



Workshop literature

Pallet truck

EXH 25
EXH 30



0183 0184 2360 2361

11538012051 EN - 10/2019

first in intralogistics



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Foreword

EXH 25 – EXH 30 pallet truck



EXH_00-001

Specifications	EXH 25	EXH 30
Nominal capacity	2500 kg	3000 kg
Speed (laden/unladen)	6 km/h / 6 km/h	
Traction motor (asynchronous)	1.5 kW	
Electric steering unit ES30-24 (maintenance-free)	Asynchronous steering motor, 0.185 kW (S1)	
Type of brake	Electromagnetic	
Type of stabilisers	Basic	
	Light: option	
	Hydraulic (controlled): option	
Control unit	Tiller	
Driving	Pedestrian	
Pump-motor unit (maintenance-free)	1.5 kW (S3: 10%)	2.2 kW (S3: 10%)
Battery	Vertical access (2, 3, 4 PzS) and side access (4 PzS)	

Optional:

- Electronic key
- Cold store (-35°C)

Maintenance

Steering, braking and wheels

Checking the air gap of the electromagnetic brake ▷

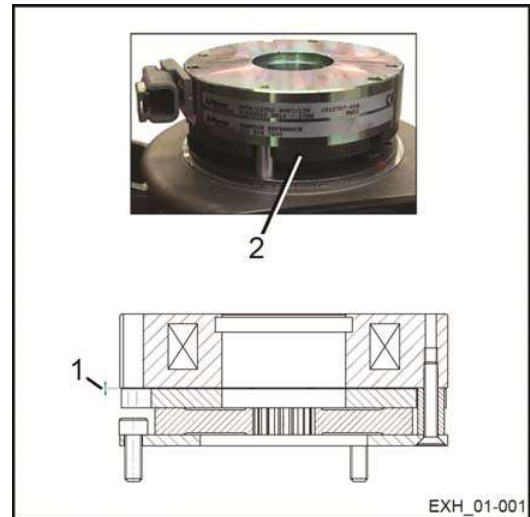
IMPORTANT: The mechanical braking torque is factory set and cannot be modified.



NOTE

The brake is designed to be used normally for the duration of the truck service life. However, depending on operating and environmental conditions, the brake may wear prematurely and will need to be replaced.

- The brake must be checked in the engaged position and with no load on the lift system. The switch key must be turned to the OFF position.
- Check the value of the air gap on the brake using a set of shims.
 - New brake: 0.2 to 0.4 mm (permissible air gap)
 - Worn brake: 0.6 mm (maximum permissible wear)
- The brake must be replaced when the maximum wear is reached.
- Immobilise the truck.
- Lower the load lift system.
- Switch off the ignition and remove the key.
- Press in the emergency off switch.
- Open the battery cover.
- Disconnect the battery connector.
- Remove the front cover.
- Disconnect the brake power supply.



1 Air gap (0.3 mm ± 0.10)
2 Electromagnetic brake

⚠ DANGER

Risk of truck movement

It is essential that the truck is positioned on level ground. As the power supply to the brake has been cut, the truck can move on its own if it is not on level ground.

- Refit the front cover.
- Reconnect the battery connector.
- Return the truck to service.

Resetting the service box

Switching the truck off and on again will trigger a reset of the service box. Switching the truck off interrupts the CAN bus power supply.

Error number	Description	Activation condition	Reset levels
		contactor is open even though it was ordered to close	
222	Battery voltage above the limit	Battery voltage > 28.35 V for 2 seconds	ON/OFF reset
224	Battery current sensor outside the range (lost)	The battery current is outside the range for 2 seconds or the main contactors are open and the battery current > 2.00000 A or < -2.000 A for 2 seconds	ON/OFF reset
225	Low supply voltage of BMS (SMU)	If the BMS (SMU) supply is active on the BMS (BMU) and the supply voltage is not detected in 0.2 seconds	ON/OFF reset

Step	INSTRUCTIONS	YES	NO	NOTE
1	Dump the BMU Black Box and contact SAFT (Linde support maintenance technician contacts and SAFT support contacts)	END	END	

Error code 218

Description: Pre-charge failure

Step	INSTRUCTIONS	YES	NO	NOTE
1	Switch off the battery Check that no additional electrical components are connected to the battery Switch on the battery			Go to step 2
2	Error code 218 appears	Go to step 3	Go to step 7	
3	Disconnect the battery from the truck			Go to step 4
4	Switch the battery off and on again			Go to step 5
5	Error code 218 appears	Go to step 6	Go to step 8	
6	Replace the BMS (see chapter 6: Lithium-ion battery, BMS)			
7	Error resolved (or corrected)	END	END	
8	Problem on the truck electrical harness			

Error code 225

Description: Low supply voltage of the SMU card

Step	INSTRUCTIONS	YES	NO	NOTE
1	Switch the battery off and on again			Go to step 2
2	Error code 225 still appears	Go to step 3	Go to step 4	
3	Replace the BMS (see chapter 6: Lithium-ion battery, BMS)			
4	Error resolved (or corrected)	END	END	

