

SELBY ENGINEERING AND LIFTING SAFETY LTD. TEL: +44 (0) 1977 684 600

Betriebsanleitung
Operating Instructions
Mode d'emploi



F08.01.020 - 02.01.2005

Elektrostapler Electric stacker Gerbeur électrique



Type **EGV EPH 1645**

Art. Nr./ Ref.No./ Réf. art. **034554080**



Firma/Company/Société: _____

Type: _____

Prüf-Nr.: _____

1. General

Before taking into operation, please carefully read this operating instructions.

Observe the safety instruction!

File documentation!



1.1. Introduction

With this manual we present to you your new Electric Stacker with electric travel.

Prior to initial operation, we recommend you to carefully study the following Operating and Maintenance instructions and to consider our suggestions. This will help you to save time and costs. Appropriate handling will also guarantee permanent serviceability and long working life.



The name plate fixed to the stacker giving type and Prüf-Nr. (serial number) is required for exact identification of the stacker. Therefore, you are requested to advise the Prüf-Nr., type number and year of manufacture in case of questions or spare part orders.

This Operating- and Maintenance Instruction should be accessible to all persons involved with the operation, maintenance and service of the Electric Stacker with electric travel and should be regarded during their activities.

1.2. Trial and Practice Runs

Before using the electric stacker, we recommend you to make trial and practice runs. By practising, you will learn sensitive handling of the stacker.

1.3. Readiness for Duty - Spare Parts

In order to avoid failure, even small damages should be repaired immediately by a competent person.

Only use original spare parts as per the enclosed spare parts list, otherwise safe function is not guaranteed.

2. Prevention of Accidents

2.1. Destined use

The Electric Stacker with electric travel EGV ESL, EPH is intended for on-site transporting of unit loads, e.g. in warehouses associated with industry and delivery companies etc., for short range transporting of standard and wire mesh pallets, box pallets and other palletised loads on even and fixed surface.

The electric stacker with electric travel is a floor conveyor with power actuated travelling and lifting actuation. It is a travelling floor conveyor with the short name EGV.

The electric stacker with electric travel is a wheel arm stacker with forks situated above the fixed roller arm. This enables to move under pallets without support situated crosswise to the drive direction (wheel opening)

2.2. Regulations for the Prevention of Accidents

The Electric Stacker with electric travel must be operated and used according to the current rules and regulations.

Observe any rules which are valid for the respective country.

presently valid in Germany:

German UVV safety standard BGV D 27

EC Directive DIN-EN 1757-1; EN 1726-1; EN 1175-1;














EN 50081-1; EN 50082-2; EN 61000-4-2

EC Directive 98/37/EG

VDI - Regulations for floor conveyors (obtainable through Beuth Verlag - Berlin - Köln)

It is absolutely essential that the operating instructions below and the BGV D27 regulations for prevention of accidents are carefully read through before starting use.

2.3. Safety Instructions

-  – Never leave the load unattended in a raised position.
-  – Transporting of persons and a presence within the danger zone is not permitted.
-  – A presence under a raised load is not permitted.
-  – The specified load capacity must not be exceeded.
-  – Operation is only permitted on a level and firm floor/ground surface.
-  – The loaded material must be distributed evenly on the fork.
-  – The hydraulic stacker must never be loaded whilst the fork is in a raised position.
-  – Never reach into moving parts.
-  – Check safety functions before and during operation (brake, safety button, lowering brake valve, emergency stop / battery plug)
-  – Defects are to be dealt with competently as soon as they become apparent.
-  – The high-lift pallet truck is not made for or capable of off-loading like a fork lift truck or crane.
-  – In case of occurring faults immediately stop operation.
-  – Alterations to the Stacker or fitting of accessories are only allowed with our written approval.

2.4. Operating Personnel

As a power-driven floor conveyor, the electric stacker with electric travel should only be operated by competent personnel aged 18 years and over, who are sufficiently trained and authorised to operate the stacker.

2.5. Examination

According to BGV D 27 § 20 the Electric Stacker has to be examined if required, but at least once a year by a competent person.

We recommend you to register the results in a test book.



2.6. Taking into Operation

Before taking into operation it is absolutely essential to carefully study this operating instructions as well as the valid Regulation for the Prevention of Accidents.

Ensure that the battery is fully charged and connected.

Only operate the truck with battery power! *Never use mains supply*- as this may damage internal electrical components.

