Operating manual

Electric tiller-controlled-stacker

BSL14S-7 BSL16S-7 BSL20S-7



Effective from year of manufacture: 2019

	Original operating instru Keep for futu	uctions Ire use!	in English!
(€	Doosan Logistics Europe GmbH Am Stieg 17, OT Freiwalde D-15910 Bersteland	Telefon: Fax: E-Mail: Web:	035474/208-0 035474/208-15 doosanlogistics@doosan.com http://www.doosanlogistics.de



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1. Introduction

1.1 Information regarding your customer documentation

Please read throught these operating instructions as well as the applicable accident prevention regulations for safe handling of industrial trucks carefully before the initial start-up.

These operating and maintenance instructions must be available to and followed by all persons involved in the operation, maintenance and handling of the electric tiller-controlled pallet vehicle. These operating and maintenance instructions will help you

- To become familiar with the electric tiller-controlled pallet vehicle,
- To use the electric tiller-controlled pallet vehicle as intended
- To make best use of the electric tiller-controlled pallet vehicle.

They contain important information about the electric tiller-controlled pallet vehicle:

- To use it in an safe
- and proper way

Following these instructions will ensure

- Protection of operators,
- Prevention of dangerous situations (work-related accidents).
- Faultless operation of your electric tiller-controlled pallet vehicle.

Specifications involving "right/left" always relate to the direction of travel (forwards) of the vehicle. We accept no liability for damages and breakdowns resulting from non-compliance with these operating and maintenance instructions.

DOOSAN pursues a policy of constant product development. We therefore reserve the right to make changes. Likewise, no legal claim may be derived from any particulars contained in the operating instructions.

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1.2 Manufacturer information

1.2.1 Service and Hotline of manufacturer

•	Manufacturer's address	Company name:	DOOSAN Logistics Europe GmbH
		Street:	Am Stieg 17 – OT Freiwalde
		Town:	D 15910 Bersteland - Germany
		Phone:	+49 (0) 354 74 – 208 - 0 +49 (0) 354 74 – 208 - 15
		Internet:	www.doosanlogistics.de
		E-mail:	doosanlogistics@doosan.com
•	Document data	Operating instructions no.	693-10013-02-1119-en
		Compliance with standards and directives, please see	enclosed CE declaration

1.2.2 Type plate

DOOSAN Am S D-15	Doosan L Stieg 17; OT 1 910 Berstela	Logistics Europe GmbH Freiwalde; T + 49 35 474 208- nd F + 49 35 474 208-	₀ €
Model Capacity Motor performance Hydraulic perform. Truck net weight Truck total weight	kg W W kg kg	Com. No. at Load center Battery Voltage Batt. Weight min. Batt. Weight max. Travel speed max.	1234-2011 mm V kg kg km/h



1.3 Staff qualifications

1.3.1 Requirements

Persons involved in the operation and servicing of the electric tiller-controlled pallet vehicle must meet the following requirements:

- They must be at least 18 years of age.
- They must be physically and mentally able.
- They must be fit (that is, rested and not under the influence of alcohol, drugs and medication).
- They must have received training in the operation and maintenance of the machine.
- The owner operator must have receives proof of competence from applicants.
- There should be no doubt that they are able to fulfill the assigned tasks reliably.

1.3.2 Qualifications

The electric tiller-controlled pallet vehicle must only be operated by staff holding a driver's license.

The scope of responsibility and required qualification of the staff appointed to work with the electric tillercontrolled pallet vehicle have to be clearly defined by the electric tiller-controlled pallet truck's owner operator.

Persons undergoing training, receiving instructions or briefing for the electric tiller-controlled pallet vehicle must be continuously supervised by an experience member of staff when working with the electric tiller-controlled pallet vehicle.

We recommend providing safety briefing to your staff and to have their participation confirmed by signature as well as to keep records thereof.

1.3.3 Additional operating instructions

The manufacturers' operating instructions for some units will either be included or can be sent for.

- Battery
- Electronic control
- Multifunction display

1.4 CE mark



The electric tiller-controlled pallet vehicle is manufactured in accordance with EU guidelines, as amended from time to time, bearing CE marking.

The enclosed declaration of conformity will become invalid if the device is modified or altered in any way without our consent.

1.4.1 Alterations to industrial trucks

Owner-operators may only modify, or engage a specialist engineer to modify, powered industrial trucks if the manufacturer has withdrawn from the business and when there is no successor.

However, owner-operators will have to ensure that:

- The modifications to be carried out and their safety is planned, checked and performed by a specialist engineer for industrial trucks;
- Permanent records for planning, checks and performance of alterations are available;
- Appropriate changes to signs with respect to load-bearing capacity, information signs and stickers as well as operating and workshop manuals are made and approved;
- durable and clearly visible labelling is attached to the industrial vehicle that states the type of modifications, date of modifications and name and address of the organisation commissioned with this task.

1.5 EN standards

This electric tiller-controlled pallet vehicle is compliant with the requirements set out in:

- The currently valid version of the Machinery Directive 2006/42/EC
- The Electromagnetic Compatibility Directive 2014/30/EC
 - > The threshold values for electromagnetic emissions and interference resistance for industrial trucks are laid down in EN standard 12895.
- The continuous sound pressure level is the mean value as per EN 12053 in compliance with EN ISO 4871, taking into consideration the continuous sound pressure level generated during driving, lifting and idling. The continuous sound pressure level is measured at the ear of the operator.
 - > Continuous sound pressure level: $L_{pZA} = 65 \text{ dB}(A)$



1.6 EU declaration of conformity as per Machinery Directive

The manufacturer / distributor

Doosan Logistics Europe GmbH Am Stieg 17, OT Freiwalde 15910 Bersteland

Entitled representative and author of the Technical documentation as per 2006/42/EG

Doosan Logistics Europe GmbH, Mr. Kwanhun Lee Am Stieg 17 – OT Freiwalde 15910 Bersteland

hereby declares that the product below

Product Name: Electric tiller-controlled-stacker

Made by:

BSL14S-7 / BSL16S-7 / BSL20S-7

Description:

Picking up, setting down and transporting of shipping unit

comply fully with all the relevant provisions of the directive mentioned above as well as any other directives applied (below) - including any amendments thereto which are in force at the time of the declaration.

The following additional EU directives have been applied:

Machinery Directive 2006/42/EU

The following harmonized standards were applied:

EN ISO 12100:2010	Machine safety - general design guidelines - risk assessment and risk reduction (ISO 12100:2010)
EN ISO 3691-1:2015	Safety of industrial trucks – safety requirements and verification – part 1: Powered industrial trucks except automated guided industrial trucks, pallet trucks with adjustable range and freight delivery vehicles (ISO 3691-1:2015)
DIN EN 16307-1:2015	Industrial trucks – safety requirements and verification - part 1: Additional requirements for powered industrial trucks except automated guided industrial trucks, pallet trucks with adjustable range and passenger vans (EN 16307-1:2013)



2. Safety and prevention of accidents

2.1 Warning notices and special information

The operating instructions contain warnings and instructions for the prevention of accidents and dangerous situations. The following warnings as well as the appropriate symbols are used in the instruction. Strictly observe the instructions.