Error code 221

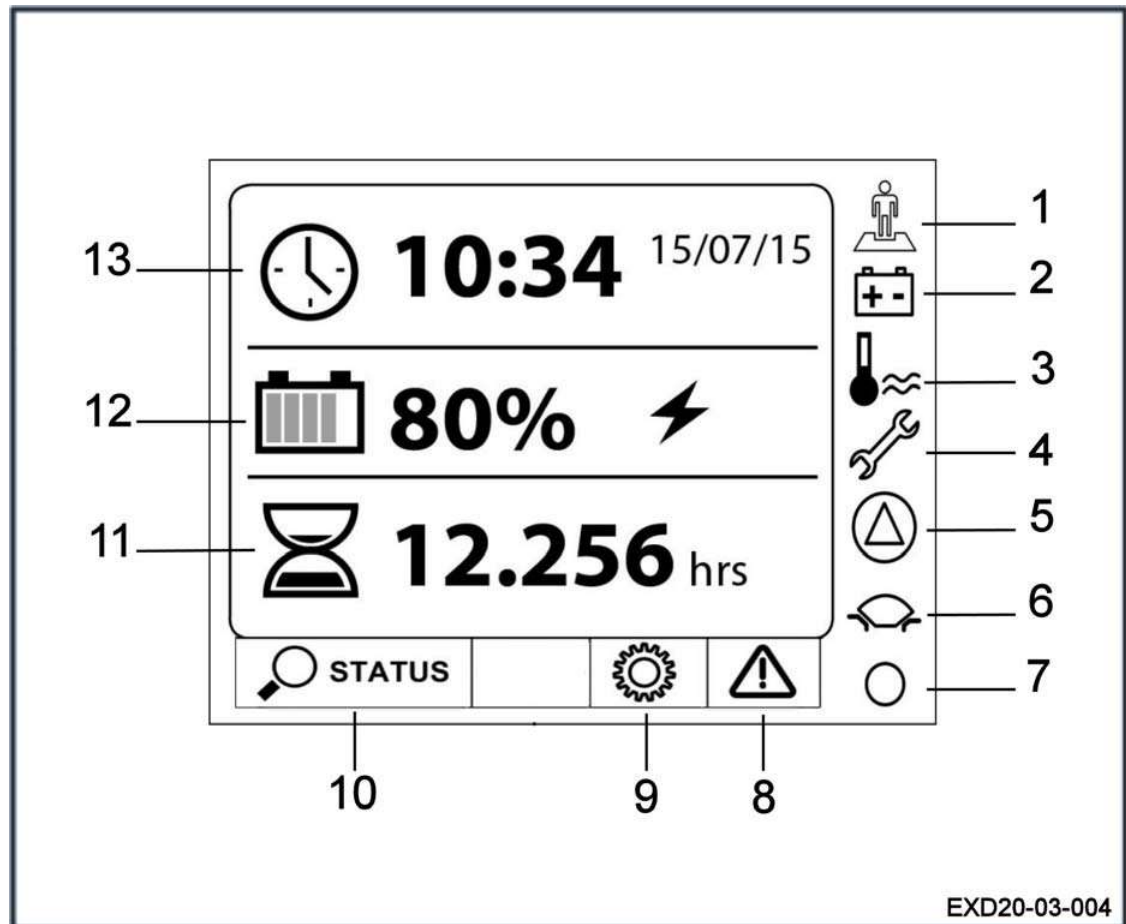
Description: Total number of invalid cells

Step	INSTRUCTIONS	YES	NO	NOTE
1	Switch the battery off and on again			Go to step 2
2	Error code 221 still appears	Go to step 3	Go to step 4	
3	Replace the BMS (see chapter 6: Lithium-ion battery, BMS)			
4	Error resolved (or corrected)	END	END	

Error code 222

Description: Battery voltage above the limit

Display-operating unit



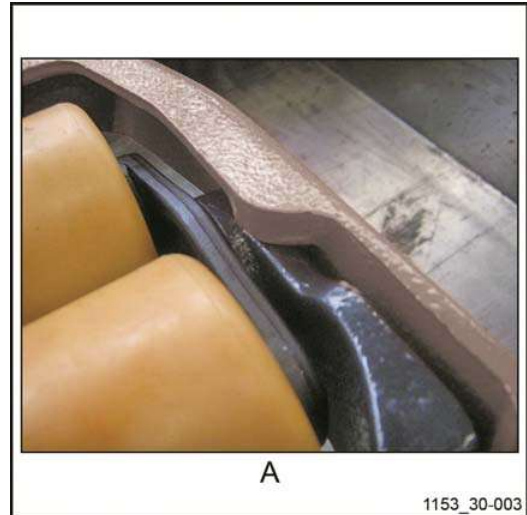
- | | | | |
|---|--|----|--|
| 1 | Operator present indicator light (depending on the model of the truck) | 7 | Activity indicator light |
| 2 | Battery indicator light | 8 | Error Code menu |
| 3 | Temperature indicator light | 9 | Settings menu |
| 4 | Settings indicator light | 10 | Truck status menu |
| 5 | Warning indicator light | 11 | Display of the operating time of the truck |
| 6 | Drive programme indicator light | 12 | Display of the battery charge |
| | | 13 | Display of the date and time |

Linkage of the truck

Adjusting the push rods

- Put the mobile chassis in the lower position (lower the load arms).
- Ensure that the bogie fork clevises come in contact with the mobile chassis (A).

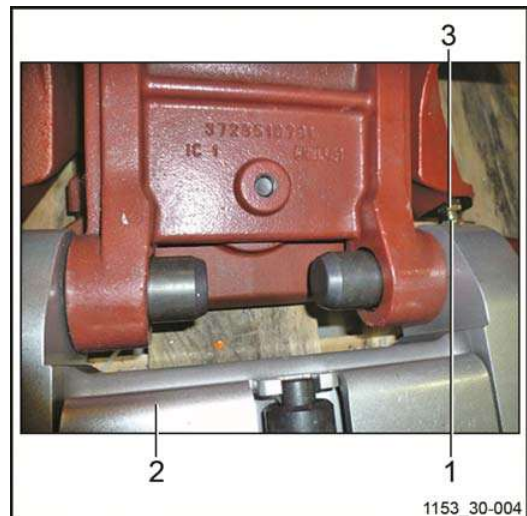
▷



1153_30-003

- Adjust the 10x30 HM screws (1) so that they stop against the lift shaft (2).
- Tighten the M10 HM locking nuts (3) with an open-ended spanner without displacing the screws (1).