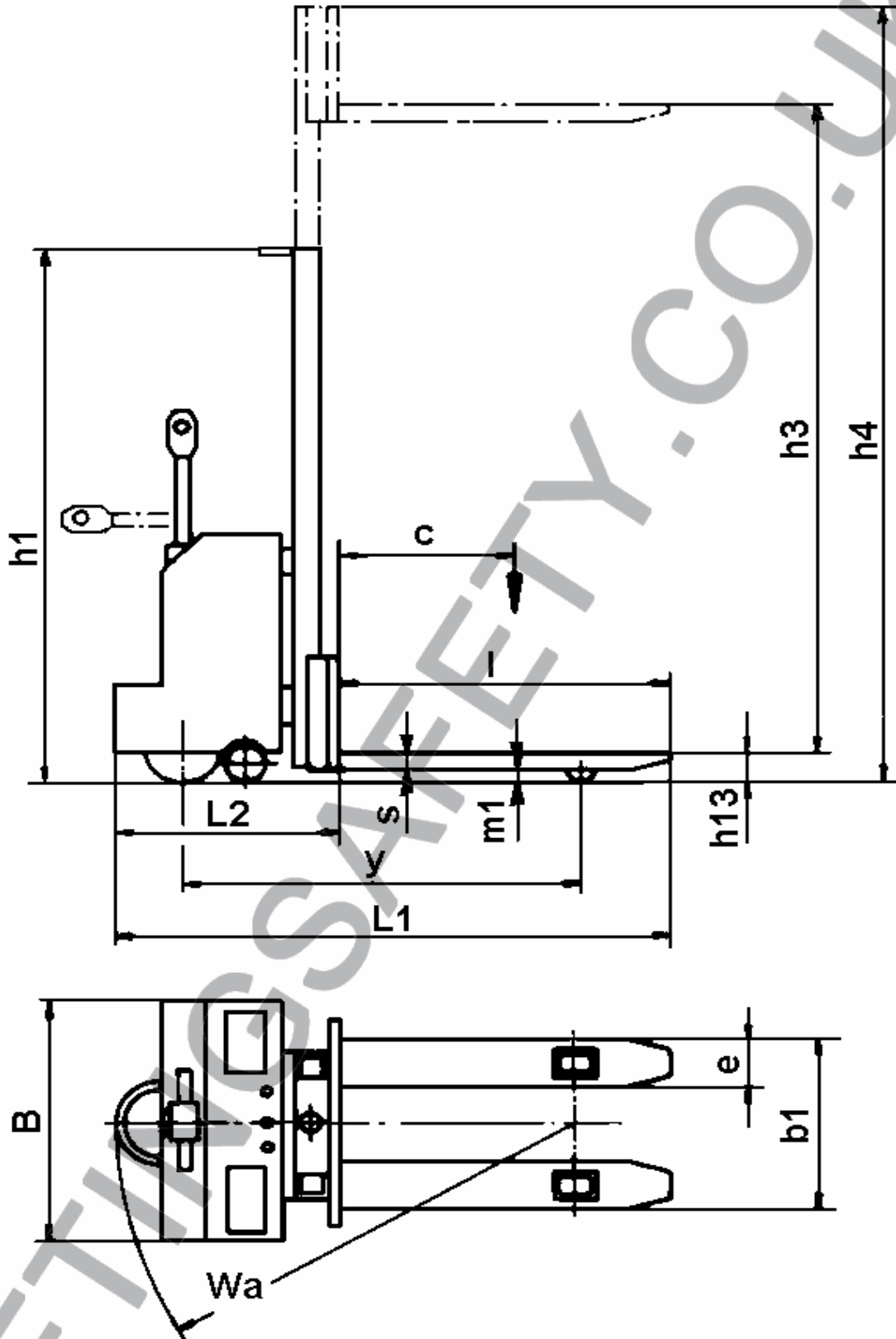
Check the gear- and hydraulic oil level.

Check safety functions, e.g.:

- safety button
- over pressure valve
- emergency stop (battery plug)
- brake

Make a test run.

3. Technical Data – Dimensions



Type description			EPH 1645
Art.-NO.			034554080
Lifting capacity		t	1,6
Residual carrying capacity		t	0,9
Net weight with battery		kg	1100
Wheels, running gear-tires **			VG* / V / V
Tire size front		mm	220x100 / 150x50
Tire size rear		mm	82x60
no. of wheels, front/rear X=driven			1x+2/4
Overall height, retracted	h1	mm	2270
Load centre of gravity	c	mm	600
Free lift	h2	mm	-
Lift	h3	mm	3915
Overall height, extended	h4	mm	5140
Wheel base	y	mm	1330
max. fork height	h3	mm	4415
min. fork height	h13	mm	85
Total length	L1	mm	1960
Front part length	L2	mm	810
Total width	B	mm	1050
Fork length	l	mm	1150
Fork width x fork height	e x s	mm	178x60
Fork carrying width	b1	mm	560
Floor/ground clearance	m1	mm	25
Width of work aisle for Europallets	Ast	mm	2250
Turning radius	Wa	mm	1460
Travelling speed with / without load		km/h	5/6
Lifting speed with / without load		m/s	0,07 / 0,11
Lowering speed with / without load		m/s	0,06 / 0,11
Gradeability with / without load		%	8/ 10
Travelling motor power		kW	1,2
Lifting motor power		kW	2,2
Battery acc. to DIN 43531			PzS
Battery voltage / capacity		V/Ah	24 / 210
Battery discharge indicator		V/A	24 / 40

