Workshop literature

Double pallet stacker

EXD-SF 20

CE

0313 0346

11638012101 EN - 06/2019

first in intralogistics

Lithium-ion safety guidelines

Technician electrical accreditation

Maintenance operations must always be carried out by a competent person.

⚠ CAUTION

Electrical accreditation regulations

Comply with electrical accreditation regulations for the country. Depending on the country, electrical accreditation of the technician may not always be compulsory.

⚠ CAUTION

Risk of accident

Any work on the lithium-ion battery must be carried out by an authorised service engineer.

⚠ CAUTION

Safety regulations

Comply with the regulations in force in the country.

⚠ DANGER

Electrical danger

Do not touch the lithium-ion battery when the battery is charging and do not wear rings or jewellery.

⚠ CAUTION

Safety regulations

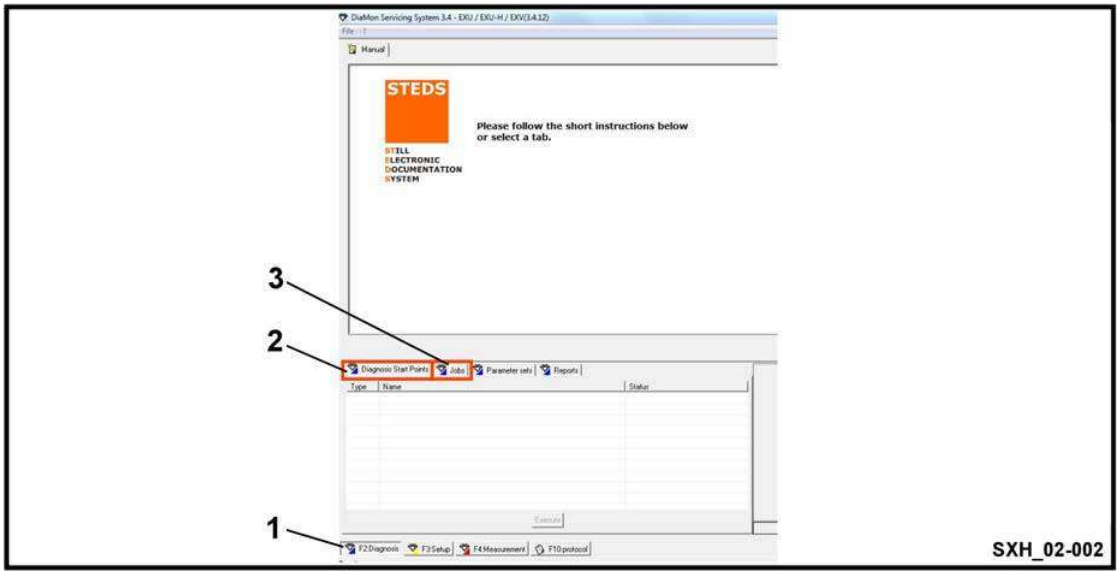
When carrying out work inside the battery, do not wear clothes with metal objects (belt, shirt buttons).

⚠ CAUTION

Safety regulations

Use protection goggles and a mask with a protective visor.

Parameterising



1 F2: Diagnostics
2 Diagnostics start points
3 Actions

A guided diagnostic procedure can be used to individually select and carry out various diagnostic sequences and actions. The user is continuously guided by the program. Always follow the relevant specifications provided.

- Park the truck safely.
- Lift the truck.
- Start the truck.
- Switch on the laptop and start the diagnostic tool.
- Connect the laptop to the truck.
- Select the required diagnostics and double-click to start.

It may take a while to establish a connection with the truck and to start diagnostics.

Error number	Description	Activation condition	Reset levels
215	BMS (SMU) reconnection failure	Number of attempts to reconnect greater than three for the BMS (SMU)	ON/OFF reset
216	A module connection is overheating	Maximum temperature connection > 90°C for 1 second	ON/OFF reset
217	Self-testing failure	If the integrated tests (at start-up, continuously, on request, when switching off) have failed (one unsuccessful attempt is regarded as a failure)	ON/OFF reset
218	Pre-charge failure	If the voltage of the battery contactor is still > 4.00000 V 3 seconds after the command to close the main pre-charge contactor or if a contactor is open even though it was ordered to close	ON/OFF reset
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

Error code 224

Description: Battery current sensor outside the range (lost)

Step	INSTRUCTIONS	YES	NO	NOTE
1	Switch the battery off and on again			Go to step 2
2	Error code 217 appears	Go to step 4	Go to step 3	
3	Error resolved (or corrected)	END	END	
4	Follow the procedure for error code 217			