▷



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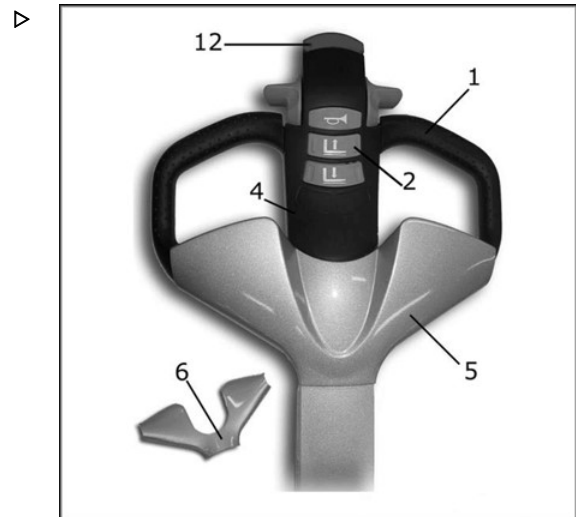
Standard tiller

General

General

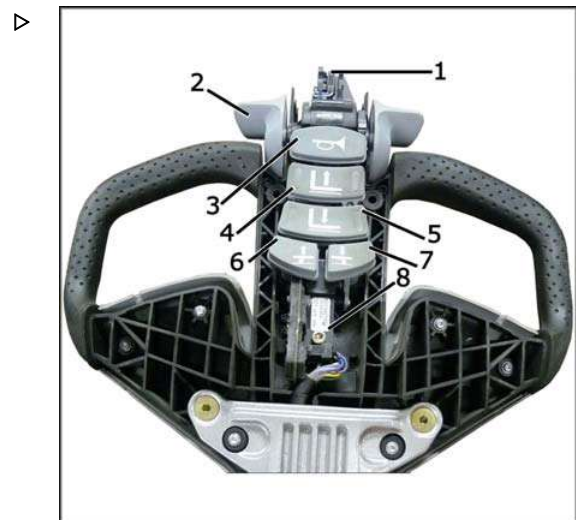
The tiller head consists of a moulded housing (1) containing an electronic card(2) with three or five buttons (lifting, lowering and horn, "lowering" and "lifting" for the initial lift option), two traction throttles, and a safety microswitch fitted with a Belly button (12) and three mounting flanges (4), (5) and (6).

When the throttles are activated, they are connected to a potentiometer which varies the setting point value according to the angle of rotation of the throttles. It is the same for the 2 hydraulic controls that dictate the progressive functions according to the travel. The horn is controlled using a micro-switch.

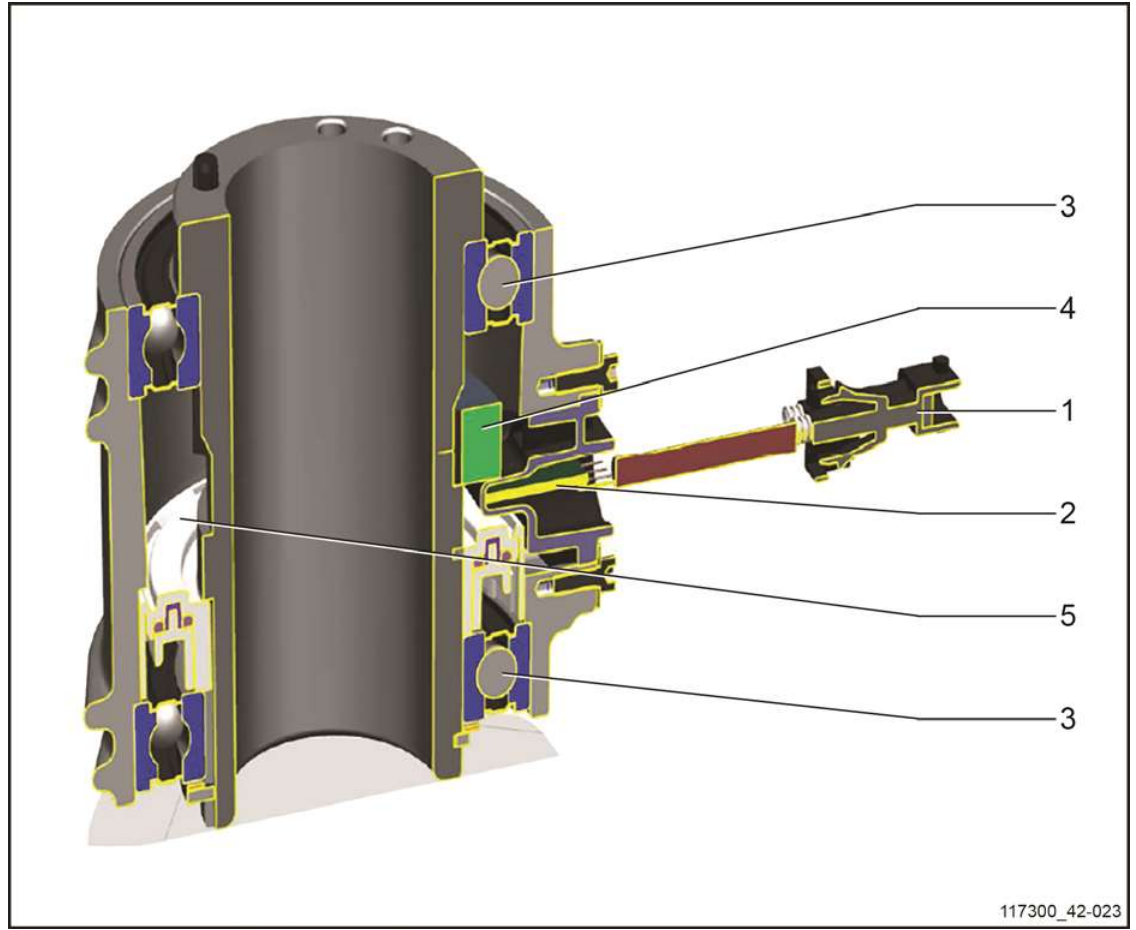


Layout of the different components of the tiller head

- 1: Safety micro-switch
- 2: Traction throttle
- 3: Horn push button
- 4: Push button for raising forks
- 5: Push button for lowering forks
- 6: Button for "lifting" the basic lift (optional)
- 7: Button for "lowering" the basic lift (optional)
- 8: Week and year of production



Steering centre section



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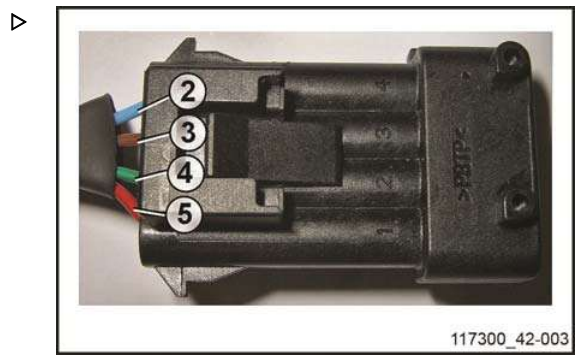
- 1 3X2 connector
- 2 Hall effect sensor
- 3 Bearings

- 4 Magnet
- 5 Resisting torque (brake)

3x2 connector pin assignment

Marking	Colour	Function
2	Blue	0 V
3	Brown	Supply
4	Green	Track 2 setting
5	Red	Track 1 setting

The connector (1) is made up of 4 spindles.



