

## Service Booklet



# Scrubmaster B 260 R

(7182.XX)

Training  
Troubleshooting  
Adjustments



RevHako GmbH · Technisches Produktmanagement · D-23840 Bad Oldesloe · Updated 03/2022 - Rev. 1.04

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Slide 1

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# 1. Information

## Caution:

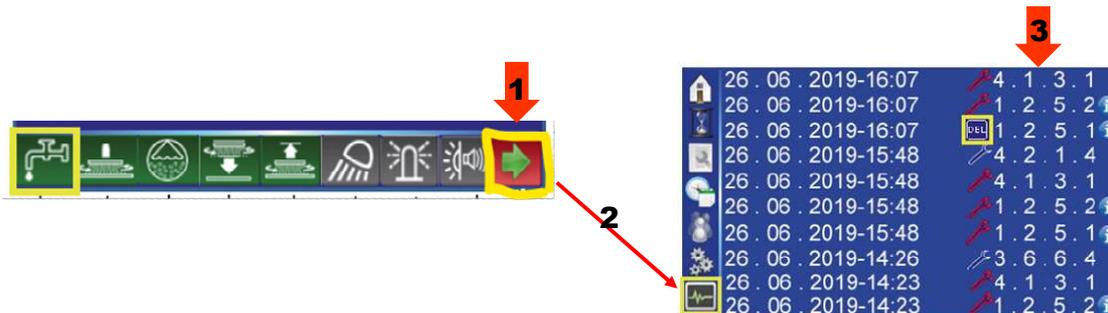
- During all work at the machine, secure it against unintentional movement.
- Only carry out work at the machine when it has been de-energised (disconnect the battery plug), except for current and voltage measurements.
- After repairing electrical drives, measure the starting and operating currents to detect possibly still present errors.
- During all work at the machine, always observe the general safety and accident prevention regulations of the legislation.

## 2. General information

The Scrubmaster B260R is equipped with a multifunction display (MFD) on which all machine statuses are displayed and machine settings can be made.

If a fault occurs, the wrench in the display lights up and the machine beeps. The current **service code** (four-digit alphanumeric code in the service indicator) is shown **with flashing dots between the characters**.

In addition, a red wrench  can be displayed above the icon of the affected unit. The corresponding service code is then determined via the "Service information" menu, if not shown in the operating hours display.



## **2. General information**

### **Scrubmaster B260 R**

The Scrubmaster B260 R is available in working widths with a 108 cm or 123 cm rotating brush unit and a 108 cm roller brush unit.

The 123 cm rotating brush unit has 3 brush motors, and the 180 cm rotating brush unit is available with 2 or 3 brush motors.

The batteries for the machine are a maintenance-free 36 V/420 Ah PzV tray and a maintenance-free 36 V/480 Ah PzS tray.

Furthermore, it is differentiated between edition machines and configuration machines. Edition machines are machines that have a clearly defined scope of equipment. In this context, only a limited scope of additional equipment features is available. Additional options are not installed in the factory but supplied loose with the delivery for installation on site at the customer's.

A separate operating manual, which describes the operating and service statuses of the charger, is available for the chargers and supplied together with the device.



## 2. General information

Configuration machines are manufactured order-specifically according to customer wishes from a pool of available equipment features. Additional options (chemical dosing, working light, warning signal, etc.) are installed in the factory. For more details, see the relevant current price lists.

Additional equipment features (e.g. chemical dosing system, rotating beacon, bluespot, etc) to be retrofitted in the field can be ordered via the Editions price list.

## 2.1 Settings

Respective settings can be carried out via the machine's configuration menu. Currently, these settings are carried out via the machine display. There are settings which can also be carried out by the operator without restrictions (e.g. cleaning programmes in Chapter 3 and several settings in Chapter 2). This is always possible if a diskette is displayed next to the value (Chapter-Configuration-Content). However, if a lock is displayed a diagnostic connector with order number PN 03006790 is required to adjust this value, or a 4-digit pin must be entered in the field above it. This is described in more detail in the Configuration chapter.

## 2.1 Settings

### 2.1.1 Control panel

In order for the display of the control panel to work, a micro-SD card must be inserted on the PCB of the control panel containing a special image file. This is required to make the control panel work. A micro-SD card with the required image file can be stored on using the Hako diagnostics. See chapter 2.3.6.

If the micro SD card is missing, a "blue screen" (Fig. 2.1) is displayed. If a empty SD-Card or defective SD-Card or a formatted SD-Card is inserted, a "Black screen" either with or without a message is displayed (Fig. 2.3).

If the "Loading Screen" is displayed, the control panel is raised but the connection to the machine controller is missing (Fig. 2.2).

The micro SD card cannot be read by the usual computer operating systems (Windows, Linux, IOS, Android).



Figure 2.1



Figure 2.2



Figure 2.3

## 2.1 Settings

### 2.1.2 Machine control unit

A new machine control unit is supplied without machine software ex spare parts warehouse. Following mechanical and electrical installation of the central control unit in a machine and switching on the key switch, the display will be in an indeterminate state, since no data has been transferred from the machine control unit to the control panel (Display: "Loading-Screen"; Service Code: 4.5.2.5.).

Therefore, the machine software must be "flashed" onto the central control unit after mechanical installation and electrical connection of the central control unit. It is recommended, to check during every inspection of the machine, if a new software is available. If so, the new version has to be installed to the control unit.

- Service PC on which the current Hako diagnostic software is installed. (Windows 10)
- 1 free USB 2.0 port (or higher)
- CAN-FOX interface PN 03502430
- Alternatively, the CAN-USB interface PN 03501750
- Interface cable PN 03502750

## 2.2 Brief description

Machine control takes place with the following electronics:

- Central electronics (A01)
- Control and display panel (A02) (MFA)
- Drive control unit (A04) / 4-wheel drive option — 2. Drive control unit (A05)
- Machine controller Slave (A06)
- Chemical dosing (A10)

The control electronics (A01) assumes all control and monitoring tasks in the machine except for the drive functions. The Slave controller (A06) controls the 3rd brush motor. As well as the group messages of the drive control unit on the display of the machine, these are displayed as detailed flash codes on the drive control using flashing LEDs (see Chapter 9).

It is possible to toggle back and forth between the tip switches for scrubbing, suction and the green Hakomatic button for combined cleaning, thus ensuring that the selected function is activated. When pressing tip switch “boost”, the brush pressure is increased and the water quantity set to max. as long as the tip switch is pressed. Tool operation can only be switched on if the parking brake is applied and the seat contact switch is open.

## 2.2 Brief description

### 2.2.1 Switching off suction / waste water tank full

Suction is switched off by the operator via the tip switch or automatically in case of the signal “waste water tank full” to protect the suction turbine.

#### Switching off by the operator:

- The squeegee is raised.
- The suction motor switches off with a delay (15 seconds).

#### Switching off because the tank is full:

The suction motors are shut off when the waste water tank is full via float switch S04, which is connected to the machine control unit A01:X15.4 and A01:X15.16.

A full waste water tank is indicated by this symbol  in the display of the machine.

## **2.2 Brief description**

### **2.2.2 Fresh water tank display**

The machine has a fill level indicator for the fresh water tank in the MFA which displays the current fill level in steps of 20 %.

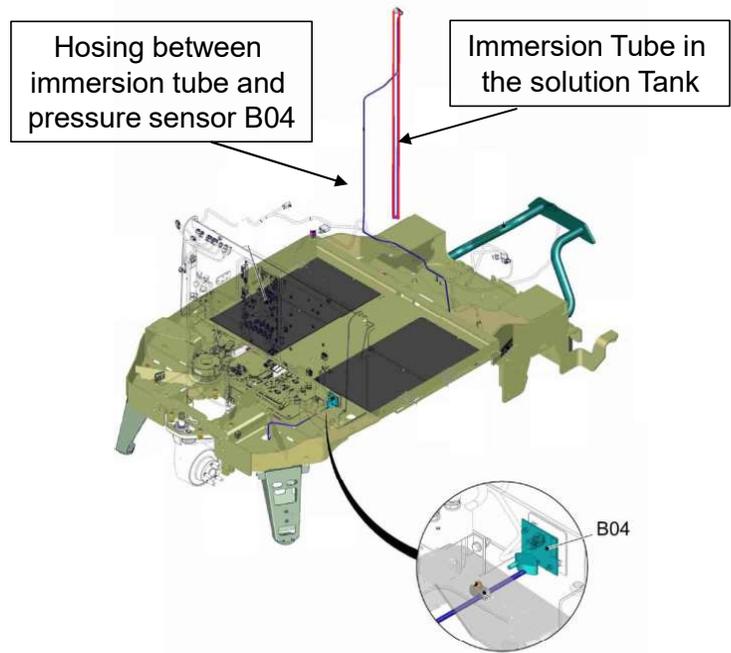
The fill level is measured via a differential pressure sensor. The pressure sensor is connected to an immersion tube via a hose which is located next to the water filling opening of the fresh water tank. The immersion tube extends to just above the bottom of the fresh water tank. A certain pressure is present at the pressure sensor via the immersion tube and the hoses, which is converted into an electrical signal by the electronics of the pressure sensor. This signal is evaluated by the machine control unit and shown on the display as a fill level signal.

## 2.2 Brief description

### 2.2.2 Fresh water tank display

The sensor is supplied with a voltage of 5V via A01:X14.5. The minus connection comes from A01:X15.15, and the analogue signal of the pressure sensor is present at A01:X15.3.

If there a water column in the immersion tube, this can result in falsification of the actual fill level on the display. The display is calibrated by completely draining the fresh water tank once. The immersion tube in the fresh water tank is completely emptied when this takes place.



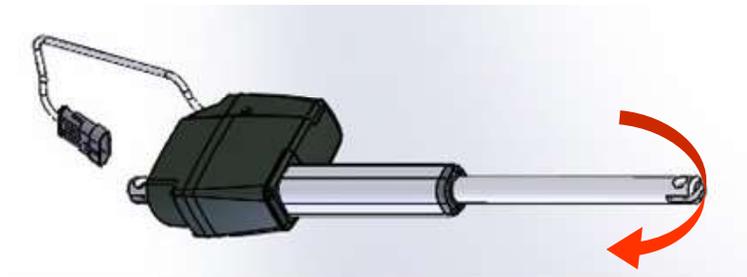
## 2.2 Brief description

### 2.2.3 Machine home position

After switching on the machine, all components are set to “home position” provided that the seat contact switch is actuated (closed).

The lifting elements will lift unless they have been switched off via the micro-switch for the upper end position integrated in the lifting element (squeegee) or the upper end position is detected by the control unit via the integrated potentiometer.

The spindle of a new lifting element must be turned 90° clockwise before it can be installed in the machine.



## **2.2 Brief description**

### **2.2.4 Seat contact switch (3.6.6.4.)**

The seat contact switch (S05) is connected to the control electronics A1 at A1:X15.6+18 (NC) and A1:X15.7+19 (NO).

The control electronics (A1) responds to the relief of the seat with an approx. 2 second delay. This means: If the contact at A1:X15.6+18 is open for more than 2 seconds during machine operation, the motors stop.

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

If the seat contact switch is not actuated for > 6 seconds while the key switch is switched on, the machine is locked in all functions (driving and cleaning). The same applies if both contacts of the seat contact switch have the same switch status for longer than a few seconds, i.e. both switches are detected as being open or closed by the machine (seat switch manipulation).