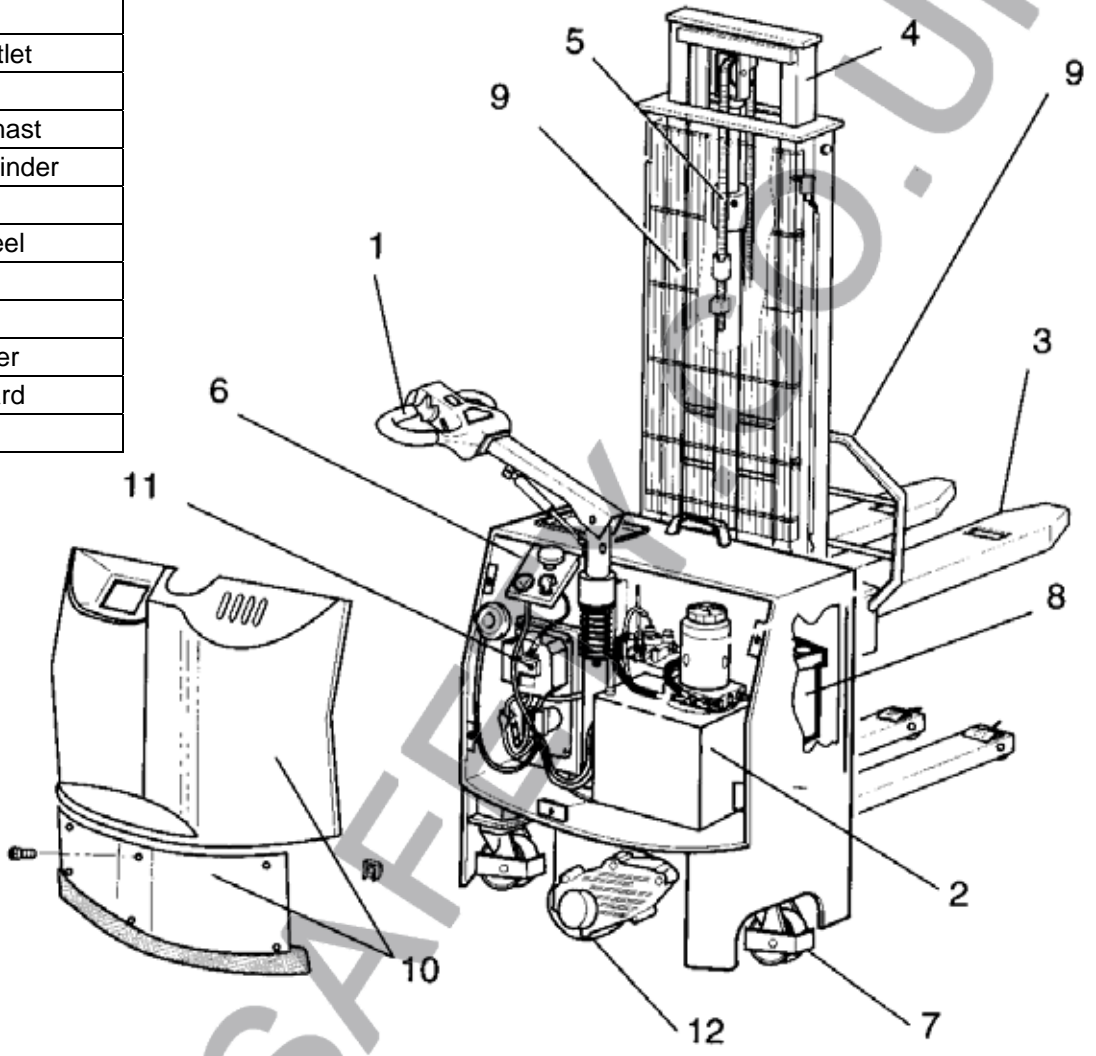
* = driving wheel

** VG = solid rubber, PUR=Polyurethan, V = Vulcanised rubber

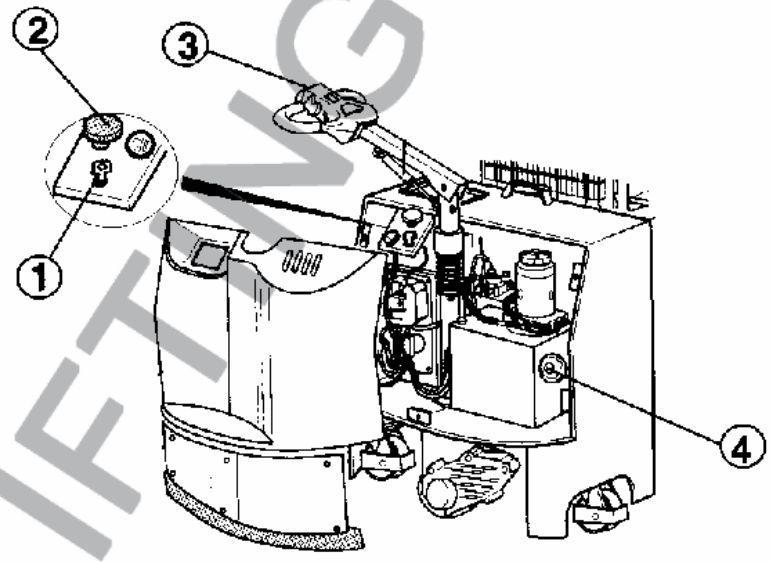
4. Operating Instructions

4.1. General Arrangement Drawing

1	Tie bar
2	Hydraulic outlet
3	Fork
4	Telescopic mast
5	Hydraulic cylinder
6	Main switch
7	Steering wheel
8	Battery
9	Protection
10	Housing cover
11	Electronic card
12	Motor wheel



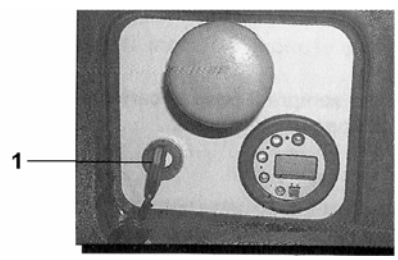
4.2. Operating Elements - General Arrangement Drawing



1	Key switch
2	EMERGENCY-STOP
3	Safety button
4	Warning horn

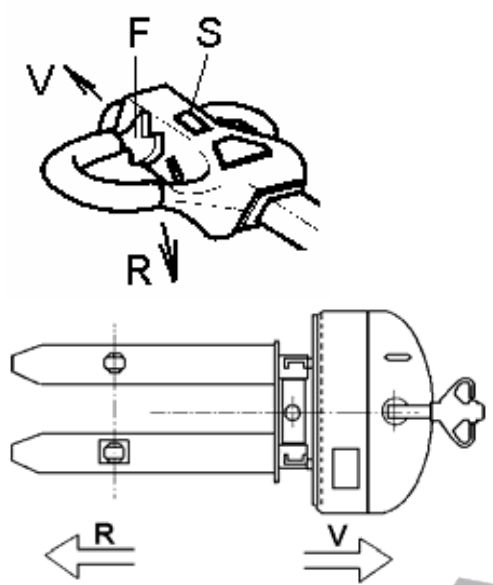
4.3. Operating Elements - Operation

4.3.1 Key-operated switch



Insert the key into the key switch and turn it clockwise onto „switched-off switch“ position
Current circuit is closed – operating position.

