Service Manual

For the

ERIDE 30

For models starting with serial
GERIDE3000001 and following

Training
Troubleshooting
Adjustments

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Attention:

All work on the vehicle may only be completed after disconnection of the power supply (disconnect the battery plug) with the exception of the current and voltage measurements.

When changing high current fuses, only loosen the screws. Never unscrew the screws completely, otherwise there is a risk of short circuit.
Insert the new high current fuses fully, i.e. evenly under the screws.

Following repairs, the starting current and operating current must be measured in order to discover any potential faults.

The legally binding, generally applicable safety and accident prevention regulations must be observed when performing any work on the vehicles.

2. General Information

•The ERIDE30 is equipped with a service indicator in the operating hour counter display. After switching the key switch on, a four-character code appears for approx. 3 seconds in the display which indicates the software version (e.g. 1.001), possibly another four-character code which indicates the last fault which has occurred followed by the operating hour counter.

•As soon as a fault occurs, the open-ended wrench lights up in the display and the machine beeps. The current diagnostic code (four-character alphanumeric code in the service indicator) appears with flashing points between the characters. Only when these criteria are fulfilled is the error currently pending!

•There is no diagnostic code which contains a "ZERO".

2.1 Settings

•The relevant settings can be defined in the machine's Configuration menu. The diagnostics connector with order number PN 03006790 is required in order to define these settings.
•The settings to be defined include:

- Machine type / Cleaning unit
- TSG (total discharge signal transducer) / Battery type
- Options
- Deletion of the display of the last error on completion of repairs
- Programmable program versions (PPV)
- Fixed program versions (FPV), cleaning programs

2.2 Short Description

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•The vehicle is controlled by means of the following electronics:
- Central electronics system (A1)
- Operating and indicator panel (A2)
- Drive control (A4)

•The control electronics (A1) assumes all the control and monitoring tasks in the vehicle except for the driving functions.
•No special diagnostic code appears in the display should a drive control error occur because the drive control is provided with a separate diagnostics display (blink code via the LED on the drive control) (see Chapter 9).

•It is possible to switch between the buttons controlling scrubbing and vacuuming and the green Hakomatic button for combined cleaning as required so that the function selected at any moment is activated. On pressing the "Boost" button, the brush pressure is increased and the water quantity is set to its maximum level for 1 minute.
•The hand-operated tool can only be used when the parking brake is applied.

2.2.1 Deactivating Vacuuming / Dirty Water Tank Full

•Vacuuming is switched off manually by the operator using the corresponding button or automatically when the “Dirty water tank full” signal is received in order to protect the suction turbines.

•Deactivation by the operator:

- Squeegee is raised
- Suction motor switches off after a delay (15 second)

•Deactivation due to full tank:

- The “Dirty water tank full” switch opens as soon as the tank is full
- If the switch remains open longer than 3 seconds (splashing protection), the squeegee is raised and the suction motor is switched off after a delay (15 seconds).

2.2.2 Home Position of the Machine

•After switching the machine on, all the components are set to their "home position" when the seat contact switch is actuated (closed).

•The lifting elements are raised as long as they have not been switched off by the micros witch monitoring the top end position integrated in the lifting element.

•The motors are switched off and the LED indicators in the cleaning component operating panel go out.

•The lifting unit for the brush head has an integrated position detector controlled via a potentiometer.

•When disassembled, the spindle of the lift element must not be turned, otherwise the positioning of the lift elements is adjusted.

2.2.3 Seat Contact Switch

•The seat contact switch is connected to the control electronics A1 at A1:X9.8+18.

•The control electronics (A1) reacts to the opening of the seat contact switch with a 2-second delay. This means: if the contact is opened for longer than 2 seconds during operation, the motors stop and the brush head and squeegee are raised.

•If the switch is closed again within the 2 seconds, the machine continues to operate without any interruption.

•If an attempt is made to switch the machine on without the seat contact switch being closed or the switch is open for longer than 2 seconds, all the machine's functions (driving and clean) are inhibited.

•If the seat contact switch remains closed for longer than 6 hours without an interruption, all the machine's functions are deactivated. The service code 3.6.6.4. appears in the operating hour counter. It is only possible to drive at this point. If the key switch is switched off and on again without the seat contact switch being opened, the driving function is deactivated too.

2.2.3 Seat Contact Switch

•The drive control is provided with its own diagnosis and self-test.

•Therefore, the function of the drive control is inhibited when the machine is switched on if the drive potentiometer is not in its neutral position or is not detected as being in neutral.

•The same occurs after the seat contact switch has been opened and is closed again. Even when the seat contact switch is closed, the drive potentiometer must be in neutral, or rather: detected as being in neutral by the drive control.

•If the drive control detects the drive potentiometer as not being in neutral, it initiates flashing signals (LED) on the drive control.

•The ERIDE30 can be configured by means of the software and adapted to various options.

•The software is also used to adapt the machine to the various hardware (machine type, batteries - TSG).

•The modification of parameters not described in this manual could lead to machine malfunction. Therefore, the utmost care must be taken with all alterations to the configuration.

•**Introduction to the Configuration Menu**

•Proceed as follows to access the Configuration menu:

•First of all, plug the diagnostics connector 03006790 on connector A1.X3 of the control electronics (Fig. 2/2). This is necessary to be able to change and save parameters.

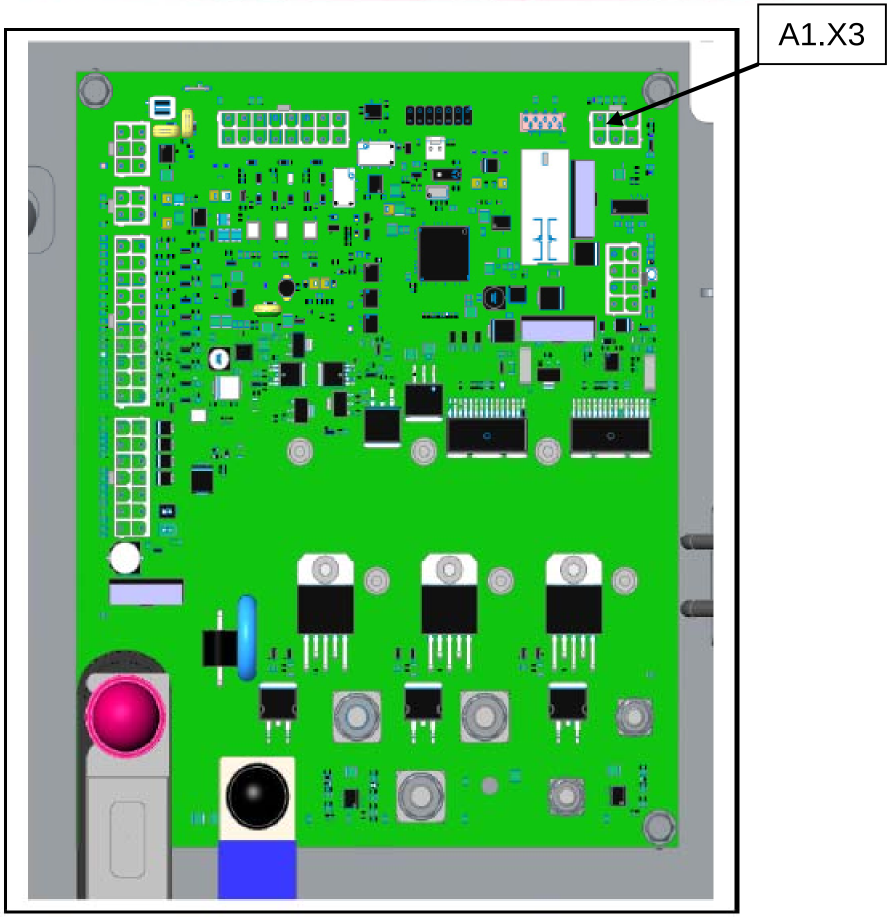


Fig. 2.2

2.2.4 Introduction to Programming

•Press and hold Buttons 1 and 2 simultaneously (Fig. 2.3) and switch on the key switch. The following display appears in the operating hour counter after approx. 3 seconds:

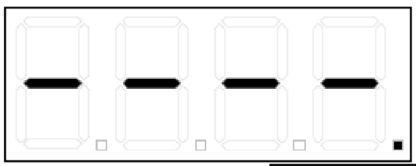


Fig. 2.1

•The start screen of the Configuration menu is now open.
Press Button 2 to access Chapter 0 of the Configuration menu.

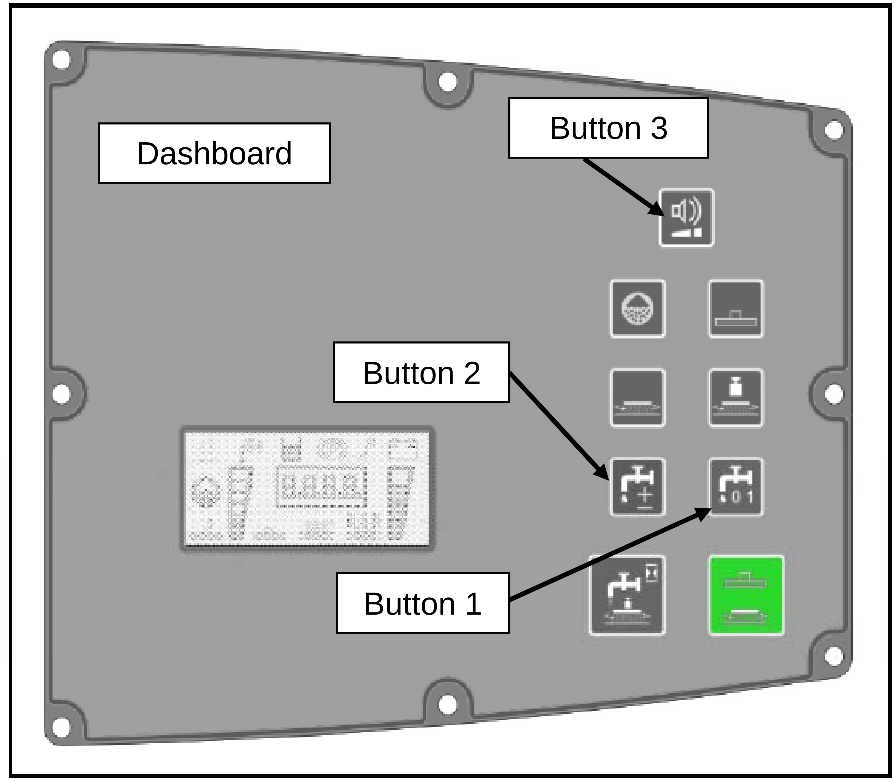


Fig. 2.3

2.2.4 Introduction to Programming

•You can navigate through the Configuration menu using the three 3 buttons indicated on the operating panel. Button 1 is the "Water on/off " button; Button 2 the "Water +-" button; Button 3 the "Silent Mode" button (Fig. 2/3).

•The Configuration menu is represented by 3 digits (Fig. 2/4) which describe the individual levels. The left-hand digit indicates the chapter, the middle digit the configuration and right-hand digit the content. The digit which is to the left of the flashing point is the one which is currently active (Chapter, Configuration or Content).

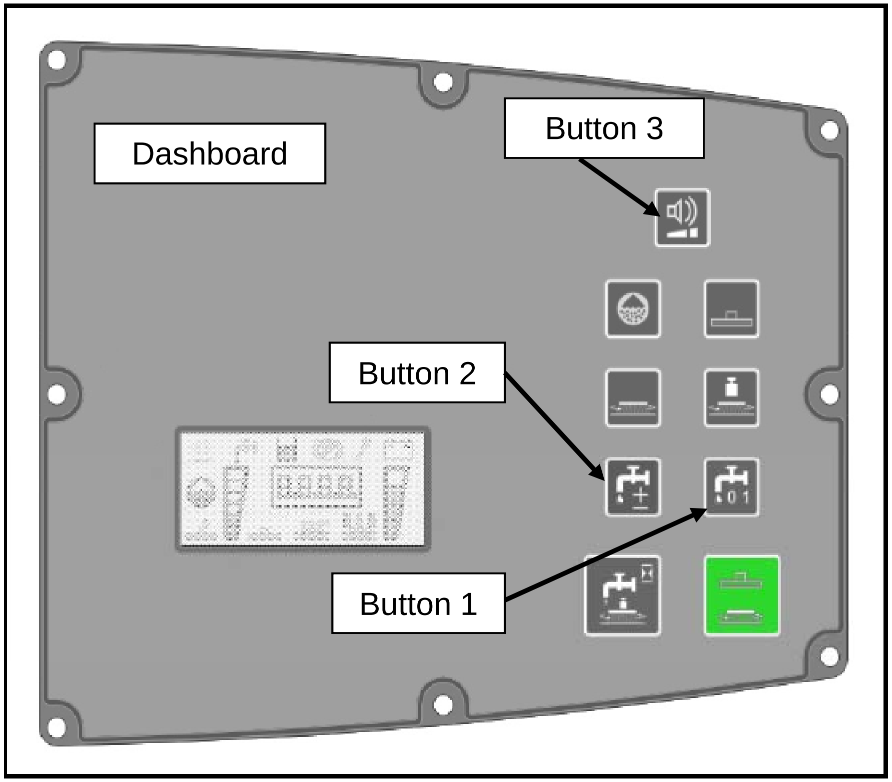


Fig. 2.3

2.2.4 Introduction to Programming

•Press Button 1 to change the active level:

- Chapter -> Configuration -> Content -> Chapter

•Press Button 2 to increase the value in the active level.

•After reaching the highest value, pressing again calls in the lowest value.

•Press and hold Button 3 for min. 3 seconds to save the Content setting selected, as long as the diagnostics connector is plugged into A1.X3.

•In the parameter tables, "d" always signifies default setting.

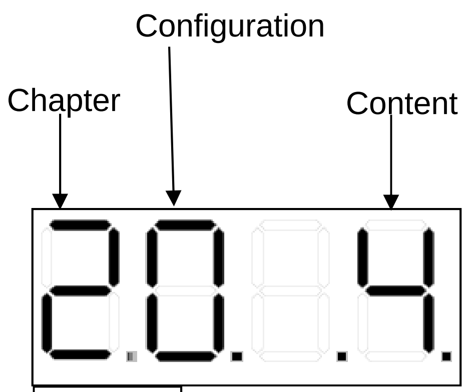
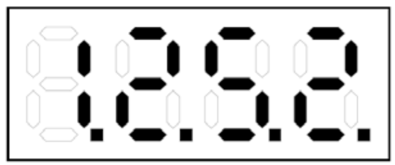


Fig. 2.4

2.2.5 Reset Last Error in the Start Screen

- Access the programming level as described in Chapter 2.2.4. Fig. 2.1 appears. The diagnostics connector must be connected to A1.X3.
- Press Button 2 six times, the last error which occurred is indicated in the display. e.g.



- Press and hold Button 3 for approx. 3 seconds until "0.0.0.0." appears in the display. Switch the machine off using the key switch and disconnect the diagnostics connector from A1.X3.

Technical Data:		
Working width	Inches	29.5
Effective suction width	Inches	37.4
Area performance up to	sq ft per hr	51,700
Working speed up to	mph	4
Voltage	24	24
Protection class (VDE 0700)		III
Air volume, Vacuum	cfm	70
Pressure, vacuum	Water Lift	68
Drive motor Watts	Watts	800
Brush motor watts	Watts	870
Vacuum motor watts	Watts	550
Number of brushes	Qty	2
Brush diameter	Inches	15
Brush RPMs	RPM	210
Brush pressure (Maximum)	Lbs	132
Solution tank capacity	Gallons	30.6
Recovery tank capacity	Gallons	30.6
Ramp climbing ability (% of incline)	%	10
Length with squeegee	Inches	65.5
Width with squeegee	Inches	37.5
Width without squeegee	Inches	31.5
Height	Inches	56.75
Turning circle in aisle	Inches	67
Weight, empty, without batteries	Lbs	749
Total weight with batteries and solution	Lbs	1325
Specific wheel pressure up to	Lbs per sq in	87

Noise emission value		
The sound power level (LwAd) measured according to EN 60335-2-72 under normal under working conditions is:	dB (A)	85
The sound pressure level (LpA) measured according to DIN EN 60335-2-72 (at the driver's ear) under normal working conditions is:	dB (A)	66
Measurement inaccuracy (KpA):	dB (A)	2
Vibration		
The weighted effective value of acceleration, measured in accordance with DIN EN ISO 5349, to which the upper parts of the body (hand-arm) are exposed under normal working conditions:	m/s^2	< 2.5

4. Maintenance Intervals

In a modular structure, the System Maintenance determines the specific technical works to be executed and equally fixes the period between two maintenance cycles.
For each of the maintenances, the replaceable parts are determined as well.
Find further details described in the specific chapters.