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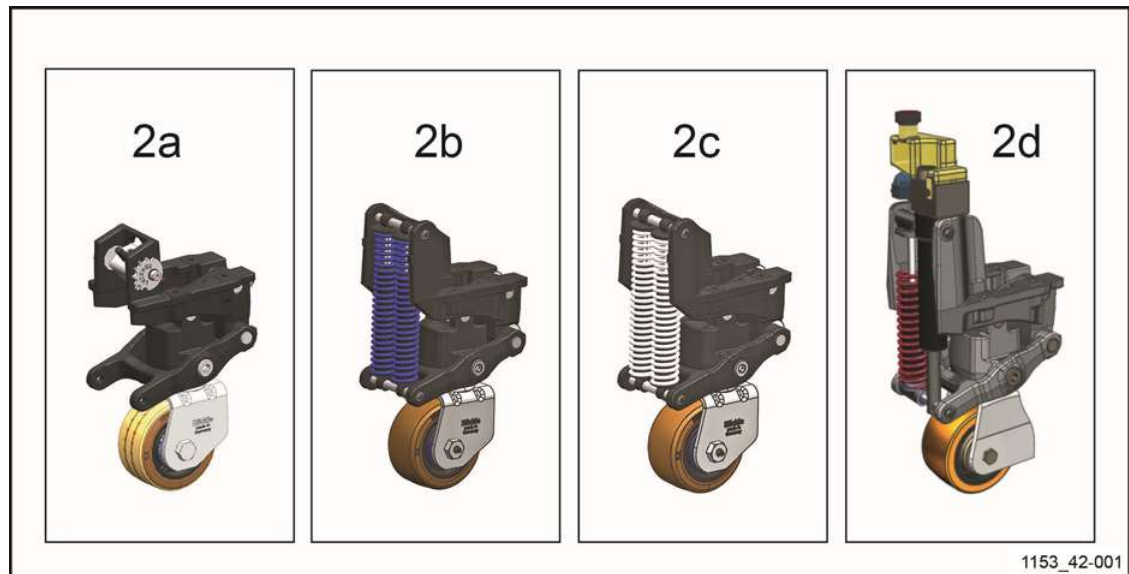


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Stabilisers

Presentation of the modular stabilisers



2a **basic** modular stabilisers
2b **Light** modular stabilisers

2c **Hard** modular stabilisers
2d **Hydraulic** modular stabilisers (**piloted**)

The modular stabilisers use a parallelogram structure.

The different versions are fitted with cylinders, springs of stiffener springs and damping different.

i NOTE

The basic version is only fitted with manually adjusted elastomer pads.

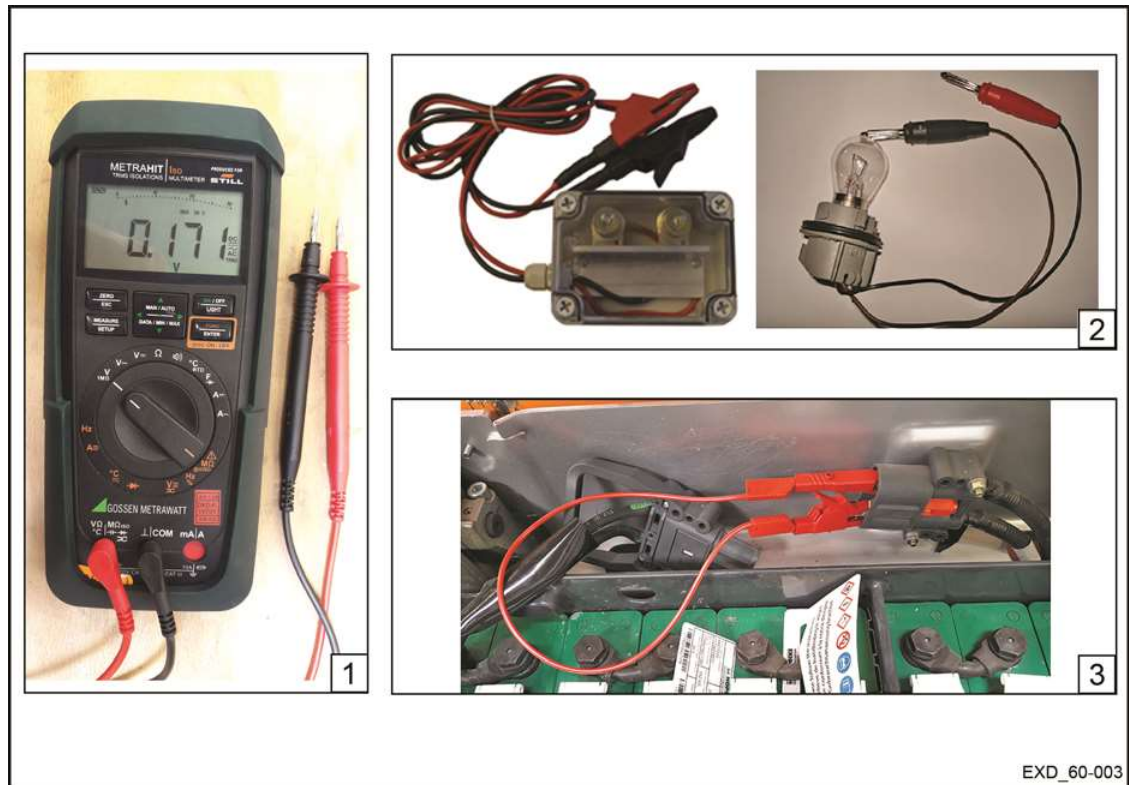
i NOTE

The light and hard modular stabilisers drives can be replaced by hydraulic versions (different LAC controller reference).