4.3.2 Driving Direction and Driving Speed



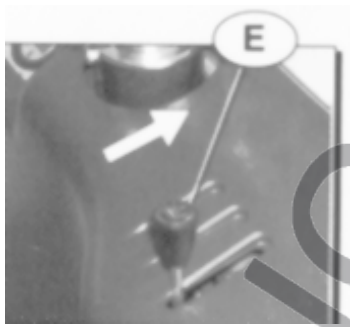
Finger lever **F** is operating in 2 steps
1st catch = disconnects the electromagnetic brake
2nd catch = establishes the driving direction

Pressing the finger lever in
Direction driving direction
V = tie bar direction
R = fork arm

When touching the safety button (**S**), the stacker automatically switches to drive in fork arm direction “**R**”

In no case may the safety button be used for shunting.

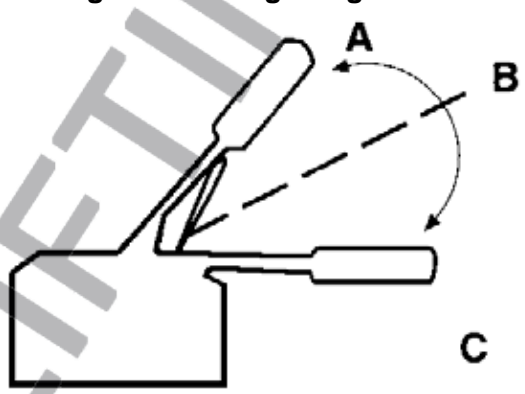
4.3.3 Lifting Hydraulic



Pulling the adjusting lever = lifting
Pressing the adjusting lever = lowering

Changing the position of the lowering lever, enables to adjust the lowering speed sensitively.

4.3.4 Travelling and Braking Range

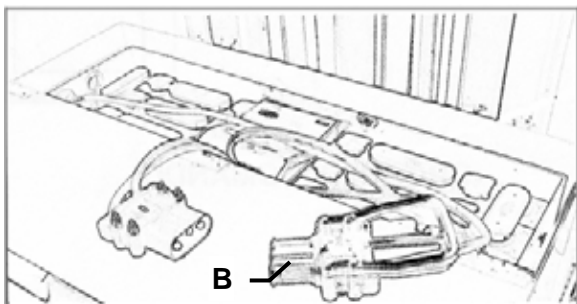


In upper position **A** of the tie bar, the stacker is braked through the electromagnetic releasable disc brake (parking brake).

Between tie bar position **B** and **C** it is possible to drive forwards and backwards. (Electromagnetic brake is released).

By actuating the finger lever (see 4.3.2) opposite to the driving direction, the stacker can be braked sensitively through counter current brake (operating brake).

4.3.5 Battery Plug - EMERGENCY-STOP



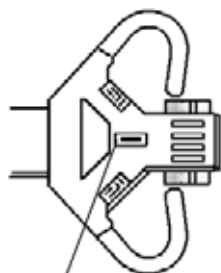
EMERGENCY - STOP →

IN CASE OF DANGER:

- pump motor cannot be switched off
- travelling motor does not switch off

DISCONNECT THE BATTERY PLUG (B)!

4.3.6 Warning Horn



Warning horn

The acoustic warning device can be actuated through the push-button!

4.4. Handling

4.4.1 Before taking into operation check:

- Perfect function of the operating elements
- Function of the brakes, parking- and operating brake!
- Make a brake test!**
- Acid level and charging state of the battery
- State of the travelling rollers, firm seat of the wheel screws and roller axles
- Function of the safety button (see 4.3.2)
- Load chains for adjustment, chain tension and wear

4.4.2 Driving and Braking

- Close the battery connector (see 4.3.5)
- Plug the safety key into the key-operated switch and turn to the right until it stops (see 4.3.1). The electric stacker is ready for travelling and the operating elements of the lifting hydraulic may be actuated.
- Bring the tie bar into driving range (see 4.3.4)
- Control the driving direction and speed with the rotary finger lever (see 4.3.2).
- Due to safety reasons, changing of the driving direction should only be effected from a standstill after having fully braked.
- Touching the safety button on the tie bar head (see 4.3.2) automatically leads to a switching to backwards drive (driving direction "R"), thus providing additional protection for the operating person.
- In **no** case may the safety button be used for shunting of the electric stacker.
- The operating brake is to be actuated according to the respective situation. Long delay or even jerky braking causes danger of accidents.
- Suddenly letting of the tie bar leads to full braking (mechanical parking brake) and should be avoided. Actuating the parking brake (upper and lower tie bar position, see 4.3.5) automatically switches off the driving current.
- When leaving the stacker, take out the safety key. Bring the tie bar into upper braking position. Completely lower the fork.
- In case of danger - pump- or driving motor cannot be switches off - pull out the battery plug (see 4.3.5). Thus, an emergency stop of all electrically effected movements is achieved.
- In current-free state, the parking brake is closed. Lowering of the fork is still possible.

4.5. Loading

Make sure the load does not exceed the carrying capacity of the stacker. Observe the respectively applicable load diagram.

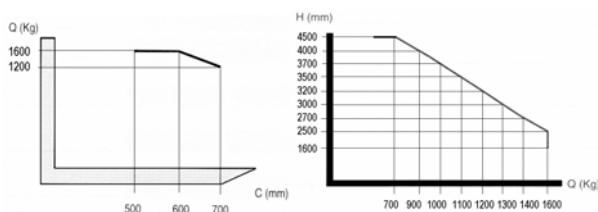
Slowly drive to the stacking area. Level forks to equal height with the pallet and move into the pallet until the back of the fork touches the load (pallet).