System Maintenance K:
To be performed by the customer in accordance with the maintenance and care instructions contained in the operating instructions (daily or weekly). The driver/operator will be instructed upon delivery of the machine.

System Maintenance I: (every 250 hours of operation)
To be performed by qualified personnel of authorized service center in accordance with the machine-specific system maintenance including spare part kit.

System Maintenance II: (every 500 hours of operation)
To be performed by qualified personnel of authorized service center in accordance with the machine-specific system maintenance including spare part kit.

System Maintenance S: (every 1000 hours of operation, safety check)
To be performed by qualified personnel of authorised service center in accordance with the machine-specific system maintenance including spare part kit.
Execution of all safety-relevant inspections according to UVV-BGV-TÜV-VDE as prescribed by law.

4.1 System Maintenance K

The daily and weekly maintenance intervals must be performed by the customer/operator.

Activity	Interval	
	Daily	Weekly
Empty and clean the waste water tank	o	
Check the lid seal of the waste water tank; clean, if necessary	o	
Check the battery charge; recharge, if necessary	o	
Check the clean water filter; clean or change as necessary	o	
Fill the clean water tank and dose the chemicals	o	
Check the sealing strips on the squeegee; turn or change as necessary	o	
Check the deflector rubber of the side deflector, change as necessary	o	
Check the scrubbing quality of the brush head; clean the brushes, pad and pad holder if necessary		o
Check the suction power of the squeegee; clean or change the sealing strips as necessary		o
Check the suction hose between the squeegee and waste water tank is fitted firmly and for signs of damage		o
Check the brushes and water retaining ring are fitted firmly and for signs of wear, change as necessary		o
Test drive and function test		o

4.2 System Maintenance I

•The following maintenance work must be performed by an authorized Service Center.

Activity	**Interval**
	Every 250 operating hours
Check the battery acid level and acid density; top up distilled water (PzS version), if necessary	**o**
Check the charger (ventilation grid and air channel)	**o**
Grease the steering pinion and gear rim	**o**
Check the functionality of the brake and parking brake lock	**o**
Check the brush head; change worn parts as necessary	**o**
Check the clean water system; change worn parts as necessary	**o**
Check the waste water and vacuum system; change worn parts as necessary	**o**
Clean the brush motor ventilation grid of fluff and dirt	**o**
Check the squeegee connection and rollers, adjust as necessary	**o**
Check the front safety bar with deflection roller	**o**
Check the wheel mounting bolts; retighten, if necessary (42 Nm)	**o**
Check the electrical system; change worn parts as necessary	**o**
Check the visual appearance of the vehicle (color, corrosion and labels)	**o**
Test drive and function test	**o**

4.3 System Maintenance II

The following maintenance work must be performed by an authorized Service Center.

Activity	Interval Every 500 operating hours
All maintenance work in accordance with Hako system maintenance I	o
Read out the error memory and evaluate the error messages	o
Check the brake disk and brake blocks; change, if necessary	o
Check the electric power (hydraulic motor, brush motor and suction turbine)	o
Change the backup battery and set the real-time clock	o
Check the visual appearance of the vehicle (color, corrosion and labels)	o
Test drive and function test	o

4.4 System Maintenance S (Safety Check)

The following maintenance work must be performed by an authorized Service Center.

Activity	Interval
	Every 1000 operating hours
All maintenance work in accordance with Hako system maintenance II	o
Clean carbon dust from the drive motor and check the carbon brushes move easily and for signs of wear; change the carbon brushes, if necessary	o
Clean carbon dust from the brush motors and check the carbon brushes move easily and for signs of wear; change the carbon brushes, if necessary	o
Test drive and function test	o

5. Cleaning Programs (FPV)

The cleaning programs define the behavior of the water supply to the brushes, the brush motors in respect of the position of the drive direction switch, the drive potentiometer (forwards, neutral, reverse) and the squeegee.

The drive direction switch S07 and drive potentiometer switch S08 provide a 24 V signal for forward drive at input A01.X10:4 and for reversing at input A01.X10:5.
If no voltage signal is applied, the cleaning units are not activated.

The reaction of the cleaning functions is described in Table 5.1.
To select a cleaning program, access the programming level as described in Chapter 2.2.4. The cleaning programs available are listed in Table 5.2.

To save any program changes, press Button 3 for min. 3 seconds. Then disconnect the diagnostics connector from A1.

5. Cleaning Programs (FPV)

Function	Contents								
	1	2	3	4	5	6	7	8	9
Brush off when drive control is in neutral	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Brush off when drive control is in reverse	No	No	Yes	No	No	Yes	No	Yes	No
Lift brush when drive control is in neutral	No	No	No	Yes	Yes	Yes	Yes	No	No
Lift brush when drive control is in reverse	No	No	No	No	No	Yes	No	No	No
Water off when drive control is in neutral	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Water off when drive control is in reverse	No	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Lift squeegee when drive control is in neutral	No	No	No	No	No	No	No	No	No
Lift squeegee when drive control is in reverse	No	Yes	No	Yes	No	No	Yes	Yes	Yes

Chart 5.1

Chapter	Configuration	Contents	Description	ER30
3	**0**		**FPV Set**	
3	0	1	Refer to FPV table	x
3	0	2	Refer to FPV table	d
3	0	3	Refer to FPV table	x
3	0	4	Refer to FPV table	x
3	0	5	Refer to FPV table	x
3	0	6	Refer to FPV table	x
3	0	7	Refer to FPV table	x
3	0	8	Refer to FPV table	x
3	0	9	Refer to FPV table	x

Chart 5.2

6.1 Basic Settings

6.1.1 Machine Type

There are various model types, equipment installed and working widths regarding the machines in the ERIDE30 series. These types can be set in the Configuration menu. To check and change the machine type setting, access programming level as described in Chapter 2.2.4. The parameters setting possible are stipulated in Table 6.1.

Note: When replacing the controller, the settings such as machine type and brush deck type may require changing.

Chapter	Configuration	Contents	Description	E30
0	**1**		**Machine Model**	
0	1	5	ERIDE30	d

Chart 6.1

6.1.2 Cleaning Units (Brush Deck)

Chapter	Configuration	Contents	Description	ERIDE 30
0	**2**		**Cleaning Units (Brush Deck Type)**	
0	2	2	Disk brush 750 mm (30")	d

Chart 6.2

6.1.3 Battery Setting (TSG - total discharge signal transducer)

In order to achieve the optimum operating time for the machine with the batteries installed and optimum service life of the batteries, it is essential to set the battery monitor, referred to as TSG, to the correct discharge curve.
Batteries of different construction are available which differ according to their discharge parameters.
To check and change the machine type setting, access programming level as described in Chapter 2.2.4. The parameters setting possible are stipulated in Table 6.3.

6.1.3 Battery Setting (TSG - total discharge signal transducer)

Battery Types

•GiS and GiV are flat plate batteries,

•PzS and PzV are tube plate batteries

•GiV and PzV are sealed, absolutely
•maintenance-free gel batteries

•GiS and PzS are sealed, low-maintenance batteries with liquid electrolyte.
•AGM batteries are wrapping electrodes with fiberglass separators.
•In the case of block batteries, the following designations are used:
•GiS = FF
•GiV = GF-Y; GF-V
•PzS = FT

•Trough batteries of the following type are available:
•EPzS and EPzV

6.1.3 Battery Setting (TSG - total discharge signal transducer)

0	**3**		**Battery Setting**	
0	3	0	Crown without offset **(Lonest battery life - shorter run)**	x
0	3	1	Crown with offset **(Default setting - Longest Run Time)**	x
0	3	2	GIS, = "USA" Flat Plate Wet Lead Acid	x
0	3	3	GIS = "Foreign" Flat Plate	x
0	3	4	PzS, = "USA" Tube Type	x
0	3	5	PzS = Sealed Liquid Tube Type	x
0	3	6	GiV = Sealed Flat Plate (AGM & GEL)	d
0	3	7	PzV = Sealed Tube Type	x
0	3	8	Hoppeke AGM with offset	x

Chart 6.3

6.1.4 TSG

•This adjustment is necessary so that the TSG can operate correctly.

•To check and change the machine type setting, access programming level as described in Chapter 2.2.4. The parameters setting possible are stipulated in Table 6.4.

6.2 Settings On Customer Request

- The programmable program versions can be used to complete various settings on the machines.
- E.g. it is possible to program whether the last error which occurred on the machine should be displayed or not when the machine is switched on again.

6.2 Settings On Customer Request

Chapter	Configuration	Contents	Description	ERIDE 30
2	**0**		**"Last error" indicator after switching on the machine**	
2	0	0	Deactivate	x
2	0	1	Activate	d
2	**1**		**Water level when switching on scrubbing**	
2	1	0	Last setting	d
2	1	1	Preset level (4)	x

Chart 6.5/1

6.2 Settings On Customer Request

Chapter	Configuration	Contents	Description	ERIDE 30
2	**2**		**Water level when switching on scrubbing and vacuuming**	
2	2	0	Last setting	d
2	2	1	Preset level	x

Chart 6.5/2

6.2 Settings On Customer Request

Chapter	Configuration	Contents	Description	ERIDE 30
2	**6**		**Water Setting**	
2	6	0	From last level to first level (in circuit)	d
2	6	1	Change direction on reaching max./min. level (ping-pong)	x

Chart 6.5/3

7.1 Squeegee

1 Squeegee
2 Star-shaped knob
3 Screw for angle adjustment
4 Suction hose
5 Fastening device
6 Washers for height adjustment

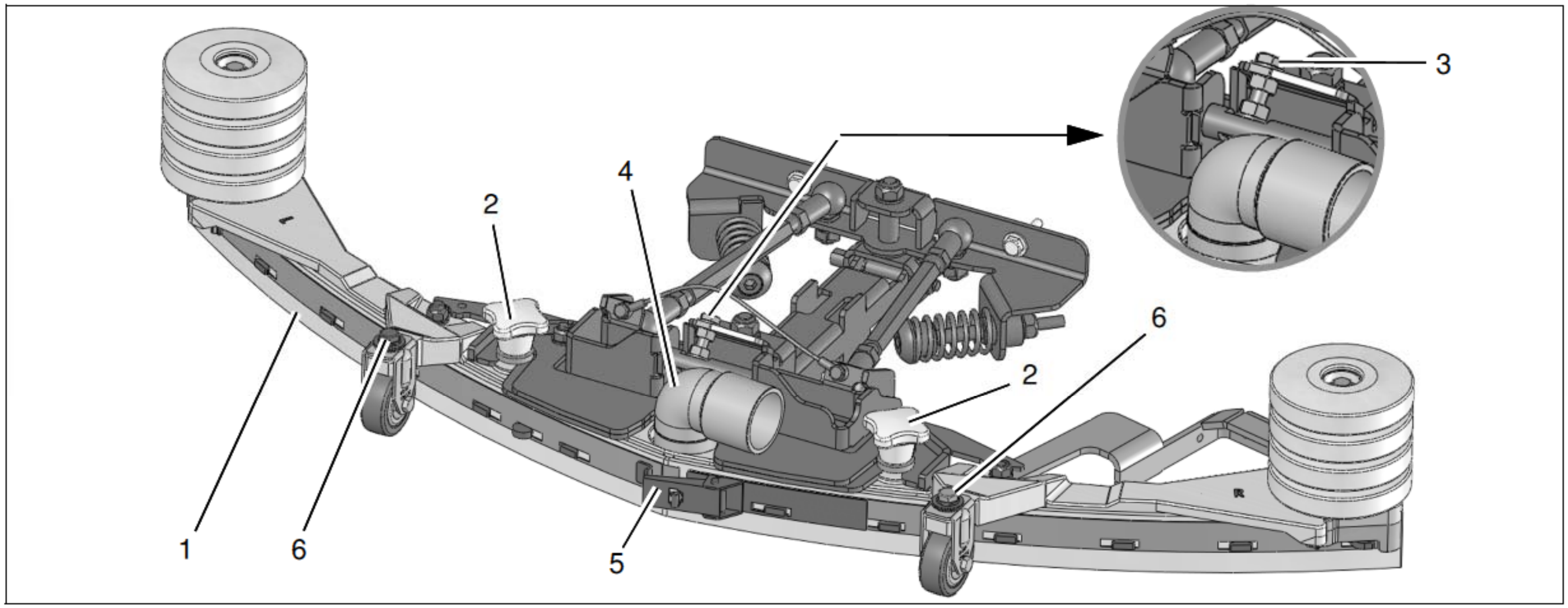


Fig. 7.1

7.1 Squeegee

Adjustment of the squeegee assembly.
The angle/pitch adjustment is the decisive factor in ensuring the assembly squeegee blades lie evenly on the floor.
1. Park the machine on a level surface and lower the squeegee.
2. Loosen the counter nut on the screw (Fig. 7.1/3) and use the counter nut to adjust the squeegee so that the ends of the sealing strips just make contact with the floor.
Fig. A (Fig. 7.2)
Turn the counter nut counterclockwise: Distance from sealing strip to floor is reduced in the middle.
Fig. B (Fig. 7.2)
Turn the counter nut clockwise: Distance from sealing strip to floor is increased in the middle.
3. Switch the vehicle on and check the suction pattern. While driving, the sealing strips must make a full, even contact with the floor (in the center and at both ends).
4. Tighten the counter nut of the adjusting bolt at 7 Nm (8.85 in lbs).

7.1 Squeegee

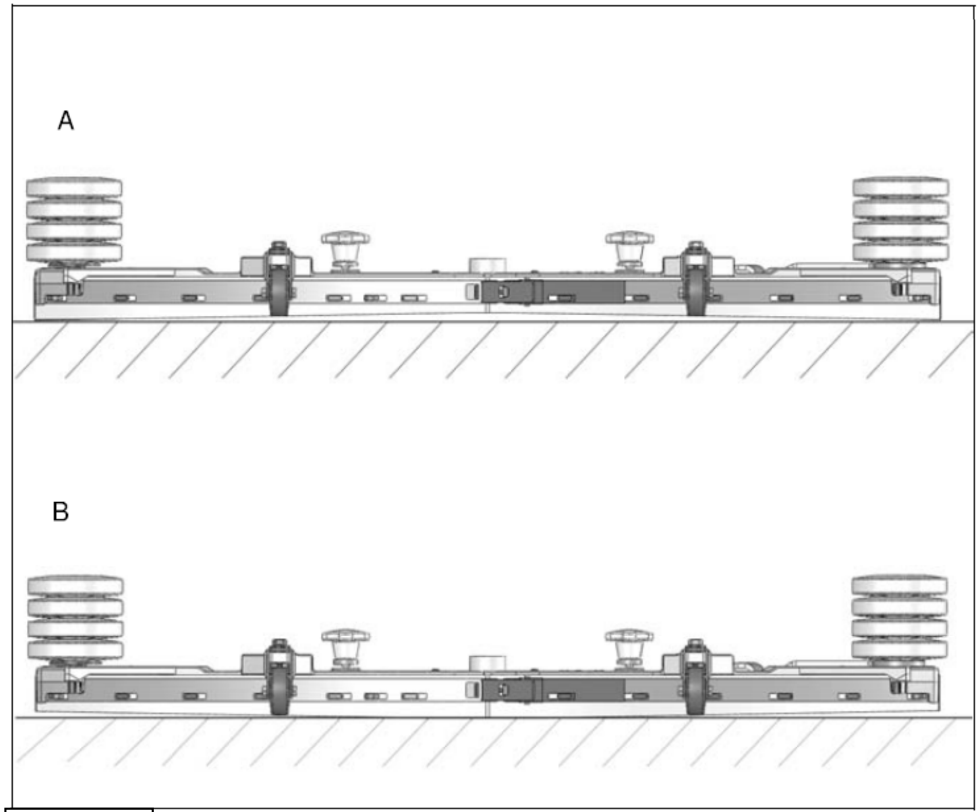


Fig. 7.2

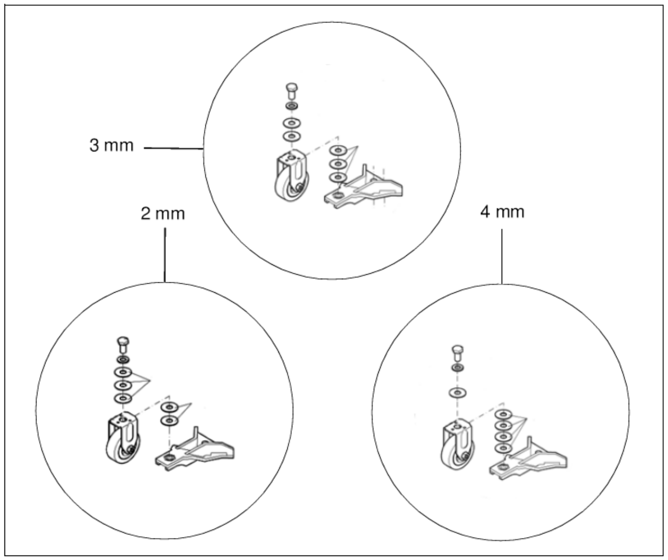


Fig. 7.3

7.1 Squeegee

Height adjustment

The height adjustment is set to 3 mm at the factory. If, despite an optimum angle adjustment, streaks are produced, the distance between the rollers and floor must be adjusted by altering the number of washers (Fig. 7.1/6 / Fig. 7.3) on the holder.
In the case of very smooth floors, e.g. coated screed, PVC, linoleum etc., the number of washers = 2.
This corresponds to a distance of approx. 2 mm to the floor.
In the case of very uneven floors, e.g. badly laid tiles (puddles form), the number of washers = 4.
This corresponds to a distance of approx. 4 mm to the floor.