Configuring the modular stabilisers

Truck types		Modular stabilisers with elastomer pads (basic)	Light modular stabilisers (light)	Hard modular stabilisers (hard)	Hydraulic modular stabilisers (piloted)
EXH pallet truck	EXH 25	YES	YES (option)	NC	YES (option)
	EXH 30	YES	YES (option)	NC	YES (option)
EXD double pallet stacker	EXD 20	NC	NC	YES	YES (option)

Tools required



EXD_60-003

METRAHIT TRMS ISO insulation measuring and monitoring device (ref. 0171946) (1)

Discharge tool (lamp) (2)

Electrical shunt (3)

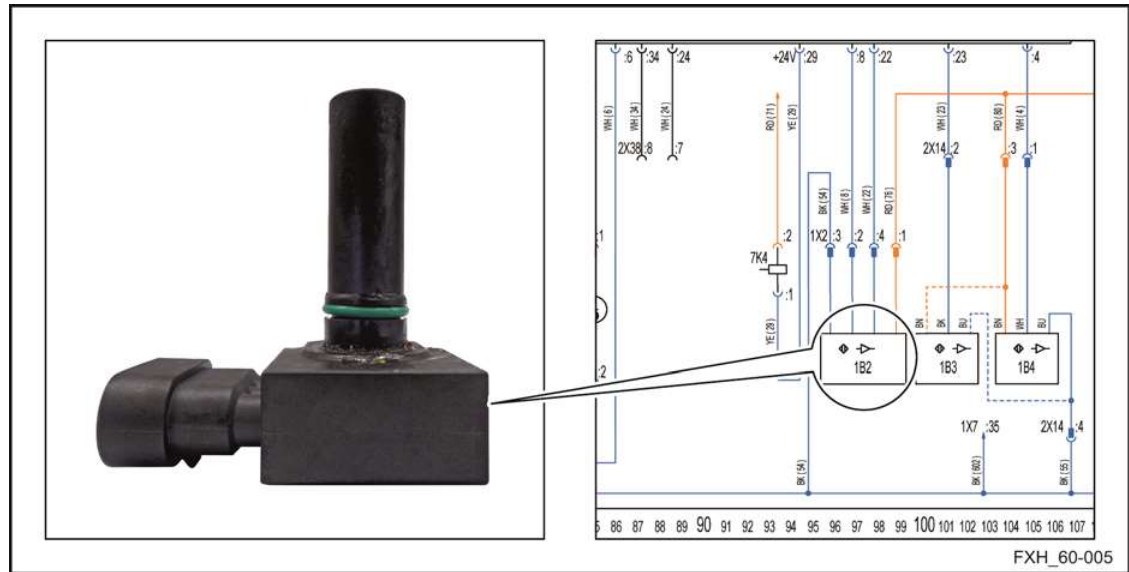
Preparation

- Stop the truck.
- Disconnect the battery connector.

1X1	Function	Signal		Type of signal	Input/Output
		Default value	Active value		
			0 V/5 V		
13	Battery voltage	-	24 V	Power supply	/
14	CAN 1 High	-	Variable voltage 0 V/5 V	Digital	Input/Output
15	Safety relay status	-	24 V	Power supply	/
16	Lowering solenoid valve 2Y2	-	0 V	All or nothing	Output
17	Traction/lift contact switch 1K2	-	PWM* signal	All or nothing	Output
18	Main lift switch	4.3 V	4.3 V	Analogue	Input
19	Not used	Not used	Not used	Not used	Not used
20	Slow speed track 1	24 V	0 V	Digital	Input
21	Main lowering switch	4.3 V	4.3 V	Analogue	Input
22	Rev sensor track B	-	Frequen- cy varia- ble 0 V/6 V	Digital	Input
23	Initial lift low position cut-out 1B3 (op- tion)	0 V	24 V	Digital	Input
24	CAN 2 High (for options)	-	Variable voltage 0 V/5 V	Digital	Input/Output
25	Traction setting no. 1	-	Variable voltage 0 V/5 V	Analogue	Input
26	Power supply belly 1S3	5 V	5 V	Power supply	/
27	+5 V power supply to potentiometers 1B1 and 2B4	-	5 V	Power supply	/
28	CAN 1 Low	-	Variable voltage 0 V/5 V	Digital	Input/Output
29	Brake Y1	-	0 V	All or nothing	Output
30	Solenoid valve of the right-hand stabilis- er 2Y8 (option)	24 V	0 V	All or nothing	Output
31	Needle solenoid valve 2Y12	-	0 V	All or nothing	Output
32	Mast height 0.3 m 2B1	24 V	0 V	Digital	Input
33	1B7 tiller foot setting no. 2		Variable voltage 0 V/5 V	Analogue	Input
34	CAN 2 Low (for options)	-	Variable voltage 0 V/5 V	Digital	Input/Output
35	Not used	Not used	Not used	Not used	Not used
36	Initial lift 2S7	24 V	0 V	Digital	Input
37	Mast height 1.8 m 2B6	24 V	0 V	Digital	Input
38	Belly 1S3	0 V	5 V	Digital	Input
39	Traction setting no. 2	-	Variable voltage 0 V/5 V	Analogue	Input
40	Fork raised pressure sensor	0 V	24 V	Digital	Input

Operation checks

Rev sensor (1B2)



1B2 Rev sensor
1X1 Traction/lift controller connector

1X2 Rev sensor connector

A sensor (1B2) is fitted to the traction motor.
This sensor monitors a gear fitted on the rotor.

The sensor is supplied with +24 V (pin 1X2:1)
and supplies two 90° out-of-phase impulsion
gaps.

These signals are transmitted to the traction
controller module (input pins 1X1:8 and 22 of the
LAC) as well as to the steering controller where
they are processed to determine the speed and
the direction of rotation of the traction motor.

No adjustment is needed for the rev sensor.

Truck applications:

SXH 20, SXD 20	07/2018
FXH 20 N, FXH 25 N, FXD 20 N, FXV 14 N, FXV 16 N	07/2018
FXH 20, FXH 25, FXD 20, FXV 14, FXV 16	09/2018

⚠ CAUTION

Risk of incorrect use of the traction motor.