You are under the obligation of being aware of and following local safety regulations. Local regulations will apply to instructions in this manual that deviate from the regulations stated above.

DANGER!	Designates an imminent danger. Death or serious injuries may ensue if this advice is not followed.
WARNING!	Indicates a possibly dangerous situation. Non-compliance with this note may result in fatal injury.
	Indicates a possibly dangerous situation. Non-compliance with this note may result in minor injury.
ATTENTION!	Special dos and don'ts for the prevention of damage
NOTICE!	Special information concerning economic use as well as important additional information



2.2 Proper use

The industrial vehicle is to be used, operated and serviced according to the information contained in these operating instructions.

- The vehicle described in these operating instructions is an industrial vehicle designed for lifting and transporting shipping units.
- For maximum load and admissible load distance please see load diagram.
- Use suitable pallets with open bottom board or trolleys
- Admitted temperature range 0°C to 40°C.
- The use at extreme temperature fluctuations and condensing humidity is to be kept at a minimum and only admissible if it is possible afterwards to dry off the vehicle completely.
- The use in cold stores requires special equipment and is to be clarified with the customer.
- For use in roofed, enclosed spaces only.
- For use up to 2000m above sea level only.
- Special equipment is required for use in very dusty or corrosive environments.
- For use on firm level ground only.
- For use on owner-operator approved clearly visible driveways only.
- For use on slopes with a maximum gradient of 10 % only
- If the industrial vehicle is to be used outside the operational range described above, please contact customer services beforehand as warranty will otherwise be lost.
- The intended use includes following operating and maintenance instructions and observing inspection and maintenance conditions.
- The industrial vehicle is to be operated, maintained and repaired by competent persons.
- Always use genuine accessories.
- Any other, or use beyond that, will be deemed non-intended!



Incorrect operation or unauthorised use may pose a hazard to:

- Life and limb
- Material assets
- > The efficient use of the industrial vehicle



2.3 Improper Use

Any non-permitted use of the industrial vehicle will be the responsibility of the owner-operator or operator. The manufacturer / supplier will not accept liability for damages resulting from it. The risk is solely for the user-owner.

The list below serves as an example and is not integral. Nonpermitted actions

include:

- Lifting or transporting people
- Exceeding the maximum load-bearing capacity of the pallet truck
- Using the vehicle in areas prone to fire or explosion hazards
- Using the vehicle as push loader or towing vehicle
- Lifting and moving a load on ramps
- Transporting a load that is distributed unevenly on the fork
- Transporting a cargo with its centre of gravity offset in relation to the longitudinal axis of the vehicle
- Travelling with the load lifted (>500 mm)

2.4 Safety hazards – prevention of accidents

2.4.1 Residual hazards

The industrial truck is designed in accordance with the latest state-of-the-art technology and accepted safety regulations. It is assumed that the pertinent health and safety regulations as well as accident prevention regulations will be followed. Never-the-less residual hazards may still occur from the way the vehicle is handled. Persons present within the hazardous range around the vehicle must be informed about the risks involved in handling an industrial vehicle.

Residual hazards may includ:

- Escape of operating fluids due to leaks, cracking lines, hoses or tanks
- Negligence due to obstructed view or operation in tight spaces
- Danger of slipping due to oil leakage or spilt lubricants
- Human error due to non-observance of safety regulations
- Irreparable damages or worn component parts
- Insufficient observance of persons present within the working range of the pallet truck



2.4.2 Stability

The steadiness of industrial trucks is only guaranteed if the stated intended use is observed.

It is not guaranteed for:

- Excessive speed when cornering
- Driving with the load lifted
- Turning manoeuvres and driving in a tilted position on descending or ascending slopes
- Carrying the load on the downhill side on descending or ascending stretches of road
- Too wide or too heavy load
- Driving with a suspended load
- Driving over ramp edges or steps

WARNING!	 The vehicle may capsize open! Always pick up and place down load on level and solid ground. Driving with the load lifted is prohibited Avoid cornering at excessive speed. Always carry load on the uphill side when driving on ascending or descending slopes.
	 Fatal injuries! Unauthorised persons are prohibited from entering the danger area during working hours. If required, a suitable person will have to direct the operator.
DANGER!	The use of the industrial vehicle under the circumstances described below is prohibited! As a means of passenger transportation Usage as crane Usage as passenger lift

2.4.3 Non-ionising radiation

WARNING!	Non-ionising radiation causes interference to medical devices!
\land	 Electrical equipment emitting non-ionising radiation (wireless data transmission) may interfere with medical devices worn by the operator.

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2.5 Markings on industrial trucks

Danger points on the vehicle are marked by the warning signs listed below. Obtain precise information about the meaning of these signs before starting to operate the pallet truck. The picture shows the arrangement of signs.



all times ! > Missing or damaged rating plates and warning signs have to be replaced .
--



DANGER!	

Risk of severe injury!

≻

> Do not step beneath suspended loads .

- Do not climb on the forks. Do not take a ride on it .
- Do not put hands into chain when it is running.
- Do not reach in between mast and mast protection.



DANGER!



Risk of severe injury!

- > Giving people a ride on the industrial vehicle is prohibited.
- > Always wear safety boots for work with the electric tiller-controlled pallet truck.
 - Do not reach into the tiller with your fingers during operation.



6







2.5.1 Type plate

- 1. Type
- 2. Serial number
- 3. Nominal load-bearing capacity in kg
- 4. at the centre of gravity in mm
- 5. Nominal motor power in W
- 6. Hydraulic power in W
- 7. Weight (without battery) in kg
- 8. Total weight in k
- 9. Battery voltage in V
- 10. Minimum battery weight in kg kg
- 11. Maximum battery weight in kg
- 12. Transport speed in km/h





2.5.2 Carrying capacity

The nominal carrying capacity on the type plate shows the maximum carrying capacity (in kg) with even load distribution on the load receptor.

ATTENTION!	The specifications on the hoisting capacity diagram require special attention!
	Exceeding the specified loads may cause the electric tiller-controlled pallet truck to tilt, resulting in possible deformation of the hoisting frame.