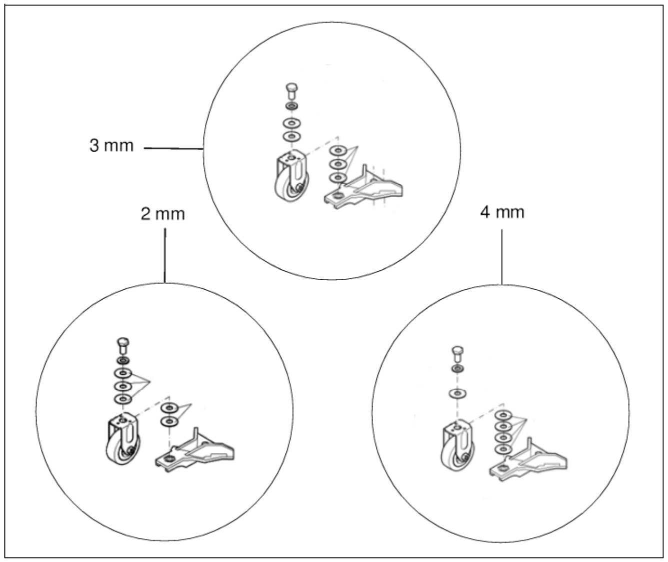


Fig. 7.3

7.1 Squeegee

Squeegee connection

The drawing (Fig 7.4) specifies the dimensions for adjusting of the suspension springs (60 mm) 2.36" and the threaded rods for adjusting the parallel alignment (151 mm) 5.94" of the squeegee connection.

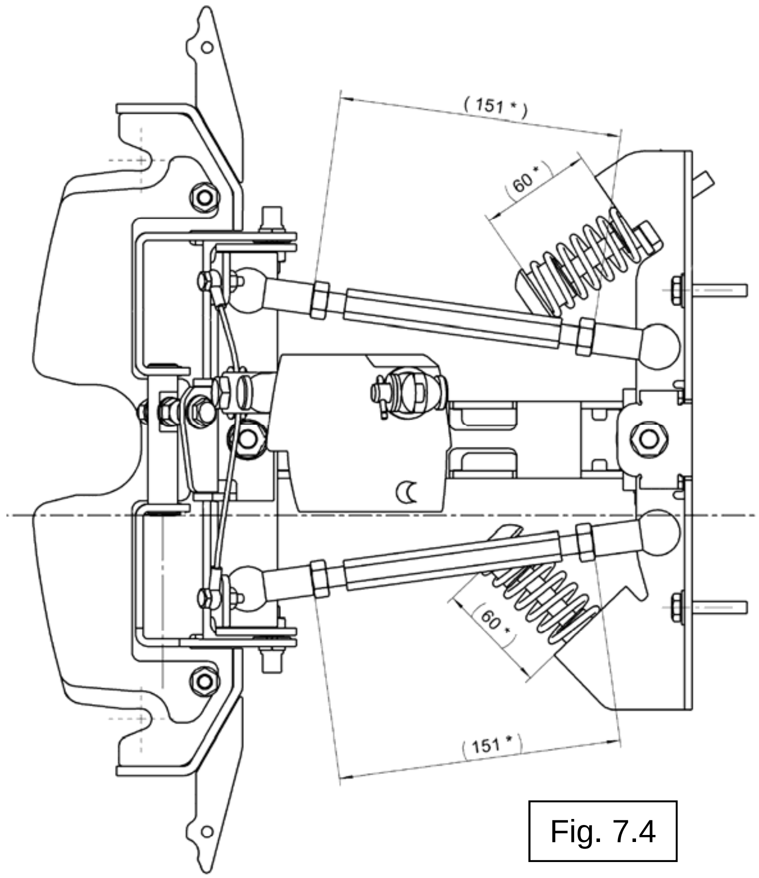
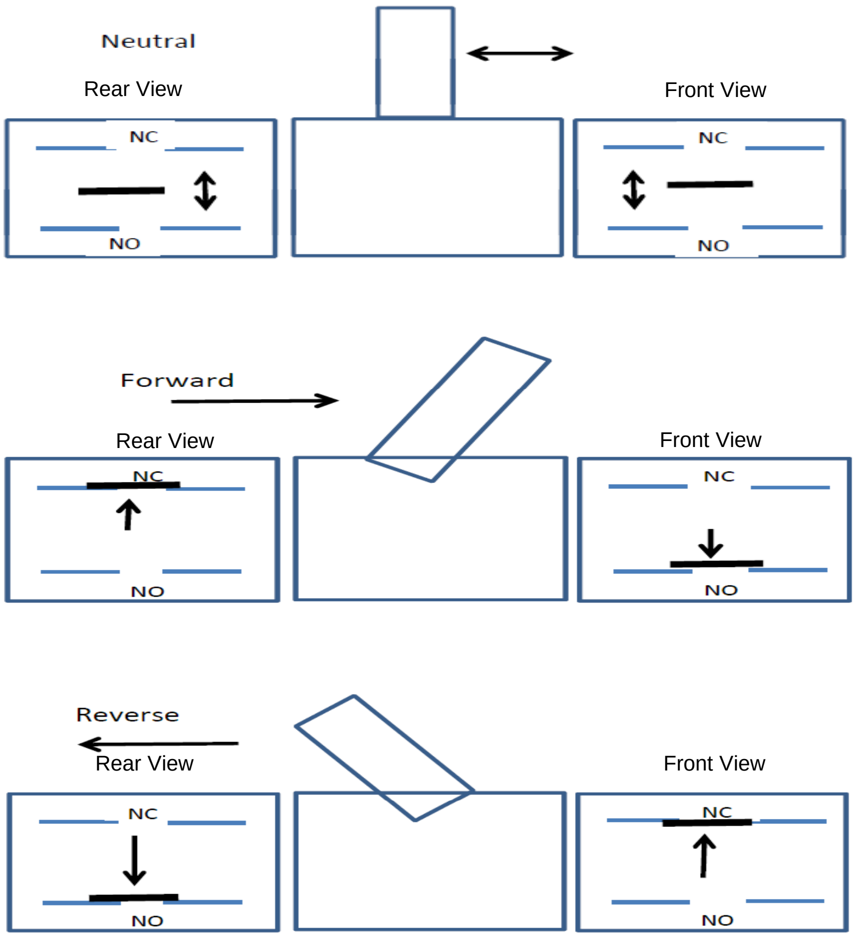


Fig. 7.4

7.2 Forward and Reverse Switch Function

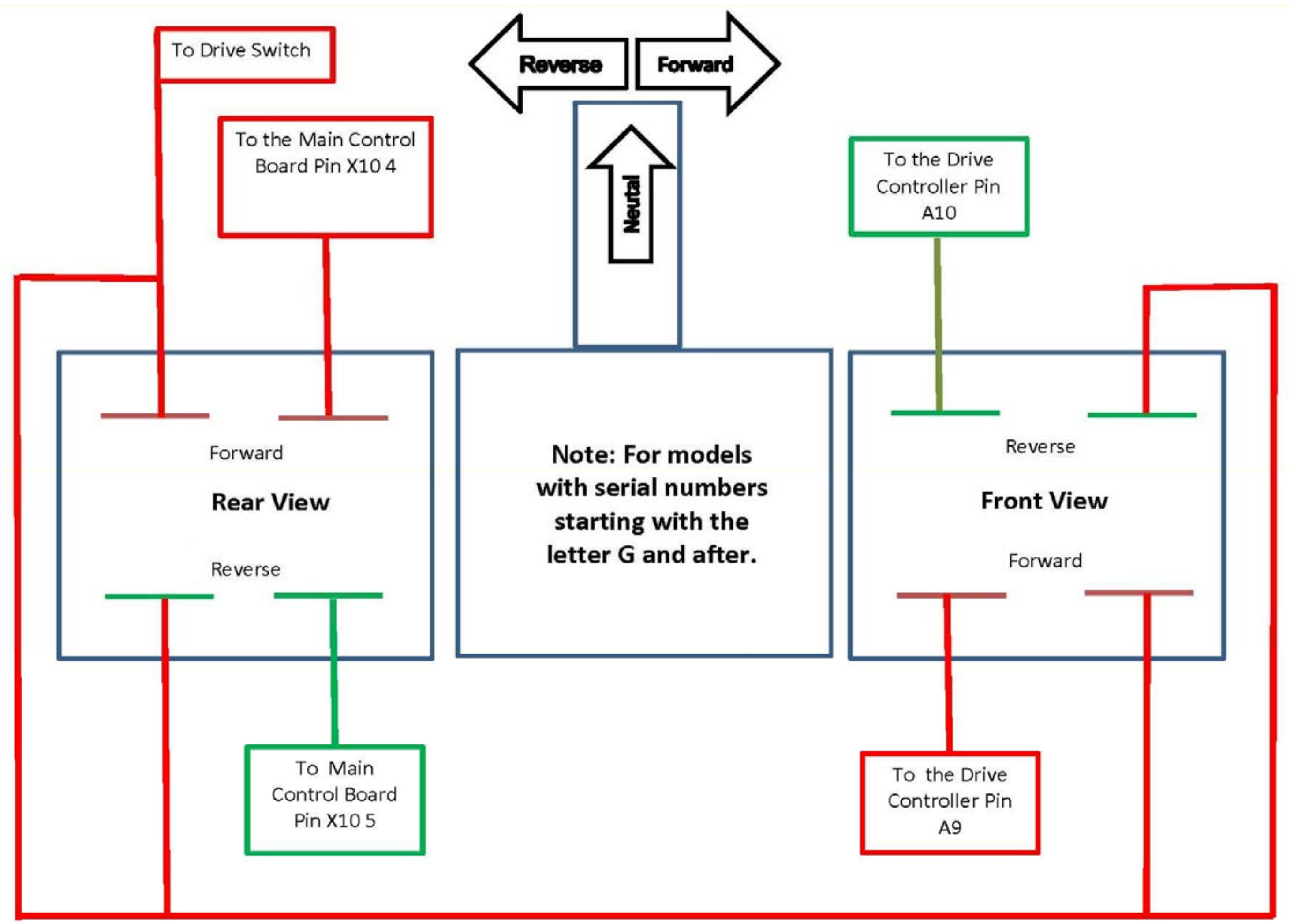
The pictures below show the mechanical function of the switch



The front view of the switch is shown in the picture.
The are 4 terminals on each side.

7.2 Forward and Reverse Switch

The pictures below show the wiring of the switch



7.3 Brush Head Lifting Unit

1 EM Lifting Attachment

When delivered, the lifting unit (Fig. 1/1) is extended 350 mm.
The cable ties (Fig. 1/2) serve as anti-twist devices for the piston rods!

⚠ Important assembly information!
The piston rod must not turn throughout the entire assembly.
The lifting unit may only be moved when installed.

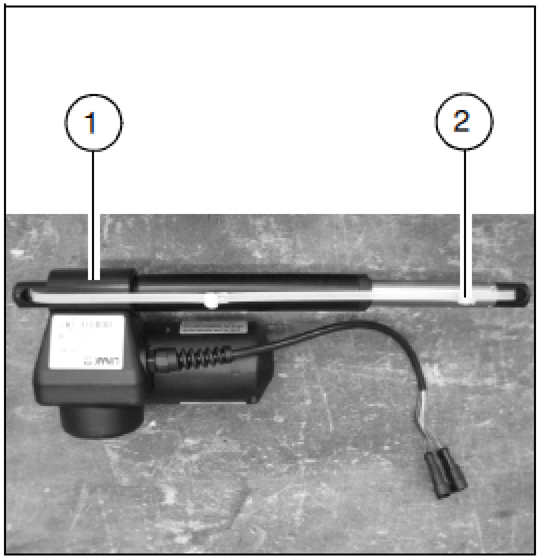


Fig.1

7.3 Brush Head Lifting Unit

1.1 Assembling the disk brush lifting unit

1. Lower the brush head by actuating the Cleaning button (operator must be seated on the seat in this case).
2. Switch the vehicle off using the key switch and disconnect the battery plug.
3. Disassemble the right-hand side deflector (viewing to the front).
4. Disconnect the cable contacts to the lifting unit.
5. Disassemble the cotter bolt (Fig. 2/1) from the brush head.
6. Disassemble the mounting support from the chassis and remove the lifting unit.
7. Release the anti-twist device from the new lifting unit.
8. Mount the lifting unit on the chassis and fix it in place.
9. Mount the brush head and fix it in place.
10. Connect the electrical connections.
11. Fix the cable to the rocker arm with the cable ties (the cable must not be crushed or be under strain when the brush head moves).