4.5.1 Bring the tie bar into upper braking position and slightly lift the load.

4.5.2 Slowly start to drive and lower the load.

4.5.3 Load Diagrams

EGV EPH 1625; 1630; 1635; 1640; 1645



The load must be equally balanced on both forks.

4.6. Travelling with Load

Travel with the load in lowest possible position in consideration of the floor clearance under the load.

The load should be moved with lifted fork only for stacking and depositing on even surface.

Travel with steady speed adapted to the load and the floor conditions.

A sudden stop is only allowed in case of danger.

Sufficiently reduce the driving speed in curves.

When driving on ascents, the climbing ability of the stacker must not be exceeded.

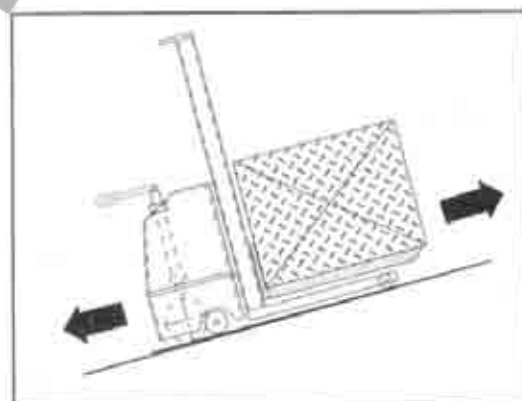
Max. climbing ability: 8% with load, 10% without load.

Climbing ability data apply to a dry floor pavement surface.

With other surface conditions (humidity, other surface, etc.) the maximum permissible ascent or slope is reduced respectively.

Driving on ascents and slopes should be effected with the load pointing to ascent direction and with lowered fork only.

When stopping, especially on ascents and slopes, bring the tie bar to upper braking position.



4.7. Depositing of the Load

Stop just before the stacking area and lift the load in safe distance over the pile. Manoeuvre the load directly above the pile and bring the tie bar in upper braking position. Lower the load until fork arms are discharged. Ensure safe reversing, move away and lower the fork arms.

5. Maintenance Instructions - View

5.1. Summary: Maintenance and Inspection Works

Maintenance Intervals		Maintenance Works
every 50 operating hours or monthly	1	The guiding rollers are provided with long-term lubrication and are thus virtually maintenance-free.
	2	Grease running paths and lateral faces of guide rollers in the lifting carriage.
every 200 operating hours or quarterly	3	Check the level of the hydraulic oil with forks completely lowered and the stacker in horizontal position.
	4	Check the hydraulic system for leakage, seating of unions and chafe marks (hoses).
	5	Check adjustment of the lifting chain, if necessary adjust, clean and grease
	6	Check seating of all screw connections.
	7	Lubricate conical lubrication nipple and turntable bearing.
	8	Re-adjust battery pole screws. Check the state of the cell connectors (only with PzS batteries.)
	9	Check proper state and tight seat of all electric wires for control current and main current
every 500 operating hours or every 6 months	10	Check the carbon brushes of the electric motor for smooth running and wear.
	11	Check the finger lever for spring pressure and perfect return movement.
	12	Check seating and smooth running of the tie bar.
every 1000 operating hours or annually	13	Change hydraulic oil. *)
	14	Change gear oil. *)
if required, but at least every 6 years	15	Replace hydraulic pressure hoses.

*) New units require the first oil change after max. 20 operating hours.

5.2. Recommended Hydraulic Oil and Lubricant

For perfect function of the electric stacker we recommend to use a hydraulic oil respectively a lubricant as per the below table. These special oils fulfil best the technical requirements with regard to viscosity (walk penetration) and pour point.

The lubricants are based on ambient temperatures of - 10° up to + 40°C.

In case of extreme temperatures please contact us or the "Technical Services" of the below-listed mineral oil companies.

Please also observe our instruction for the operation at low temperatures (see 8.)

Viscosity class	Rec. working substance for the hydraulic system Hydraulic Oil HLP-DIN 51524 T2 SO VG 46	Rec. gear oil for wheel hub gear gear oil CLP-DIN 51517 T3 ISO VG 100	Rec. lubricant for greasing points - multipurpose grease-DIN51825 T 1 K 2 K
AGIP	AGIO OSO 32	ROTRA 80W 90M/P	GRM U/2
BP	Energol HLP 37	Hypogear 80W90	BP Fett LTX 22
ELF	OLNA 32	Tranself TB	ROLEXA 2; EPEXA 2
Esso	Nuto H 32; Nuto HP 32	Getriebeöl GX 80W90	Esso Beacon 2 Esso GP
Shell	Tellus Öl 32; Tellus Öl S 32	Spirax HD 80 W90	Alvania Fett R 2; Alvania Fett 2
IP	IP Hydrus Öl 32	IP Pontiax HD 80W90	Athesia GR2; Athesia EP2

Every other reputed brand of lubricant corresponding to the applicable specification of the table may be used.

Used oil to be disposed according to legal regulations !

6. Description of Required Inspection and Maintenance

6.1. Hydraulic System

The hydraulic system consists of the hydraulic aggregate with mounted-on speed-adjustable lowering valve and safety valve, as well as lifting cylinder with incorporated lowering brake valve.

The hydraulic system requires almost no 5.1 maintenance apart from the recommended tests (see 5.1 - 3.4) and the required oil change (see 5.1 - section 13 and oil recommendations 5.2).

Prior to maintenance or repair relieve the pressure in the hydraulic system. Lower the fork completely and remove the load.

If repair is unavoidable on the extended lifting structure, secure all parts (fork, mast, cylinder) against unintended lowering.