2.6 Installed safety equipment

2.6.1 The most important safety features of the vehicle



Pos.	Designation
1	Safety screen
2	Emergency reverse brake
3	Braking is achieved by letting go of the controller
4	Emergency-stop switch
5	Braking of forklift vehicle occurs as soon as the tiller arm has reached upper position.
6	Safety hood
7	Horn
8	Electromagnetic brake
9	Ram-protection

- The wheels are protected by a sturdy collision guard in order to prevent contact with the operator.
- Rounded corners and edges ensure safe operation of the industrial vehicle.
- A long slewing tiller provides sufficient safety distance. When released, the tiller will automatically be brought into braking position.
- The emergency reversing button on the tiller head changes the direction of travel when coming into body contact.
- The safety screen on the mast protects the operator against moving parts.
- When released, the controller will jump into neutral position, braking the vehicle.
- In the case of danger, people present within the dangerous area can be warned by activating a warning signal.
- When activated in the case of danger, the emergency stop button will shut down all electric functions.

WARNING!	Risk of injury due to falling loads !
	Loads handled above the safety screen may endanger the operator and the industrial vehicle by being dropped.
	> Loads containing small parts must be secured against falling .





2.6.2 Actions to be taken in the event of an emergency

- Press the emergency stop button (4) immediately (downwards)
- This will interrupt the power supply to the machine.
- This will stop all movements. The electromagnetic brake will be activated.
- Do not unlock the emergency stop button before the cause of the problem is determined and has been eliminated. (pull upwards) Afterwards the power supply to the vehicle will be re-established and the vehicle will be ready for operation.

 Frequent switching for the purpose of turning the machine on/off during breaks will reduce the useful life of the switching contacts. To turn the machine on/off, use the keypad. 	NOTICE!	The emergency stop button should only be operated in the case of an emergency!
	i	 Frequent switching for the purpose of turning the machine on/off during breaks will reduce the useful life of the switching contacts. To turn the machine on/off, use the keypad.

	٨	Do not remove safety equipment at any time or render it inoperative by making changes.
ΔΤΤΕΝΤΙΟΝΙ	>	The operation of the industrial vehicle with known technical defects is prohibited.
	>	Always use genuine DOOSAN spare parts. Other makes do not meet the specified technical requirements.
	>	Keep all hazard warnings at/on the vehicle in a complete and legible state.
	4	Disconnect the machine from the power supply before starting any maintenance, repair or service work. Ensure that the ignition lock is in zero position.





3. Technical data

Details of specifications as per VDI 2198; subject to technical changes.

3.1 Exterior dimensions





3.2 Standard mast types

Rating mast	t lift		BSL14S-7	BSL16S-7					
Height of lift	Cons (h1)	struction h mm	neight	Free	lift (h2) m	ım	Load-bearing capacity (Q)	Load-bearing capacity (Q)	
` mm ´	SF	DF	TF	SF	DF	TF	kg	kg	
2890	1950	1950	-	-	1400	-	1400	1600	
3590	2300	2300	-	-	1750	-	1200	1200	
4190	-	-	1885	-	-	1370	800	800	
4390	-	-	1950	-	-	1440	750	750	
4790	-	-	2085	-	-	1570	650	650	
5390	-	-	2285	-	-	1770	400	400	

Rating mas	BSL20S-7						
Height of lift	Con	struction	height	Free	؛ lift (h2) ا	Load-bearing	
(n13+n3) mm	SF	DF	TF	SF	DF	TF	capacity (Q) kg
2890	1990	-	-	-	-	-	2000
3590	2340	-	-	-	-	-	1300
4190	-	-	1950	-	-	1370	1000
4390	-	-	2085	-	-	1440	900
4790	-	-	2225	-	-	1570	750
5390	-	-	2370	-	-	1770	500

3.3 Characteristic

1.2	Type designation of manufacturer			BSL14S-7 (2PzS)	BSL14S-7 (3PzS)
1.3	Drive			electric	electric
1.4	Operator type			pedestrian	pedestrian
1.5	Load capacity / rated load	Q	t	1,4	1,4
1.6	Load centre distance	с	mm	600	600
1.8	Load distance - RTA	х	mm	735	735
1.9	Wheelbase	у	mm	1326	1397



1.2	Type designation of manufacturer			BSL16S-7 (2PzS)	BSL16S-7 (3PzS)	BSL20S-7 (3PzS)
1.3	Drive			electric	electric	electric
1.4	Operator type			pedestrian	pedestrian	pedestrian
1.5	Load capacity / rated load	Q	t	1,6	1,6	2,0
1.6	Load centre distance	С	mm	600	600	600
1.8	Load distance - RTA	х	mm	735	735	735
1.9	Wheelbase	у	mm	1326	1397	1397

3.4 Weights

1.2	Type designation of manufacturer		BSL14S-7 (2PzS)	BSL14S-7 (3PzS)
2.1	Service weight, incl. Battery	kg	950	1260
2.2	Axle load with load front/back	kg	940/1610	1030/1830
2.3	Axle load without load front/back	kg	700/250	880/380

1.2	2 Type designation of manufacturer			BSL16S-7 (2PzS)	BSL16S-7 (3PzS)	BSL20S-7 (3PzS)
2.1	Service weight, incl. Battery		kg	950	1260	1350
2.2	Axle load with load front/back		kg	940/1610	1030/1830	1172/2178
2.3	Axle load without load front/back		kg	700/250	880/380	976/374

3.5 Running gear

1.2	Type designation of manufacturer			BSL14S-7 (2PzS)	BSL14S-7 (3PzS)
3.1	Tyres		Vulkollan		
3.2 Tyre size, front			mm	ø230	x 80
3.3	Tyre size, rear		mm	n ø85 / 78	
3.4	Tyre size support wheels		mm	m ø140x60	
3.6	Track width, front		mm	m 525	
3.7	Track width, rear	mm 385		5	



1.2	Type designation of manufacturer		BSL16S-7 (2PzS)	BSL16S-7 (3PzS)	BSL20S-7 (3PzS)
3.1	Tyres		Vulkollan	Vulkollan	Vulkollan
3.2	Tyre size, front	mm	ø230 x 80	ø230 x 80	ø230 x 80
3.3	Tyre size, rear	mm	ø85 / 78	ø85 / 78	ø85 / 78
3.4	Tyre size support wheels	mm	ø140x60	ø140x60	ø140x60
3.6	Track width, front	mm	525	525	525
3.7	Track width, rear	mm	385	385	385

3.6 Dimensions

1.2	Type designation of manufacturer			BSL14S-7 (2PzS)	BSL14S-7 (3PzS)
4.2	Closed mast height		mm	s. table 3.2	s. table 3.2
4.3	Free lift	h2	mm	s. table 3.2	s. table 3.2
4.4	Lift	h3	mm	s. table 3.2	s. table 3.2
4.5	Height, mast extended	h4	mm	s. table 3.2	s. table 3.2
4.6	Initial lift	h5	mm	-	-
4.9	Height of tiller in drive position	h14	mm	1260	1260
4.15	Height lowered	h13	mm	90	90
4.19	Overall length	11	mm	1928	2000
4.20	Length to face of forks	12	mm	732	805
4.21	Overall Width	b1	mm	790	790
4.22	Fork dimensions	s/e/l	mm	65/185/1195	65/185/1195
4.25	Width across forks	b5	mm	570	570
4.32	Ground clearance, centre of wheel base	m2	mm	25	25
4.34	Aisle width for pallets 800x1200	Ast	mm	2304	2373
4.35	Turning radius	Wa	mm	1490	1560