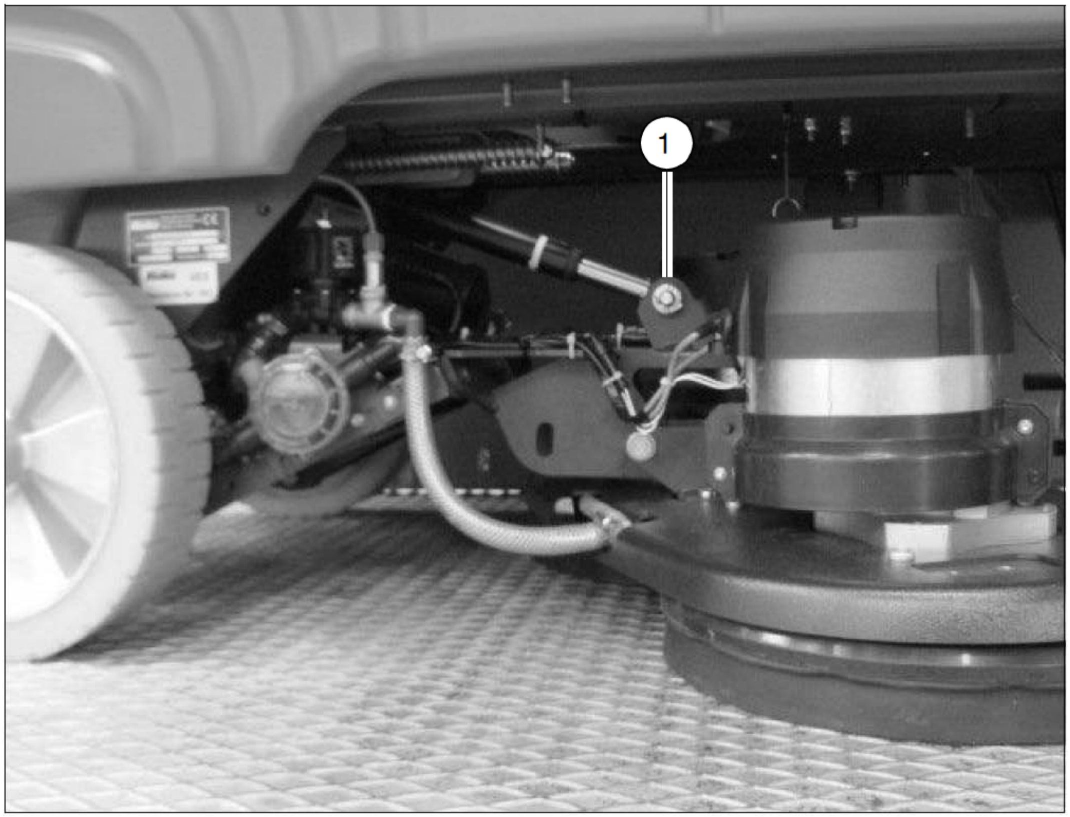


Fig.2

7.4 Potentiometer in the Brush Head Lifting Unit

The potentiometer of the lifting element is powered by a 2.5 V reference voltage at A1.X19:1. Reference point for this voltage is A1.X19:3. Depending on the position of the potentiometer, the voltage at A1.X19:2 is between 0 and 2.5V.

Measuring point :

A1.X19:1 – A1.X19:3	2.5V Reference Voltage
A1.X19:2 – A1.X19:3	0..2.5V 0...2.5V depending on the position of the lifting element

Possible faults :

A1.X19:1- A1.X19:3 less than 2.5V or 0V

Short circuit in the wiring or in the potentiometer. 0V indicates a a short circuit to ground. Voltage less than 2.5V indicates an overload of output A1.X19:1.

A1.X19:2 – A1.X19:3: permanent 0V

Interruption in the wire to A1.X19:1 or A1.X19:2, faulty lifting element

A1X19:2 – A1.X19:3: permanent 2.5V

Interruption in the wire to A1.X19:3, faulty lifting element

8. Water Pump

•To control the function of the water pump, the voltage for the individual levels can be disconnected at the central electronics unit (A1.X11:4+11). The following results are achieved when measuring with a True RMS measuring instrument and water in the tank but with the suction turbines switched off:

	Disk brush
Level 1:	Approx. 3.5 V
Level 2:	Approx. 4.2 V
Level 3:	Approx. 5.1 V
Level 4:	Approx. 7.6 V
Level 5:	Approx. 9.8 V
Level 6:	Approx. 15.2 V

•However, the measured values determined in the machines could deviate from the values achieved in practice. A more reliable method for controlling the water pump is to measure the water quantities actually fed.

8.1 Water Quantities

•Measuring the water quantities provides a good, reliable method with which to check the function of the water pump. Let the pump run and measure the volume of water fed per minute (l/min.). The data regarding the water quantities is specified as follows in the operating manual:

Step	1	2	3	4	5	6
Disk	1,0	1,6	2,0	2,4	3,6	5,2

Measurement in liters per min

•If power is applied to the pump but the water quantity does not correspond to the
•information, check whether the hoses are clogged or kinked, that the
•solenoid valve is open fully and the membranes of the valve plate in the pump are
•in order. The solenoid valve is connected to -A1.X11:3 + 10.

8.2 Water Pump Standstill Recognition

If the pump does not supply water to the brushes due to clogging of the hoses or lack of water, the standstill recognition is activated.

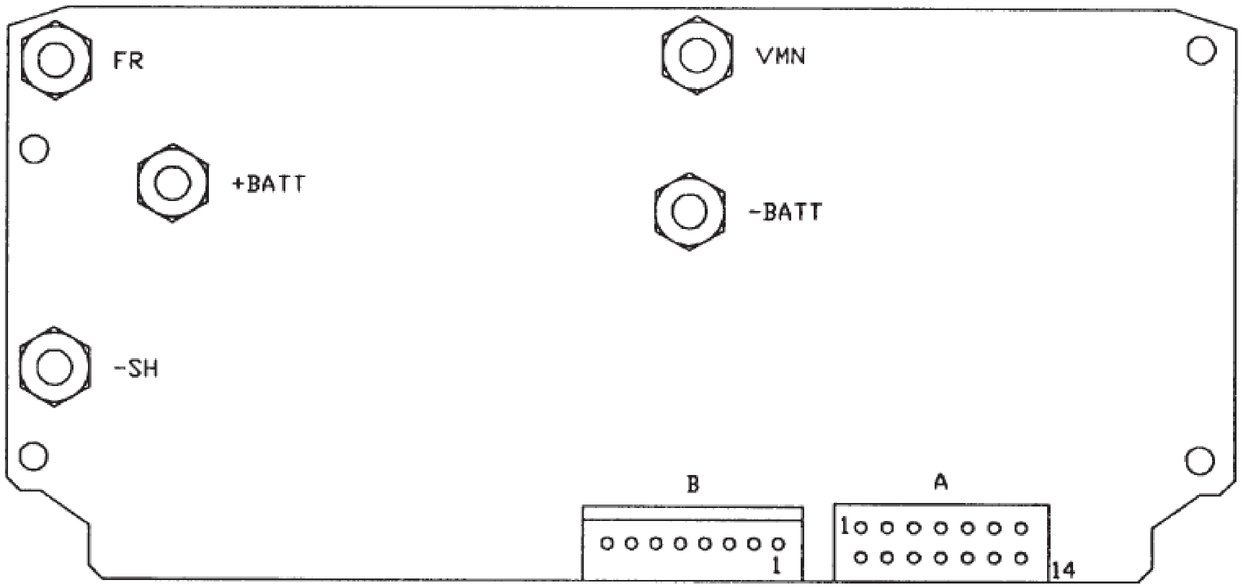
Automatic standstill recognition for water pump:

The electronic module allows protection of the water pump if the pump does not deliver correctly. This means if the pump takes in water from the tank and cannot deliver it to the brushes, a pressure builds at the pump. Without being protected by the electronic module the pump would deliver against this pressure and could be damaged.
The electronic module detects the blocked delivery and automatically switches the pump off for 2 seconds.
After this delay, the pump is briefly switched on again and it is simultaneously measured whether delivery of water to the brushes is free or blocked.
If delivery is as required, the pump remains ON in the selected stage. If the pressure still exists, the pump is switched off again for 2 seconds. This procedure is repeated until the error is remedied.

The ZAPI drive control unit is equipped with a diagnosis connector.

Any changes of the factory presetting values and parameters is forbidden.

Position of connectors



A = Connector for relay control and control inputs

B = Connector for diagnosis device and alarm LED

Connectors, Description of ZAPI Drive Control

A1	*RV1*	Speed reduction no 1 input; normally close contact toward battery positive: active when pin is free.
A2	*IRE*	Europe quick inversion input; normally open contact; active when pin is connected to battery positive.
A3	*MT*	Tiller or seat micro switches; normally open contact; running is permissible when the pin is connected to battery positive.
A4	*NT2*	Output for control toward forward contactor coil negative on auto stop configuration. Or output for electro-brake, by-pass, main contactor on standard configuration.
A5	*CH*	Key contact input, for chopper feeding.
A6	*IRZ*	Zapi quick inversion input, normally close contact toward battery positive: active function when pin is free.
A7	*RV2*	Speed reduction no 2 input; normally close contact toward battery positive: reduction is active when pin is free.
A8	*PT*	Positive contactors output; it provides positive for chopper's controls; decoupled from A5 input through a diode.
A9	*MA*	Forward running request input; normally open contact: request is active when contact is closed to battery positive.
A10	*MI*	Backward running request input; normally open contact: request is active when contact is closed to battery positive.
A11	*NT1*	Output for command to backward contactor coil negative on auto stop configuration; or running contactors common return on standard configuration.
A12	*NPOT*	Potentiometer negative:
A13	*CPOT*	Potentiometer central: range varies either from 0.6V to 10V
A14	*PPOT*	Potentiometer positive:; output potential is 13V while output impedance is 82ohm.

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•9.1 Automatic Monitoring of Components

- The micro-processor executes evaluation of basic controller functions.
- This evaluation concerns the following 4 states:
- Check upon switching on by key switch:
- Watchdog, current sensor, power MOS FETs, contactor drive (contactor driver), direction switch, potentiometer connections, EEPROM
- Check during standstill:
- Watchdog, current, power MOS FETs, contactor drive (contactor driver), potentiometer connections
- Check during ride:
- Watchdog, current, power MOS FETs, contactor drive (contactor driver), potentiometer connections, closing and opening of contactors
- Permanent monitoring:
- Temperature, battery voltage
- Eventual error messages are displayed via flashing LED at connector B (paragraph 2). Error type can be differentiated by number of flashes.

9.2 Diagnosis LED for Drive Module (ZAPI)

	Flash-Code	Message	Status*	Remark
1)	1	WATCH-DOG	A	Faulty electronic
2/3/4/5)	1	EEPROM	A	Faulty electronic (EEprom)
6)	2	INCORRECT START	B	Direction selected when switching on (or incorrect IR connection)
7)	3	VMN LOW	B	MOSFET short-circuited
8)	3	VMN HIGH	B	Diodes short-circuited or direction contactor stuck
9)	4	VACC NOT OK	B	Potentiometer defective
10)	5	I=0 EVER	A	No current detected during riding
11)	5	HIGH CURRENT	A	Current flow in rest state
12)	6	PEDAL WIRE KO	B	Potentiometer wiring defective
13)	7	TEMPERATURE	C	Temperature > 76°C
15)	8	DRIVER 1 KO	A	NT1 driver short-circuited
16)	8	DRIVER 1 SIC KO	A	Contactor coil short-circ. at NT1
17)	8	DRIVER 2 KO	A	NT2 driver short-circuited
18)	8	DRIVER 2 SIC KO	A	Contactor coil short-circ. at NT2
19)	8	DRIVER SHORTED	B	Driver short-circuited (NT1)
20)	8	CONTACTOR OPEN	B	Contactor does not close
21)	9	POSITION HANDLE	B	Handle micro-switch not actuated
22)	9	INVERSION	B	Deadman key (IR) actuated or incorrectly wired
23)	9	FORW.+BACKW.	B	Both directions simultaneously actuated
24)	permanent flash	BATTERY	C	Battery low
	*	A = switch off system, remedy and switch on again		
		B = remedy and actuate direction again		
		C = status display and eventually required measures controlled by software		

<u>9.3 Explanations of Error Messages</u>

•1) WATCH-DOG

•Test in rest position as well as during riding; internal auto-test function of hard- and software; replace controller in case of error alarm!

•2) EEPROM PAR. KO

•Error in the memory area containing the adjustment parameters. System switches off. Replace logic if error persists after switching key switch off and on! If alarm disappears mind the fact that the saved parameter values are deleted. (—> basic setting)

•3) EEPROM CONF. KO

•Error in the memory area containing the configuration data of the controller. Replace logic if error persists after switching key switch off and on! If alarm disappears mind the fact that the saved configuration is deleted. (—> basic setting)

- 4) EEPROM DATA KO
- Data in the memory area which controls the hour meter are faulty.
- If alarm disappears, after switching key switch off and on, mind the fact that the hour meter is reset to zero.
- 5) EEPROM OFF LINE
- Error in the non-volatile memory containing hour meter values, programmable parameters and saved alarms.
- Replace controller if error persists after switching key switch off and on!

- 6) INCORRECT START
- Incorrect sequence of start conditions. Depending on SAFETY SWITCH programming, system starts if the following sequence is respected:
- - key switch – handle micro-switch – direction switch (HANDLE)
- - key switch - direction switch(FREE)
- - key switch + seat contact switch - direction switch (SEAT)
- Possible causes:
- a) Direction or handle micro-switch stuck.
- b) Operator did not respect sequence.
- c) Incorrect wiring.

- If no external fault can be detected, replace controller!

- 7) VMN LOW
- Test in rest state and during ride until VMN is pulsed out to up to 80%;
- If contactors are open, voltage at VMN connection normally amounts to 50% VBatt. If this voltage value is insufficient (< 30% VBatt) an alarm is output. Possible causes:
- a) Master contactor (if fitted) does not close or is not connected at all
- b) Short-circuit between connection VMN and -Batt (metal particles or
- other.) (disconnect cable at connection VMN, switch on, error disappears)
- c) Power MOSFET short-circuited or permanently triggered by logic;
- (disconnect cable at connection VMN, switch on, error persists, replace
- controller)
- d) Bypass contactor (if fitted) stuck or opens too slowly

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- 8) VMN HIGH
- Test in rest state;
- If contactors are open, voltage at VMN connection normally amounts to 50% VBatt. If this voltage value is exceeded (> 70% VBatt), an alarm is output. Possible causes:
  - **a)** A direction contactor is permanently closed since mechanically blocked or permanently driven (incorrect wiring of contactor coil)
  - **b)** Short-circuit between field and armature winding of motor (disconnect cable at connection VMN, switch on, error disappears, repair motor)
  - **c)** Incorrect connection of motor cable (check field and armature winding)
  - **d)** Power circuit of controller defective (free wheeling or braking diodes short-circuited) (disconnect cable at connection VMN, switch on, error persists, replace controller)

9.3 Drive Control Unit ATECH / ZAPI

- 9) VACC NOT OK
- Test in rest state;
- Alarm is displayed if, referred to the saved minimum value, potentiometer voltage is higher than 1V.
- Possible causes:
- a) Wire broken at potentiometer or inductive sensor.
- b) Potentiometer or the inductive sensor is defective.

- 10) I=0 EVER
- Test during ride;
- If current does not exceed a determined minimum value during ride, an error message appears and the system switches off.
- Possible causes:
- a)Resistance of motor is excessive since motor is defective
- or contact of carbon brushes is not okay
- b)The current sensor is defective (replace controller)

•11) HIGH CURRENT
•Test in rest state – contactor open;
•If measured current is >50A, alarm is output and the system switches off. The current sensor is defective (replace controller!)

•12) PEDAL WIRE KO
•If no voltage is measured at pin NPOT (A12), to which the negative wire of the potentiometers is connected, an alarm is output.
•Possible causes:
- a) Wire rupture at pin PPOT (A14)
- b) Wire rupture at pin NPOT (A12)
- c) Potentiometer is defective (infinite resistance)
- d) Potentiometer resistance >47 kOhm

•13) TEMPERATURE

•This message signals that controller temperature has exceeded 76°C.

•Maximum current is reduced step by step to zero at a temperature of 86°C. Possible causes:

a) If the alarm is output immediately after system ON with cold controller, temperature monitoring is faulty (replace controller!)

b) If the alarm is output after relatively short period of operation, heat is insufficiently dissipated (check installation and fixing screws)

•14) NO FULL COND.

•Test during full ride;

•If during full ride, the voltage at connection VMN is > 1/3 VBatt, the diagnosis circuitry is faulty and the system switches off.

•If error persists, replace controller (logic unit).

- 15) DRIVER 1 KO
- If voltage at connection NT1 (A11) does not correspond to determined value, an alarm is output and the system switches off.
- Possible causes:
- a) Wire broken at connection NT1 (A11) or coil of reverse direction contactor is defective.

  b) The internal MOSFET driver is short-circuited (replace controller!)

- 16) DRIVER 1 SIC KO
- If current load at contactor driver controlling the output NT1 (A11) is excessive, an alarm is output and the system switches off.
- Possible causes:

  a) Short-circuit of the wire at connection NT1 (A11) to +Batt

- b) Coil of connected contactor short-circuited or current consumption > 5A

- 17) DRIVER 2 KO
- If voltage at connection NT2 (A4) does not correspond to determined value, an alarm is output and the system switches off.
- Possible causes:
- a) Wire broken at connection NT2 (A4) or coil of forward direction contactor is defective.
- B) The internal MOSFET driver is short-circuited (replace controller!)
- 18) DRIVER 2 SIC KO
- If current load at contactor driver controlling the output NT2 (A4) is excessive, an alarm is output and the system switches off.
- Possible causes:
- a) Short-circuit of the wire at connection NT2 (A4) to +Batt
- b) Coil of connected contactor short-circuited or current consumption > 5A

•19) DRIVER SHORTED (only H0 STANDARD TRACT.)