Error code 217

Description: Self-testing failure

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

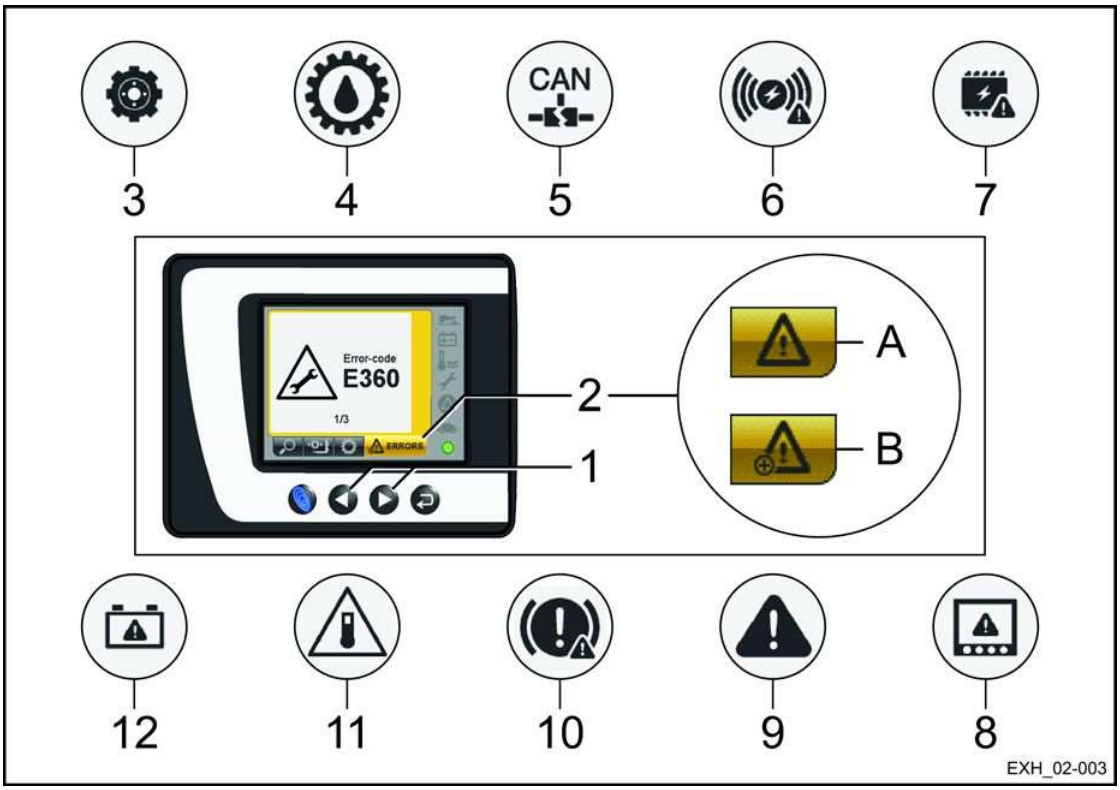
Step	INSTRUCTIONS	YES	NO	NOTE
1	Switch off the battery Check that no additional electrical components are connected to the battery Switch on the battery			Go to step 2
2	Error code 218 appears	Go to step 3	Go to step 7	
3	Disconnect the battery from the truck			Go to step 4
4	Switch the battery off and 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	

Pictograms of error codes on the display



Faults

1 Navigation between the screens
2 Warning icon
A A fault appears
B Several faults appear

Types of error

3 Traction
4 Hydraulics
5 CAN
6 Electrical (sensor)
7 Electrical (internal to the LAC)
8 Internal error display
9 Other

Types of warnings

10 Brake: Fault detected
11 Lower the load arms: the height of the forks is greater than 1.80 m
12 Temperature: the engine temperature **OR** the controller is too high

When a fault occurs on the truck, an error icon appears on the display.

In case of multiple faults, errors are displayed on multiple screens.

It is possible to navigate between the different screens using the arrows (1).

Fixed chassis

Accessing the technical compartment

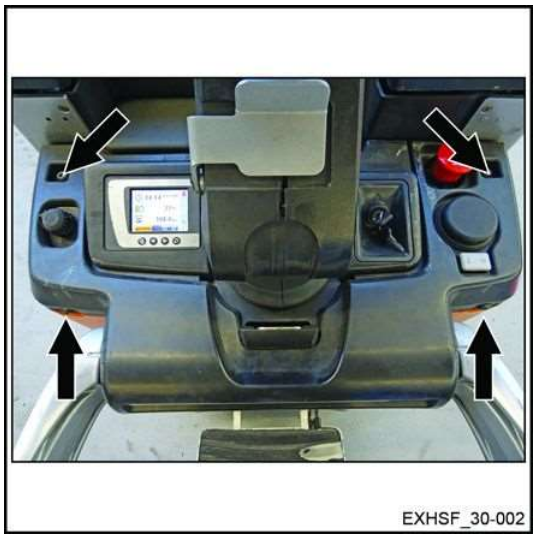
– Disconnect the battery connector.

– Lower the platform and raise the side protections.

– Remove the four dashboard cover mounting screws. ▷

– Disconnect the various connectors.

– Remove the dashboard cover.



– Unscrew the two mounting screws on the front cover. ▷

– Remove the front cover.

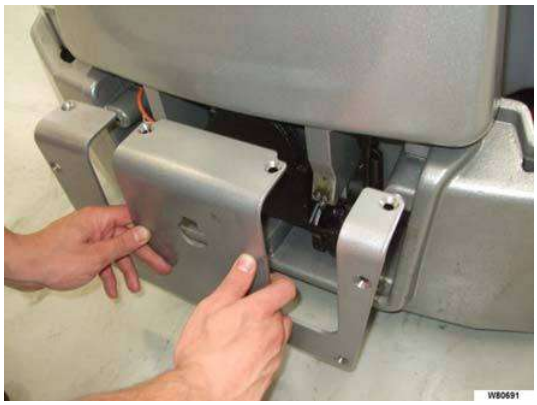
To refit the two covers, proceed in the reverse order to removal.

– Use the 5-mm hexagon socket wrench with T-handle to unscrew the mounting screws from the panel on the chassis frame.

▷

– Remove the panel.

▷



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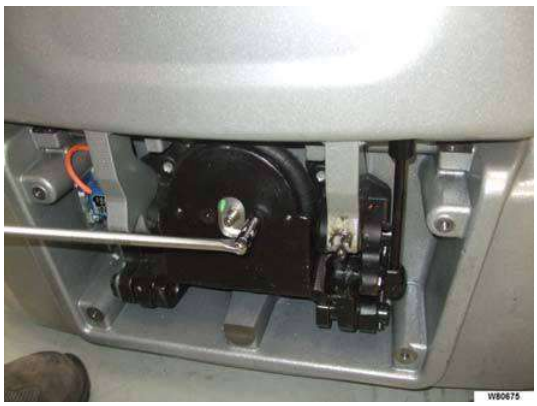
▷