1.2	Type designation of manufacturer			BSL16S-7 (2PzS)	BSL16S-7 (3PzS)	BSL20S-7 (3PzS)
4.2	Closed mast height		mm	s. table 3.2	s. table 3.2	s. table 3.2
4.3	Free lift	h2	mm	s. table 3.2	s. table 3.2	s. table 3.2
4.4	Lift	h3	mm	s. table 3.2	s. table 3.2	s. table 3.2
4.5	Height, mast extended	h4	mm	s. table 3.2	s. table 3.2	s. table 3.2
4.6	Initial lift	h5	mm	-	-	-
4.9	Height of tiller in drive position	h14	mm	1260	1260	1260
4.15	Height lowered	h13	mm	90	90	90
4.19	Overall length	11	mm	1928	2000	2000
4.20	Length to face of forks	12	mm	732	805	805
4.21	Overall Width	b1	mm	790	790	790
4.22	Fork dimensions	s/e/l	mm	65/185/1195	65/185/1195	70/185/1195
4.25	Width across forks	b5	mm	570	570	570
4.32	Ground clearance, centre of wheel base	m2	mm	25	25	20
4.34	Aisle width for pallets 800x1200	Ast	mm	2304	2373	2373
4.35	Turning radius	Wa	mm	1490	1560	1560

3.7 Performance data

1.2	Type designation of manufacturer		BSL14S-7 (2PzS)	BSL14S-7 (3PzS)
5.1	Travel speed, with / without load	km/h	6	
5.2	Lift speed, with / without load	m/s	0,13 / 0,20	
5.3	Lowering speed, with / without load	m/s	0,49 / 0,23	
5.7	Max. grade ability, with / without load	%	7/12	
5.10	Service brake		generatorisch	



1.2	Type designation of manufacturer		BSL16S-7 (2PzS)	BSL16S-7 (3PzS)	BSL20S-7 (3PzS)
5.1	Travel speed, with / without load	km/h	6	6	6
5.2	Lift speed, with / without load	m/s	0,13 / 0,20	0,13 / 0,20	0,11 / 0,16
5.3	Lowering speed, with / without load	m/s	0,49 / 0,23	0,49 / 0,23	0,49 / 0,23
5.7	Max. grade ability, with / without load	%	7/12	7/12	-
5.10	Service brake		generatorisch	generatorisch	generatorisch

3.8 Drive

1.2	Type designation of manufacturer		BSL14S-7 (2PzS)	BSL14S-7 (3PzS)
6.1	AC - drive motor / power S2-60min.	kW	1	1
6.2	DC – lift motor / power S3-15%	kW	3	3
6.3	Battery as per DIN 43535 A, B, C, no		2PzS (B)	3PzS (B)
6.4	Battery voltage / nominal capacity	V/Ah	24 / 250	24 / 375
6.5	Battery weight	kg	220	350
	Drive / lift control		AC-Impuls	AC-Impuls

1.2	Type designation of manufacturer		BSL16S-7 (2PzS)	BSL16S-7 (3PzS)	BSL20S-7 (3PzS)
6.1	AC - drive motor / power S2-60min.	kW	1	1	1
6.2 DC – lift motor / power S3-15%		kW	3	3	3
6.3	Battery as per DIN 43535 A, B, C, no		2PzS (B)	3PzS (B)	3PzS (B)
6.4	Battery voltage / nominal capacity	V/Ah	24 / 250	24 / 375	24 / 375
6.5	Battery weight		220	350	350
	Drive / lift control		AC-Impuls	AC-Impuls	AC-Impuls



4. Vehicle description

4.1 Service description

The descripted vehicle is an electric pedestrian controlled pallet truck featuring four-wheel design and a steered, laterally arranged drive wheel.

It is designed for use on level ground for lifting and transporting shipping units in roofed, enclosed spaces. They are suitable for use with open base pallets or trolleys. The nominal load-bearing capacity is shown on the rating plate. The load-bearing capacity in relation to the height of lift and load centre of gravity is shown on the load diagram.

4.2 Main components

- 1. Tiller with tiller head
- 2. Operating panel
- 3. Lifting frame
- 4. Safety screen
- 5. Battery cover
- 6. Rear hood
- 7. Electronic panel
- 8. Support wheel
- 9. Driving wheel
- 10. Lifting gear





4.3 Switches and controls





- 11. Driving switch
- 12. Emergency reversing button
- 13. Push-button horn
- 14. Flip switch lift/lower carriage
- 15. Flip switch lift/lower carriage
- 16. Creep speed button (tiller)
- 17. Turtle speed button (control panel)
- 18. Multifunction display (MDI)
- 19. Keypad
- 20. Emergency-stop switch





4.3.1 Key functions

Emergency switch

 Connection to battery will be interrupted and all electric functions will be disabled. The vehicle's brakes will be applied.

Keypad

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• The control and all electric components will be put into operation.

Rocker switch mast lift

- The rocker switch lifts or lowers the load carriage by proportionally controlled hydraulics. This allows sensitive metering of functions.
- Both buttons are enabled, electronically isolated and may be applied separately.

Driving switch

 The travel switch on the grab handle is put into operation by rotating it in the directions forward or reverse.

Emergency reversing button

- The vehicle will stop immediately if pressure on the switch is detected and will move slowly in the direction of the fork until the switch is no longer operated.
- In rider mode the emergency reversing button is disabled.

Creep speed push-button

• The creep speed function enables manoeuvring the vehicle at a reduced speed (60%) in confined spaces.

Inching speed button

• The creep speed function enables vehicle manoeuvres with the tiller in a vertical position at creep speed (10%).

Buzzer

• The horn will be sounding when the switch is operated.



4.3.2 Multi-function display Curtis 3140

The multi-function display unit (MDI) provides an overview of the following functions:

- Battery capacity
- Display of current operating hours
- Operating hours meter enabled
- Maintenance interval due
- Creep mode enabled
- Display of errors by showing flashing LED and error code

Display Function



- Operating hours counter:
 - > Operating hours are indicated by an alpha-numeric LCD display.
- Alarms:
 - The same display also reflects alarms. In the case of an alarm the alarm code will be flashing on the LCD display.
- Battery charge display:
 - The charging status of the battery is displayed in percent. When the charging status is < 20%, it will start flashing on the display.</p>
- Display "LIMIT":
 - This text will appear if either speed reduction or acceleration reduction is enabled.
- Spanner symbol:
 - This symbol will normally be off. This will appear (permanently) if a preset maintenance interval has expired or in the case of a pending alarm. In this case the relevant code will be displayed.
- Hourglass symbol:
 - > This symbol will normally be off. This will be flashing while the operating hours meter is running.