•If voltage at connection NT1 (A11) does not correspond to determined value, an alarm is output and the system switches off.

•Possible causes:

- a) Wire broken at connection NT1 (A11) or coil of forward or reverse direction contactor is defective.
- b) The internal MOSFET driver is short-circuited (replace controller!)

•20) CONTACTOR OPEN

•Test upon actuation of driving direction;

•It is checked whether the selected direction contactor closes by measuring the VMN value. If value is incorrect, an alarm is output.

•Proceed as follows to remedy:

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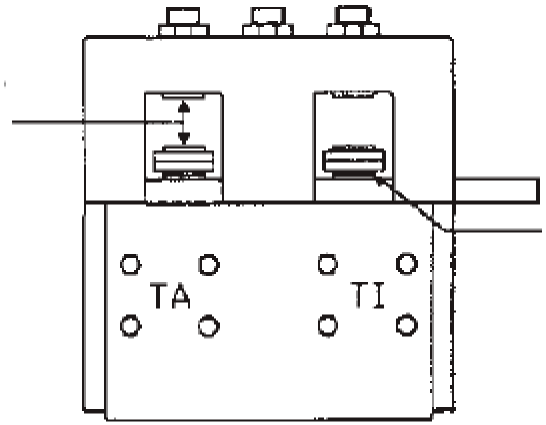
When does error occur?	First test	Result	Second test	Result	Error
In forward direction only	Forward direction contactor closes for 0.3 sec. before opening	yes	-->	-->	A1
		no	At the forward direction contactor, a voltage applies to the coil for 0.3 sec.	yes	B1
				no	C1
In reverse direction only	Reverse direction contactor closes for 0.3 sec. before opening	yes	-->	-->	A2
		no	At the reverse direction contactor, a voltage applies to the coil for 0.3 sec.	yes	B2
				no	C2
In both directions	Forward or reverse direction contactor (depending on selected direction) closes for 0.3 sec. before opening	yes	-->	-->	A3
		no	At the forward or reverse direction contactor (depending on selected direction), a voltage applies to the coil for 0.3 sec	yes	B3
				no	C3

A1 The make contact of the forward direction contactor (TA) or the break contact of the reverse direction contactor (TI) is soiled or blocked. Clean contacts or, if required, replace contactor group.

Clean the make contact of forward direction contactor (TA).



Clean the break contact of reverse direction contactor (TI).

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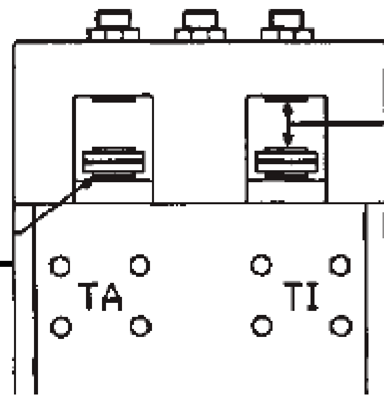
A2 The break contact of the forward direction contactor (TA) or the make contact of the reverse direction contactor (TI) is soiled or blocked. Clean contacts or, if required, replace contactor group.

Clean the break contact of forward direction contactor (TA).



Clean the make contact of reverse direction contactor (TI).

A3 No connection to motor:

- Carbon brushes without contact to collector (Fig. 1)
- Connection cable of carbon brushes interrupted (Fig. 2)
- Motor winding defective or motor cable interrupted
- Incorrect connection of motor

Fig. 1

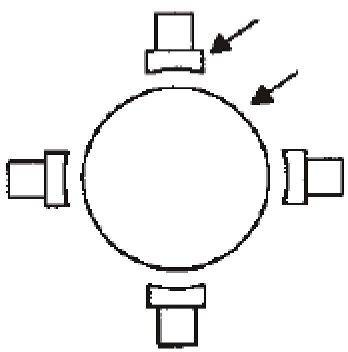
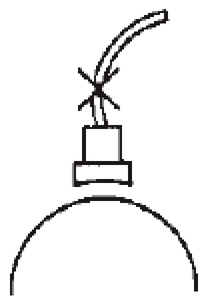


Fig. 2



B1 The forward direction contactor is correctly driven but does not close.
- Contactor coil is defective; use ohmmeter to measure resistance
- Contact is mechanically blocked
- Nominal voltage of contactor coil higher than battery voltage

B2 The reverse direction contactor is correctly driven but does not close.
- Contactor coil is defective; use ohmmeter to measure resistance
- Contact is mechanically blocked
- Nominal voltage of contactor coil higher than battery voltage

B3 The forward or reverse direction contactor is correctly driven but does not close.
- Contactor coils are defective; use ohmmeter to measure resistance
- Contacts are mechanically blocked
- Nominal voltage of contactor coils higher than battery voltage

C1 No voltage supply to coil of the forward direction contactor. Check connector and cable from contactor coil to positive supply and to pin A4 (NT2).

C2 No voltage supply to coil of the reverse direction contactor. Check connector and cable from contactor coil to positive supply and to pin A11 (NT1).

C3 No voltage supply to coils of the forward and reverse direction contactor. Check connector and cable from contactor coils to positive supply and to pins A4 (NT2) and A11 (NT1).

If no faults are detected for the items C1, C2, C3, replace logic.

21) POSITION HANDLE

If upon switching on, the handle micro-switch has already been actuated, error is signalled (only if SAFETY SWITCH is programmed to HANDLE). Possible causes:

a) Handle micro-switch stuck
b) Incorrect operation

22) INVERSION

If upon switching on, the emergency reverse (dead man) button is depressed, an alarm is output. Possible causes:

a) Micro-switch for emergency reverse stuck
b) Incorrect operation
c) Incorrect wiring or programming

23) FORW - BACK

An error is displayed if two directions are simultaneously active. Possible causes:

a) Wiring defective.
b) Direction micro-switch stuck. If none of the causes applies, replace logic!

24) BATTERY

Battery discharged i.e. battery voltage has fallen below 60% of nominal voltage. An alarm is output. The system switches off but can be re-started. Maximum current then will be reduced to 50% of programmed maximum current value.

10. Error Reference Chart with Information on Service Display

Error number / Message number	Error source	Comment
1.2.5.2.	Thermostatic switch, brush 1/2	Check temperature of brush motors; check power consumption of brush motors; check cabling of thermostatic switch (connector X3 and X4) of brush motors (series circuit). Inputs -A1.X9:1 and 11 power consumption per brush motor max. PB 650 - 30A; PB 750, PB 900, CB 700, CB 850 - 40A
1.2.6.1.	Blocking protection, brush 1/2	Do brush motors run smoothly? Check power consumption? (See 1.2.5.2.)
1.2.6.3.	Blocking protection, brush lifting element 1/2	Stiff? Brush head jammed?
1.4.6.1.	Blocking protection, squeegee lifting element	Stiff? Squeegee jammed?
1.4.6.3	Blocking protection, suction turbine	Short circuit at suction motor output -X14.1 / -X15.1

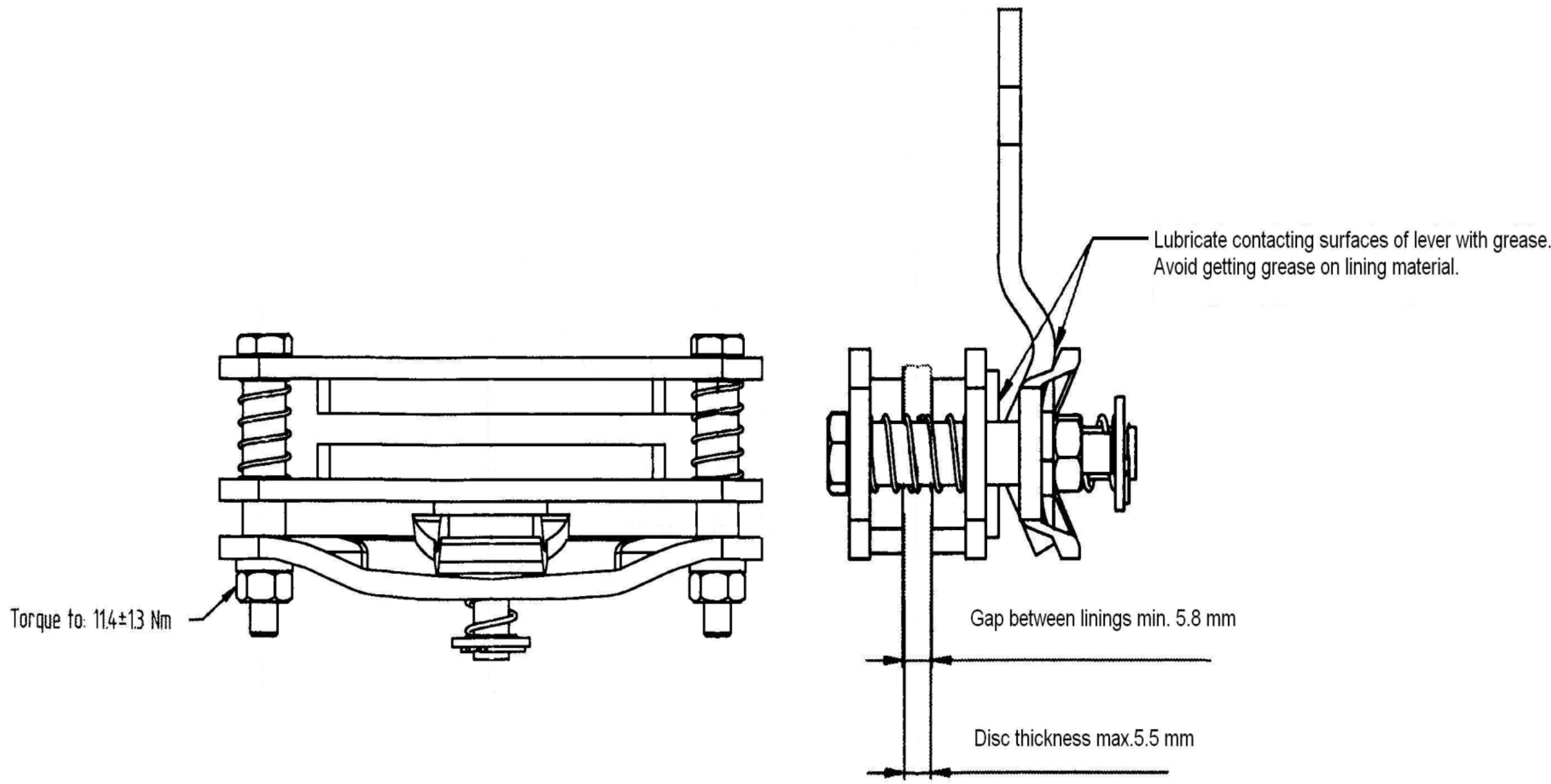
10. Error Reference Chart with Information on Service Display

Error number / Message number	Error source	Comment
3.1.6.E.	Power fuses (group signal)	Group signal, fuses -F02; -A01.F2
3.2.6.5.	Backup battery "weak"	Message appears after the "Last error" display and before the operating hour counter; remains 5 s or when working unit is ON
3.2.6.6.	Backup battery "empty"	Message appears after the "Last error" display and before the operating hour counter, remains until working unit is ON
3.3.1.1.	Service interval has expired	Message appears after the "Last error" display and before the operating hour counter; remains 5 s or when working unit is ON (If a service intervall was enabled - via PC based diagnosis)

Error number / Message number	Error source	Comment
3.3.6.2.	Group signal, low power outputs	Overload of small consumers (solenoid valve, buzzer)
3.4.1.1.	Drive rheostat	Check drive direction switch and cabling
3.4.5.1.	Drive motor overheated	Check thermostatic switch and cabling of drive motor, connector X10 input A1.X9:2 and 12
3.6.6.4.	Seat switch manipulation	The seat contact switch was closed longer than 6 hours. The working units are switched off; after the key switch has been set to "OFF" and "ON" again, also the drive control unit is blocked. To reset the message, a change of signal must occur at input -A01.X9:8 / 18.

Error number / Message number	Error source	Comment
4.5.2.5.	Operating panel not detected	Check connection cable for control unit (-A01) - operating panel (-A02). This error only occurs when switching the machine on
4.5.3.5.	Operating panel response missing (timeout)	Check connection cable for control unit (-A01) - operating panel (-A02). This error only occurs during operation of the machine on
4.6.1.2.	Internal error control system	If error occurs repeatedly, even after switching the machine off and on again, replace the control unit (-A01)

11. Adjustment of Disk Brake



•The ERIDE30 is equipped with a real-time clock which is integrated in the vehicle's control system. When the vehicle is switched off, the clock is supplied with power from a backup battery on the control electronics.
•Proceed as follows to set the clock, e.g. after changing the battery:

•Plug diagnostics connector PN 03006790 on connector -A1.X3 (Fig. 2.2). Without the diagnostics connector, the date and time can only be viewed, not changed.

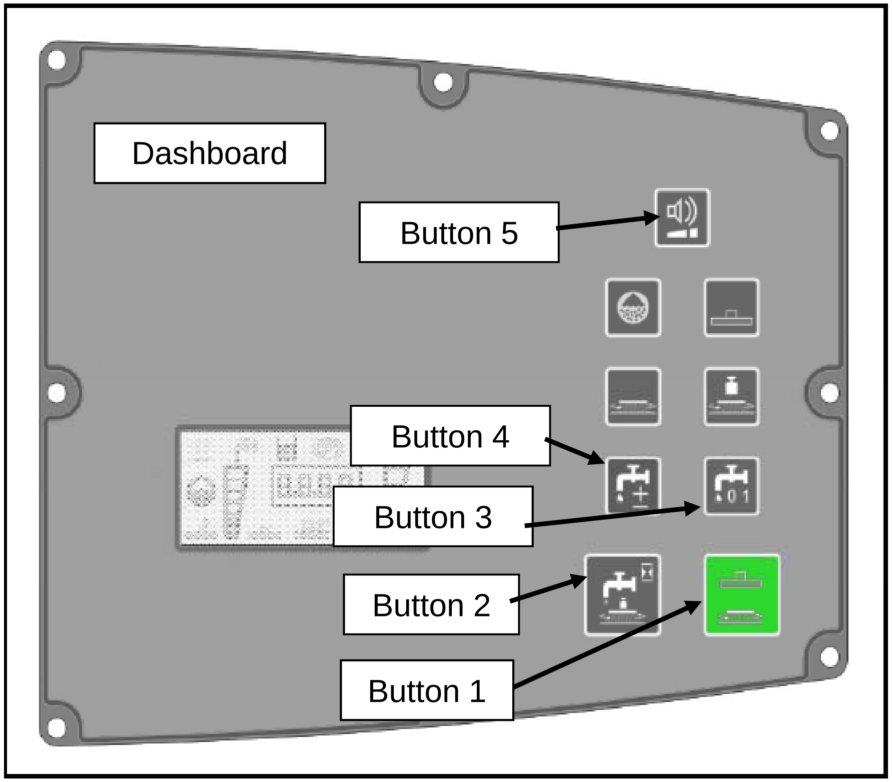


Fig. 13.1

12. Real-Time Clock (RTC)

•In order to access the Setup menu, press and hold Button 1 and Button 2 simultaneously while the key switch is switched on.
•After approx. 3 seconds, the year setting appears in the operating hour counter. (In the example, 11 for 2011). Release the buttons.