Do not run the hydraulic pump without oil !

Replace the pressure hoses in case of damage or on demand, but at least after 6 years.

For oil changing suck the oil out of the oil tank.

For further details see 5.1 - oil recommendation 5.2

Ventilate the hydraulic system after oil change or on demand.

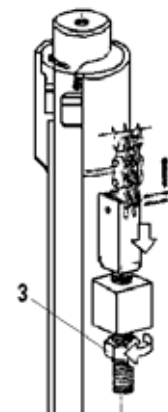
Ventilation may only be effected in unloaded state.

Ventilation Process

Slightly open the screw plug ① at the top of the hydraulic cylinder.

Operate the adjusting lever (see 4.3.3) until hydraulic oil discharges without bubbles.

Tighten the screw plug ① before operating the lowering valve



6.2. Adjustment of the Lifting Chain

Adjust the chain length by tightening the tension nut ③ so that the load chain is tightened when the fork is completely lowered.

After adjustment fix nuts ② and ③ by a lock-nut.

At regular intervals, check the lifting chains for fractures, scores and marks of wear (see 5.1)

The permissible elongation must not exceed 3%.

Replace damaged chains or those elongated by more than 3%

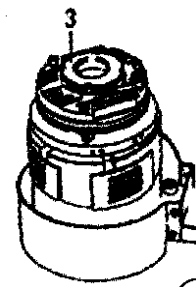
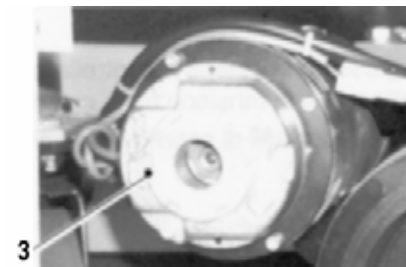
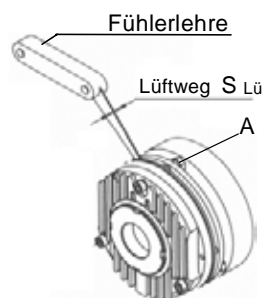
6.3. Electro-magnetic Spring Brake

Works on the brake may only be executed by authorised and competent personnel.

The brakes are virtually maintenance-free.

However, we recommend to check the ventilation gap $SLü$ = at regular intervals depending on type of application (every 2000 operating hours). If the ventilation gap has reached $SLü_{max} \geq 0,5$ mm, the nominal value $SLü = 0,2$ mm has to be re-adjusted.

For that, loosen the fixing screws (A) and tighten the sleeve screws (3) until on three points of the circumference (measured between magnetic body and anchor washer by means of thickness gage) the same value for $SLü = 0,2$ mm results. Then, re-tighten the fixing screws.



6.4. Electric System

During all works on the electric system, pull the battery plug out of the feeding socket.

Due to danger of short circuit, no metallic objects must be laid on the battery.

7. Battery

7.1. Substituting the battery

1. Remove the battery from its retainers;
2. Remove the cables from the battery terminals;
3. Slide out the battery;
4. Mount the battery following the above instructions in reverse order, fixing in place and connecting it correctly.

Before assembly check the battery for correct mechanical condition.

Fix the pole terminals safely to the respective end poles + and - of the battery. This is a permanent connection and shall not be used for continuous changes.

Check the electrolyte level of the battery. If not all cells have equal electrolyte level or if the electrolyte is not visible, refill distilled water (DIN 43530) up to shortly above plate level.

Do not refill up to max. level mark!

After recharging (according to charging condition) cleaned water may be refilled up to the maximum filling mark. The battery is ready for operation.

7.2. General Rules and Advice for Operation

Above all, the battery manufacturer's directions and instructions are applicable.

Modern sulphuric acid batteries require little maintenance and are easy to maintain. The working life of the battery depends mainly on the manner of application and maintenance. To ensure longest possible working life, observe the following rules:

The indicator gives the battery condition indication by means of a series of 5 green LED and one red LED.

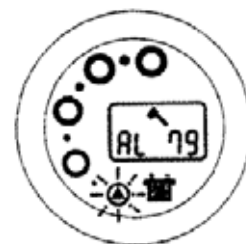
When the battery is charged, the first 4 green LED are on and, with the progressive discharging of the battery, they switch off one after the other, in proportion to the residual charge of the battery, until the residual charge value reached is such that the red LED lights up, signalling in this way that the battery is flat.

Hour counter

In the middle of the instrument dial there is a liquid crystals alpha-numerical display which informs the operator about the working hours carried out.

Alarms

The same display used for the hour counter works also as the indicator of the alarm condition, by displaying a code which corresponds to the kind of alarm signalled. In order to draw the attention of the operator, the red LED begins flashing



- Do not retain discharged batteries. Recharge as soon as possible.
- Avoid heavy discharge of more of 80% of nominal capacity. The acidity should not be lower than 1,13 kg/l .
- Heavy discharges reduce capacity and working life.
- The most favourable operating temperature is between + 25°C and + 55°C. Do not exceed the electrolyte temperature of + 55°C.
- Expect a temperature increase of approx. 10° up to 12 K (°) during charging.
- Interrupt charging before having exceeded the temperature limit of 55°C.
- At temperatures of more than 40°C more distilled water will evaporate. Control the acid level more often.
- Heavy duty and winter temperatures require a daily charging of the battery, even if less than 80% of the nominal capacity have been consumed.
- Always keep the battery clean and dry and protect against soiling.
- Thoroughly grease the pole terminals (pole screws)
- Only refill distilled water according to DIN 43530.
- For charging, only use charging devices which are suited for the battery size (capacity) and charging times.
- Before charging, remove the battery covers respectively open the battery storage cap.
- The ventilation holes of the fillers must be free to allow battery gasses to escape.
- Always connect the charging device with correct poles, i.e. plus to plus, minus to minus.
- Repairs on the battery and charging device should only be executed by trained and competent personnel.
- **After having completed the charging process the stacker has to remain in a ventilated room until all gasses have safely escaped. Avoid handling the electric installation during charging and in the subsequent non-working time.**

7.3. Maintenance

Read carefully the attached instructions of use and maintenance, given by the company manufacturing the battery.