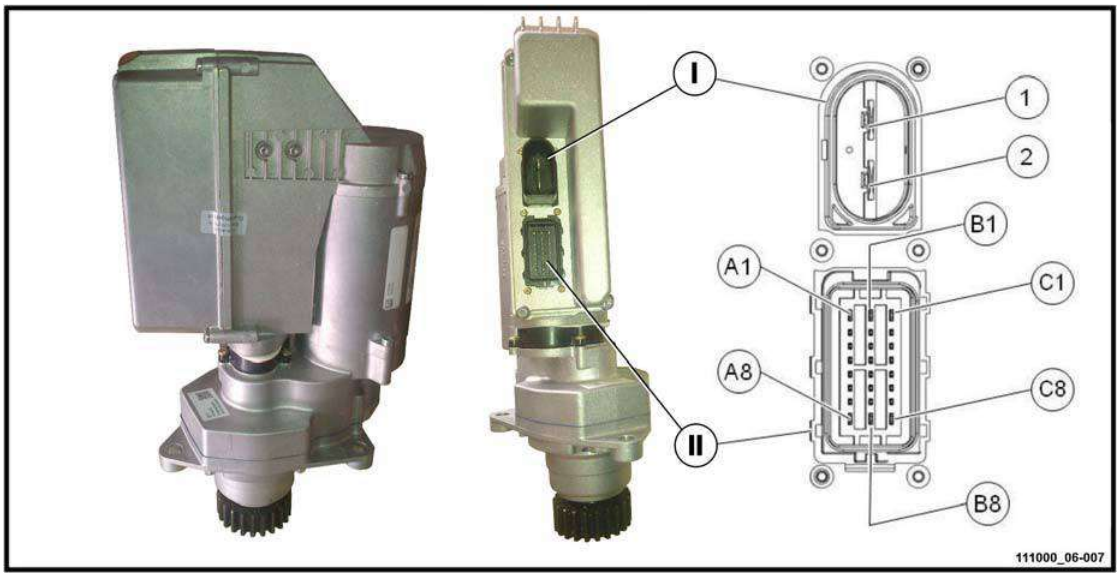
– Use the 5-mm hexagon socket wrench to unscrew the mounting screws of the bellows.

▷



ES30-24 unit

Electric steering unit ES30-24



I: Connector **3X8**: power section

II: Connector **3X1**: control section

The electric steering unit ES30-24 comprises a control card with two VR and SR microprocessors.

The transistors are controlled internally.

The motor wiring is internal.

If an anomaly occurs, it is detected instantly and the control system goes into safety mode and orders the truck to stop.

Identifying the ES30-24 using the diagnostic software

To check the identity of the ES30-24 unit:

- Connect the CAN Box to the **6X7** diagnostic connector.
- Connect the CAN Box to the laptop connector.
- Launch the diagnostic software and go to the following menu:

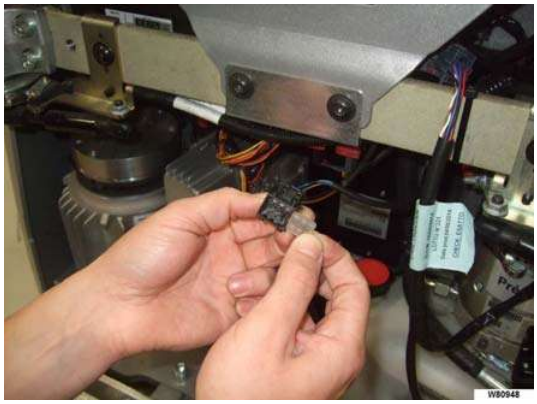
```
F3:Setup
▼
Control device info
▼
Steering control device (ES)
▼
Steering main line
```

– Before tightening the mounting screws, ensure that the clasp of the chain is pushed downwards as indicated in the illustration.

▷

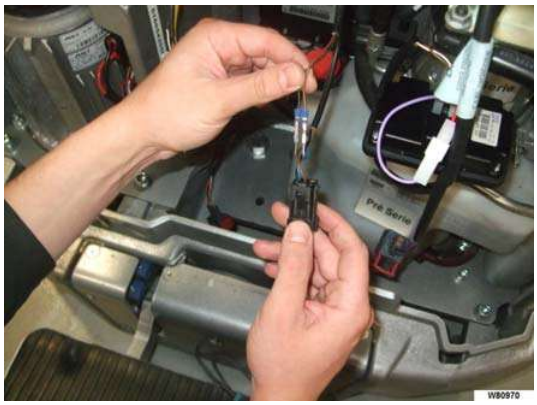
– Remove the seal.

▷



– Use the extraction tool for SAAB contacts to remove the two wires from the microswitch.

▷

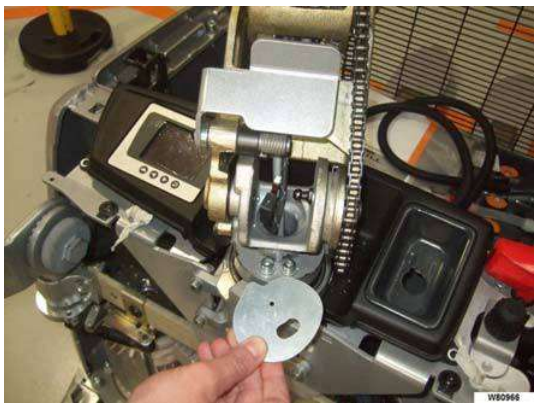


– Unscrew the mounting screws from the microswitches.

▷

– Remove the plate.

▷



Replacing the brake

Equipment required

- Size 5 Allen key

– Immobilise the truck.
– Lower the load lift system.
– Switch off the ignition.
– Press the emergency off switch.
– Open the battery hood.
– Disconnect the battery connector.
– Remove the front cover.
– Disconnect the brake connector 7X6.
– Loosen the three brake screws.

⚠ DANGER

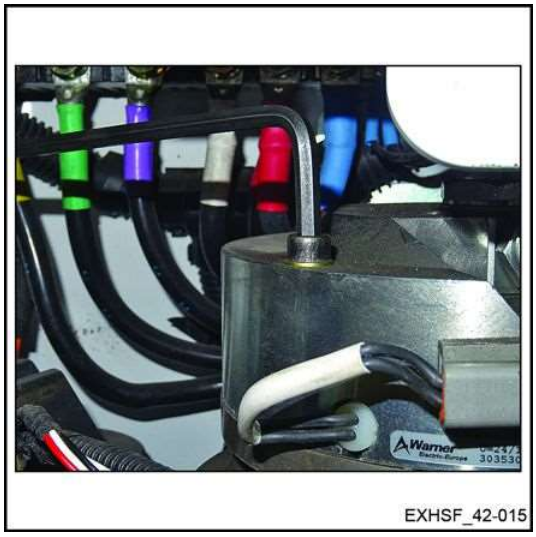
Risk of truck movement.

The truck must be 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.

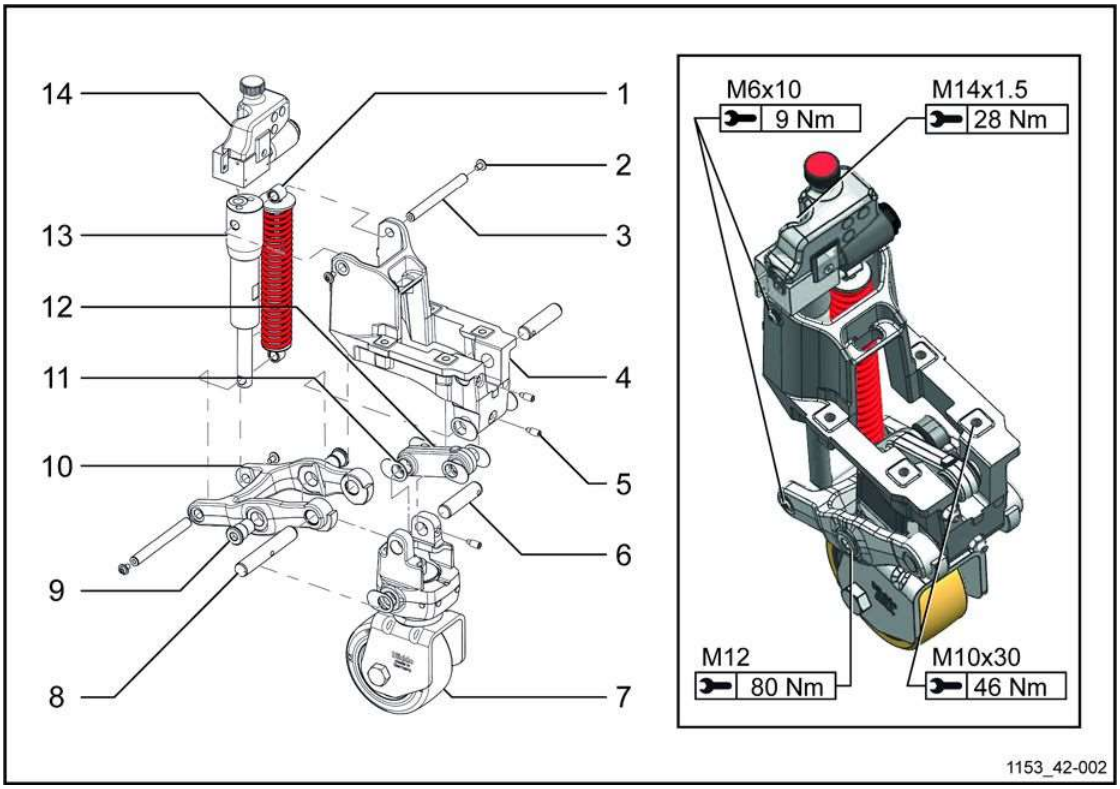
– Replace the worn brake with the new brake.
– Retighten the three brake screws.
– Reconnect the brake connector 7X6.
– Close the front hood.
– Reconnect the battery connector.
– Return the truck to service.
– Check that the brake releases completely.

NOTE

This operation should preferably be carried out by the After-Sales Service Centre.



Hydraulic modular stabilisers



1	Shock absorber	8	Chassis bolt Ø18x110
2	Button head screw M6x10-10.9	9	Bearing bolt Ø18x32.7
3	Shock bolt Ø12x115	10	Lower lift swing unit
4	Shock mount	11	Washer Ø18.5x26x1.5
5	Stud bolt M8x21	12	Upper lift swing unit
6	Chassis bolt Ø18x70	13	Cylinder Ø18x70
7	Full PE support wheel	14	Hydraulic block

Description

The trucks can be fitted with hydraulic stabilisers to compensate for wear to the drive wheel.

They increase the truck's traction and greater cornering stability.

NOTE

The modular stabilisers are fitted with automatic drive wheel wear adjustment. Therefore, no adjustment is necessary during the truck's service life.

The hydraulic modular stabilisers are controlled from the (1A1) LAC controller that controls the following solenoid valves:

- **2Y8** on the right hydraulic stabiliser.
- **2Y9** on the left hydraulic stabiliser.

NOTE

*The hydraulic modular stabilisers are mandatory on trucks equipped with masts **>2424**.*

Tools required

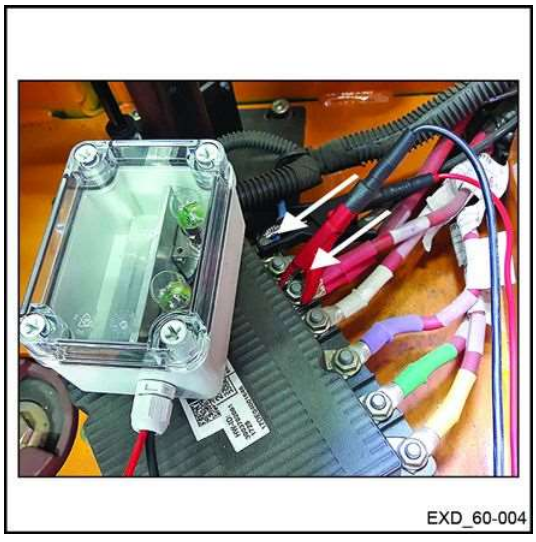
METRAHIT TRMS ISO insulation measuring and monitoring device (ref. 0171946) (1)

Discharge tool (lamp) (2)

Electrical shunt (3)

Preparation

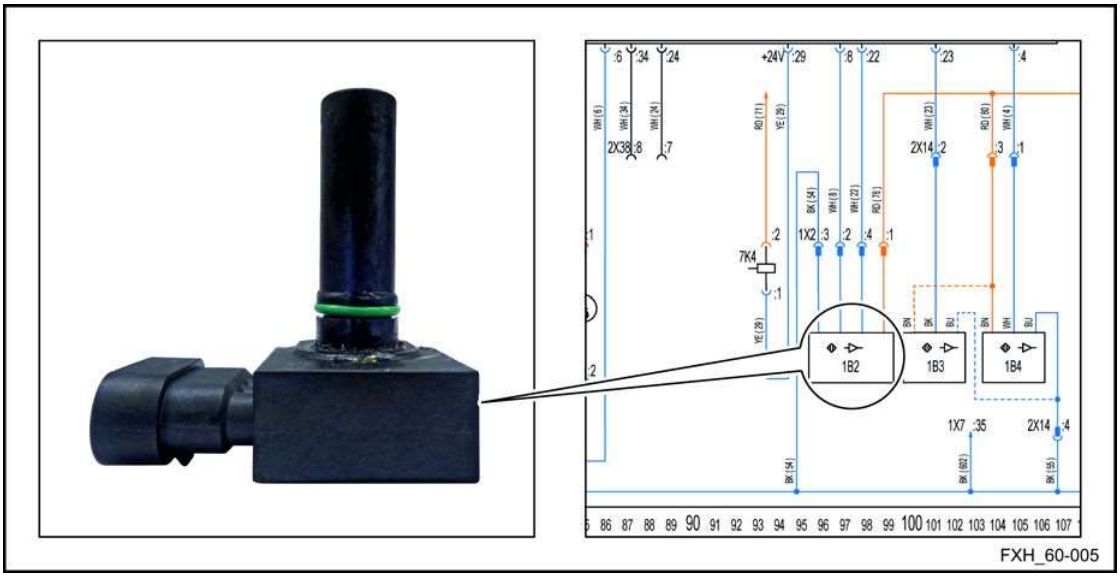
- Stop the truck.
- Disconnect the battery connector.
- Discharge the LAC traction controller circuit (+ and - terminals). ▷



1X1	Function	Signal		Type of signal	Input/Output
		Default value	Active value		
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 (on EXD-SF 20)	4.3 V	4.3 V	Analogue	Input
19	Forklift operator presence 1S9	24 V	0 V	Digital	Input
20	combi tiller switch 1S4 (option)	0 V	5 V	Analogue	Input
21	Pressure sensor 7B11 (EXH-SF 20-25)	Approx-imately 0.5 V	Variable voltage 0.5 V–4 .5 V	Analogue	Input
	Main lowering switch (EXD-SF 20)	4.3 V	4.3 V	Analogue	Input
22	Rev sensor track B	-	Fre-quency variable 0 V/6 V	Digital	Input
23	Initial lift low position cut-out 1B3 (option)	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, 1B7, 2B4 and 7B11 (depending on version)	-	5 V	Power supply	/
28	CAN 1 Low	-	Variable voltage 0 V/5 V	Digital	Input/Output
29	Brake Y1	24 V	0 V	All or nothing	Output
30	Solenoid valve of the right-hand stabiliser 2Y8 (option)	24 V	0 V	All or nothing	Output
31	Needle solenoid valve 2Y12 (EXD-SF 20)	-	0 V	All or nothing	Output
32	Mast height 0.3 m 2B1 (EXD-SF 20)	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	4.6 V	0 V	Digital	Input
37	Mast height 1.8 m 2B6	24 V	0 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:

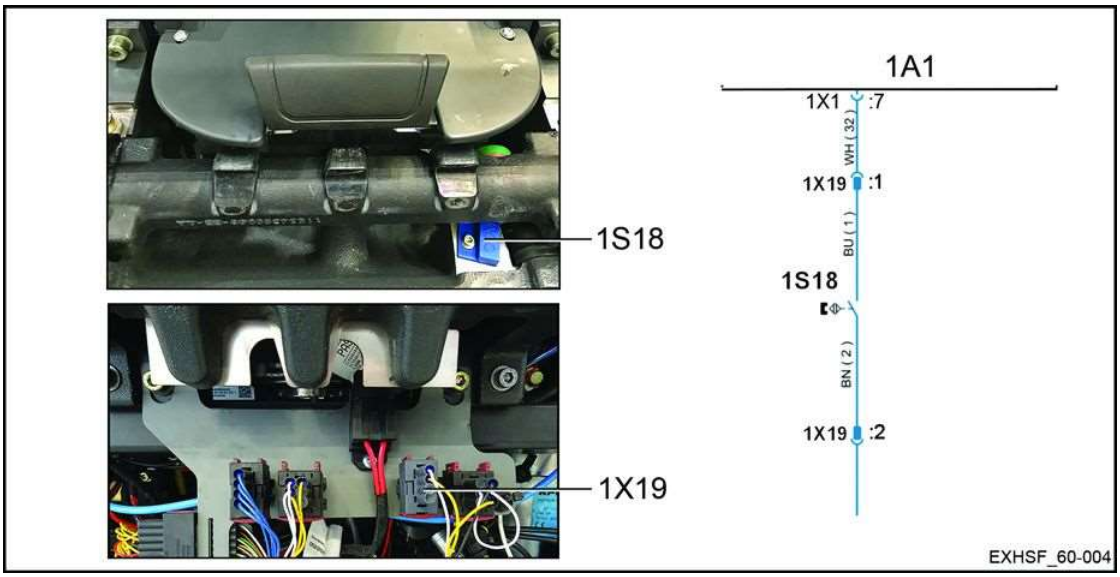
SXH 20, SXD 20	**07/2018**
FXH 20 N, FXH 25 N, FXD 20 N, FXV 14 N, FXV 16 N	**07/2018**
FXH 20, FXH 25, FXD 20, FXV 14, FXV 16	**09/2018**

⚠ 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 Imax current of 270 A (according to standard factory settings for the truck).

Side protections (1S18)



1S18	Position contact with side protection	1X19	Position switch connector for the side protection
1X1	Traction/lift controller (LAC) connector		

Side protection position control

– Connect the PC to the **6X7** diagnostic connector.

– Launch the diagnostic tool and go to the following menu:

```
F4: Measurement
▼
Traction
▼
Platform
▼
X1:07 Safety guardrail (1S18)
```

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

Features

NOTE

The on-board charger does not have a terminating resistor.

⚠ CAUTION

It is strictly prohibited to use any on-board charger other than the one recommended.

Precautions for installation and use

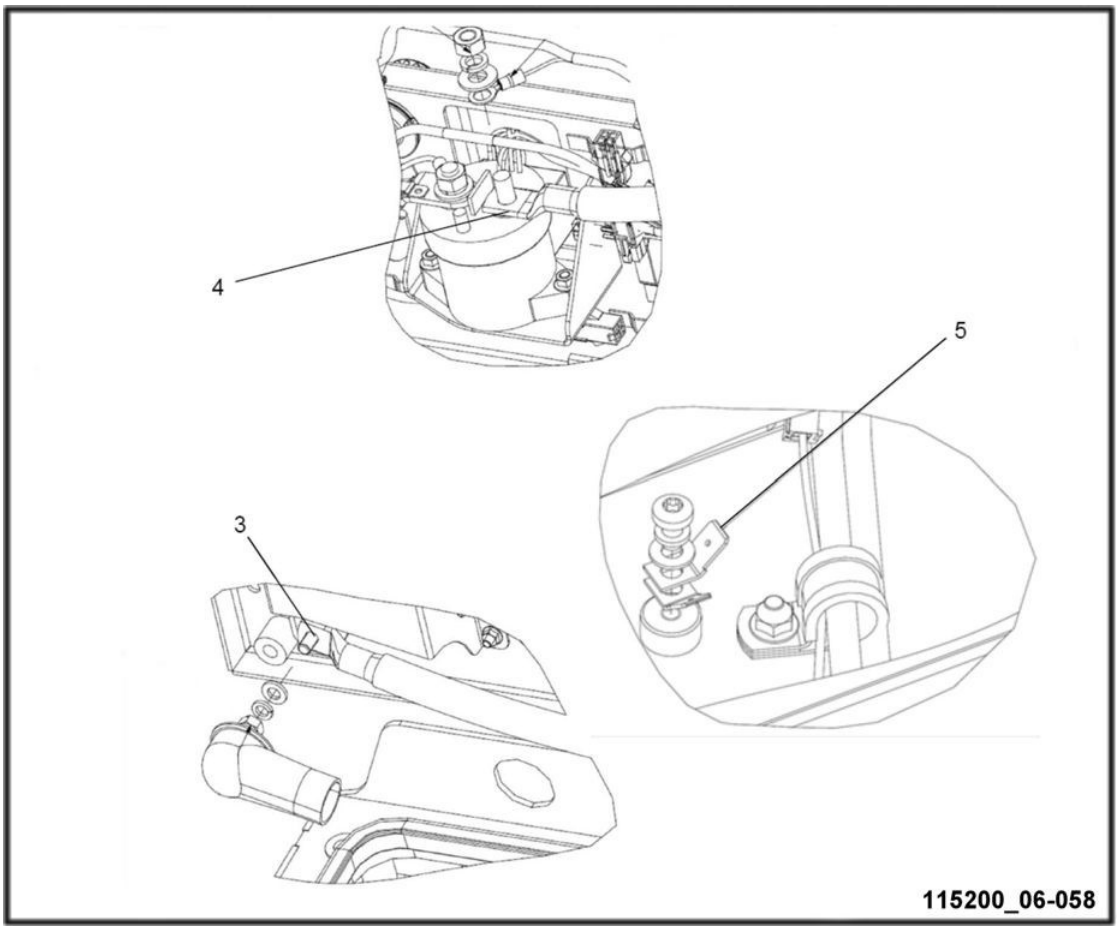
The on-board charger can be connected to any 2P+T 230-V 16-A socket.

However, before charging in this way, the user must ensure that the location selected for charging satisfies all the required safety guarantees:

- The electric installation must comply with the standards defined by the country in which the truck is used.
- The electric wall socket must be a 2-pole + earth 16-A, 230-V type socket that is correctly connected and protected.
- Before charging, check the condition of the connections and cables (retighten as required).
- The mains cable must not be taut when in use on the mains.
- The mains cable must be regularly checked as part of periodic statutory checks and maintenance operations.
- Charging must be carried out in an area where there is no condensation or pollution and where there is sufficient ventilation.
- The charger must not be exposed to oil, grease or other similar substances.
- Charging must be carried out with the truck stopped.
- The increase in the temperature of the unit in relation to the ambient temperature is 10°C maximum. The temperature of the expelled air is 25°C maximum.
- As the charger is cooled by forced ventilation, do not block the air inlets and outlets. There must be sufficient air circulation to the outside.
- Wait 10 minutes after stopping the charger before touching the unit.

The charger is designed:

Replacing

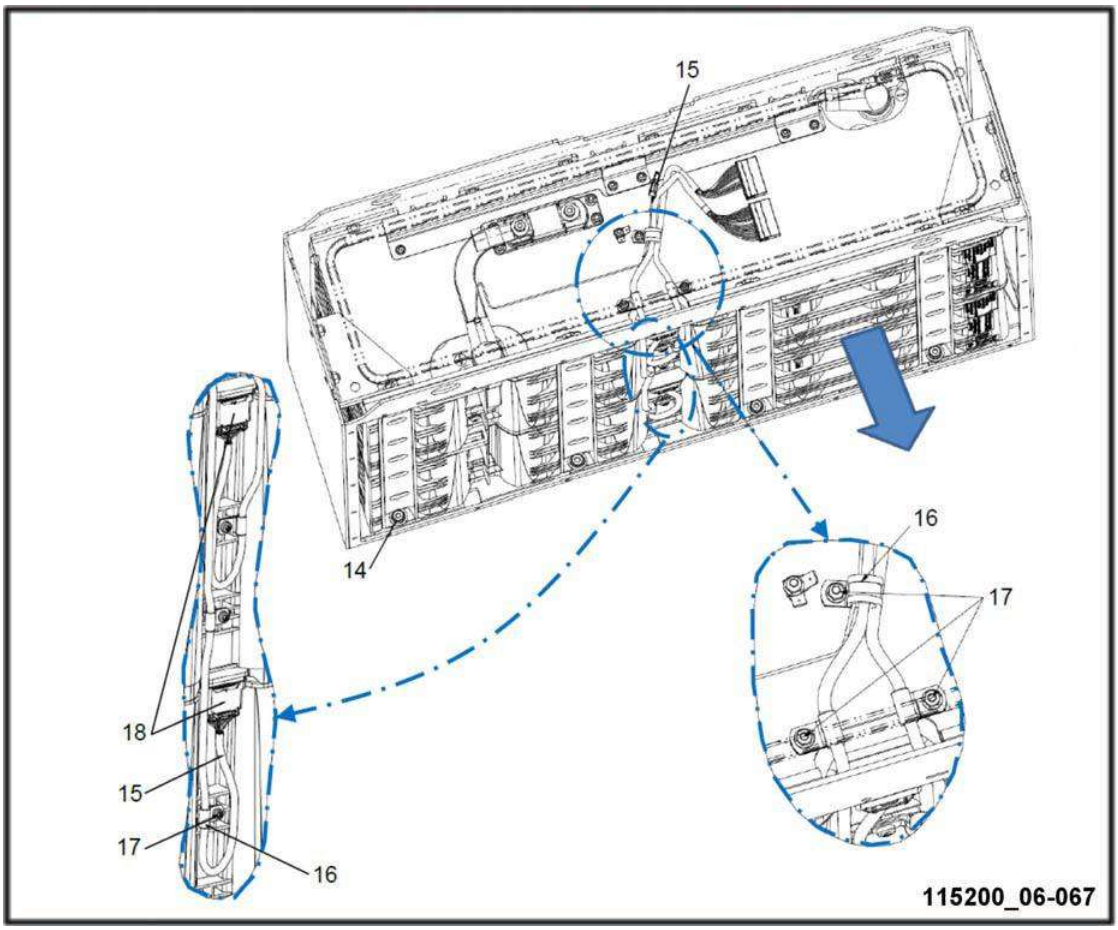


- Install the BMS (old or new) on the cover provided.
- Check whether the cover seal is damaged. Replace if necessary.
- Move the battery cover provided (2) closer.
- Locate and connect the earth cable (5) on the side of the cover provided.
- Remove the maintenance insulation cover from the negative power cable.
- Connect the negative power cable to the shunt (3). Connect it with the H M6 nut and with the spring washer and the flat washer (tightening torque: 5 Nm).

Refit the insulation protection.

- Remove the maintenance insulation cover from the positive power cable.
- Install the positive power cable for the contact switch provided (4) and the shoe located at the end of the harness from the contact switch. Then tighten the nut with the spring washer and the flat washer (tightening torque: 10 Nm).
- Connect the SMU harness connectors (6) to the BMS: push the release clip.
- Fit the battery cover provided (2).
- Fit the cover provided (2) with the four CBLX M6 screws (1) and with the spring washer and the flat washer (tightening torque: 10 Nm).
- If the battery is being stored, attach adhesive tape to the insulation covers on the power terminal block.

2) Removing the power pack:



– Remove the SMU harness (15).

- Unscrew the six retaining screws (17) on the retaining clamps of the SMU harness (16).
- Disconnect the two SMU harness connectors (18) from the modules.
- Remove the SMU harness (15).

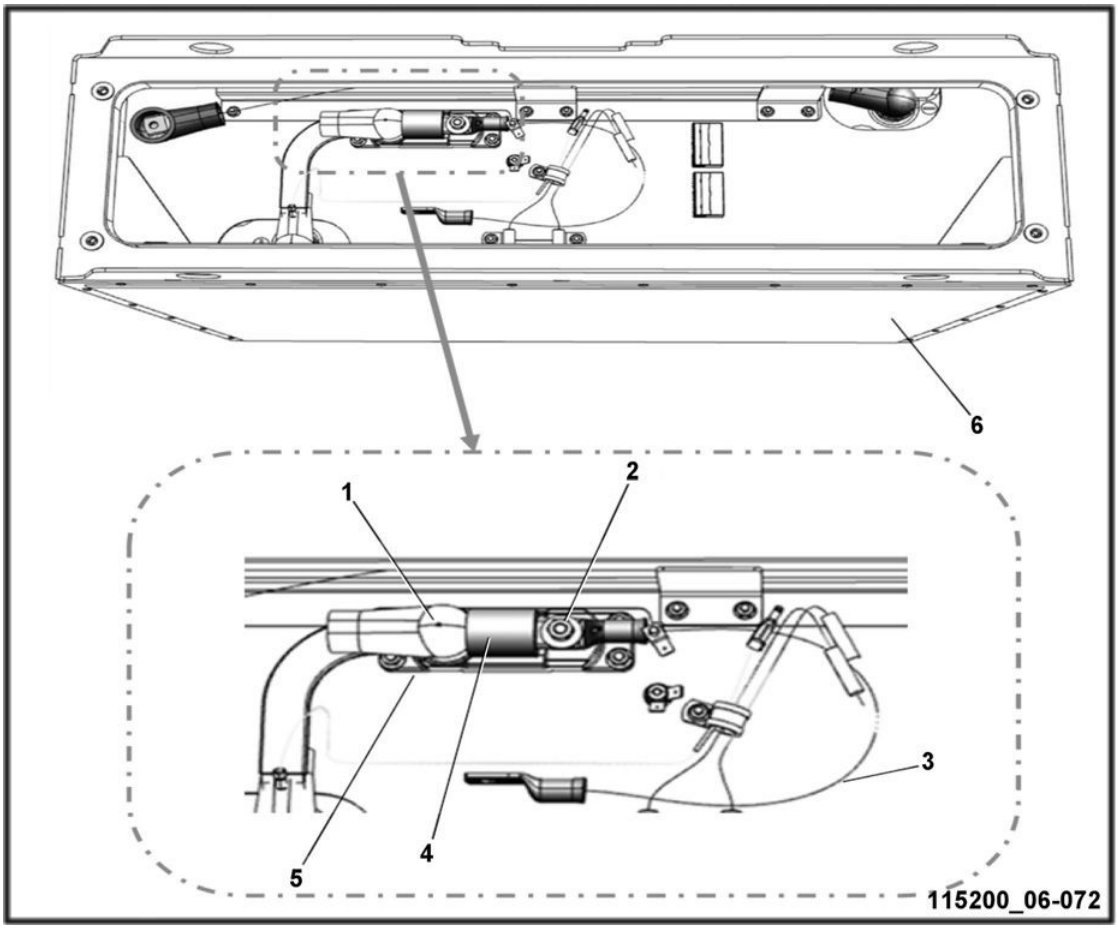
– Remove the four mounting screws from the power pack (14).

– Remove the power pack (19) (blue arrow).

NOTE

The power pack is heavy (96.5 kg).

Replacing the fuse



Removing

- Remove the protective cap (1).
- Unscrew the two CBLX M6 nuts (2) and remove the flat washers and the conical spring washers.
- Remove the fuse (5) from the fuse holder (4).
- Remove the hose connection (3).

Replacing

- Fit the hose connection (3).
- Fit the fuse (5) in the fuse holder (4).
- Fit the flat washers, the conical spring washers and the nuts (2).
- Tighten the two CBLX M6 nuts (tightening torque: **5 Nm**).
- Fit the protective cap (1).

NOTE

The solenoid valves are normally closed.

▼

Raise/Lower

▼

Lifting speed

To adjust the lifting speed, adjust the rotational speed of pump motor 2M1:

- Use [>] and [>>] to increase the lifting speed.
- Use [<] and [<<] to reduce the lifting speed.

NOTE

Lifting speed of the main lift as a %:

- *0% corresponds to a zero lifting speed (0 V at the terminals of motor 2M1).*
- *100% corresponds to the maximum lifting speed (+24 V at the terminals of motor 2M1).*

Adjusting the damping speed below 0.3 m from the ground

– Connect the "CAN box" to the diagnostic connector **6X7**.

– Connect the "CAN box" to the laptop socket.

– To adjust the damping speed, go to the following menu:

F3: Adjustment

▼

Hydraulics

▼

Raise/Lower

▼

Lower valve current < 0.3 m

To adjust the damping speed of the carriage at the lower stroke-end:

- Use [>] and [>>] to increase the lowering speed.
- Use [<] and [<<] to reduce the lowering speed.

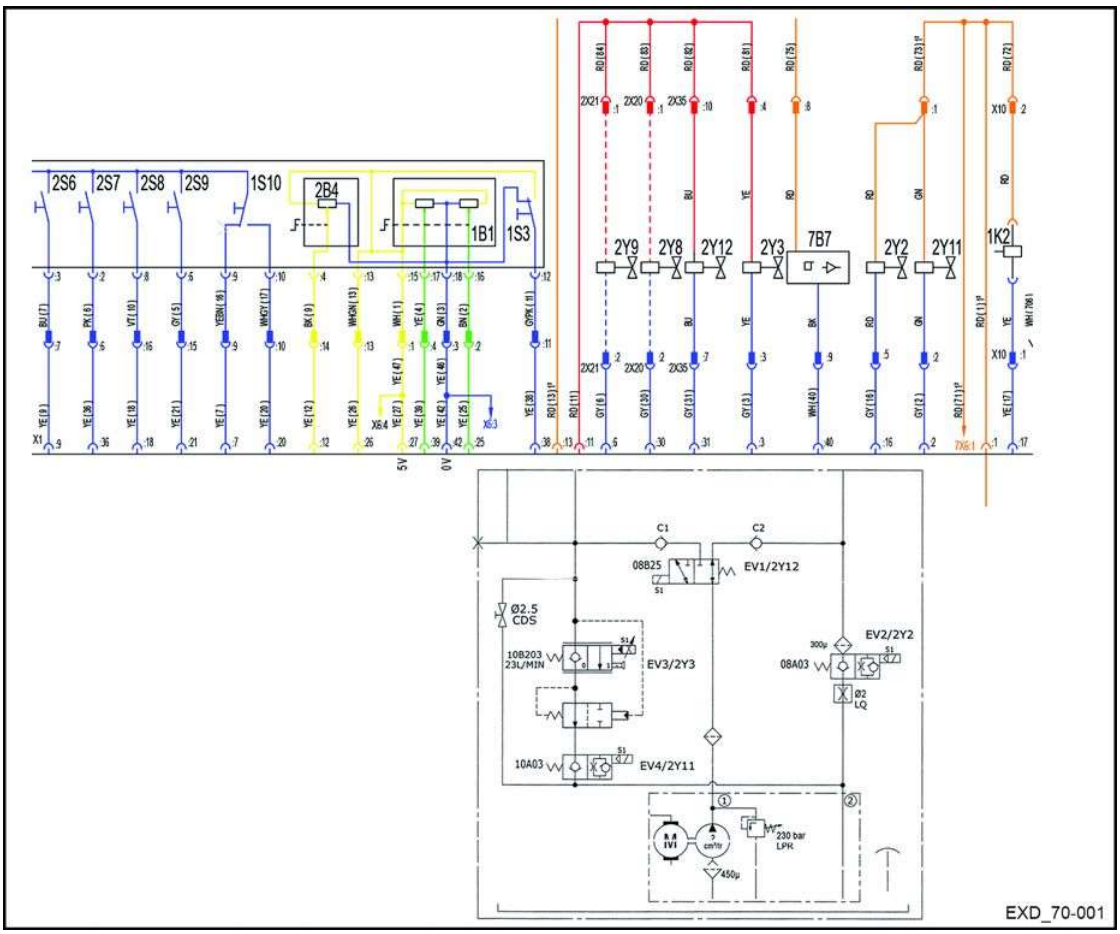
NOTE

*The damping speed varies depending on the aperture of the proportional solenoid valve **2Y3**:*

- *0 mA corresponds to a zero lowering speed (2Y3 closed).*
- *720 mA corresponds to the nominal lowering speed (2Y3 open).*

Adjustment values:

Operation of the pump-motor unit



The main lift and the initial lift are controlled from the controller (1A1).

The controller (1A1) enables precise control of the hydraulic lifting functions by acting directly on:

- The pump-motor unit (2M1)
- The "main lift" or "initial lift" needle solenoid valve (2Y12)
- The proportional solenoid valve (2Y3) to control mast lowering
- The load-retaining solenoid valve (2Y11), controlled simultaneously with (2Y3) when lowering the mast
- The initial lift lowering solenoid valve (2Y2)