5. Transportation and commissioning

5.1 Transport

ATTENTION!	A	Always use a suitable hoist providing sufficient load bearing capacity when transporting the vehicle. For overall weight see type plate.
	A A	Secure the device on the industrial vehicle against uncontrolled movements with the help of tension belts and wedges.



DANGER!	Risk of severe injury! Ensure that all persons keep clear of the area below or next to the vehicle when the vehicle is lifting.
WARNING!	Risk of severe damage to machine! It is strictly prohibited to lift the vehicle by its tiller or other points not intended for such operations.



5.2 Initial Commissioning

Before commissioning please read these operating instructions as well as the relevant accident prevention regulations carefully.

It has to be ensured that the vehicle is in a faultless condition before commissioning.

	٨	Prior to commissioning check for damages (wheels, cables, terminals, mast,).
	>	If required, take out the battery.
ATTENTION!	۶	Charge the battery.
	>	Check the battery fuse for firm fit.
U	۶	Check oil level of hydraulics.
	۶	Check safety equipment for functioning (emergency stop, brake, collision safety key).
	>	The vehicle is designed exclusively for battery operation. Rectified alternating current may damage the electronic system.





6. Operation

In order to ensure safety, the industrial vehicle has to be checked daily before operation according to the instructions below. Any damages and faults have to be fixed immediately.

- Operating elements of the industrial vehicle
 - > Check whether the controls for forward and reverse travel are functioning faultlessly
 - Check whether the control elements for lifting and lowering of the fork are functioning faultlessly
 - > Check whether the emergency stop is functioning faultlessly
 - Check horn for faultless function

Electric system

- Check battery status
- Check battery lock
- Lifting system
 - > Check condition of forks, guide rails and lift chains
 - Check condition of safety screen

Hydraulics

> Check cables and terminals for imperviousness

Test drive

- Check brake system
- > Check functioning of emergency reversing switch
- Check condition of wheels

Damages or other faults on the vehicle may result in accidents or hazardous situations.
If noticing damages or other faults during the daily checks, ensure that all defects have been eliminated before putting the vehicle back into service.

AAAA	Giving people a ride on the industrial vehicle is prohibited. Keep a safe distance to people and vehicles. Advise unauthorised persons to leave the danger area. In case of danger to people give a timely warning signal.



6.1 Driving and braking

6.1.1 How to start the vehicle

- Pull-out emergency stop switch (1).
- Enter the PIN code on the keypad (2). The green LED will appear.
- Pre-setting:

0	User-1 Code:	"1111"
0	User-2 Code:	"2222"
0	User-3 Code:	3333"

- The system will start a test run of the electronic system (approx. 5 seconds).
- After a faultless run the symbols for operating hours meter, remaining battery capacity etc will appear on the multi-function display (3), or else the appropriate error code will be displayed (See table in appendix)
- Check functioning of brake and travel for tiller (4).
- Check functioning of horn (5).
- The vehicle is now ready for operation.

To change master and user codes:

- Type in the current 4 digit master code (pre-setting "0000"). If correct, the green and red LED will blink.
- Type in the user number you want to change. If correct, the green and red LED will be **ON**.
 - o Master: "1"
 - o User-1: "2"
 - o User-2: "3"
 - o User-3: "4"
- Type in a new <u>4 digit code</u>. The geen LED will **blink** when you entered 4 valid digits.
- Confirm the new code pushing " * ". The green and red LED will blink twice if the password change was succesful.
- The code is now changed. The keypad is ready for the next entry.







6.1.2 Travelling

The driving directions of the industrial vehicles are defined as follows:

- Forward travel in direction of tiller
- Reverse travel in direction of fork

The position of the tiller activates or releases the electromagnetic brake. The electromagnetic brake is activated while in this range (B) and the vehicle cannot be moved.

When released, the tiller will swivel automatically into the upper braking range (B), causing emergency braking. Check the braking and travel function of the tiller before operating the vehicle.

In confined spaces, we recommend using the creep speed switch (7) turtle push-button. The display will show the creep speed icon. This reduces the travel speed to 60%.

Full travel speed is re-established by operating the rabbit push-button.

To travel at creep speed (10%) with the tiller in a vertical position, operate the inching speed key (8) on the tiller head.



Operating manual



• Forward travel



- > Tilt the tiller >> this releases the brake.
- Turn driving switch until it points down >> electric tillercontrolled pallet truck will travel in the direction of the tiller.

Reverse travel



- > Tilt the tiller >> this releases the brake.
- Turn driving switch until it points up >> electric tillercontrolled pallet truck will travel in the direction of the fork.



How to change the direction of travel





- To change the direction of travel from travel in the direction of the fork to travel in the direction of the tiller, we recommend following the sequence of operations below.
- Swivel the tiller horizontally or vertically >> this activates the brake.



- Let go of the tiller >> the tiller swivels automatically in a vertical position (B) and this will activate the brake.
- Slant the tiller as soon as the electric tiller-controlled pallet truck has come to a full standstill.

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Actuate driving switch in opposite direction.

ATTENTION!	Before changing the direction of travel you MUST stop the vehicle and wait until the electric tiller-controlled pallet truck has come to a total standstill. Otherwise the life span of the drive unit will be reduced considerably.		
NOTICE!	For safety reasons, the electric tiller-controlled pallet truck is equipped with a counter-current brake. This will be activated the moment you switch the travel direction to the opposite direction, that is, electronic braking takes place followed by automatic acceleration in the opposite direction.		



6.1.3 Brakes

There are three ways of braking for the vehicle

- Braking by dynamic braking
 - > Releasing the travel switch will decelerate the device until it has come to a stop.
 - > The service technician can set the strength of this braking behaviour depending on customer requirements. After stopping the parking brake will take over.

Braking by service brake

Moving the tiller when in braking position up or down (B) will trigger maximum deceleration during braking until the vehicle has come to a stop. When released, the tiller will swivels automatically into upper braking range. In a parked vehicle, the service brake acts as parking brake.

Braking by counter-current brake

- This is achieved by turning the driving switch in an opposite direction. This delivers maximum braking force and the vehicle will afterwards travel in the opposite direction.
- The electric tiller-controlled pallet truck is also equipped with an emergency reverse switch. Check the emergency reverse switch daily for proper functioning before starting to operate the vehicle.
 - Move the vehicle in a forward direction and operate the emergency reverse switch (5). The pallet truck should stop immediately and then move at a lower speed in the opposite direction.
 - > The vehicle's brakes will be applied as soon as the switch is released.

ATTENTION!	>	The braking behaviour of the vehicle depends on the driveway conditions. The driver will have to adjust his/her driving accordingly.
	۶	Apply the brakes carefully in order to avoid slipping of load
	>	In the case of danger, move the tiller into braking position (B) or press the emergency stop button .