The service code 3.6.6.4. is shown in the operating hours meter. If the seat contact switch is actuated, only driving is now possible. If the key switch is switched off and then back on without the seat contact switch being relieved or actuated again, the driving function is also deactivated. The machine is blocked for use if the seat contact switch is not actuated.

## 2.2 Brief description

To reactivate the machine after triggering “seat switch manipulation”, the machine control unit must “register” the change of the switch status or the change between ‘operator is sitting on the machine’ and ‘operator has left the seat’.

To achieve this, the seat contact switch must be opened and closed several times while the machine is on.

A seat contact switch that has been detected as “open” by the machine (no operator on the seat) is indicated on the control panel display via the “operator” in the top line of the multifunction display. If the seat contact switch is detected as “closed”, i.e. the operator is on the seat, the operator symbol in the multifunction display will go off.

‘Seat contact switch closed’ means there is an operator on the seat;

Seat contact switch ‘**open**’ means there is **no** operator on the seat.

The second seat contact switch always has the respective opposite switching status.

## **2.3 Diagnostics and communication**

### **2.3.1 Prerequisites**

**The following components are required to activate the control unit of the Scrubmaster B260 R after a replacement:**

- Current Hako diagnostic software (via the Hako WebX download portal)
- Service PC (e.g. Panasonic CF20 with Windows 10)
- Interface PN 03502430 \* (preferred variant) or alternatively also: PN 03501750 \*\*
- Diagnostic cable PN 03502750
- Diagnostic connector PN 03006790

**See Chapter 2.3.4 for connections to the recommended interface**



## **2.3 Diagnostics and communication**

### **2.3.2 Diagnostic software on the diagnostic computer**

**Download the “HakoDiagnostics” software as a zip file or as a folder from the Hako WebX download area (Annual Update).**

Information on accessing the download server can be requested from Ms. Christin Ramm, e-mail: [cramm@hako.com](mailto:cramm@hako.com).

**To install the software on a service computer:**

Follow the steps in the “Instructions” for Hako diagnostics setup which is supplied with the diagnostic software.

The diagnostic software is then updated automatically during the current year via the Hako-update-tool.

## 2.3 Diagnostics and communication

### 2.3.3 Connection to the diagnostic PC

- Ensure that the –A01 control unit has been fully installed in the machine before activating the backup battery. To do this, remove the insulating strip between the battery (CR2032) and the battery holder on the control unit.
- Connect the interface (\* / \*\*) to a free USB port of the service PC.
- Establish a connection between the machine and the diagnostic computer using the diagnostic cable (PN 03502750) and the interface (PN 03502430 or 03501750).
- Connect the OBD connector (blue contact protection) of the diagnostic cable to the OBD contact of the machine (located behind the cover in the steering column).



Connecting the machine controller to –A01.X20 with the serial cable automatically leads to activation of the Fleet recorder option. The machine is not operational if the Fleet recorder is not connected. In this case the “Fleet recorder” option must be deactivated (Chapter 12 – Options).

## 2.3 Diagnostics and communication

With CAN-FOX interface PN 03502430 (\*): (recommended variant – see Chapter 2.1.3)

Connect the D-Sub 9 connection of the diagnostic cable marked CAN1 (red marking) to the D-Sub 9 connection of the interface marked “CAN”.

**Caution:** Do not use the D-Sub 9 connection with the designation RS232.

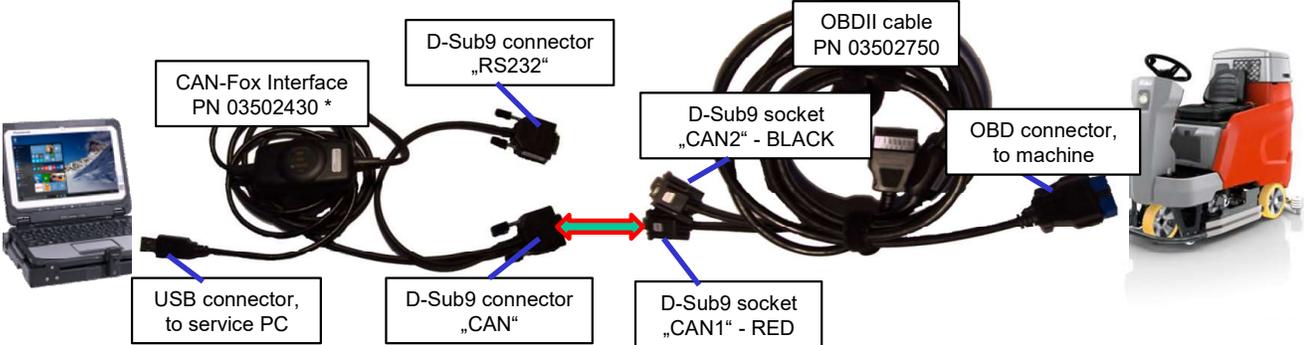
With CANUSB interface PN 03501750 (\*\*): (*alternative connecting option*)

Connect the D-Sub 9 connection of the diagnostic cable marked CAN1 (red marking) to the round jack of the interface using the adapter (D-Sub 9 to 7-pin round plug) included in the scope of delivery of the diagnostic cable.

- Carry out the settings for operative units, options, battery and parameters via the display according to the training documents.

## 2.3 Diagnostics and communication

### 2.3.4 Diagram for connection between machine and the diagnostic PC



## **2.3 Diagnostics and communication**

### **2.3.5 Flashing the software:**

- Turn on the machine.
- Start the Hako diagnostic software. Select the “HAKO” button, then click the “\*\* B260R” button. The application independently searches for a new, blank control unit.
- Follow the instructions of the programme. Do not turn off the machine or disconnect the connection before flashing has been completed.
- Carry out the settings for operative units, options, battery and parameters via the display according to the training documents.

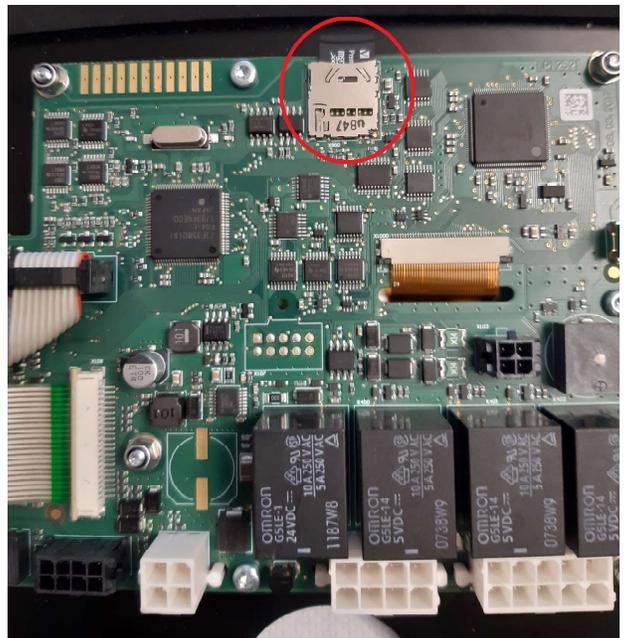
In the case of a master and slave control (3-brush decks), the flashing of the slave control is done by the master control. If newer software is available for the slave control when the machine is switched on (e.g. when a new slave control is installed or after a software update of the master control), the software of the slave control is automatically updated. This is displayed in the control panel. Do not switch off the machine during the update.

## 2.3 Diagnostics and communication

### 2.3.6 Flashing the SD-Card :

For installation of a new dash board software, remove the Micro-SD-Card from the SD-Slot of the dash board. Insert the micro SD-card in a empty SD-slot of your diagnosis computer (may a Micro-SD=>SD Adaptor is required). Alternative a USB-Micro-SD-Adaptor can be used.

- Switch on the machine ( without a connected machine the diagnostic application can't be started).
- Start the Hako-Diagnostic-Software. Select the „HAKO“-button, then press the Button „\*\* B260R.
- Then select the tab „System“



This picture indicates the position of the SD-card in the dash board.

## 2.3 Diagnostics and communication

### 2.3.5 Flashing the SD-Card :

- Select the button „write micro-SD card“, this will start the flashing process
- Now follow the instructions on the screen
- Switch off the machine and insert the SD-card in the SD-slot of the dash board.
- Switch on the machine
- A message „Bootloader“ and two software version numbers will appear on the screen, if a new software version is available
- Two buttons appear in the bottom line: „ Cancel“ and „Update“
- The button „Update“ is selected by pressing the „Turn-push-knob“. All other activities will escape the software update.
- Now the initialising of the new dashboard software starts.
- Wait till the screen displays the „Loading“ Screen.
- Switching off and on again the machine, will complete the software update of the dash board.

## 2.4 Configuration menu

### 2.4.1 Accessing the configuration

The turn-push knob can be used to access sub-menus in which it is possible to:

- set machine configurations
- set the clock
- delete the last error in the display and the error overview

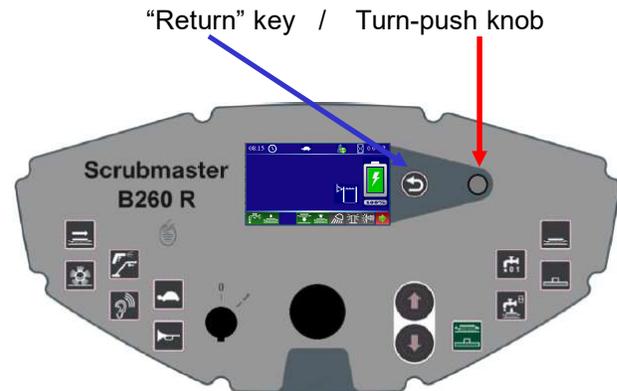
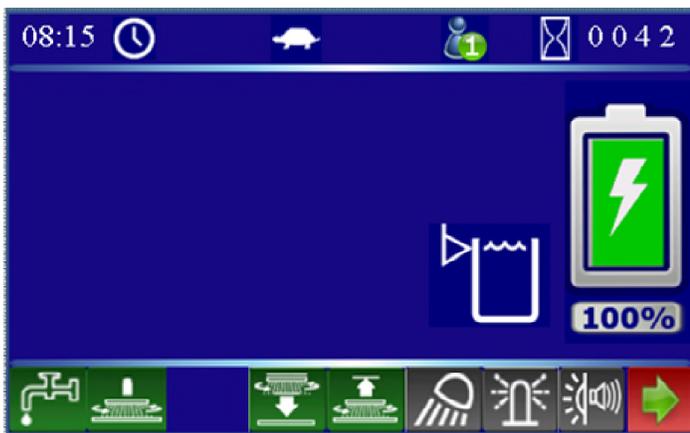
Select the sub-menus:

In the main display screen, use the turn-push knob to select the red button with the green arrow and actuate it by pressing the turn-push knob. The display screen jumps into the sub-menu on the operating hours meter page.

Use the turn-push knob to select the desired menu item and actuate it by pressing the turn-push knob.

- Time/Date setting
- Configuration menu
- Error memory for resetting the last error

## 2.4 Configuration menu



“Menu selection” softkey for selecting the sub-menus.

The sub-menu of the operating hours appears and the select buttons are displayed on the left-hand side (with yellow border for selection).

## 2.4 Configuration menu

Go back to the main menu using

- the return key on the keypad
- or
- the home button (softkey) on the display panel

“Menu selection” softkey for selecting the sub-menus.  
The sub-menu of the operating hours appears and the select buttons are displayed on the left-hand side (with yellow border for selection).  
The individual menus can be selected using the turn-push knob.