If the sensor is improperly fitted or if (1X2) is disconnected, the traction speed will be 0.2 km/h and the effective motor current will increase to the I_{max} current of 270 A (according to standard factory settings for the truck).

Functions of the "inputs/outputs" of the ES30-24

Control connector 3X1

3X1	Function	Signal		Type of signal	Input/output
		Default value	Active value		
A1	Position sensor 3B2 (setpoint), track 2	-	Variable voltage 0 V/5 V	Analogue	Input
A2	Not used	/	/	/	/
A3	Not used	/	/	/	/
A4	Not used	/	/	/	/
A5	0 V sensor	-	0 V	Supply	/
A6	Power supply for the position sensor (setpoint)	-	10 V	Supply	/
A7	Power supply for the control card	-	24 V	Supply	/
A8	Power supply for the control card	-	24 V	Supply	/
B1	Position sensor 3B2 (setpoint), track 1	-	Variable voltage 0 V/5 V	Analogue	Input
B2	Not used	/	/	/	/
B3	Not used	/	/	/	/
B4	Not used	/	/	/	/
B5	0 V CAN A	-	0 V	Supply	/
B6	Power supply for the steering switch 3K1	-	24 V	Supply	Output
B7	Pivot brake 7A5	-	24 V	Supply	Output
B8	Safety loop	-	24 V	Supply	Output
C1	CAN A high		Approximately 2.5 V	Digital	Input/output
C2	CAN A low	-	Approximately 2.5 V	Digital	Input/output
C3	CAN B earth	-	0 V	Analogue	Input
C4	CAN B high	-	Approximately 2.5 V	Digital	Input/output
C5	CAN B low	-	Approximately 2.5 V	Digital	Input/output
C6	Pivot brake 7A5	-	PWM* signal	Digital	Input
C7	Steering switch 3K1	-	0 V	Supply	Input
C8	Not used	/	/	/	/

*PWM: Pulse Width Modulation

Power connector 3X8

3X8	Function	Signal		Type of signal	Input/output
		Default value	Active value		
1	Positive after battery	-	24 V	Supply	/
2	Battery negative	-	0 V	Supply	/

Help for diagnostics

In order to improve the quality of diagnostics and to better identify problems encountered involving our trucks' on-board battery chargers, we ask you to follow the checking procedure below in the event of a suspected failure and before any replacement.

REFERENCES	
* 1152 353 10 04	* 1152 353 10 05
* 1152 353 10 26	* 1152 353 10 32
* 1152 353 10 48	



NOTE

- *Testing conditions: -15°C to +35°C*
- *The charger unit and battery must have been stopped for at least one hour in order to carry out the preliminary checks under normal temperature conditions*



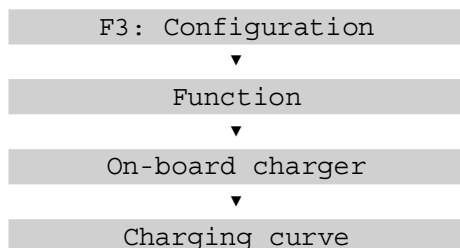
On-board charger for lithium-ion/gel/lead batteries (option)

Adjusting the on-board charger

- When the truck is delivered with its battery, the charger settings are adjusted in the factory.
- When the truck is delivered without its battery, the settings are adjusted in the factory in accordance with the battery type selected.

Parameterisation of the charging curve

- Connect the CAN box to the diagnostic connector **6X7**.
- Connect the CAN box to the laptop socket.
- Start the diagnostic tool.
- Select the truck's service base.
- Go to the following menu:



- Select the battery type then confirm.

The charging curve is recorded.

**NOTE**

The charger is supplied in the neutral position.

CAUTION

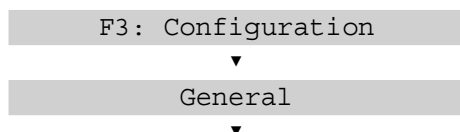
Risk of premature damage to the battery.
Select the correct battery type in the truck's service base.

If the battery type or type of charger is changed during the service life of the truck:

- Check that the charger setting corresponds to the new type of battery.