Intervals	
daily	Charge Battery
weekly	Control the electrolyte level. If required, refill cleaned water as per DIN 43530 (distilled water) towards the end of recharging.
monthly	Control all cells for equal gassing at the end of recharging. Check acidity and temperature.
quarterly	Check the pole terminals for tight connection. Towards the end of the recharging control voltage Check charging device and charge the battery.

7.4. Dangers and Preventive Measures

Dangers	Preventive Measures
The gasses developed during charging are explosive.	Have charging area well ventilated. Avoid open flames and sparks. Smoking prohibited.
The electrolyte (diluted sulphuric acid) is corrosive.	Wear protective clothing, eye protectors and safety gloves.
Lead and lead connections are harmful.	When handling batteries do not eat or drink. Wash your hands thoroughly after having worked on batteries.

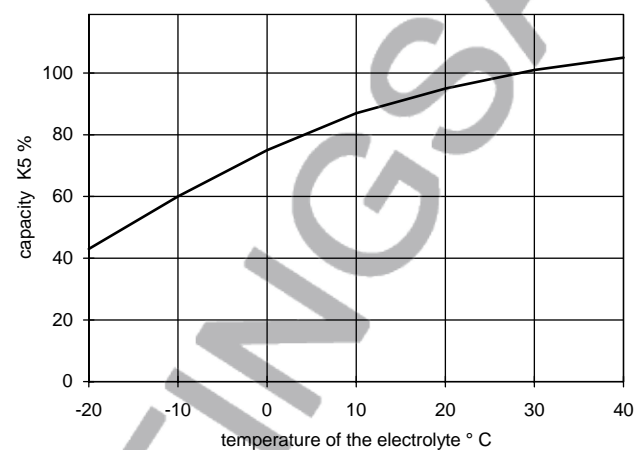
Used batteries to be disposed according to legal regulations.

7.5. Operation in Winter Time or at low Temperatures

To avoid excessive cooling of the battery and the hydraulic system, the electric stacker with electric travel shall not be unnecessarily exposed to cold areas.

The storage area should have normal temperatures not below + 15°C.

Charging of the batteries below +15°C will take longer and is not economical.



At low temperatures the battery capacity is quickly reduced (reference values see diagram), that means the operating time is reduced with descending temperatures.

Batteries should be recharged daily or more often, although consumption has been less than 80% of the capacity.

The electrolyte of a battery discharged by 80% (acidity 1,13 kg/l) will already freeze at -12° C.

Heavy discharged batteries are subject to freezing at temperatures just under 0°C.

The electrolyte of a newly charged battery (acidity 1,28 kg/l) will freeze only at approx. - 68°C.

The cooling period of a newly charged battery may last up to 12 hours depending on temperatures.

Before taking the stacker into operation and in order to warm up the oil, the lifting system should be operated in unloaded state several times prior to leaving the temperature storage area.

For permanent operation at winter temperatures we recommend the use of multigrade lubricants for the hydraulic system and the wheel hub gear.

Please contact our Technical Department for questions concerning application and type of lubricant.

8. Operating Failures and Their Causes

8.1. Electric System

Failure	Cause	Remedy
With pressed driving switch (rotary finger lever), the drive motor does not run.	defective fuse	replace the fuse
	battery discharged	charge the battery
	a cell connection in the battery has loosened (only with PzS batteries)	reconnect and tighten
	loose cable lug	reconnect and tighten
	loose cable connecting plug	reconnect and tighten
	abraded bushes in the motor or weakened springs of the brushes	replace bushes with springs
	failure in the contactor	check and replace
	defective wiring to the contactor or motor	repair
	failure in the impulse control	replace
Too early battery discharge	silted battery	replace battery
	sulphating or other failure in the battery	check respective replace the battery
	accidental earth contact in the electric system or battery	repair or replace battery

8.2. Brakes

Failure	Cause	Remedy
Tie bar brake shows no or not sufficient brake effect	Brake is incorrectly adjusted.	Have the brake adjusted by a competent person (see 6.3)
	Brake discs are worn out	

8.3. Hydraulic System

Failure	Cause	Remedy
Stacker does not lift the load (pump aggregate operates)	load is too heavy, overload valve is actuated	reduce the load
	lowering valve does not close or valve face is leaky due to soiling	clean or replace
Stacker lifts slowly or not at all with running pump motor, with or without load.	pressure relieve valve not correctly adjusted or valve face is soiled	adjust or clean valve
	hydraulic pump is defective	repair or replace hydraulic pump
	battery discharged or defect	charge or replace the battery
The motor pump does not start	battery plug is not plugged in	plug in the battery plug
	loose connecting cable	fix connecting cable
	blown fuse	replace the fuses
	defective starter relay	replace starter relay
	abraded brushes in the pump motor or weakened pressure springs	replace brushes with springs
	defective pump motor	replace motor or aggregate
Lifted load is no longer suspended	leakage in the hydraulic system	seal accordingly
	lowering valve does not close or valve face is leaky due to soiling	clean or replace
	pressure relief valve (pump) is leaky (pump turns slowly backwards.)	clean or replace the valve
Loss of oil on the cylinder	sealing elements are worn out	Replace sealing elements <ul style="list-style-type: none"> ▪ Discharge the stacker or the hydraulic system ▪ Let oil flow out of the cylinder, remove screwing ▪ Dismount the cylinder. ▪ Disassemble the hydraulic cylinder by unscrewing the guide piece ▪ Remove the piston guiding ▪ Draw the piston rod upwards out of the guide piece and replace the sealing elements Use original spare parts only Ventilate the cylinder after reassemble and oil filling For that see 6.1.
Lifted load lowers too slowly	temperature is too low - hydraulic oil is too viscous	Warm up
	soiled filter for return flow (lowering valve)	Clean

8.4. Symbols and Alarms

Three symbols inform the operator as follows:

8.4.1 Symbol of the turtles:

It shows the starting-up of the "soft" operation way of the truck, that is maximum speed and reduced acceleration.



8.4.2 Symbol of the adjustable wrench:

It shows the request of programmed maintenance or the alarm condition, shown also by means of the corresponding code; the piece of information given by the MDI indicator is extremely useful to the maintenance service, because it eases the location of the possible breakdowns of the machine to the operator himself, making in this way easier to solve the problem.



8.4.3 Symbol of the hour-glass:

When it is flashing, it means that the hour counter is working.



8.4.4 Decoding of the alarms on the MDI

The indicator gives an indication about the alarm condition of the machine connected to it, through the signalling of a code corresponding to the actual alarm.

In case an alarm happens, the red LED starts flashing in order to draw the attention of the operator towards the display, and the symbol of the adjustable wrench appears.

By consulting the following table the operator, if the kind of alarm is not particularly serious, can solve the problem by consulting the paragraph about alarms, in the system manual to which it is linked.

Whenever the alarm results difficult to remove, it is anyway possible to give useful information to the service centre and in this way to speed up the servicing time, saving time and money.

AL 08 - WATCH DOG

The text is executed at the key turn-on, at the stand-by and on running.

Possible causes:

- a) Watch-dog hardware circuit not OK,
- b) Watch-dog Software not OK.

AL 13 - EEPROM KO

Fault in the area of memory where the adjustment parameters are stored. This alarm inhibits machine operation. If the fault continues when the Key Switch is recycled, replace the logic. If the fault disappears, the previously stored parameters will have been replaced by the default parameters.

AL 15 - VFIELD NOT OK

This test is made at standby with the Line Contactor open. In this condition the voltages on both the connections of field must be around 1/2 V battery. This alarm is generated if the field voltage is different from this value.

Possible causes:

- a) Frame fault on the motor to chassis.
- b) Incorrect connection of the field winding to the controller.
- c) Failure of the controller in the section relative to the field

AL 19 - LOGIC FAILURE #1

This test is carried out at the start-up: Possible cause: failure of the logic board.

AL 32 - VMN NOT OK

This test is performed at rest, with the general Contactor Closed, and also during operation. At rest if VMN is lower than battery voltage this Alarm is generated.

During operation this Alarm is generated if VMN doesn't follow the duty-cycle of the chopper.

Possible causes:

- a) Incorrect Motor connection.
- b) Short circuit motor winding to chassis
- c) Defect in the power unit

AL 37 - Contactor Closed

This check is made during the initial diagnosis. With the coil of the line contactor de energised, the capacitors should not be charged, unless there is divert resistor across the power poles.

Possible causes:

- The line contactor power poles are welded.
- This alarm could be generated even if the line contactor has opened, but there is a problem with either the field circuit, or a problem detected by the safety microprocessor.

AL 49 - I = 0 EVER

This check is made during travel. If the current is not higher than a pre-set minimum value, this alarm is generated and the machine is disabled.

Possible causes: See STBY I HIGH. Check the motor armature (brush connections).

AL 53 - STBY I HIGH

This test is made during the initial diagnosis and at standby. The test verifies that the current is zero. This alarm disables the machine.

Possible causes:

- Defective current sensor.
- Logic failure. First replace the logic. If fault remains replace the power unit.

AL 57, AL 58 - HIGH FIELD CUR, NO FIELD CUR

Problem detected with the field winding current.

Possible causes:

- Failure of the field current sensor:
- Field cables not connected or incorrectly connected.
- Failure of the Field Power Unit.

AL 60 - CAPACITOR CHARGE

This check is made during the initial diagnosis. This alarm is generated if the Capacitors are not charged within 500ms after the Key Switch is closed. Probable cause is failure inside the power block.

AL 62 - TH PROTECTION

If the temperature of the fan rises higher than 70°C, this alarm is generated.

The fan current is reduced in proportion to the increase in temperature. At 80°C the fan totally stops. If the temperature of the fan is <-10°C, this alarm is also generated and the current is reduced by 80 %. If this alarm is displayed when the fan is temperature is the same as ambient or better than zero degrees:

- Check the connection of the temperature sensor.
- The temperature sensor may be defective.
- The logic may be defective.

AL66 - BATTERY LOW

This alarms is generated when the battery becomes 50 % discharged from the nominal value.

AL 75, AL 76 - CONTACTOR DRIVER, COIL SHORTED DRIVER SHORTED.

This alarm is generated if the accelerator output voltage differs more than 2V from the acquired minimum during the PROGRAM VACC.

Possible causes:

- The track of the potentiometer has become open.
- The potentiometer is not wired correctly.
- The potentiometer itself is defective.
- The values set in PROGRAM VACC routine have not remained or made correctly.

AL 79 - INCORRECT START

Alarm generated by an incorrect Starting Sequence.

Possible causes:

- The enable microswitch has welded or failed.
- Error in the starting sequence from the operator.
- Error in the wiring.

AL 86 - PEDAL WIRE KO

This alarm is generated if potentiometer or wiring fault is detected. (NPOT or PPOT are open circuit.