Time setting menu

Configuration setting menu

Service messages menu

	00235:23 h:mm		00095:00 h:mm
	00225:20 h:mm		00095:00 h:mm
	00205:13 h:mm		00005:00 h:mm
	00215:03 h:mm		
	00205:13 h:mm		-234 h
	00195:00 h:mm		-334 d

## 2.4 Configuration menu

### 2.4.2 Time and date setting menu

- Respective times and dates can be set in the time/date setting sub-menu.
- Clock selection 12h / 24h in hours/minutes, date in day/month/year
- Turn the turn-push knob to the adjustable parameters and press. If the border turns green the parameter can be adjusted and saved by pressing again. Turn further to the next value to be adjusted.
- Values are saved automatically when exiting the menu item (turning the turn-push knob on the time setting menu item).



Menu item for setting the time. Select the softkey via the turn-push knob and press to confirm.

Time setting section

12 h / 24 h setting

Hour setting

Minute setting

Date setting section

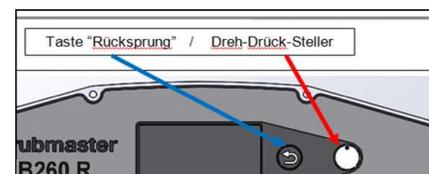
Setting: Day

Month

Year

The screenshot shows a blue menu interface. On the left is a vertical toolbar with icons for home, clock, calendar, settings, and a signal icon. The main area is divided into two sections. The top section, labeled 'Time setting section', contains a clock icon, a selection between '12h' (green) and '24h' (grey), a colon separator, and two boxes for '10' (hh) and '12' (mm) with 'am' to the right. The bottom section, labeled 'Date setting section', contains a calendar icon, three boxes for '15' (DD), '03' (MM), and '2017' (YYYY). Red arrows point from text labels to these specific elements. A yellow border highlights the '12' minute box and the '2017' year box.

Use the return key on the keypad to exit the menu. The set values are accepted.

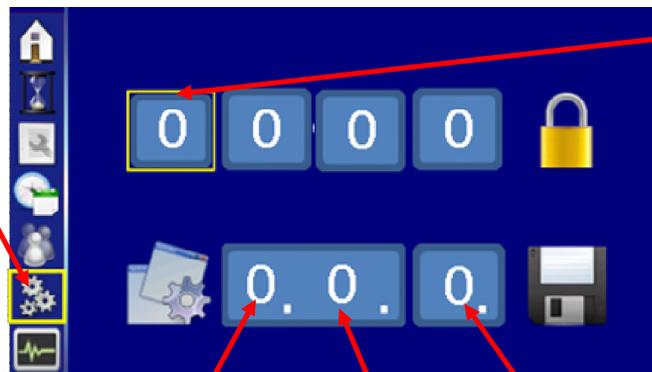


## 2.4 Configuration menu

### 2.4.3 Configuration setting menu

- Respective options and values can be adjusted in the system settings sub-menu "configuration menu".
- Adjustable values are divided into operator settings (can be changed by the operator), service settings (can only be changed by service staff using a password, diagnostic connector PN 03006790 or diagnostics device), and non-adjustable values (can only be changed via a software update).
- Turn the turn-push knob to the adjustable parameter and press. If the border turns green, the content can be adjusted. Save the value via the "disk" icon.

Menu item for setting the configurations. Select the softkey via the turn-push knob and press to confirm.



Enter the code here.

The code is calculated using the last 4 digits of the 12-digit serial number of the machine plus 1.

These are the positions 9 to 12 of the serial number of the machine.

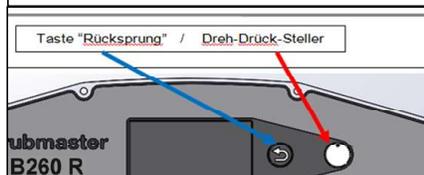
Chapter

Configuration

Content

## 2.4 Configuration menu

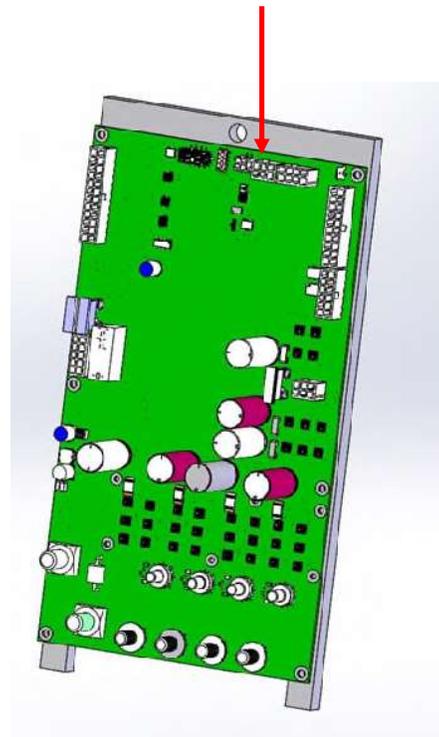
Use the return key on the keypad to go back without saving the currently selected value.



### Menu operation:

- Turn the turn-push knob to access the field of the value to be changed.
- Press the turn-push knob to be able to adjust the value (the border turns green).
- Adjust by turning the turn-push knob.
- Press the turn-push knob to exit the field
- Rotate as far as the diskette to save the value

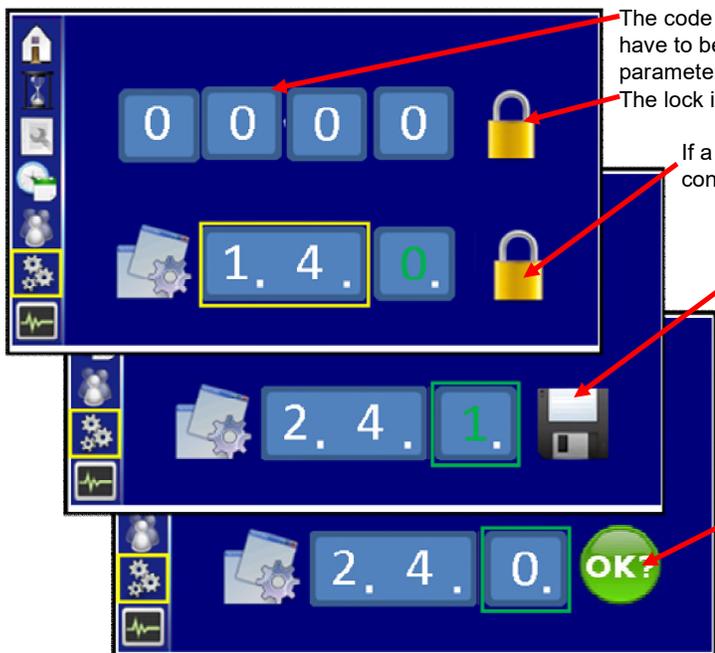
- Connect the diagnostic connector PN 03006790 to -A01/X20 to change the protected parameters.



## 2.4 Configuration menu

### 2.4.4 Settings that can be carried out without a code or a diagnostic connector

Settings that can be carried out by the operator are indicated by not having to enter a code in the top field (or connecting a diagnostic connector) and by the disk displayed next to the configuration setting for saving. Without a code, all settings can be viewed but only released ones can be adjusted.



The image shows three sequential screenshots of the Hako configuration menu interface, illustrating different states of a configuration setting. Each screenshot features a vertical sidebar on the left with icons for home, clock, camera, globe, person, gears, and a pulse line. The main display area shows a configuration setting with four digits and a lock icon.

- Top Screenshot:** The top field contains four zeros (0000) and a yellow padlock icon. A red arrow points to the top field with the text: "The code or diagnostic connector for setting parameters does not have to be entered or connected if the operator wants to adjust parameters (only released parameters can be adjusted).". Another red arrow points to the padlock icon with the text: "The lock is locked.".
- Middle Screenshot:** The top field contains the digits "1.4.0." and a yellow padlock icon. A red arrow points to the padlock icon with the text: "If a locked lock is shown next to the configuration setting, the configuration cannot be changed by the operator.".
- Bottom Screenshot:** The top field contains the digits "2.4.1." and a floppy disk icon. A red arrow points to the floppy disk icon with the text: "If a disk is shown next to the configuration setting, the configuration can be changed by the operator. A green number means: currently saved content. A green border means: the value can be adjusted.".

The bottom screenshot shows the configuration setting "2.4.0." with a green border around the "0." and a green "OK?" button. A red arrow points to the "OK?" button with the text: "The content can be adjusted by turning the turn-push knob. The number turns white and 'OK?' appears as a prompt to save this value.".

Another red arrow points to the "0." in the bottom screenshot with the text: "After saving, the disk appears and the number turns green. If saving should not take place, use the 'return' key on the keypad or the turn-push knob to exit the setting."

## 2.4 Configuration menu

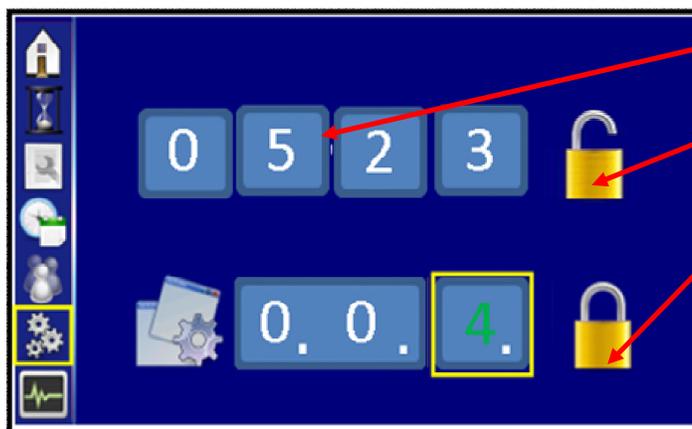
### 2.4.5 Settings that can only be carried out with a code or diagnostic connector

Settings that can be carried out by service staff are indicated by having to enter a code in the top field and by the disk displayed next to the configuration setting for saving.

To avoid having to enter a code, it is also possible to use the diagnostic connector PN 03006790 at connection – A01.X20 of the control unit.

The code is assigned by the HAKO Service during production at the assembly line or when installing a new control unit. The code is calculated using the last 4 digits of the 12-digit serial number of the machine plus 1. These are the positions 9 to 12 of the serial number of the machine.

If no code has been assigned, release for adjusting the configuration can only take place via the service plug.



If parameters are to be changed, the code for setting parameters must be entered (alternatively, diagnostic connector).

The lock is unlocked.

If a locked lock is shown next to the configuration setting, the configuration cannot be changed by service staff.



If a disk is shown next to the configuration setting, the configuration can be changed by service staff. A green number means: the currently saved content.



The content can be adjusted by turning the turn-push knob, the number then turns white and “OK?” appears as a prompt for saving the value. After saving, the disk appears and the number turns green. If saving should not take place, use the “return” key on the keypad to exit the setting.

## 2.4 Configuration menu

### 2.4.6 Resetting the last error and deleting the error memory

- The last ten errors can be displayed with real time and date in the error information sub-menu.
- The last error can be deleted in the main display.
- The display of the last ten errors can be deleted. However, the diagnostics memory cannot be deleted.

Shows the time when the error occurred in:  
 24 h display – hh:mm:ss or  
 12 h display – pm/am hh:mm:ss

Shows the date when the error occurred in: DD.MM.YYYY

Shows the status of the error (several errors can be active / inactive):  
 Service key RED:  
 Active/Inactive error  
 DEL: The error has been rectified and is displayed for 3 seconds after switching on the machine.

Menu item for displaying the last ten errors. Select the softkey via the turn-push knob and press to confirm.

	13:06:00 - 31.03.2016		2.5.5.2	
	13:06:00 - 31.03.2016		1.2.4.0	
	13:06:00 - 31.03.2016		1.2.4.0	
	13:06:00 - 31.03.2016		2.5.5.2	
	13:05:00 - 31.03.2016		1.2.3.5	
	13:04:00 - 31.03.2016		1.2.3.6	
	13:03:00 - 31.03.2016		2.5.5.2	
	13:02:00 - 31.03.2016		1.2.3.8	
	13:00:00 - 31.03.2016		2.5.5.2	
	13:01:00 - 31.03.2016		1.2.3.9	

Error display sequence: The last occurred error is displayed at the top, previous errors are displayed underneath.

Service code

Call detailed information

## 2.4 Configuration menu

### 2.4.7 Deleting the last error on the display panel

- Use the cursor to navigate to “DEL” between time/date and the error message of the last occurred error (“DEL” is only visible if the error has been reset, i.e. the service key has extinguished).
- Press and hold the turn-push knob for 3 seconds to reset the error indicators for the main display screen.
- “DEL” disappears from the display.

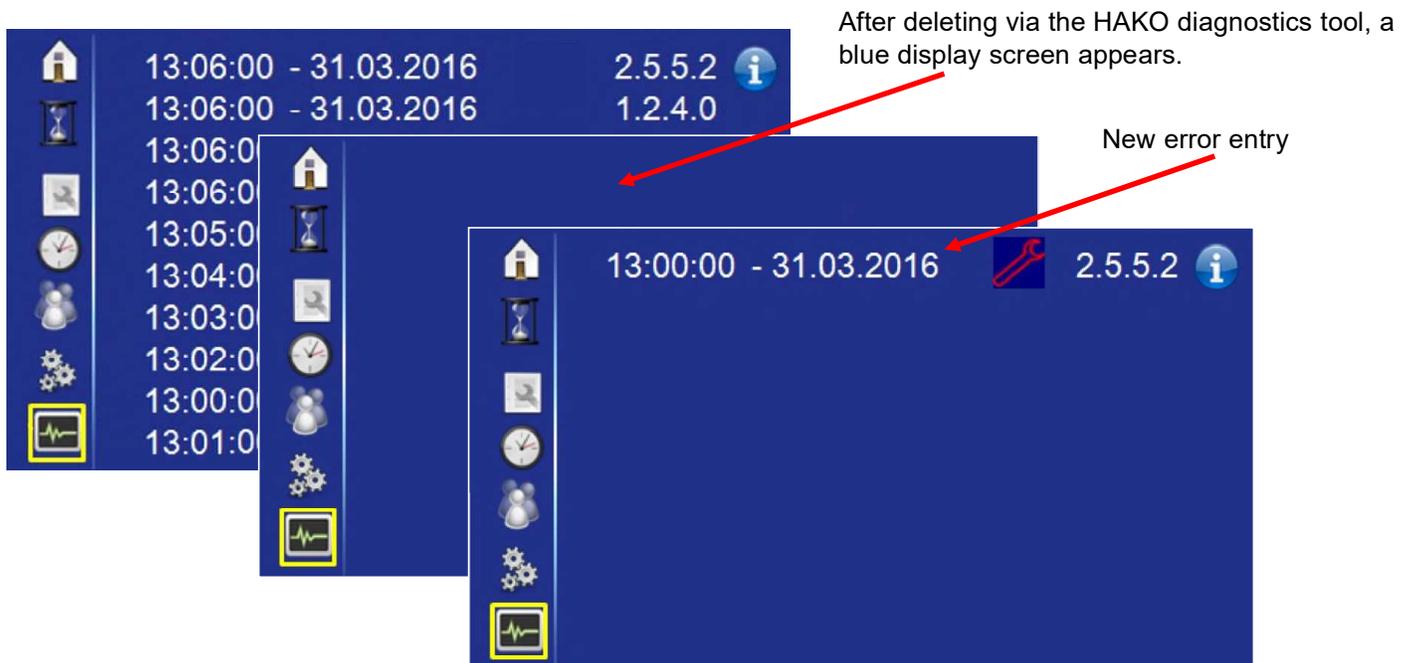


	13:06:00 - 31.03.2016	<b>DEL</b>	2.5.5.2	
	13:06:00 - 31.03.2016		1.2.4.0	
	13:06:00 - 31.03.2016		1.2.4.0	
	13:06:00 - 31.03.2016		2.5.5.2	
	13:05:00 - 31.03.2016		1.2.3.5	
	13:04:00 - 31.03.2016		1.2.3.6	
	13:03:00 - 31.03.2016		2.5.5.2	
	13:02:00 - 31.03.2016		1.2.3.8	
	13:00:00 - 31.03.2016		2.5.5.2	
	13:01:00 - 31.03.2016		1.2.3.9	

## 2.4 Configuration menu

### 2.4.8 Deleting the error entries

- The entries on the display (not the diagnostics memory) can only be deleted via the HAKO diagnostics system.
- New error entries are saved chronologically (last error that occurred is displayed at the top position).



## 2.5 Jacking points

The SCM B260 R has 3 jacking points for a car jack.

The front jacking point is on the left next to the front wheel, close to the working light.



The rear jacking points are located on the right and left next behind the rear wheels.





### **3 Technical data**

The technical data for the individual variants of the SCM B260R model series can be found in chapter 4 of the instruction manual provided with the machine.

## **4. Maintenance intervals**

The Hako system maintenance specifies in single modules the special technical work to be done and the periods of time for the maintenance activities.

Parts to be replaced for the individual maintenance tasks are determined.

More details can be found in the separate maintenance manual, which has document number 88-XX-3192.

## 5. Cleaning programs (FPV)

The cleaning programmes are used to specify the behaviour of the water supply to the brushes, the brush motors in relation to the position of the driving direction switch and the speed control potentiometer (forwards, neutral, reverse) as well as the squeegee.

A GND signal is connected to input A04:A3 of the drive control unit via the speed control potentiometer switch in B03. This is the release signal for the drive control unit. When driving direction forwards is selected on the control panel, this signal is connected to input A04:A1 from A02:X109.3. When reversing is selected, the signal is connected to input A04:A2 from A02:X109.4. If these signals are missing at A04:A1 or A04:A2, the machine will not move.

The “forwards” and “reverse” signals are transferred to the machine control unit via CAN-bus and the cleaning units are therefore activated. The behaviour of the cleaning functions is described in Table 5.1.

In order to select a cleaning programme, you must switch to the programming level as described in Chapter 2.4 Configuration (sub-chapters 2.4.3 and 2.4.4). The available cleaning programmes are listed in Table 5.2.

The so-called “SOW” menu can be activated using setting 3.0.0. This parameter enables settings 3.1.x to 3.D.x. An individual cleaning program with additional functions can be created in this menu. The setting options are listed in Table 5.3.

## 5. Cleaning programs (FPV)

Function \ Content	0	1	2	3	4	5	6
Brush off when drive control is in neutral	<b>SOW</b>	Yes	Yes	Yes	Yes	Yes	Yes
Brush off when drive control is in reverse	SOW	No	No	Yes	No	No	Yes
Lift brush when drive control is in neutral	SOW	No	No	No	Yes	Yes	Yes
Lift brush when drive control is in reverse	SOW	No	No	No	No	No	Yes
Water off when drive control is in neutral	SOW	Yes	Yes	Yes	Yes	Yes	Yes
Water off when drive control is in reverse	SOW	No	Yes	Yes	No	Yes	Yes
Lift squeegee when drive control is in neutral	SOW	No	No	No	No	No	No
Lift squeegee when drive control is in reverse	SOW	Yes	Yes	Yes	Yes	Yes	Yes
Speed dependability is set to active as default, for the SOW adjustments							
Speed reduction when brush on	SOW	No	No	No	No	No	No
Speed reduction when suction on	SOW	No	No	No	No	No	No
Speed reduction when brush and suction on	SOW	No	No	No	No	No	No
Pre Sweep off when drive control is in neutral	SOW	No	No	No	No	No	No

Table 5.1

## 5. Cleaning Programs (FPV)

Chapter	Configuration	Content	Description	B260R
<b>3</b>	<b>0</b>		<b>Adjusted FPV</b>	
3	0	0	SOW Variante (see Configuration 3.1...3.d); see table 5.3	x
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

Table 5.2

## 5.1 Cleaning programs (SOW)

The following settings can only be made if the cleaning program has been set to 3.0.0 beforehand.

Chapter	Configuration	Content	Description	B260R
<b>3</b>	<b>1</b>		<b>SOW: Brush off, when drive pedal neutral</b>	
3	1	0	No	x
3	1	1	Yes	x
<b>3</b>	<b>2</b>		<b>SOW: Brush off, when drive pedal revers</b>	
3	2	0	No	x
3	2	1	Yes	x
<b>3</b>	<b>3</b>		<b>SOW: Lift Brush, when drive pedal neutral</b>	
3	3	0	No	x
3	3	1	Yes	x
<b>3</b>	<b>4</b>		<b>SOW: Lift Brush, when drive pedal revers</b>	
3	4	0	No	x
3	4	1	Yes	x
<b>3</b>	<b>5</b>		<b>SOW: Water off, when drive pedal neutral (only information)</b>	
3	5	1	Yes	x
<b>3</b>	<b>6</b>		<b>SOW: Water off, when drive pedal revers</b>	
3	6	0	No	x
3	6	1	Yes	x

Table 5.3 a

## 5.1 Cleaning programs (SOW)

Chapter	Configuration	Content	Description	B260R
<b>3</b>	<b>7</b>		<b>SOW: Lift squeegee, when drive pedal neutral</b>	
3	7	0	No	x
3	7	1	Yes	x
<b>3</b>	<b>8</b>		<b>SOW: Lift squeegee, when drive pedal revers</b>	
3	8	0	No	x
3	8	1	Yes	x
<b>3</b>	<b>9</b>		<b>SOW: Reduce speed, when brushes on</b>	
3	9	0	No	x
3	9	1	Yes	x
<b>3</b>	<b>A</b>		<b>SOW: Reduce speed, when suction on</b>	
3	A	0	No	x
3	A	1	Yes	d
<b>3</b>	<b>B</b>		<b>SOW: Reduce speed, when brushes and suction on</b>	
3	B	0	No	x
3	B	1	Yes	d
<b>3</b>	<b>D</b>		<b>SOW: pre sweep off, when drive pedal neutral</b>	
3	D	0	No	x
3	D	1	Yes	d

Table 5.3 b

## **6. Machine settings**

### **6.1 Basic settings**

There are different equipment options and working widths within the Scrubmaster B260R machine series. These can be set and adapted in the configuration menu. To check and change the setting, access the configuration menu as described in Chapter 2.4. The possible setting parameters are described in the following chapters.

## **6. Machine settings**

### **6.1 Basic settings**

#### **6.1.1 Cleaning units**

Four different brush units are used with the Scrubmaster B260R.

There are 3 plate brush units; 108 cm with two brush motors, 108 cm with three brush motors and 123 cm with three brush motors; and a cylindrical brush unit with a working width of 108 cm.

This setting is necessary for correct functioning of the overrange limits and water quantities.

To check and change the setting of the cleaning units, proceed as described in Chapter 2.4

Configuration. The possible setting parameters for the working units are specified in Table 6.1.

## 6. Machine settings

### 6.1.1 Cleaning units

Chapter	Configuration	Content	Description	B260R
<b>0</b>	<b>2</b>		<b>Brush decks</b>	<b>1</b>
0	2	8	Cylindrical brush deck 1080mm	x
0	2	9	Plate brush deck 1230mm	x
0	2	A	Plate brush deck 1080mm	d
0	2	B	Plate brush deck 1080mm HD	x

Table 6.1

## **6. Machine settings**

### 6.1.2 Battery and charger settings

In order to achieve optimum service life and performance of the batteries available for the machine, it is necessary to set the battery monitor, called LDS, to the correct battery type.

These settings are carried out in the menu items 0.3.X.

For the SCM B260R no On-Board-Charger is available. Therefore the setting 0.4.X can't be changed. The adjustment for this configuration is set to 0.4.0. – “w/o battery charger”.

## 6. Machine settings

### 6.1.3 Battery settings (LDS)

PzS and PzV are batteries with tubular type plates.

GiV and PzV are encapsulated,  
completely maintenance-free gel batteries.



PzS are sealed, low-maintenance batteries containing liquid electrolyte. Regular checking of the electrolyte as well as topping up with distilled water are required here.

AGM batteries have glass mat separators.

The following designations are also used for monobloc batteries:

GiV = GF-Y; GF-V

PzS = FT

Trough batteries are available in the following versions:

EPzS / EPzB and EPzV

## 6. Machine settings

### 6.1.3 Battery settings (LDS)

Chapter	Configuration	Content	Description	B260R
<b>0</b>	<b>3</b>		<b>LDS Adjustment - Battery-Type</b>	<b>1</b>
0	3	0	Crown w/o Offset	x
0	3	1	Crown	x
0	3	2	GIS, „Foreign“	x
0	3	3	GiS	x
0	3	4	PzS or PzB „Foreign“	x
0	3	5	PzS or PzB	d
0	3	6	GiV	x
0	3	7	PzV	x
0	3	8	AGM - only for Hoppecke batteries	x

Table 6.2

## 6. Machine settings

### 6.1.4 Battery charger

Chapter	Configuration	Content	Description	B260R
0	4		<b>Battery charger and battery types</b>	1
0	4	0	w/o battery charger	d

Table 6.3

## 6. Machine settings

### 6.1.7 Variant All wheel drive (A XC)

The all-wheel drive variant must be activated here if it is present in the machine.

Chapter	Configuration	Content	Description	B260R
0	6		All wheel drive installed	
0	6	0	only front wheel drive	d
0	6	1	Front and rear wheel drive	x

Table 6.4

## 6. Machine adjustments

### 6.1.8 SD storage medium in control panel

This parameter must not be adjusted. Can currently lead to a complete failure of the machine.

A missing SD-card in the dash board, leads to a “Blue-Screen” , that only displays the clock and the software version of the machine control system. The machine is inoperable.

Chapter	Configuration	Content	Description	B260R
<b>0</b>	<b>7</b>		<b>additional memory at the display</b>	
0	7	0	not available	<b>x</b>
0	7	1	available	d

Table 6.5

## 6. Machine adjustments

### 6.1.9 Logo on the start screen

The start logo can be selected here when the machine is switched on. A choice can be made between the "Hako" logo and the "Powerboss" logo.  
 For special customer requirements, a specific logo can be installed and activated via the special workshop.

Chapter	Configuration	Content	Description	B260R
<b>0</b>	<b>8</b>		<b>Logo on the start screen</b>	
0	8	0	Hako	<b>d</b>
0	8	1	PowerBoss	<b>x</b>
0	8	F	Specific Brand (SOW)	<b>x</b>

Table 6.6

## **6. Machine settings**

### **6.2 Customer-specific settings (PPV)**

Different settings can be carried out at the machine using the programmable programme variants.

It can, e.g., be set whether the last error that occurred in the machine is shown when turning on the machine or not.

Check and change the setting as described in Chapter 2.4 Configuration. The possible setting parameters are specified in the following table.

Depending on the software revision of the machine, not all the parameters will be visible or adjustable.

## 6. Machine settings

### 6.2 Customer-specific settings (PPV)

Chapter	Configuration	Content	Description	B260R
<b>2</b>	<b>0</b>		<b>Last error indicator after switching on the machine</b>	
2	0	0	Deactivate	x
2	0	1	Activate	d
<b>2</b>	<b>1</b>		<b>Water level when switching on scrubbing</b>	
2	1	0	Last setting	d
2	1	1	Preset level (4)	x
<b>2</b>	<b>3</b>		<b>Water level when switching on TOOL (menu option only appears when TOOL option is activated!)</b>	
2	3	0	Last setting	d
2	3	1	Preset level (4)	x
<b>2</b>	<b>4</b>		<b>Water amount depending on the speed</b>	
2	4	0	Deactivate	x
2	4	1	Activate	d
<b>2</b>	<b>5</b>		<b>BlueSpot always On (drive pedal neutral)</b>	
2	5	0	Deactivate	d
2	5	1	Activate	x

Table 6.7 a

## 6. Machine settings

### 6.2 Customer-specific settings (PPV)

Chapter	Configuration	Content	Description	B260R
<b>2</b>	<b>7</b>		<b>Silence Mode Setting</b>	
2	7	0	Is not saved	x
2	7	1	Is saved	d
<b>2</b>	<b>8</b>		<b>Acoustic Alarm Tone Interval (menu option only appears when the Acoustic Alarm option is activated!)</b>	
2	8	0	Standard	d
2	8	1	Alternative	x
<b>2</b>	<b>9</b>		<b>Chemical Dosing Adjustment- when machine is switched On</b>	
2	9	0	Last setting	
2	9	1	Preset level (1:75)	
<b>2</b>	<b>B</b>		<b>Highest water stage independent from machine speed</b>	
2	B	0	No	d
2	B	1	Yes	x

Table 6.7 b

## 7. Mechanical components

### 7.1 Squeegee

#### Squeegee connection

**Installation note:**

1. Hook squeegee connection into chassis.
2. Align parallel to floor and tighten bolts.

**Squeegee connection default setting:**

1. For default setting of adjusting bushing see figure 7.1 (dimensions 9 and 8 mm).
2. Screw on the squeegee which is intended for the machine and align via the adjusting bushing so that the sealing strips are vertical against the floor (lift slightly and allow to fall).
3. Align castors using the method shown and adjust them so that they are 7 mm above the ground.
4. If necessary, adjust the squeegee inclination to the ground conditions.

## 7. Mechanical components

### 7.1 Squeegee

#### Squeegee connection

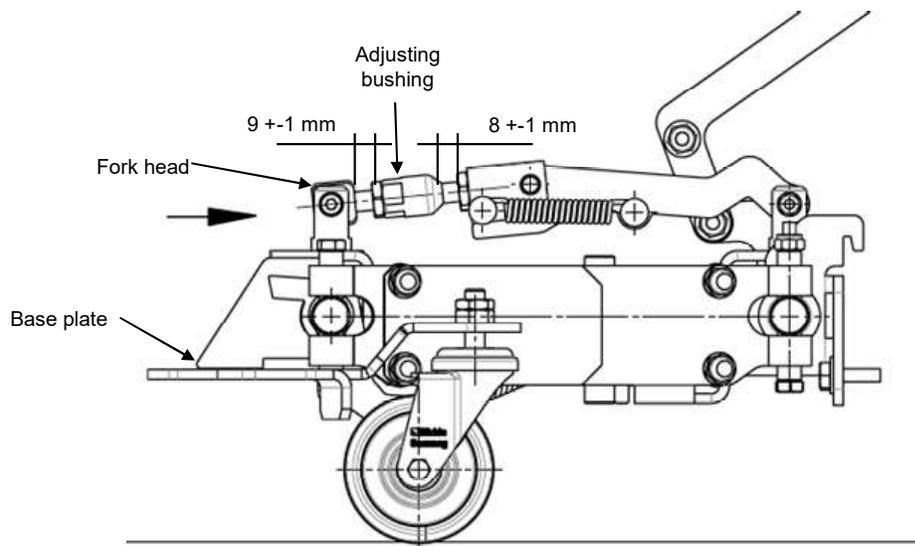


Figure 7.1

## 7. Mechanical components

### 7.1 Squeegee

#### Adjusting the sealing strips / inclination

The correct inclination adjustment is decisive for:

- ensuring that the sealing strips of the squeegee are lying evenly on the ground over their contact surface

- ensuring that the squeegee runs quietly and evenly during the suction process.

1. Place the machine on a level surface and lower the squeegee using the squeegee key figure 7.2b -46.

2. Loosen the lock nuts (figure 7.2a-A) and adjust the squeegee by turning the adjusting bushing (figure 7.2a-B) so that the ends of the sealing strips are just about touching the ground.

#### **Turning the adjusting bushing clockwise:**

The distance between the sealing strip and the ground increases at the ends figure 7.2a.

#### **Turning the adjusting bushing counter-clockwise:**

The distance between the sealing strip and the ground decreases at the ends figure 7.2b.

3. Turn on the machine and check the suction pattern. When driving, the sealing strips must be turned over evenly everywhere (centre and outside).

4. Tighten the lock nuts.

## 7. Mechanical components

### 7.1 Squeegee

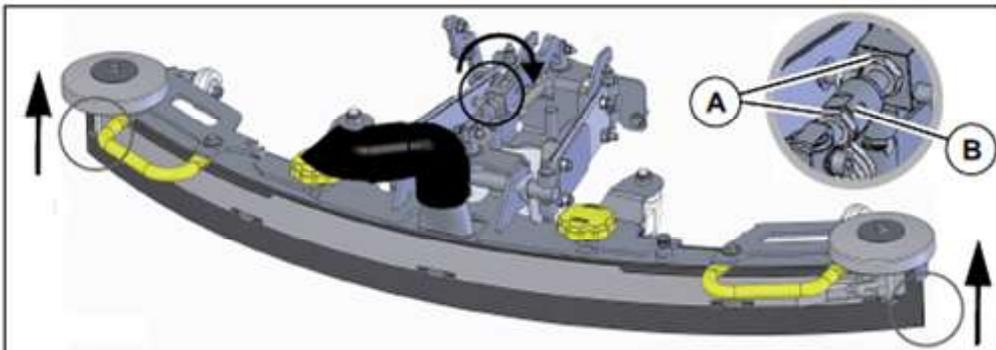


Figure 7.2a

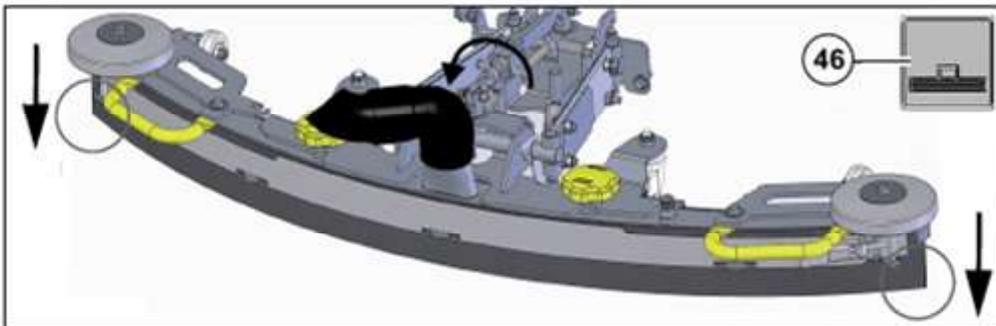


Figure 7.2b

## 7. Mechanical components

### 7.1 Squeegee

#### Height adjustment

The height adjustment (X) of the supporting rollers Fig. 7.4 has been set to 7 mm in the factory. If striping still occurs despite optimum inclination adjustment, readjust the distance between the supporting rollers and the lower edge of the sealing strip.

1. Place the machine on a level surface.
2. Lower squeegee. The sealing strips must now be resting vertically onto the floor.
3. Loosen nuts (figure 7.4 B) and adjust distance between supporting roller and ground as per the table.
4. Tighten nuts.

Distance from floor (X)	Use
<7 mm	Very smooth floor surfaces, e.g. coated screed, PVC, linoleum
<b>7 mm</b>	<b>Standard setting</b>
>7 mm	Very uneven floor surfaces, e.g. poorly laid tiles (water does not drain off)

Figure 7.3

## 7. Mechanical components

### 7.1 Squeegee

#### Height adjustment

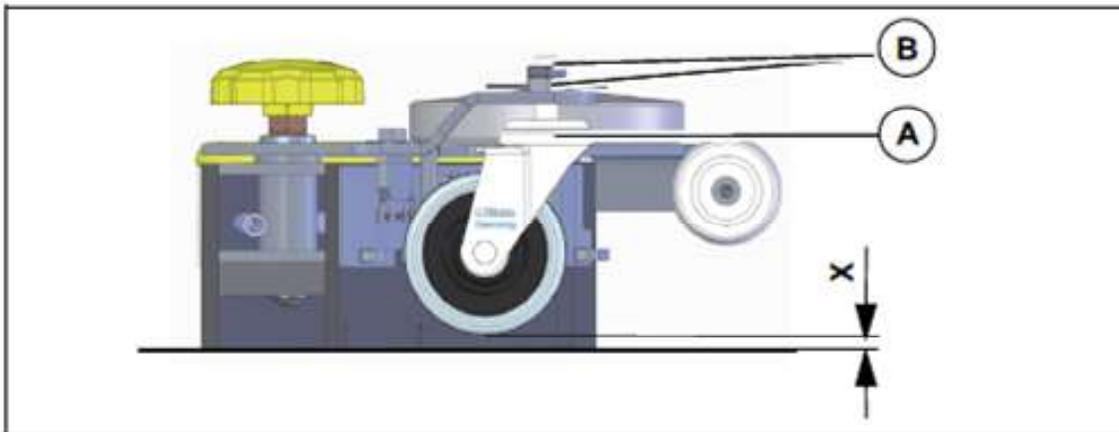


Figure 7.4

## **7. Mechanical components**

### **7.2 Plate brush heads**

Rotating brush heads in 2 working widths are used with the Scrubmaster B260R; 108 cm and 123 cm. The 108 cm brush head is available as a 2 or 3 brush version. Each brush is powered by a separate motor.

The brushes of the rotating brush units all rotate clockwise. This is needed for automatic brush decoupling and automatic threading.

## **7. Mechanical components**

### **7.2.1 Rotating brush heads – contact pressure stages**

The SCM B260R has 3 contact pressure stages for the brush unit.

The brush unit of the 3-disk rotating brush units is relieved using 2 springs in the 1st contact pressure stage (Fig. 7.5 A and B) due to the extent of its own weight.

When the brush unit is removed, ensure that the tension in these springs is relieved beforehand.

An additional spring (Fig. 7.5 C) is tensioned via the lifting element for the 2nd and 3rd contact pressure stage, which also presses the brush head against the ground via a bracket.

## 7. Mechanical components

### 7.2.1 Rotating brush heads – contact pressure stages

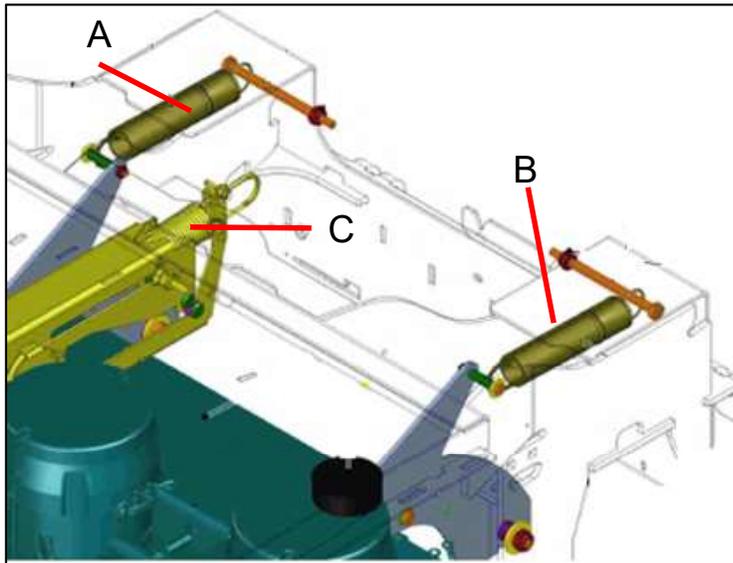


Figure 7.5

## **7. Mechanical components**

### **7.3 Roller brush head**

A unit with a working width of 108 cm is used as the roller brush unit for the Scrubmaster B260R.

The roller brush unit can also be extended with a side brush unit.

Use the guide rail to adjust the dirt hopper so that the brush strip is positioned all-round on the housing and the dirt hopper can still be easily inserted.

Due to the high dead weight of the roller brush deck, it is relieved by 2 springs. (Figure 7.6 A und B). Before the roller brush head can be removed, these springs must be relieved. First loosen the fastening screw of the clamping plate (M8 x 20). Then loosen the springs with the tensioning screw M10 x 150. Now the fixing bolts of the upper rocker can be loosened from the lower rocker (M10 x 30). The springs are tensioned in reverse order. (see Figure 7.7)

The spring in figure 7.6C is used to increase the pressure at the highest pressure level.

## 7. Mechanical components

### 7.3 Roller brush head

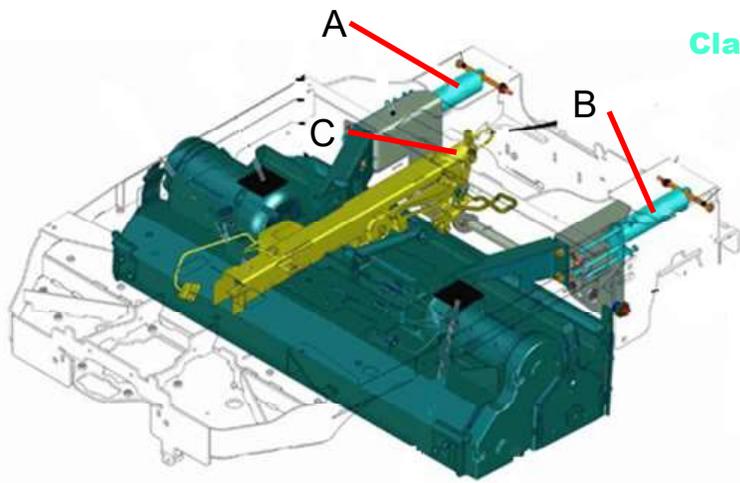


Figure 7.6

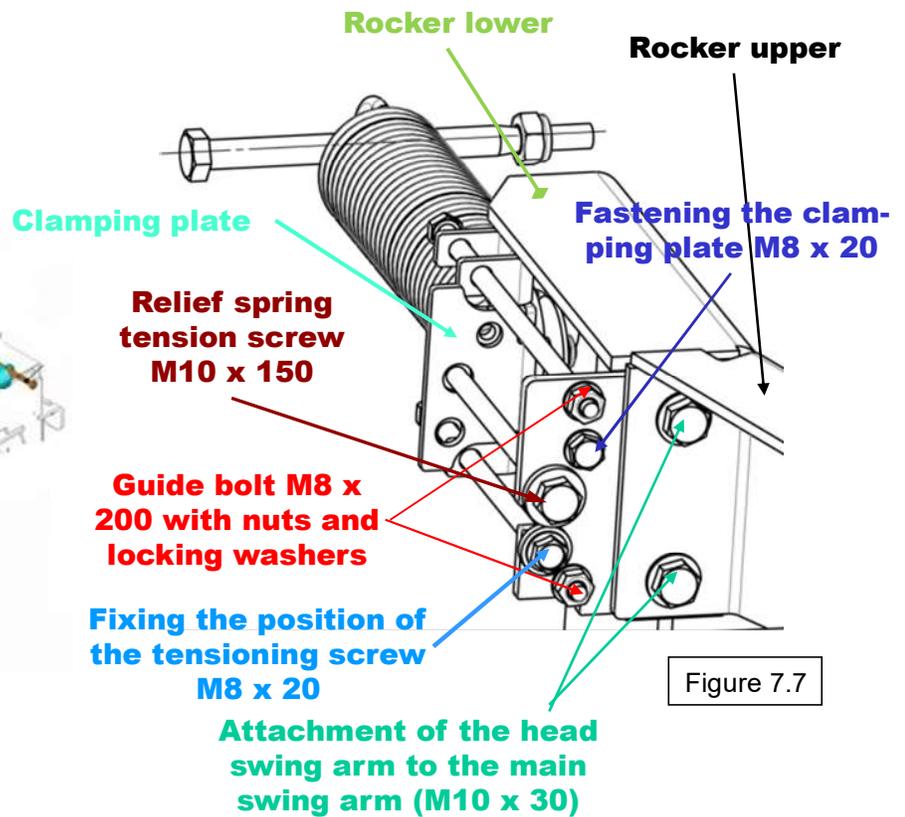


Figure 7.7

## **7. Mechanical components**

### **7.4 Brush head lifting**

#### **7.4.1 Position detection in the brush head lifting element**

The lifting element for the brush head features integrated position detection. The position detection is supplied with 24 V via the machine control unit A01.X13:1 (+) and A01.X13:7 (-). The reference signal for the brush head position can be measured against supply plus or minus at the central control unit at A01.X15:5. This signal must be between 0.3 V and 2.3 V. Voltage values outside this range are detected and output as errors (message 1.2.6.3.). This message is also output if the “ACTUAL” signal of the position detection does not correspond to the “TARGET” value within a defined time.

The power output of the lifting element is A01.X11:1 and 4.

## 7. Mechanical components

### 7.4 Brush head lifting

#### 7.4.2 Replacing the brush head lifting element

When the lifting element is replaced, the spindle must be rotated clockwise by 90° so that it can be secured in the guide.

Since the lifting element is delivered in the extended condition, it may be necessary to extend the lifting element via the control system.

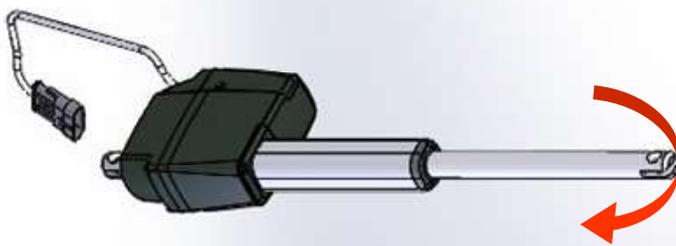


Figure 7.6

## **8. Water pump**

The water pump for supplying the operative units is connected at the central control unit at A01.X12:1 + 11. It is operated via a clocked voltage to deliver different quantities of water for the stages. The voltage values measured here depend on numerous factors; it is therefore not possible to specify exact values. It is decisive that the voltage values differ considerably from the lowest to the highest stage.

Checking of the actual water quantities is preferable.

During the voltage measurement it must be taken into consideration whether the dependence of the water quantity on the travel speed has been activated. This can be activated by the operator in menu item "Maintenance". The values measured with this setting can easily be misinterpreted.

## 8. Water pump

### 8.1 Water quantities

The water quantities in the 5 water stages for the brush units are listed in the following table.

	Water amount (l min <sup>-1</sup> )			
	Plate brush 1080 mm (2-brush)	Plate brush 1080 mm (3-brush)	Plate brush 1230 mm	Cylindrical brush 1080 mm
Stage 1	1.3	1.3	1.3	1.4
Stage 2	2.9	2.9	2.9	2.6
Stage 3	4.2	4.2	4.2	3.8
Stage 4	6.0	6.0	6.0	5.0
Stage 5	6.9	6.9	6.9	5.9

## **8. Water pump**

### **8.2 Water pump standstill detection**

**If the pump cannot convey freely because the water cannot run freely through the hoses to the brush, the so-called water pump standstill detection becomes effective.**

#### **Automatic water pump standstill detection:**

The electronics offers the option to protect the water pump if the pump can no longer convey freely.

This means: If the pump sucks water from the tank but cannot further convey the water to the brushes, pressure builds up behind the pump. Without the protection from the electronics, the pump would now always pump against this pressure and could be damaged.

The electronics detect that the pump cannot deliver freely and automatically switches the pump OFF for 2 seconds.

After these 2 seconds have expired, the pump is briefly switched back on while simultaneously measuring whether the pump can now convey freely again or whether the water supply to the brushes is still blocked.

If the pump can convey freely, it remains switched on in the selected stage.

If there is, however, still counter pressure, the pump is switched off again for 2 seconds.

This is repeated until the error has been eliminated.

## **8. Water pump**

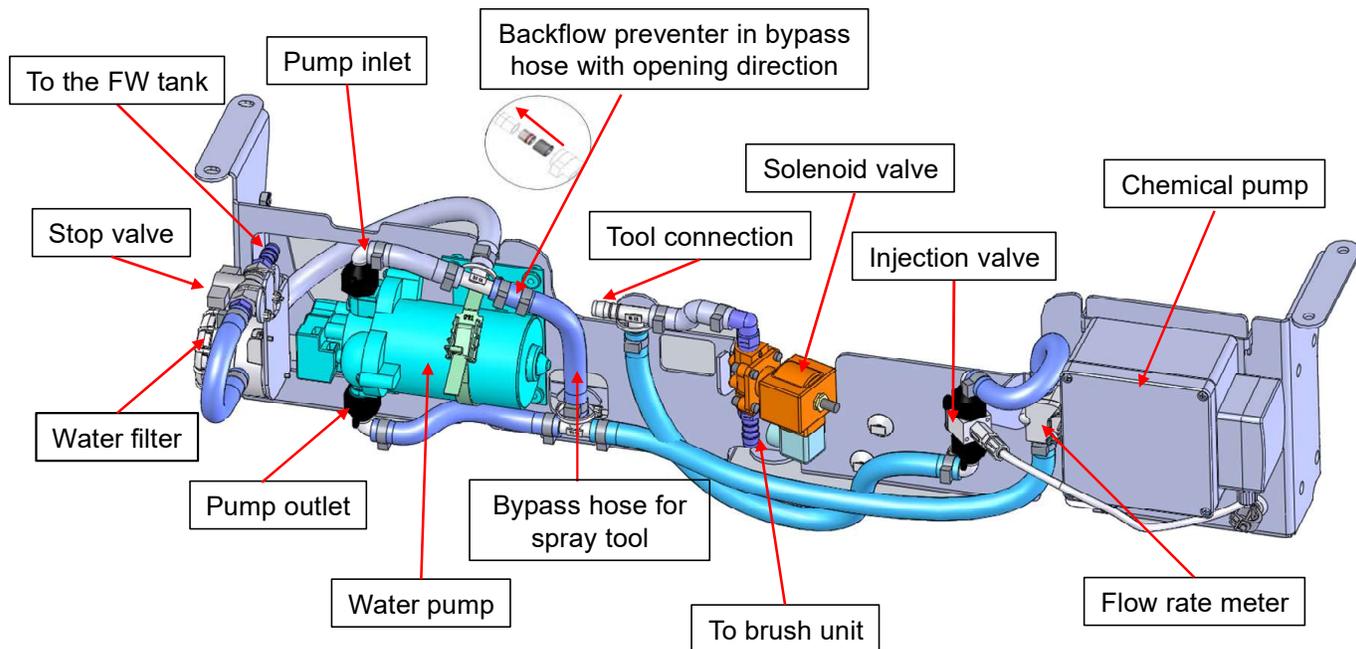
### **8.3 Scrubbing/suction tool and spray tool**

The scrubbing/suction tool and the spray tool are options which can be installed in the machine and then have to be activated in the machine control unit.

The spray tool requires a greater quantity of water so that a sufficient jet of water comes out of the spray nozzle. In order to do this, the water pump is actuated with a high voltage in order to obtain a sufficient delivery quantity. This can lead to the system pressure increasing so much that the solenoid valve is opened by the water pressure. To prevent this, a bypass must be installed between the water pump outlet and the inlet which contains a valve which opens at a pressure of about 2 bar.

## 8. Water pump

### 8.4 Water supply – Position of components on the water plate



## 9. Drive

The drive controls have their own integrated diagnostics and a self-test.

Therefore, the function of the drive control units is blocked when the machine is turned on if the speed control potentiometer is in neutral or is not recognised as being in neutral.

The same behaviour applies after the seat contact switch has opened and is closed again.

The speed control potentiometer must also be in neutral when closing the seat contact switch; or to be more precise: it must be recognised as being in neutral by the drive control.

If the drive control unit does not recognise that the speed control potentiometer is in neutral, it shows flashing signals (LED) at the drive control unit.

These messages are transferred to the machine control unit via the CAN bus, where they are evaluated.

Different drive control units are used for the front and rear wheel drive. These must not be switched round.

## 9. Drive

### 9.1 DMC drive control unit - Front

The DMC drive control unit features a diagnostic input. Unless clearly noted in the service documents, changes to the preset values and parameters is generally **not** permitted. Currently, only the diagnostics with flash codes for the LED indicator is used.

#### 9.1.1 Connection description:

M1; M2; M3 – motor connections

B+; B- – battery power supply

A – control connections (16-pole)

B – programming plug CAN bus (8-pole)

C – motor feedback (6-pole)  
(encoder and temperature)

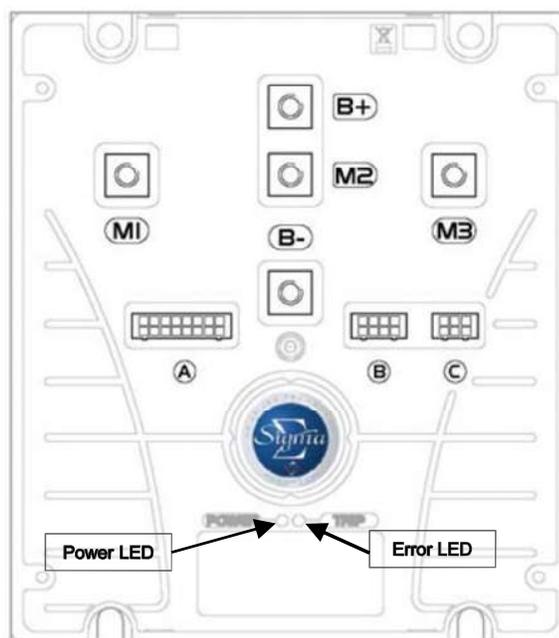


Figure 9.1

## 9. Drive

### 9.1.1 Connection description – drive control unit Front

- A1 – forwards (active when B- is connected) from A02:X109.3
- A2 – reverse (active when B- is connected) from A02:X109.4
- A3 – release for driving from speed control potentiometer switch B03 (active when B- is connected)
- A4 – release from machine control unit (seat contact) (active when B- is present) from A01/X13.11
- A5 – not used
- A6 – with single wheel drive at battery minus via bridge on X11/ not used for all-wheel drive
- A7 – foot brake input from switch S10; if B- is connected, the machine is slowed down until standstill
- A8 – supply speed control B03 (negative)
- A9 – setpoint from speed control B03
- A10 – control voltage from key switch (36V)
- A11 – control power supply for small consumers (max. 3A) (e.g. K02 and brake)
- A12 – main relay release (B-) –K02 – power supply for drive control unit
- A13 – brake release (B-)
- A14 – not used for single wheel drive / safety control from A05:C3 with 4-wheel drive
- A15 – 12 V supply for encoder
- A16 – 5 V supply for speed control B03

## 9. Drive

### 9.1.2 Service codes DMC control unit - Front

Code	Error description	Cause	Remedy
<b>Warning - reduces the output, resets itself (if possible).</b>			
1	Not used	--	--
2	Low voltage	Low battery voltage (<18 V)	Charge the battery
3	Not used	--	--
4	High voltage	High battery voltage (usually during braking) (U> 60 V)	Extreme downwards travel (pay attention to machine specifications) defective battery?
5	Hot drive motor	Vehicle used outside the specification? Is the motor OK?	Let the motor cool down
6	Hot control unit	Vehicle used outside the specification? Are the control unit and cooling OK?	Allow drive control unit to cool down
7	Parameters outside the permissible range	One or several parameters are outside the valid range	Replace the control unit
8	Standard parameters loaded	Standard parameters have been loaded	If error persists, replace drive control unit.

## 9. Drive

### 9.1.2 Service codes DMC control unit - Front

Code	Name	Description	Remedy
<b>Drive error faults -Commences gracefull neutral brake - requires a neutral recycle action to reset fault</b>			
9	Memory chip fault	Memory not accessible	Internal voltage <12V; replace Drive Control Unit
10	2 directions active	forward and Reverse direction active	Check the wiring of the direction switch (-A02.X6 and -A04.A1/A2)
11	Seat switch not closed or timed out	No release signal from Machine Control Unit	Check the wiring from -A01.X13:11 to -A04.A4 (should be connected to battery minus)
12 S01	Wrong Power Up sequence	Forward, Reverse or FS1 (-A04.A3) active before key switch on	Pay attention to the starting sequence: key switch / seat switch, direction switch, potentiometer switch.
12 S02	Wrong Power Up sequence	Rear Controller Anti Roll back at ramp and active brake	Check the EM brake of the rear axle
12 S03	Wrong Power Up sequence	Rear controller micro switch on EM brake is active	Check deactivation of rear motor EM brake
13	Accelerator signal is active at Power Up	Speed signal is >50% at power up	Check potentiometer and it's wiring
14	CAN-Bus	Stop via CAN	Machine Control unit send Stop Signal via CAN-Bus. e.g. machine locked, by open seat contact.