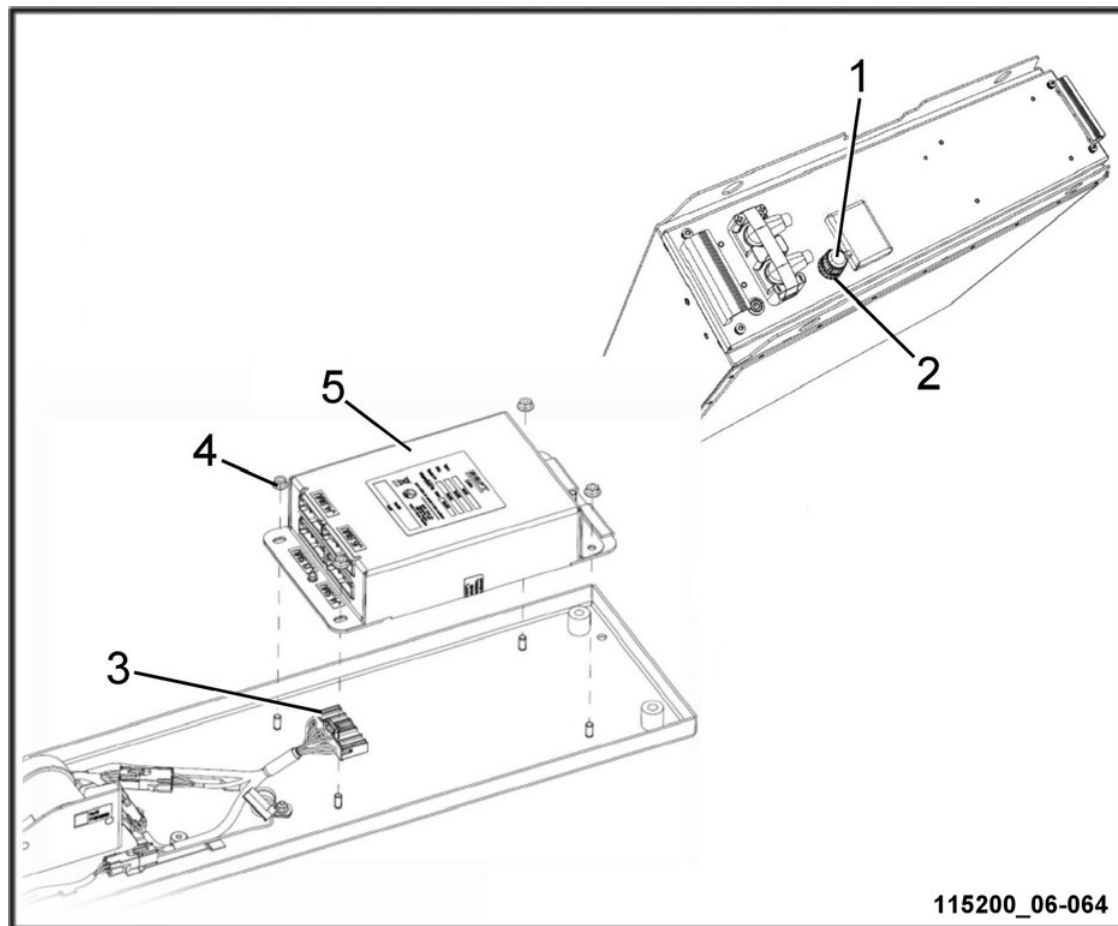
Parameters of the on-board charger

- Go to the following menu to check the charger information:



Replacing the BMS

Removing



- Unscrew the cap of the battery diagnostics connector using the tab (1).
- Connect the diagnostic tool to the battery diagnostics connector (2).
- If possible, start the diagnostic tool software and download data from the BMS (black box, shunt calibration parameters etc.).
- Disconnect the diagnostic tool.



NOTE

It is also possible to access the BMS directly via the RS485 output of the BMS using the SAFT tool (WINDIAG_BMS).

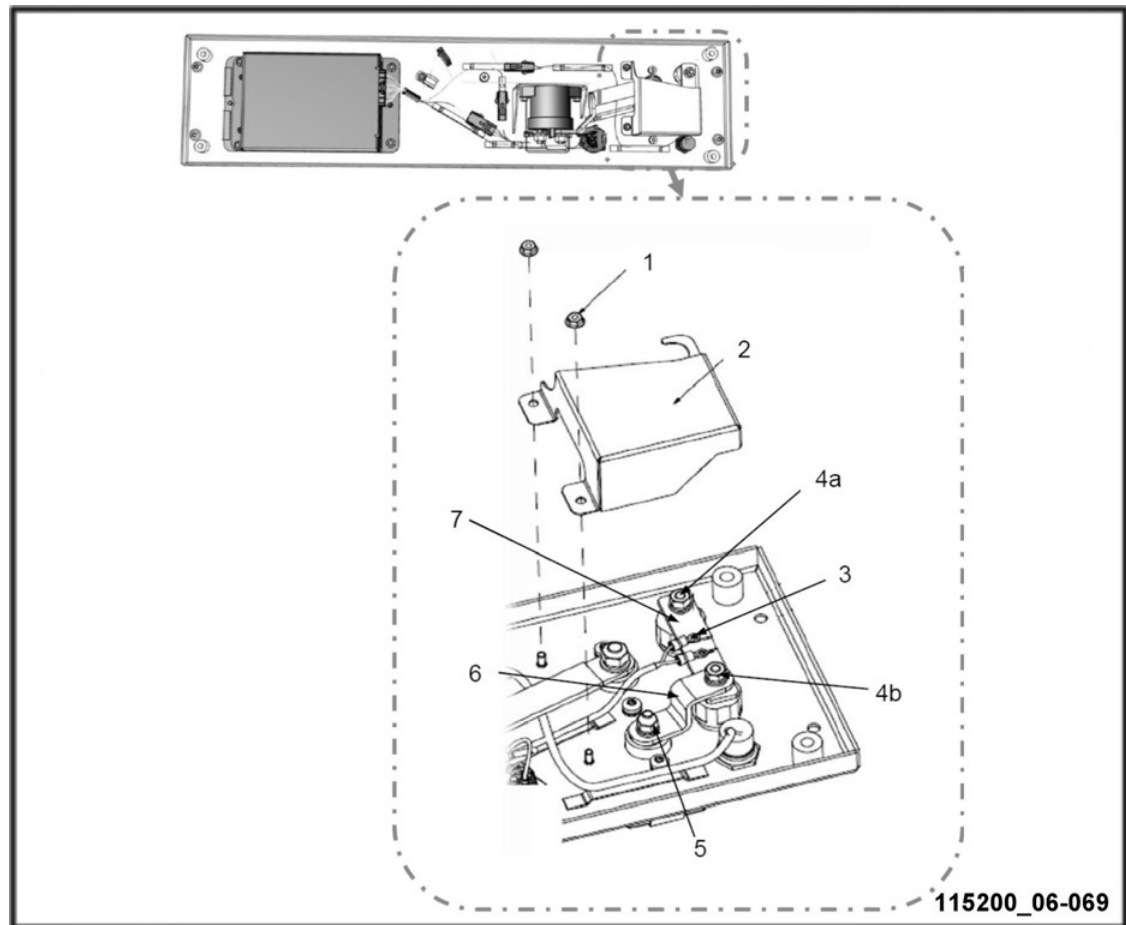
- Screw on the cap (1).
- Remove the cover provided.
- Disconnect the diagnostic harness connector (3).

- Unscrew the four mounting nuts (4) of the BMS.
- Remove the BMS(5).

Replacing

- Install the BMS(5).
- Tighten the four mounting nuts (4) on the BMS (tightening torque: **4 Nm**).
- Connect the diagnostic harness connector (3).
- Install the cover provided.
- Unscrew the cap (1) of the battery diagnostics connector using the tab.
- Connect the diagnostic tool to the battery diagnostics connector (2).
- Start the diagnostic tool software (KION CAN_KWP2000 tool) and transfer the data

Replacing the shunt

**Removing**

- Unscrew the two mounting nuts on the insulation cover (1) and then remove them.
- Remove the insulation cover (2).
- Gently unscrew the mounting screws of the communication cable (3).