6.1.4 Steering

The tiller impacts directly on the drive wheel, making it necessary to turn it in the desired direction when wanting to change direction. The steering angle is 180°.





6.2 Picking up, transporting and setting down of loads

6.2.1 How to pick up a load

	 Risk of severe injury! Always pick up loads in such a way that there is no chance of a load falling off or shifting. The maximum load-bearing capacity (See load diagram) must not be exceeded. Pick up the load in a way that the load centre of gravity is centrally
	Pick up the load in a way that the load centre of gravity is centrally between the forks.
	> Do not reach into the mast area during lifting and lowering.



- > To pick up a load, approach carefully and keep to the centre of the load to be picked up.
- Tilt the tiller in travel range (A), operate drive switch and move under the load.



Before lifting the load ensure that the load is positioned on the carriage and that it is distributed in a stable and even way.



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Actuate the fork lift button >> load will be lifted.

ATTENTION!



- Prior to moving the industrial vehicle ensure that the travel route is free.
- Move at an appropriately slow speed during loading and unloading.



6.2.2 How to transport a load

	Risk of severe injury!		
WARNING!	Do not lift load above chassis clearance when transporting cargo. Chassis clearance within the meaning of BGV D27 equals up to 0.5 m above ground.		
	 EXCEPTION: Moving with load above chassis clearance is permitted during picking up and setting down 		
	Never attempt to drive across or reverse on ascending or descending stretches of road.		
	> The vehicle might capsize or the load drop off.		
	> Transporting people is prohibited.		
	> Transport only loads that are properly secured and placed.		
	Ensure that all persons keep clear of the hazardous area around the industrial vehicle		



- When travelling along horizontal distances always carry the load in the direction of the tiller.
- Adjust speed according to the state of the carriage way and local conditions.



For transport on ascending or descending stretches of road always keep the load on hill side.



Always drive the unloaded electric tiller-controlled pallet vehicle with the fork on the side of the valley when driving on ascending or descending stretches of road.



If view is impaired, engage a second worker.



6.2.3 How to place down a load

WARNING!	Risk of severe injury!			
	> Do not touch adjacent loads or loads behind the vehicle.			
	Once the load has been lifted, ensure that all persons keep clear of the area below or in the immediate vicinity of the vehicle.			
	Check that the load does not exceed the maximum load-bearing capacity of the vehicle in relation to the height of lift.			
	Check the available shelf space to prevent items beyond the angle of view but on the shelf from being moved or tipped over.			

- Approach the storage space slowly and in a straight line and lower the load by pressing the button.
- > When stacking on a shelf, lift the fork teeth well above the level at which the load is to be placed.



Slowly drive the electric tiller-controlled pallet vehicle away from underneath the load.

ATTENTION!	Placing down of loads is prohibited:			
	 on travel and escape routes Safety arrangement works equipment that has to be accessible at all times. 			



6.3 Parking and turning off ignition of vehicle

6.3.1 Parking

Before leaving the vehicle ensure that it is safely parked, even if you plan to be only absent for a short time.

- Put tiller in braking position (B).
- Lower the lifting device.
- Switch off ignition.

	A	Do not park the electric tiller-controlled pallet truck with the load or fork lifted.
	۶	Ensure that the parking space is level and horizontal.
	۶	Keep travel and escape routes free.
	۶	Ensure access to operating and safety equipment.

6.3.2 Switching Off

- Press the "#" button on the keypad. The red LED will appear.
- Parking brake is pulled, the device is parked safely.



7. Maintenance and repair

Arrange regular maintenance for the electric tiller-controlled pallet vehicle according to the maintenance checklists below at the intervals stated and by using the equipment specified for this purpose.

7.1 Basic Safety Precautions

Maintenance and repair work may only be carried out by a competent person.
Before commencing maintenance / cleaning work, park the electric tiller-controlled pallet vehicle on a level surface, switch it off and provide a safeguard to prevent unauthorised reclosing (Pull off battery plug).
When working on a lifted mast, ensure that a safeguard is provided that protects against unintentional lowering.
Alterations to the electric tiller-operated pallet vehicle require prior approval by the manufacturer.
> All safety equipment has to be reattached after maintenance and repair, followed by a check for good working order.
After the completion of maintenance work remove all the tools and implements from the workspace of the electric tiller-controlled pallet vehicle!

NOTICE!	Ensure safe and environmentally-compatible disposal of processing and ancillary materials and spare parts.
	To prevent floor contamination when topping up oil, use suitable funnels or an oilcan with funnel!
	> Follow the separate manufacturer's instructions for process materials.



7.2 Cleaning

Regular cleaning expands the useful life of your electric tiller-controlled pallet vehicle and contributes to keeping it in a good condition. Depending on the operating conditions, it is advised to clean the vehicle as often as possible.

	Do not clean the electrical tiller-controlled pallet vehicle w liquids.	vith flammable
	Before commencing the cleaning procedure, disconnect t from the power supply (Pull battery plug).	he vehicle
	Do not expose electrical and electronic components, moto insulation coating to direct water jets.	ors or
	After completing cleaning the cleaning procedure, check functions for good working order.	all safety
	For cleaning of battery please observe the instructions in and in the operating instructions provided by the battery	section 8.6 manufacturer.

7.3 Service intervals

ATTENTION!	 Maintena person. 	nce and repair work may only be carried out by a competent
	 The main In the ca temperate maintena 	tenance intervals are defined for one-shift standard operation. se of operation in dusty environments, at extremely high or low ures, heavy-duty operation or multi-shift operation, ance intervals will have to be shortened accordingly.

DANGER!	
	Risk of severe injury!
	Remove the feeder clamp from the battery before commencing work on the electrical system.



7.3.1 Maintenance checklist

	Maintenance work		Service intervals	
Subassembly			2000 h annual	
	Visual check of bearings, sliding surface and limit stops	х		
	Check lateral clearance of mast profiles		х	
Mast	Check mast fitting	х		
	Check lift chains and chain guide for wear, adjust and grease	x		
	Check safety equipment for secure attachment and damage	х		
	Check support arms and fork for deformation and cracks	х		
Lifting equipment	Visual check of bearings, sliding surface and limit stops	х		
	Check function	х		
Hydraulic equipment Braking system	Check hydraulic oil and top up, as required	х		
	Change hydraulic oil		х	
	Check hydraulic unit for secure attachment and tightness		х	
	Check Hoses and fittings for tightness and damage	х		
	Check hydraulic cylinder for tightness, damage and secure attachment	х		
	Check functioning of pressure-limiting valve		х	
	Check function and setting	х		
	Check return spring of tiller for good working order	х		
Steering Check steering clearance		х		

Operating manual



Wheele	Check for wear and damage	х	
Wheels	Check wheel bearing and secure attachment	х	
	Check gears for noises and leakages	х	
Drive	Lubricate slew bearing	х	
	Check transmission oil level and top up if necessary (once after 300 hours)	х	
	Check whether the emergency reversing button is in good working order	х	
	Check cable connections for firm fit and damage	х	
Electric system	Check fuses		х
Lieotho system	Check horn for good working order	х	
	Check emergency stop function	х	
	Check functioning of displays and controls	х	
	Check male contacts of battery plug	х	
Electric	Check carbon brush wear		х
motors	Check motor fittings		х
Battery	Check electrolyte level, electrolyte density and battery voltage	х	
	Check fluid level in battery trough	х	
	Check battery plugs for firm fit	х	
	Check battery cable for damage	х	
	Check insulation resistance	х	
Electric tiller-	DGUV regulation 68		х
controlled pallet vehicle	Test drive	Х	



7.4 Lubrication schedule

- S Lubricating nipple
- E Filler neck (*) Use hydraulic oil suitable for cold stores





7.4.1 Operating material

To keep your electric tiller-controlled pallet truck in good working order, we recommend the operating materials listed on the table below.