•Then press Button 1 to access the settings for month, day, hour, minute and second and finally back to year.
•The example shows 9 May 2011 at 11:05:25

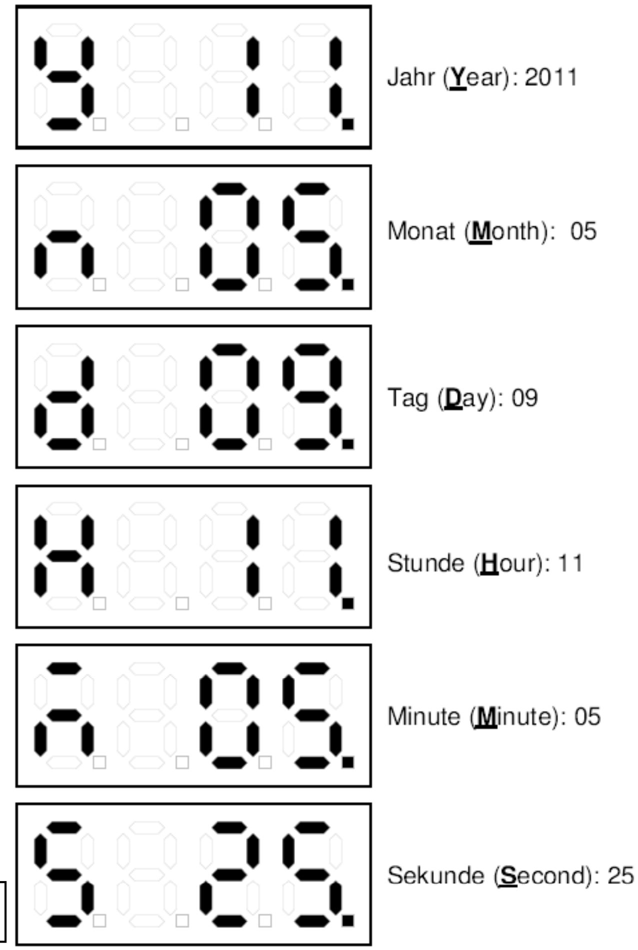


Fig. 13.2

12. Real-Time Clock (RTC)

•The value in the respective display can be increased by pressing Button 3 once or reduced by pressing Button 4 once. If the respective button is pressed and held for longer than one second, the value changes automatically at a constant speed.

•If a value is modified, the point at the bottom right behind the number disappears.

•After pressing Button 5 for three seconds, the adjusted value is saved and the point at the bottom right behind the number reappears.

•Exit from the menu by switching the machine off.

12.2 Notes

Part	Description	Code no.	Sheet Pos.	Loc.
A01	machine controller	90594300	3/17 4/12 5/12	
A01:G01	battery of controller	90601907	5/45	
A02	touch panel with electronic	97113823	3/4	
A04	drive controller	90522442	5/1	
A101	controller chemical pump	90596511	3/24	
B01	buzzer	90333105	4/38	
B101	flow meter	90596529	3/25	
E01	head light	90434457	2/38	
E02	flash light	90415019	2/50	
F01	fuse controller 7,5A	19731066	2/15	
F02	main fuse 125A	19731140	4/3	
F03	fuse horn 5A	19731181	2/31	
F06	fuse working headlight 5A	19731181	2/38	
F07	fuse chemical dosing 2A	19731448	3/19	
G01	battery		2/7	
G02	on-board-charger	97117733	2/13	
H01	horn	90136383	2/31	
K01	main relay	90597535	2/6	
K02	buzzer	90267485	2/51	
K03	flashing relay	90552530	2/45	
K05	direction relais	90522459	5/42	
K101	chemical dosing	90567777	3/17	
M01	drive motor	90412578	5/41	
M02	suction motor	90240714	4/3	
M05	motor disc brush right	90586645	4/11	
	or			
M05	motor cylindrical brush right	90529371	4/11	
M06	motor disc brush left	90586645	4/21	
	or			
M06	motor cylindrical brush left	90529371	4/21	
M07	actuator squeegee	90344987	4/42	
M08	water pump	90329095	4/48	
M09	actuator brush deck	90528803	4/32	
R01	drive pot.	90305996	5/6	
S01	key switch	90323437	2/23	
S02	horn	90125782	2/31	
S03	head light	90260282	2/38	
S03.	switch warning beacon	90437286	2/49	
S04	sensor recovery tank	90273160	4/12	
S05	seat switch	90425034	4/6	
S06	parking brake	90243908	4/18	
S07	direction switch	90270208	5/20	
S08	switch drive potentiometer	90306002	5/14	
S09	switch TOOL	90541764	3/6	
V01	recovery diode horn	90194879	2/34	
V02	diode warning beacon	90194879	2/49	
VGND	VGND sheet A02		3/45	
X01	battery connector DIN 2 pole		2/7	
X01.	battery connector Anderson 2 pole		2/2	
X02	connector 3-pole		5/6	
X02.	connector 2-pole		2/11	

Part	Description	Code no.	Sheet Pos.	Loc.
X03	connector 2-pole		4/28	
X04	connector 2-pole		4/23	
X05	connector 2-pole		4/12	
X07	connector 2-pole		4/38	
X09	junction 6-polig		2/11	
X10	connector 2-pole		2/53	
X100	VGND chassis		3/45	
X103	connector 2-pole		3/21	
X104	connector 4-pole		3/25	
X11	connector 2-pole		2/38	
X12	connector 2-pole		4/48	
X14	connector 3-pole		4/26	
X16	connector 2-pole		4/43	
X17	connector 2-pole		4/35	
X20	connector 2-pole		4/3	
X21A	connector 1-pole		4/8	
X21B	connector 1-pole		4/6	
X23	connector 2-pole		5/51	
X26	connector 4-pole		3/4	
X29	junction 6-polig		5/36	
X30	stud terminal M8	90268657	2/14	
X31	stud terminal M8	90268657	2/17	
X35	connector 2-pole		4/38	
X37	connector 2-pole		3/17	
Y01	water valve	90435595	4/45	
	bar (+)	96133152	2/5 4/2	
	bar (-)	96133145	2/7 4/47	
	bar drive controller	90598632	5/49	
	ribbon cable	90594672	3/9	
W1	wire harness variant HAKO	97116016		
W1.	wire harness variant MMAN	97116701		
W2	wire harness	97116024		
W3	wire harness	97116032		
W4	wire harness	97116040		
W5	wire harness option 99-7091-00	97078976		
W6	wire harness	97116057		
W7	wire harness	97116073		
W8	wire harness variant HAKO	97041446		
W11	wire harness option 99-7092-00	97080337		
W13	wire harness option 99-7376-00	97100960		
W20	wire harness option 99-7376-00	97117261		
W101	wire harness option 99-7678-45	97117477		
W102	wire harness option 99-7678-45	97117485		
WS1	wire set variant HAKO	97041438		
WS2	wire set variant without charger	97116461		
WS3	wire set	97116065		
WS4	wire set	97116487		

Part	Description	Code no.	Sheet Pos.	Loc.
WS5	wire set variant with charger	97117493		
WS	wire set variant cylindrical brush	97115729		

Plot-Datum:

	Eingeführt lt.	2249-07	06.07.11	Ri	
A2 Nr.	Zahl kommt vor	Änd.-Nr.	Datum	Name	

2011	Datum	Name
Gezeichnet	07.06.	Ri
Geprüft		
Normgepr.		

B115 R

Ersatz für :

Änd. Nr. :

Benennung

Schaltplan B115 R

Für diese Zeichnung behalten wir uns alle Rechte vor (Gemäß DIN 34) KABI 470

Hako

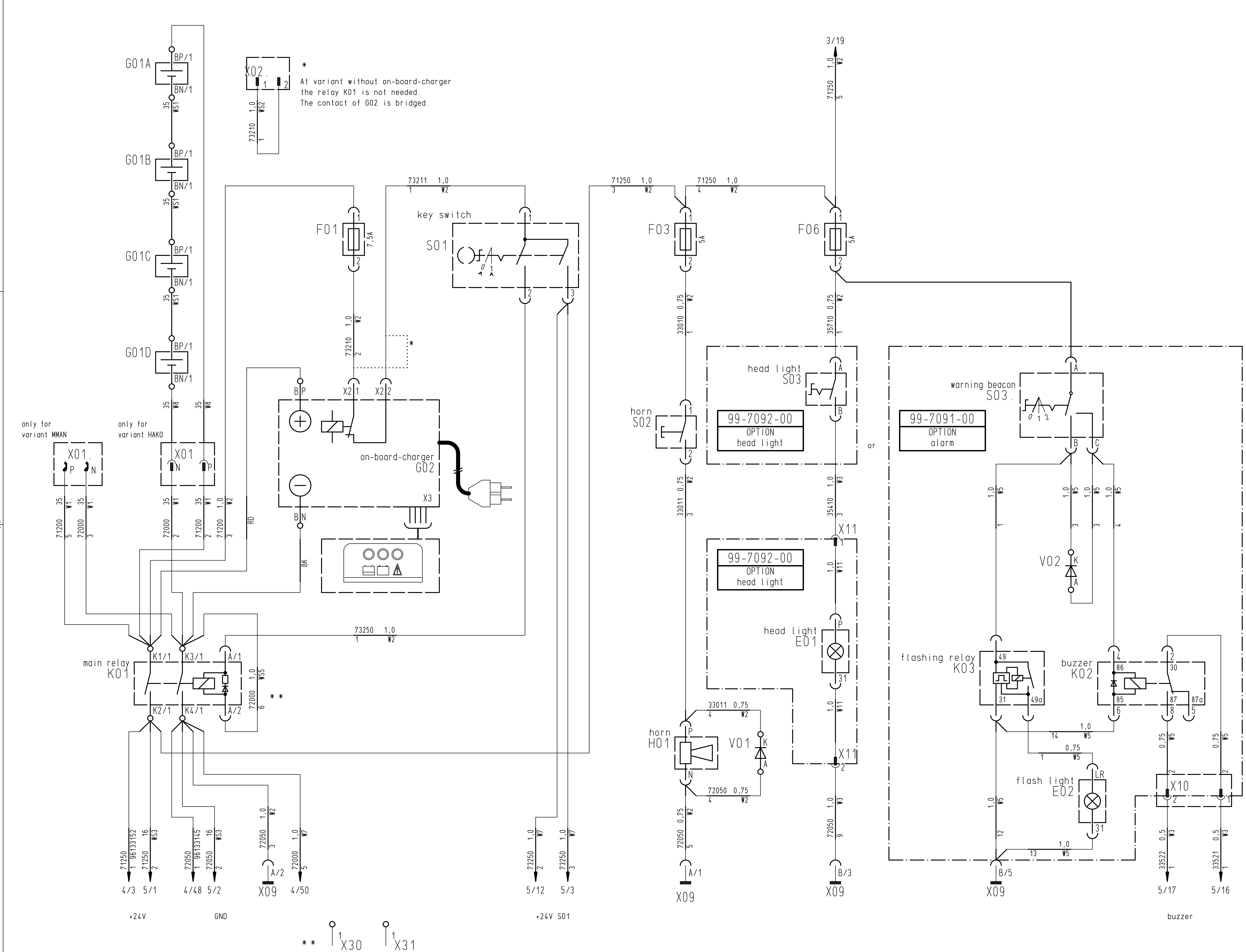
Hako-Werke GmbH
D-23840 Bad Oldesloe

Typ: 7090 Abt: ELK

Zeichnungs-Nr.

91031054

Blattzahl: 6 Blatt: 1



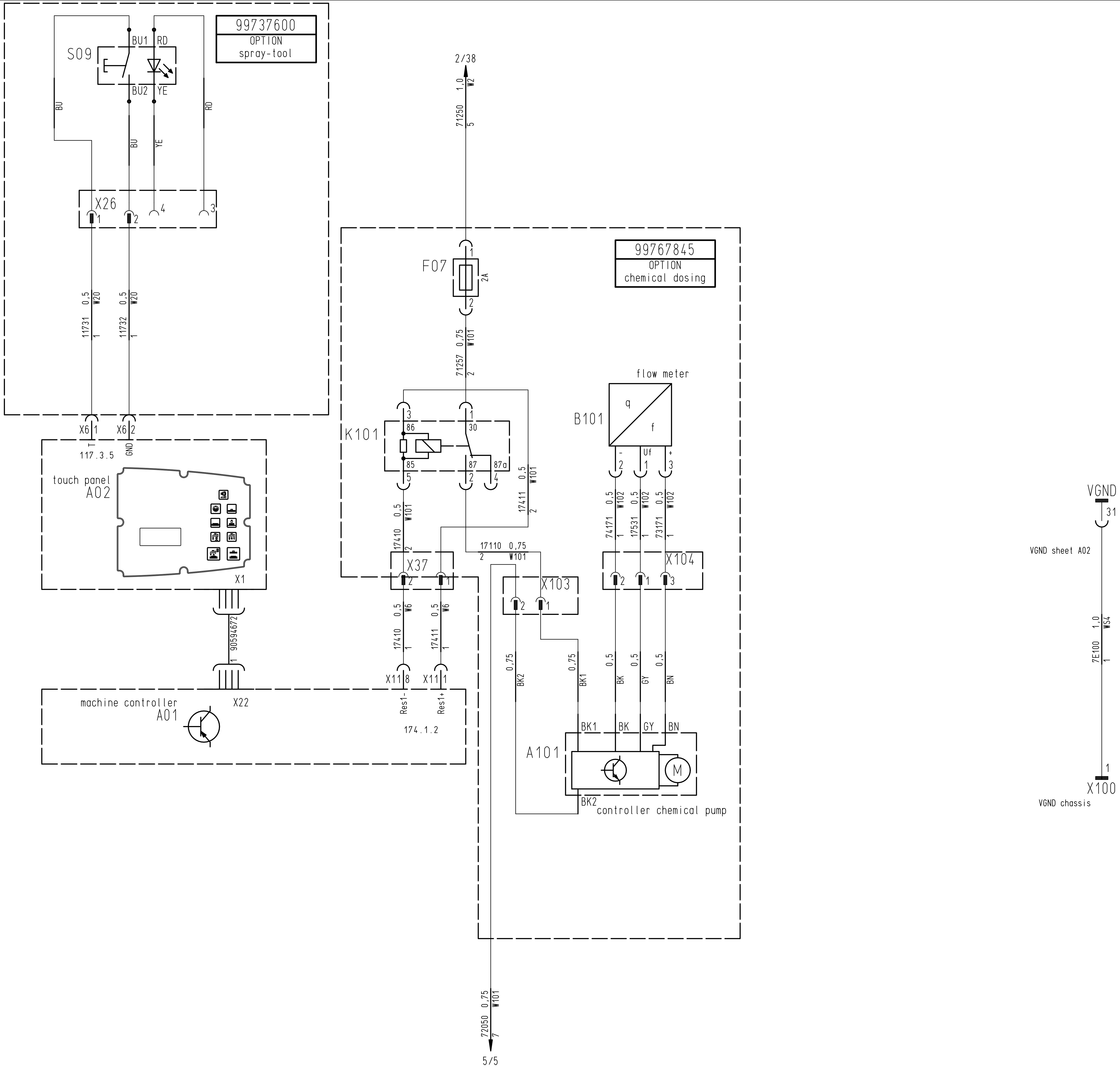
Legende

E01	head light
E02	flash light
F01	fuse controller 7,5A
F03	fuse horn 5A
F06	fuse working headlight 5A
G01A	battery
G01B	battery
G01C	battery
G01D	battery
G02	on-board-charger
H01	horn
K01	main relay
K02	buzzer
K03	flashing relay
S01	key switch
S02	horn
S03	head light
S03.	switch warning beacon
V01	recovery diode horn
V02	diode warning beacon
X01	battery connector DIN 2 pole
X01.	battery connector Anderson 2 pole
X02.	connector 2-pole
X09	junction 6-polig
X10	connector 2-pole
X11	connector 2-pole
X30	stud terminal M8
X31	stud terminal M8

**
At variant without on-board-charger
the main contactor K01 is not needed.
Connect the wires K01/K1/1 and K01/K2/1
to the stud terminal X30.
Connect the wires K01/K3/1 and K01/K4/1
to the stud terminal X31.
Fix the wire K01/A/1 at the
wire harness W2 with cable ties.
The wire set W55 is not applicable

Plot-Datum:

					2011	Datum	Name	B115 R	Benennung	Hako	Zeichnungs-Nr.
	Eingeführt lt.	2249-07	06.07.11	Ri	Gezeichnet	06.07.	RI	Ersatz für :	Schaltplan B115 R	Hako-Werke GmbH D-23840 Bad Oldesloe	91031054
					Geprüft						
A2 Nr.	Zahl kommt vor	Änd.-Nr.	Datum	Name	Normgepr.			Änd. Nr. :	Für diese Zeichnung behalten wir uns alle Rechte vor (Gemäß DIN 34) KABI 470	Typ: 7090 Abt: ELK	Blattzahl: 6 Blatt: 2



Legende

A01	machine controller
A02	touch panel with electronic
A101	controller chemical pump
B101	flow meter
F07	fuse chemical dosing 2A
K101	chemical dosing
S09	switch TOOL
VGND	VGND sheet A02
X26	connector 4-pole
X37	connector 2-pole
X100	VGND chassis
X103	connector 2-pole
X104	connector 4-pole

Plot-Datum:

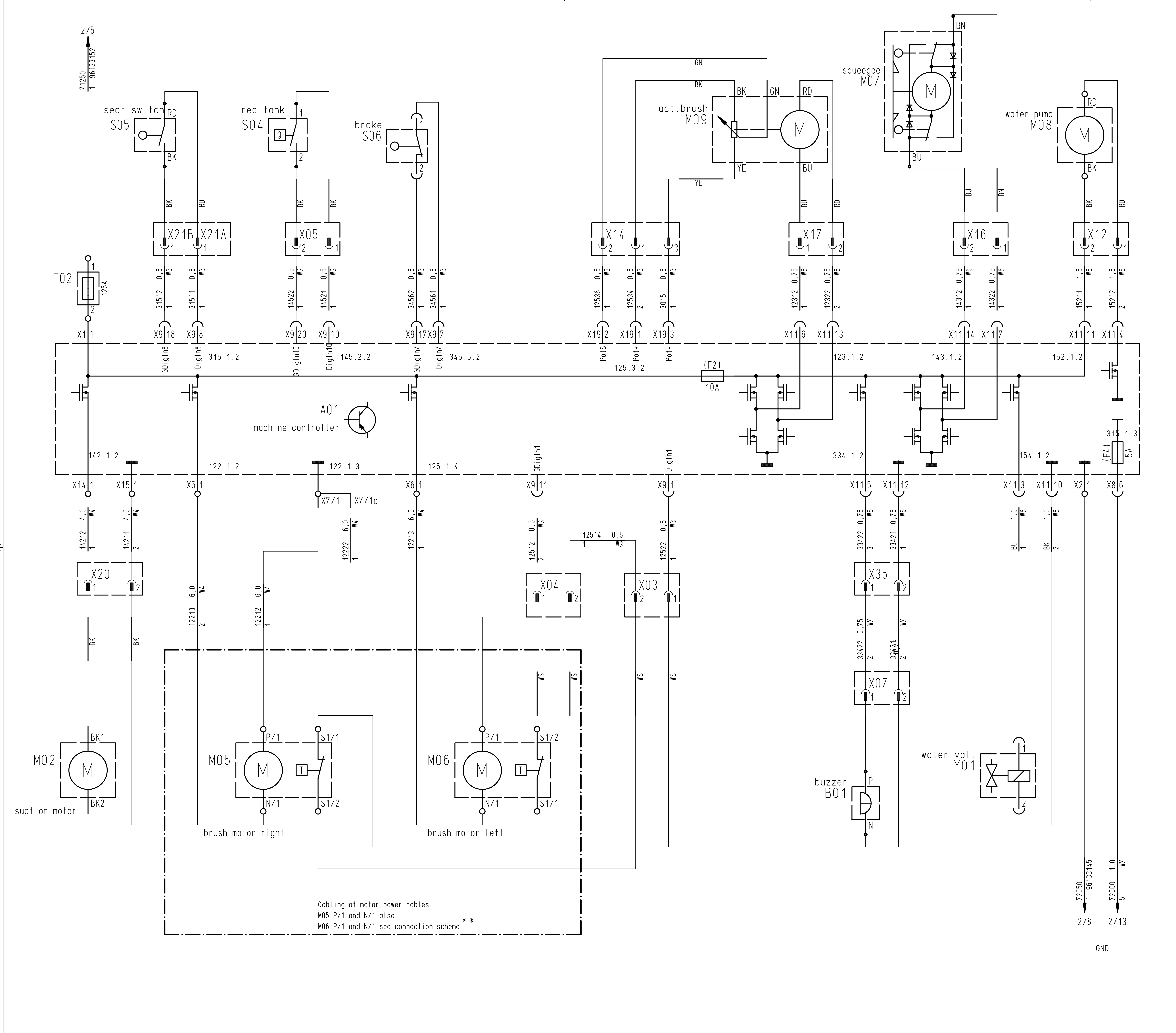
	Eingeführt lt.	2249-07	06.07.11	Ri	2011	Datum	Name	B115 R	Benennung: Schaltplan B115 R
					Gezeichnet	06.07.	Ri	Ersatz für :	
					Geprüft				
A2 Nr.	Zahl kommt vor	Änd.-Nr.	Datum	Name	Normgepr.			Änd. Nr. :	Für diese Zeichnung behalten wir uns alle Rechte vor (Gemäß DIN 34) KABI 470

Hako — Hako-Werke GmbH, D-23840 Bad Oldesloe

Typ: 7090 | Abt: ELK

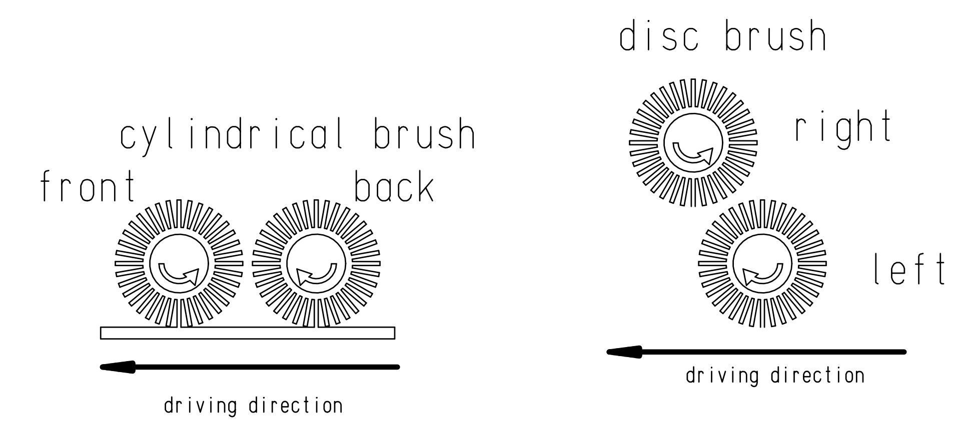
Zeichnungs-Nr. 91031054

Blattzahl: 6 | Blatt: 3



Legende

A01	machine controller
B01	buzzer
F02	main fuse 125A
M02	suction motor
M05	brush motor right
M06	brush motor left
M07	actuator squeegee
M08	water pump
M09	actuator brush deck
S04	sensor recovery tank
S05	seat switch
S06	parking brake
X03	connector 2-pole
X04	connector 2-pole
X05	connector 2-pole
X07	connector 2-pole
X12	connector 2-pole
X14	connector 3-pole
X16	connector 2-pole
X17	connector 2-pole
X20	connector 2-pole
X21A	connector 1-pole
X21B	connector 1-pole
X35	connector 2-pole
Y01	water valve



** connection scheme

cable marker	brush motor	99-7090-XX VARIANTE cylindrical brush	or 99-7090-XX VARIANTE disc brush
A01.X5/1 (M05:N/1)	to brush motor right (M05)	bolt N(-)	bolt cable red (+)
A01.X7/1 (M05:P/1)	to brush motor right (M05)	bolt P(+)	bolt cable black (-)
A01.X6/1 (M06:N/1)	to brush motor left (M06)	bolt N(-)	bolt cable black (-)
A01.X7/1a (M06:P/1)	to brush motor left (M06)	bolt P(+)	bolt cable red (+)

	Eingeführt lt.	2249-07	06.07.11	Ri	2011 / Datum / Name	B115 R
					Gezeichnet 06.07. Ri	Ersatz für :
					Geprüft	
A2 Nr.	Zahl kommt vor	Änd.-Nr.	Datum	Name	Normgepr.	Änd. Nr. :

Benennung
Schaltplan B115 R

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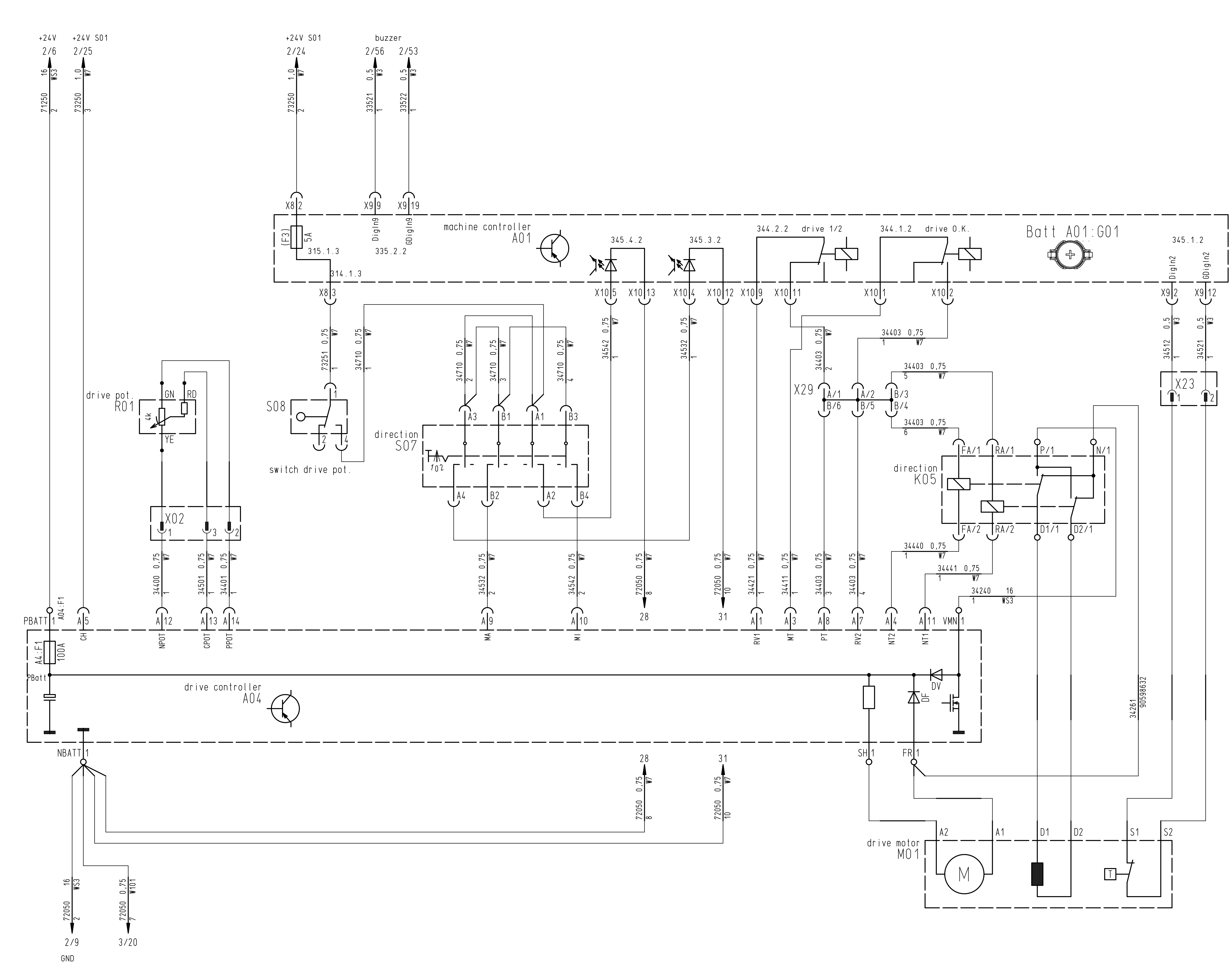
Hako-Werke GmbH
D-23840 Bad Oldesloe

Typ: Abt: ELK

Zeichnungs-Nr. 91031054

Blattzahl: 6 Blatt: 4

Plot-Datum:



Legende

A01	machine controller
A01:G01	battery of controller
A04	drive controller
K05	direction relais
M01	drive motor
R01	drive pot.
S07	direction switch
S08	switch drive potentiometer
X02	connector 3-pole
X23	connector 2-pole
X29	junction 6-polig

Plot date

		Eingeführt lt.	2249-07	06.07.11	Ri	2011 / Drawn by / Verified / Standard	Date 06.07.	Name R1
A2	No.	Number appears	Change No.	Date	Name			

B115 R
Replacem. for
Change No.

Name
Schaltplan B115 R
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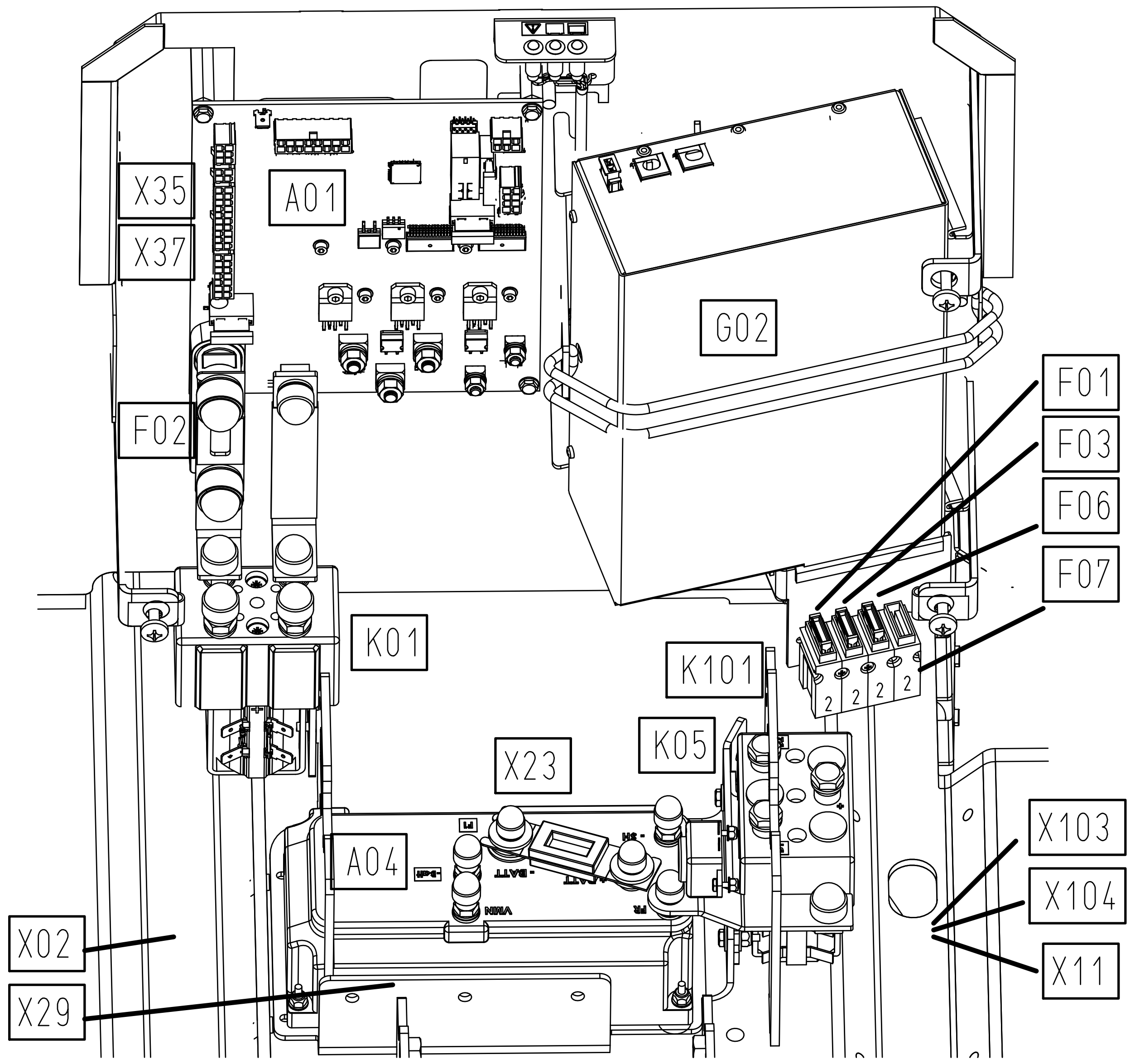
Hako-Werke GmbH
D-23840 Bad Oldesloe
Type 7090 Dep. ELK

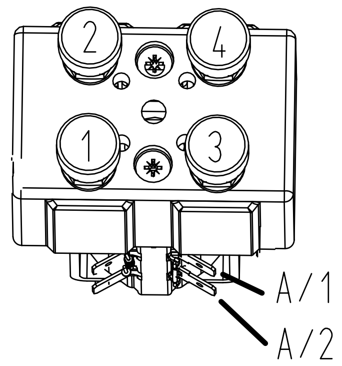
Drawing Number
91031054
No. of Sh. 6 Sheet 5

X30 X31 X02.