**NOTE**

The mounting screws of the communication cable are small in diameter. They are screwed on the shunt, which is made of copper.

**NOTE**

Be careful not to damage the threads or lose the screws.

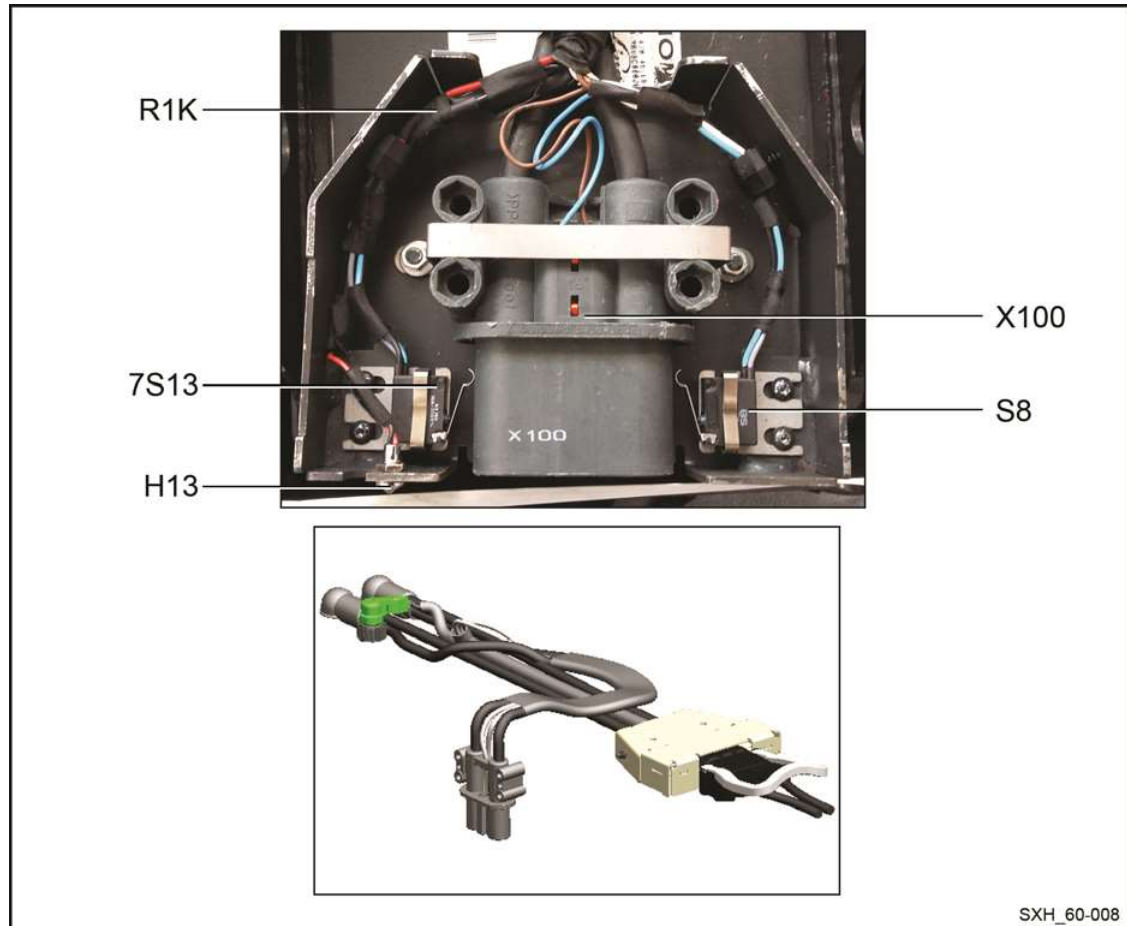
- Unscrew the two mounting nuts on the shunt (4a and 4b).
- Unscrew the rigid connection nut (5).

- Remove the rigid connection (6).
- Remove the shunt (7).

Replacing

- Put the shunt (7) into position.
- Put the rigid connection (6) into position.
- Screw on the rigid connection nut (5) (tightening torque: 5 Nm).
- Screw the mounting nut on the shunt (4a) (tightening torque: slight tightening).
- Screw the other mounting nut on the shunt (4b) (tightening torque: 5 Nm).
- Put the screws of the shunt communication cable (3) in place and then screw them in (tightening torque: 3 Nm).

Side socket on lithium-ion battery



SXH_60-008

H13 Charger socket presence LED (illuminated when the socket is connected, turned off when charging)
 R1K Resistor (1K–2W)

S8 Truck CAN cut-off switch
 X100 Charger socket connector
 7S13 Supply cut-off switch

Operating

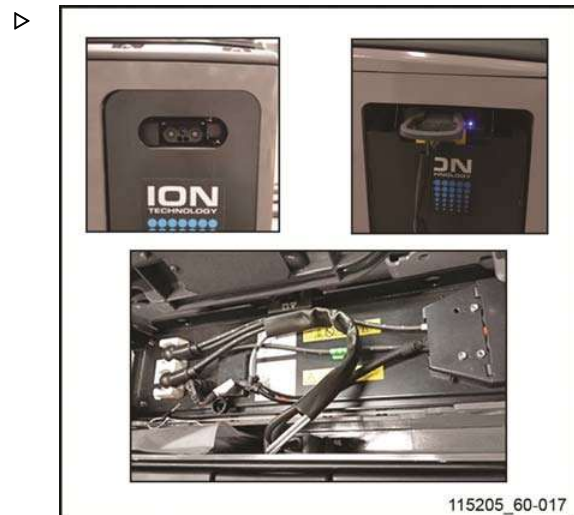
The lithium-ion battery can be charged using a side socket.

Advantages:

- Can be charged without moving the hood.
- No other sockets need to be disconnected.

Detection:

- S8: The detection switch prevents the CAN from communicating between the battery and the truck.
- 7S13: The switch cuts the 24 V power supply for the battery.
- H8: The blue LED only indicates that the side socket is connected. It does not indicate that the battery has been charged.



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