Application for	Description	Specification
Hydraulic system	Hydraulic oil	HLP 32
Hydraulic system	Hydraulic oil (cold store use)	HVLP 32 (Renolin MR520)
Greasing points	Grease, lubricant	KP3 K-30
Drive	Transmission oil	SAE 85W-90, GL5

7.5 Maintenance instructions

7.5.1 Removing cover

- Undo screws (1) and (2).
- Remove covers and put them next to the vehicle.
- Assembly in reverse order.





7.5.2 Check hydraulic oil level

- Open rear hood.
- Check oil level in hydraulic tank. Read oil level while lifting device is fully extended.
- The oil level must be at least 25 mm above tank bottom.
- Refill with hydraulic oil according to specification.



7.5.3 Check electric fuses

- Open electronic panel.
- Check the fuse for the power unit 300A (1) for correct value and replace, as required.
- Check the fuse for the control circuits 10A (2) for correct value and replace, as required.





7.6 Battery maintenance

	Batteries may only be charged, maintained and replaced by a competent person.
	For instructions on battery maintenance, please see the user instructions provided by the battery manufacturer.
	> Keep the cell covers of the battery dry and clean.
NOTICE!	> Charge the battery after each discharging process.
•	Do not fill battery cells with water before charging. Battery might overflow during charging!
	Avoid excessive discharge (< 20% of rated capacity) in order to guarantee optimum battery life.
	> Always use the genuine battery charger for charging.
	> When charging, ensure that the gas flues are working properly.
	 Always follow the manufacturer's instructions for the disposal of batteries.

7.6.1 Safety instructions for battery handling

ATTENTION!	 Follow the operating instructions and keep them displayed at the place of charging in a clearly visible spot! Seek the advice of technical staff before attempting to do any work to the battery!
	 When working on the battery wear protective goggles and clothing! Please observe accident prevention regulations as well as DIN EN 50272-3 and DIN EN 50110-1!
	 Smoking prohibited! Do not allow open flames, embers or sparks in the vicinity of the battery as there is a risk of explosion and fire!



+	 For acid splashes on eyes or skin, rinse affected areas immediately with plenty of clean water and seek medical advice without delay n. Rinse clothing contaminated with acid in water.
DANGER!	Risk of explosion and fire! Avoid short circuit!
CAUTION!	 Electrolyte is highly caustic! Caustic substances may destroy skin.
	 Do not tilt battery! Always use authorized lifting and transport devices such as lifting gear as per Trading Ass. Regulation 3616. Hoisting hooks must be prevented from damage to cells, connectors or connecting cables!
DANGER!	 Dangerous electric voltages! ATTENTION! Metal parts of battery cells are always live, so do not put other objects or tools on the battery.

7.6.2 Check electrolyte level of battery

NOTICE!	For instructions on how to check the electrolyte level, please see the user instructions provided by the manufacturer !
1	 Charge battery after every discharge . Prior to commissioning after charging it is of utmost importance that you check the electrolyte level !



ATTENTION!		
	A	Never use ordinary tap water! This damages the battery.

7.6.3 Check fluid level in battery tray

NOTICE!	For instructions on how to check the fluid level, please see the user instructions provided by the battery manufacturer teller.
ATTENTION!	 Check battery tray as required but at least quarterly for spills or leaked fluids. Remove (suck out) fluids from the battery tray immediately as these might destroy the battery.
	Risk of chemical burn! Never use your mouth to try and suck out the fluid from the end of the hose.

7.6.4 How to measure temperature and electrolyte density in battery cells

NOTICE!	Measure and record electrolyte density and temperature once a month.
i	For instructions on how to check electrolyte temperature and density, please see the user instructions provided by the battery manufacturer.



7.6.5 How to measure insulation resistance

NOTICE!	
i	 Check insulation resistance as required but at least once a year. For instructions on how to check insulation resistance, please see the user instruction provided by the battery manufacturer.

7.6.6 Charging the battery

- Park the vehicle in a safe place.
- Prior to charging, check the condition of the battery cable and the charging cable.
- The surfaces of the battery cells must be exposed during charging in order to ensure sufficient ventilation.
- Plug the battery plug into the terminal of the charging station.
- After charging, connect the battery and check the charge state on the display.

Battery charge display:

- The MDI shows the current rated capacity.
- To prevent excessive discharging of battery, the lifting function will be interrupted when the residual capacity has dropped to 10% and travel speed will be reduced to creep speed.
- The display can only be reset when the residual capacity has reached < 70% of battery.
- Otherwise further charging may result in faulty display of MDI.

ATTENTION!	 Charge the battery according to the rules provided by the battery and charging station manufacturer. Connection is restricted to a charger suitable for the respective battery size. Batteries must be charged in enclosed, well ventilated spaces. To avoid the generation of sparks, always connect the battery before turning on the charger, and turn it off before disconnecting the battery plug.
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7.6.7 How to replace a battery

WARNING!	۶	Risk of accidents while removing or installing a battery.			
	>	Crushing may occur during removing or installing a battery due to its weight.			
	۶	Wear safety shoes!			
	۶	Park the vehicle on level ground!			
	>	The weight and dimensions of a battery play an important role for the operating safety of the vehicle.			
	>	Please pay due attention to safety instructions before commencing maintenance work!			
	>	Seek the advice of technical staff before attempting to do any work to the battery!			
	۶	Always choose a suitable place when changing a battery.			
	۶	Always use the specified lifting gear.			
	۶	After reassembly, check all cable and plug-in connections for damage.			
WARNING!					
	A	Risk of chemical burn! Wearing of protective clothing is Mandatory!			

Sequence of operations for battery change from above:

- Actuate emergency stop switch.
- Open battery cover and lock it in place.
- Disconnect battery plug (1).
- Remove battery from the side with appropriate lifting means.
- Insert new or recharged battery in battery trough.
- Plug in the battery plug.
- The vehicle is now ready for operation.



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7.7 Decommissioning

If the electric tiller-controlled pallet vehicle is to be taken out of operation for a longer period of time, it will be necessary to carry out the following measures before, during and after the decommissioning.

- Clean vehicle thoroughly
- Park vehicle in a dry room free of frost
- Cover all mechanical component parts with a thin film of oil or grease
- Lubricate vehicle as specified in lubrication schedule
- Charge battery (for longer periods of time charge at least once a month)
- Disconnect and clean battery
- Jack up vehicle and provide safeguard



It is absolutely essential to charge the battery at regular intervals as otherwise spontaneous discharge of battery will occur, resulting in undercharging and the associated sulphation will destroy the battery.

7.7.1 Putting the vehicle back into service after a decommissioning

If the electric tiller-controlled pallet vehicle was taken out of operation for more than 6 months it has to be checked carefully before being put back into service.

- Clean vehicle thoroughly
- Grease or oil all mechanical component parts.
- Check the battery status (electrolyte level and density)
- Charge battery
- Check hydraulic oil for condensation and replace, as required
- Carry out maintenance as performed before the initial start-up
- Commissioning the vehicle

7.8 Regular safety-related checks

The owner-operator must ensure that the vehicle is checked over at least once a year or after special incidents.

- It is necessary to carry out a comprehensive inspection of the industrial vehicle's technical condition with respect to accident safety.
- In addition, the vehicle must be inspected in detail for damages that may have resulted from improper use.
- It is necessary to create inspection records. The results of the inspection must be kept at least until the one but next inspection.
- The owner-operator is responsible for the immediate removal of defects.



8. Troubleshooting, disassembly and assembly

ATTENTION! > Please call technical staff for troubleshooting, disassembly and assembly work. Vork to the hydraulic or electric installation must be carried out without exception by accordingly trained staff appointed for this purpose.					
Fault	Causes	Remedy			
Electric tiller-controlled palle	Magnetic brake stuck.	Disassemble and clean brakes.			
	Malfunction of the control unit Alarm is shown in the display.	Use the manual for the control to analyse the alarm message (appendix).			
	The key switch is not in operating position.	Turn the key switch to operating position.			
	Battery is shown as discharged on the display.	Check the actual voltage of the battery under load. Charge the battery.			
	Battery is defective	Exchange battery.			
	Drive switch defective	Customer Service:			
	Plug contacts of battery plug are defective.	Customer Service:			
	Water missing in battery cells	Top up battery with distilled water after charging. See operating instructions of respective manufacturer.			
Electric tiller-controller pallet	Brake switch is defective.	Customer Service.			
truck not braking.	Control unit malfunction				
Steering is awkward.	Slew ring bearings not greased.	Grease Slew ring bearings.			
Horn not working.	Plug contacts are loose.	Customer Service:			
Function keys not working.	The electronics in the switches are defective	Customer Service:			
The electric pallet truck is moving but the lifting functio is not working.	Battery discharging control is switched off	Charge the battery The charging cut-off voltage must be above the reset voltage of the control unit.			



9. Disposal

ATTENTION!	 Disposal must be carried out according to all applicable directives for metals, synthetics, electric and electronic components, greases, oils, hatteries etc.
	 Have any necessary dismantling work carried out by qualified specialists.



10. Enclosure

10.1 Alarm message to display

The Curtis instrument 3140 shows the alarms for all inverters connected via CAN-Bus to the display. When an alarm is pending, the number will be flashing so as to draw the user's attention to the error.

The display is showing Y-Y as flash code. Y-Y stands for error code.

The error code and its meaning, respectively, are explained in the manual for the inverter.

1-2	Controller Overcurrent	7-2	PDO Timeout
1-3	Current Sensor	7-3	Stall Detected
1-4	Precharge Failed	7-7	Supervision
1-5	Controller Severe Undertemp	7-9	Supervision Input Check
1-6	Controller Severe Overtemp	8-2	PDO Mapping Error
1-7	Severe B+ Undervoltage	8-3	Internal Hardware
1-7	Severe KSI Undervoltage	8-7	Motor Characterization Error
1-8	Severe B+ Overvoltage	8-8	Encoder Pulse Error
1-8	Severe KSI Overvoltage	8-9	Parameter Out of Range
1-9	Speed Limit Supervision	9-1	Bad Firmware
1-10	Travel Control Supervision	9-2	EM Brake Failed To Set
2-2	Controller Overtemp Cutback	9-3	Encoder LOS
2-3	Undervoltage Cutback	9-4	Emer Rev Timeout
2-4	Overvoltage Cutback	9-5	Pump Overcurrent
2-5	Ext 5V Supply Failure	9-6	Pump BDI
2-6	Ext 12V Supply Failure	9-7	Pump Hardware
2-8	Motor Temp Hot Cutback	9-9	Parameter Mismatch
2-9	Motor Temp Sensor	9-10	Interlock Braking Supervision
3-1	MAIN DRIVER	9-11	EMR Supervision
3-2	EM Brake Driver	10-1	Driver 1 Fault
3-4	Load Hold Driver Fault	10-2	Driver 2 Fault
3-5	Lower Driver	10-3	Driver 3 Fault
3-6	Encoder Fault	10-4	Driver 4 Fault
3-7	Motor Open	10-5	Driver 5 Fault
3-8	Main Contactor Welded	10-6	Driver 6 Fault
3-9	Main Contactor Did Not Close	10-7	Driver 7 Fault
4-2	Throttle Input	10-8	Driver Assignment
4-4	Brake Input	10-9	Coil Supply Fault
4-6	NV Memory Failure	11-1	ANALOG 1 OUT OF RANGE
4-7	HPD Sequencing	11-2	ANALOG 2 OUT OF RANGE
4-7	EMER Rev HPD	11-3	ANALOG 3 OUT OF RANGE
4-7	Pump HPD	11-4	ANALOG 4 OUT OF RANGE
4-9	Parameter Change	11-5	ANALOG 5 OUT OF RANGE
4-10	EMR Switch Redundancy	11-6	ANALOG 6 OUT OF RANGE
5-1	Tiller_PDO_Communication_Fault	11-7	ANALOG 7 OUT OF RANGE
5-2	Tiller_PDO_Timeout_Fault	11-8	ANALOG 8 OUT OF RANGE
5-3	back_up_fault1	11-9	Analog 9 Out Of Range
5-4	EMR_Switch_Fault	11-11	ANALOG 14 OUT OF RANGE
5-5	back_up_fault2	11-12	Analog Assignment
5-6	Interlock_ON_at_startup	11-13	Analog 18 Out Of Range
5-7	EMR_switch_trigger_backward	11-15	Pump Current Sensor
5-8	VCL_TRA_HPD_Fault		Branding Error
5-9	HYD_SRO_Fault		Hardware Compatibility
6-1	1 Important_Par_Changed_Fault		Lift Input Fault
6-8	VCL Run Time Error	12-6	Lower Input Fault