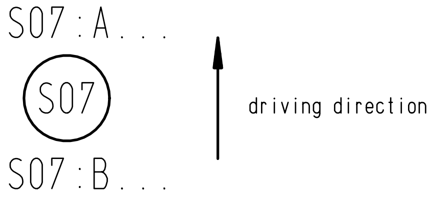
At variant without on-board-charger
instead of the relay K01
the bolts X30 and X31 are installed.
The wire with X02. is installed.



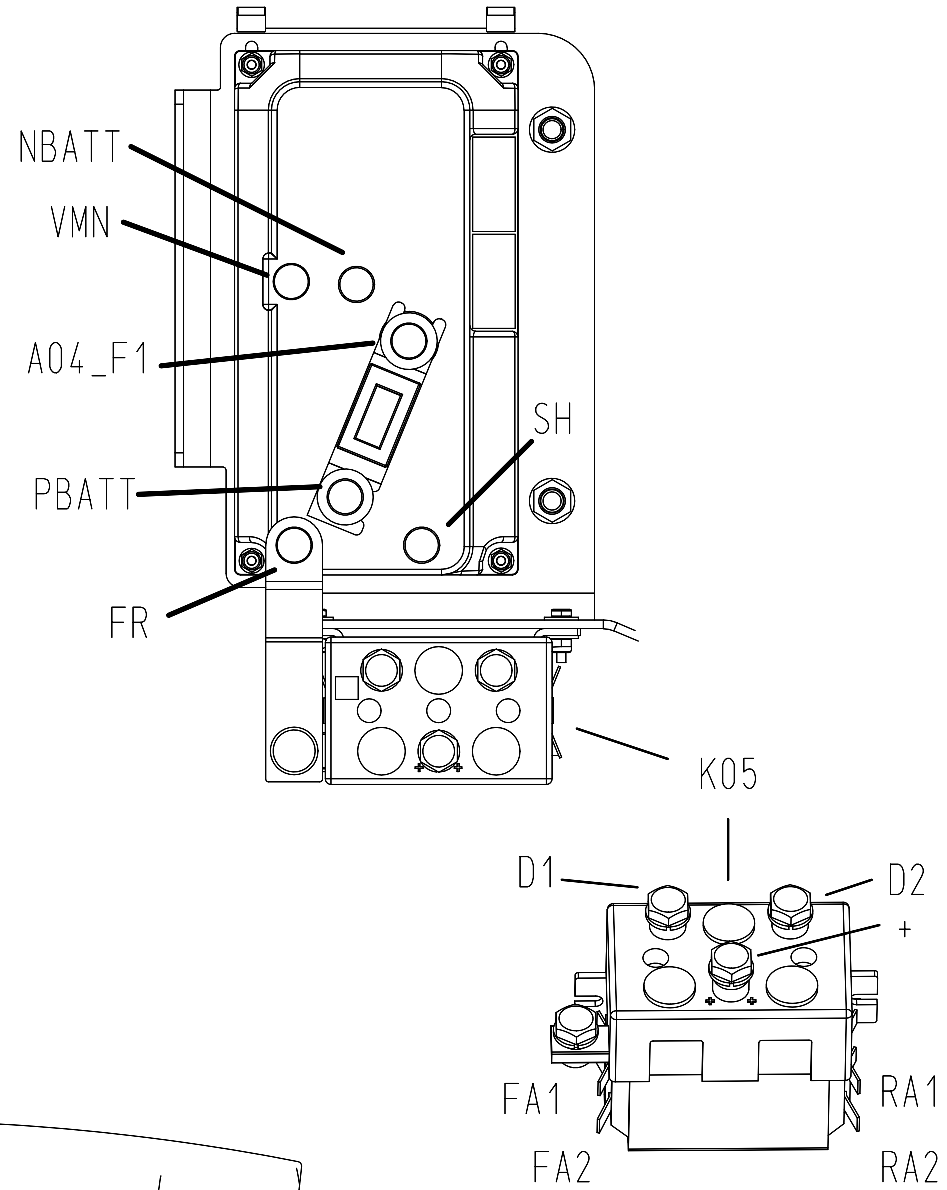
position of connection K01



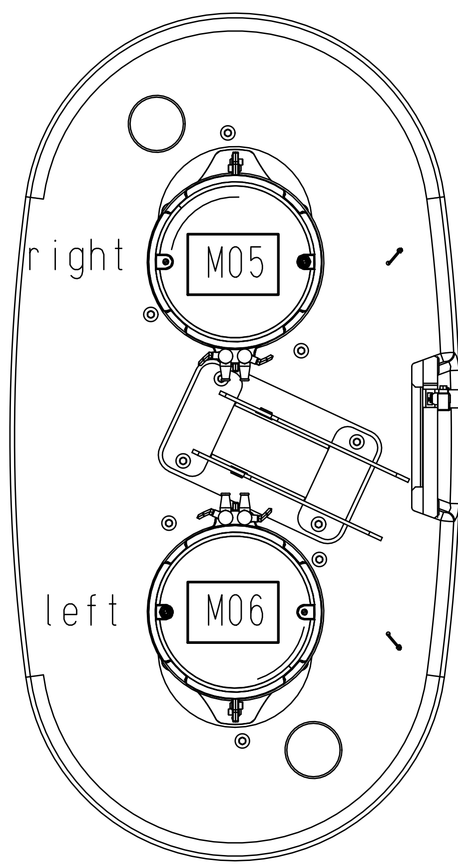
position of connection levels S07

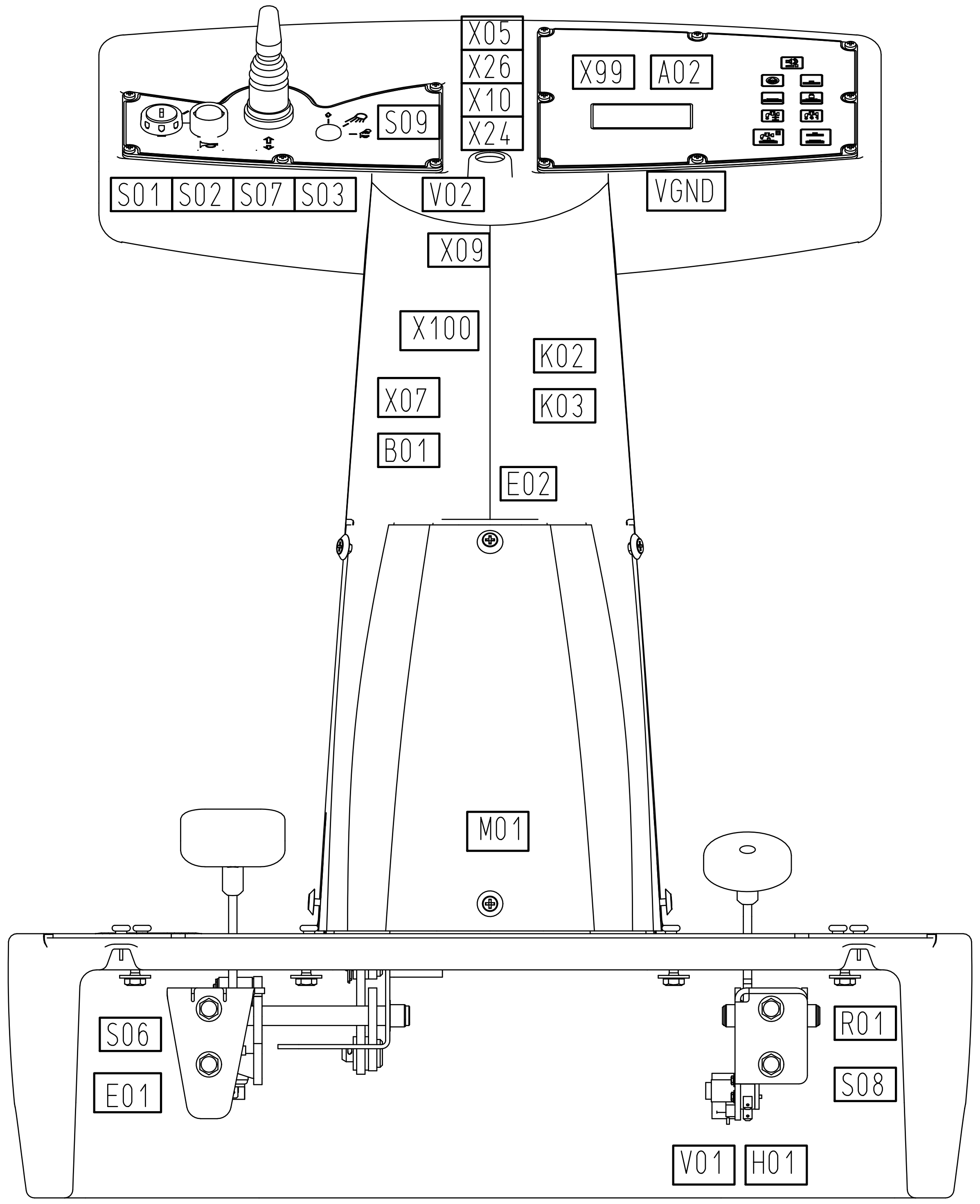


view drive controller A04

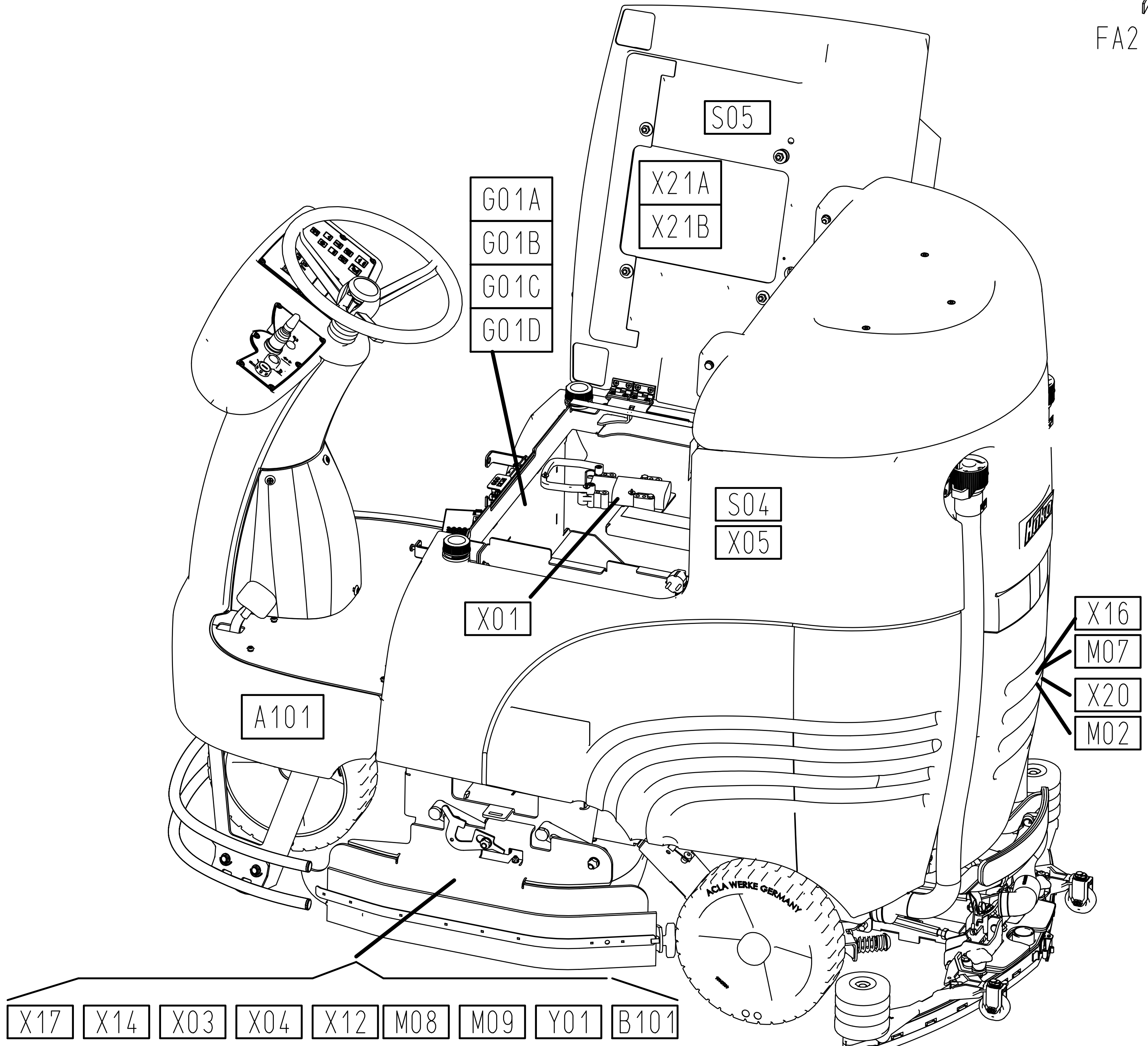


motor disc brush deck



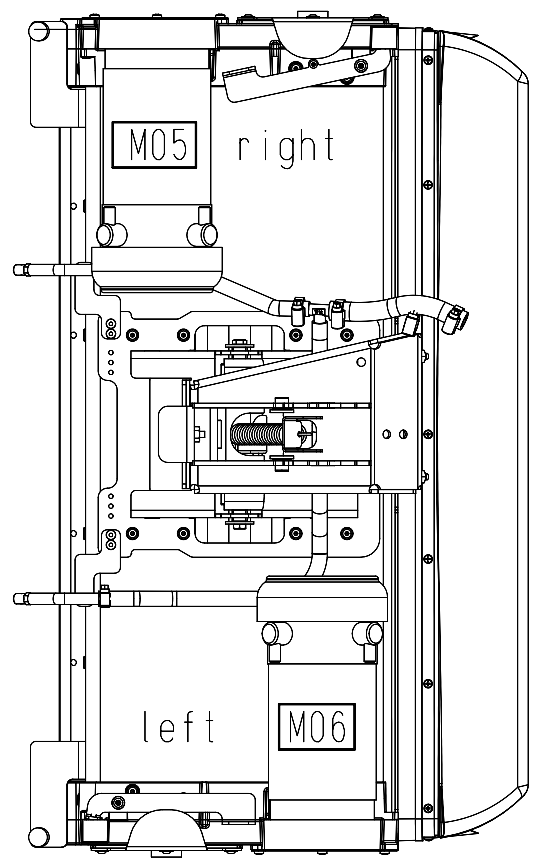


chassis



komponents on rocker / brush deck

motor cylindrical brush deck



Eingeführt lt.	2249-07	06.07.11	Ri	2011 / Gezeichnet / Geprüft / Normgepr.	Datum 06.07.	Name RI
A2 Nr. Zahl kommt vor	Änd.-Nr.	Datum	Name			

B115 R
Ersatz für :
Änd. Nr. :

Benennung
SChaltplan B115 R
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Hako
Hako-Werke GmbH
D-23840 Bad Oldesloe
Typ: 7090 Abt: ELK

Zeichnungs-Nr.
91031054
Blattzahl: 6 Blatt: 6

Plot-Datum: