10. Screw the threaded collars (2) out of the stator until they are in contact with the fixed part.

11. Check that the width if the air gap is the same over the whole of its length.
12. Tighten the hexagonal bolts (6) with a torque loading of 25 Nm.

The adjustment of the hand release may not be changed, not even when air gap "a" is readjusted, as security can be adversely affected.

13. Re-fit the fan and secure it to the shaft.

14. Mount the fan cover and the brake release mechanism.

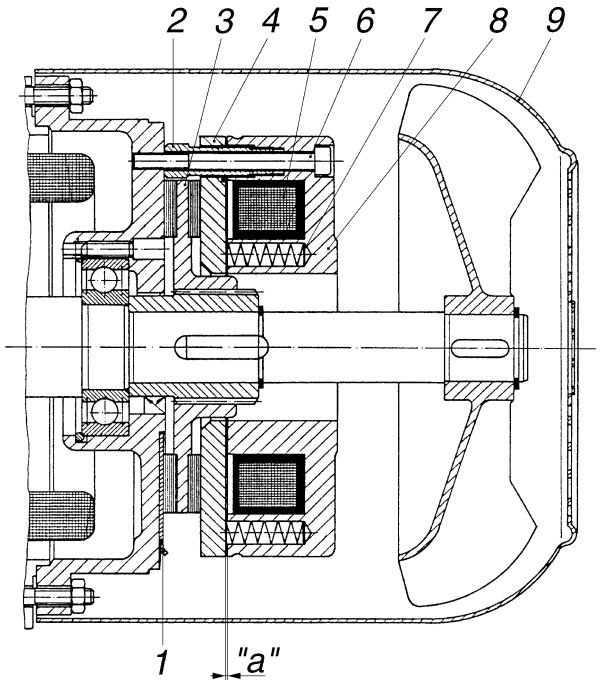


Fig.9-2 Motorbrake

10. MALFUNCTION ANALYSIS

The control box on the platform has an "information panel". This "information panel" consists of a display on which fault codes appear in the event of a malfunction. An explanatory list of fault codes is attached to the control box as an aid to rapid and efficient fault repair. The following table gives an indication of the methods to be employed in the event of a malfunction.

Code	Description	Malfunction	Solution
01	Motor M1 & M2 thermal overload	- Platform loading too high - Voltage too low - Motor stalled	- Reduce loading - Consult an electrician - Consult an electrician
02	Phaseguard relay	- Main switch incorrect position	- Set main switch in the other position; if the malfunction is not corrected, consult an electrician.
03	Emergency stop pushbutton	- Pushbutton depressed	- Rotate pushbutton to release
04	Limiting switch bottom	- The machine has run too far downward	- Consult an electrician
05	Motor control unit	- Motor control malfunction	- Switch off the main switch for 30 seconds and then on again; if the malfunction is not corrected, consult an electrician
06	Limiting switch top	- The machine has run too far upwards	- Consult an electrician
07	Others	- Depending of erection, others	- Consult an engineer
08	Gate/other	- Gate is open - Connector not in socket - Switch defective or "sticking"	- Close the gate - Plug connector into socket - Check the switch
12	Mast detection sensor	- Machine run too far during assembly phase - Switch defective	- Move the machine downward; if the malfunction is not corrected, consult an electrician
13	Control voltage	- Fuse F104 deactivated	- Consult an electrician

In all cases not covered by the above malfunction tables an electrician must be consulted.

Motor does not run	No power supply	- Defective fuses in building site supply - Damaged cable - Motor safety relais switched off - Main switch defective
	Voltage too low	- Incorrect cable type - Cable is too long
	42 Vac control voltage not present	- Automatic fuses operated
Voltage present but platform cannot be raised or lowered	Relays K102 en K103 are energized but platform does not move up or down	- Motor brake locked - Adjust brake
Other malfunctions	Brake distance too long	- Adjust brake
	The platform does not develop sufficient power	- Inform your technical service or dealer

In all cases not covered by the above malfunction tables an electrician must be consulted.

11. MACHINE DISPOSAL

General
After a number of years of reliable service the life of every machine inevitably comes to an end. The machine must then be disposed of in an as environmentally friendly manner as possible.

Amongst others, the following possibilities present themselves:

- Part exchange for a new machine.
- Disposal by a recycling facility.
- Demolition.

Discarding the machine
- Drain the oil out of the reduction gearbox and dispose of this via an authorized facility.
- Remove any usable parts.
- Dispose of the remainder via waste disposal facility.

12. LIST OF KEYWORDS

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