## 9. Drive

### 9.1.2 Service codes DMC control unit - Front

Code	Name	Description	Remedy
<b>Soft error faults - immediately stops pulsing - Requires a neutral recycle action to reset fault</b>			
15	Low voltage	internal 12 V supply too low	Check charging level of the battery
16	Not used	--	--
17	Low voltage	Battery voltage too low	Check charging level of the battery
18	High Side Mosfet short circuit	Short circuit to battery plus	Check Motor insulating; Faulty Drive Control Unit.
19	Front Controller has no error, but rear controller has a fault	--	Check service message of the rear controller

## 9. Drive

### 9.1.2 Service codes DMC control unit - Front

Code	Name	Description	Remedy
<b>Hard Error Faults - Immediately stops pulsing and open line contactor - Cannot be reset (only by a key switch recycle)</b>			
20	Hardware over current trip	Motor Over current	Check Motor and Motor wiring
21	Contactor Coil driver fault	Coil of Line Contactor or Magnetic Brake short circuit	Check Line contactor (-K02) and Magnetic Brake(-M01)
22	Battery Voltage is too high	Voltage > 67V	Excessive downhill ride?
23	Mosfet short circuit in neutral	Low side Mosfet short circuit in neutral position	Check Motor Insulation, if OK, replace drive Control Unit
24	Hardware Fail safe fault	Hardware safety problem	Check wiring. Replace Drive Control Unit.
25	Line Contactor failure	Relais Contacts of -K02 are not closed within it's time Specification	Check the wiring of the line contactor (-K02) Battery Voltage too low? E-stop in Key switch circuit is active Difference in the voltage between A04.B+ and A04.A10 during start up check Open circuit from B+ to B- (Fuse -F03)

## 9. Drive

### 9.1.2 Service codes DMC control unit - Front

Code	Name	Description	Remedy
<b>Hard Error Faults - Immediately stops pulsing and open line contactor - Cannot be reset (only by a key switch recycle)</b>			
26	Not used	--	--
27	Mosfet shortcircuited to battery minus	Mosfet shortcircuited to battery minus before Line Contactor is closed; Motor wiring is interrupted	Check insulating of the motor. If ok, replace the Drive Control Unit; Check the wiring between Drive control unit and Motor for continuity
28 S01	Wire off	Motor Phase Connection	Check Wiring -A04 <=> -M01
28 S02	Wire off	Magnetic Brake short circuit	Check Wiring
28 S03	Wire off	Magnetic Brake wire off	Check Wiring
28 S04	Wire off	Speed sensor wire off	Check Wiring
28 S05	Wire off	Accelerator Wire off	Check Wiring of Hall Sensor -B03
28 S06	Wire off	Motor Thermistor Wire off	Check Wiring

## 9. Drive

### 9.1.2 Service codes DMC control unit - Front

Code	Name	Description	Remedy
<b>Hard Error Faults - Immediately stops pulsing and open line contactor - Cannot be reset (only by a key switch recycle)</b>			
<b>29</b>	<b>CAN Error Front</b>		<b>Only in 3WD</b>
29 S01	CAN Error	Front controller Timeout	Check CAN-Bus connection between front and rear controller
29 S02	CAN Error	Front controller security bit error	Check CAN-Bus connection between front and rear controller
29 S03	CAN Error	Timeout Front Controller and Machine controller	Check CAN-Bus Drive controller front and machine control unit
29 S04	CAN Error	Data error machine control unit	Check CAN-Bus Drive controller front and machine control unit
29 S05	CAN Error	Data error machine control unit	Check CAN-Bus Drive controller front and machine control unit
30	Over speed	Overspeed or Speed sensor failure	Check the speed sensor

## 9. Drive

### 9.1.3 Brake – manual release of brake - front

In order to also move the machine without a power supply (no battery installed or other drive problems), the magnetic brake can be released manually.

In order to push the machine, carry out the following steps:

1. Loosen the bolts of the cover to the drive using the supplied socket wrench and remove the cover.
2. Remove the pin **Fig. 9.2-A** from the holder and screw it into the ring **Fig. 9.2-B**.
3. In order to unlock the parking brake, slightly pull the pin upwards **Fig. 9.2-C** and simultaneously push the machine.
4. Disassembly is in reverse order.

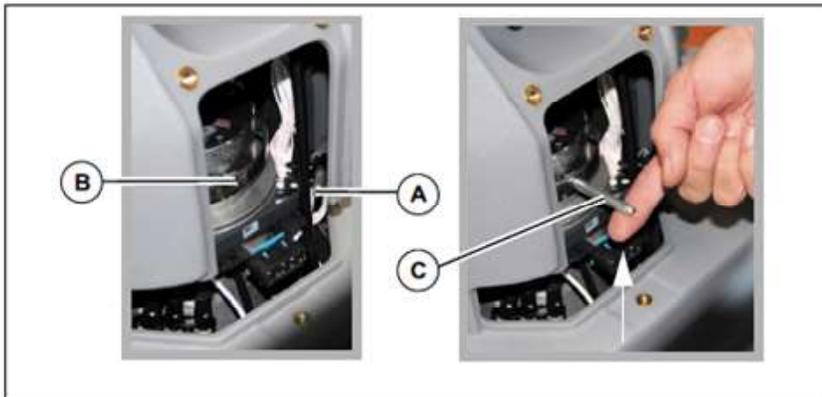


Figure 9.2

## **9. Drive**

### 9.1.4 Brake – checking the brake function

The brake must be capable of stopping the machine on a level road within 0.19 m per km/h.

At a maximum speed of 8 km/h, this means that the maximum braking distance must not exceed 1.52 m. Check this after carrying out work at the brake system and as part of regular maintenance.

This value must be achieved when actuating the brake tip switch S10.

The service brake function of the SCM B260R is exclusively realised via the drive control.

The magnetic brake on the motor is merely the parking brake.

## 9. Drive

### 9.2 DMC drive control unit - Rear

The communication between the drive control unit Front (-A04) and the drive control unit Rear (-A05), is only via CAN-Bus. The two drive control unit have different parameter sets, Therefore the never have to be exchanged.

#### 9.2.1 Connection description:

M1; M2; M3 – motor connections

B+; B- – battery power supply

A – control connections (16-pole)

B – programming plug CAN bus (8-pole)

C – motor feedback (6-pole)  
(encoder and temperature)

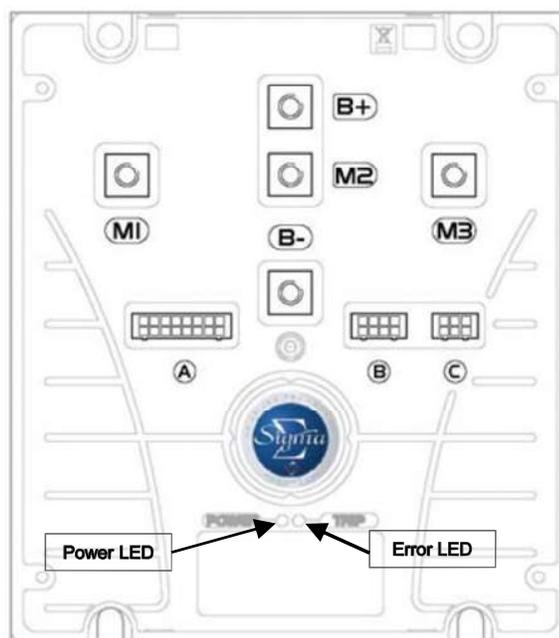


Figure 9.3

Slide 90

## 9. Drive

### 9.2.1 Connection description – drive control unit Rear

A1 – not used

A2 – not used

A3 – not used

A4 – release from machine control unit (seat contact) (active when B- is present) from A01/X13.11

A5 – not used

A6 – micro switch from magnetic brake;

Drive control unit is deactivated, if the brake is manually released (signal from –A05.A11 – 36V)

A7 – not used

A8 – supply steering angle sensor R20 (negative)

A9 – setpoint from steering angle sensor R20

A10 – control voltage from key switch (36V)

A11 – control power supply for small consumers (max. 3A) (e.g. K03 and brake)

A12 – main relay release (B-) –K03 – power supply for drive control unit

A13 – brake release (B-)

A14 – not used

A15 – 12 V supply for encoder

A16 – 5 V supply for steering angle sensor R20

## 9. Drive

### 9.2.2 Service codes DMC control unit - Rear

Code	Name	Description	Remedy
<b>Controller warning faults - Reduces only performance - Fault will reset itself (if possible)</b>			
1	Not used	--	--
2	Low Voltage	Low Battery voltage (U < 18V)	Charge battery
3	Not used	--	--
4	High Voltage	High Battery Voltage (typically during braking) (U > 60V)	Defective Battery? Excessive downhill ride?
5	Drive Motor overheated	Machine is used outside it's specification?	Cool down the drive motor
6	Drive Control Unit overheated	Machine is used outside it's specification? Cooling of the Drive Control Unit ok?	Cool down the Drive Control Unit
7	Parameters out of specification	One or more parameters out of it's specification	Replace the Drive Control Unit
8	First Power Up	Default parameters restored in FRAM	If permanent error, replace Drive Control Unit

## 9. Drive

### 9.2.2 Service codes DMC control unit - Rear

Code	Name	Description	Remedy
<b>Drive error faults -Commences gracefull neutral brake - requires a neutral recycle action to reset fault</b>			
9	Memory chip fault	Memory not accessible	Internal voltage <12V; replace Drive Control Unit
10	2 directions active	Forward and Reverse direction active	Check the wiring of the direction switch (-A02.X6 and -A04.A1/A2)
11	Seat switch not closed or timed out	No release signal from Machine Control Unit	Check the wiring from -A01.X13:11 to -A05.A4 (should be connected to battery minus)
12	Wrong Power Up sequence	Forward, Reverse or FS1 (-A04.A3) active before key switch on	Pay attention to the starting sequence: key switch / seat switch, direction switch, potentiometer switch.
13	Accelerator signal is active at Power Up	Speed signal is >50% at power up	Check potentiometer and it's wiring
14	Not used	--	--

## 9. Drive

### 9.2.2 Service codes DMC control unit - Rear

Code	Name	Description	Remedy
<b>Soft error faults - immediately stops pulsing - Requires a neutral recycle action to reset fault</b>			
15	Low voltage	internal 12V supply too low	Check charging level of the battery
16	Safety line error	Drive control rear is ok	Error from drive control front; (-A04.A14 => -A05.C3)
17	Low voltage	Battery voltage too low	Check charging level of the battery
18	High Side Mosfet short circuit	Short circuit to battery plus	Check Motor insulating; Faulty Drive Control Unit.
19	Not used	--	--

## 9. Drive

### 9.2.2 Service codes DMC control unit - Rear

Code	Name	Description	Remedy
<b>Hard Error Faults - Immediately stops pulsing and open line contactor - Cannot be reset (only by a key switch recycle)</b>			
20	Hardware over current trip	Motor Over current	Check Motor and Motor wiring
21	Contactor Coil driver fault	Coil of Line Contactor or Magnetic Brake short circuit	Check Line contactor (-K03) and Magnetic Brake (-M02) and it's wiring
22	Battery Voltage is too high	Voltage > 67V	Excessive downhill ride?
23	Mosfet short circuit to Batt minus	Low side Mosfet short circuit in neutral position	Check Motor Insulation, if OK, replace drive Control Unit
24	Hardware Fail safe fault	Hardware safty problem	Check wiring. Replace Drive Control Unit.
25	Line Contactor failure	Relais Contacts are not closed within it's time Specification	Check the wiring of the line contactor (-K03) Battery Voltage too low? E-stop in Key switch circuit is active Difference in the voltage between -A05.B+ and -A05.A10 during start up check Open circuit from B+ to B- (Fuse -F04)

## 9. Drive

### 9.2.2 Service codes DMC control unit - Rear

Code	Name	Description	Remedy
<b>Hard Error Faults - Immediately stops pulsing and open line contactor - Cannot be reset (only by a key switch recycle)</b>			
26	Not used	--	--
27	Mosfet shortcircuited to battery minus	Mosfet shortcircuited to battery minus before Line Contactor is closed; Motor wiring is interrupted	Check insulating of the motor. If ok, replace the Drive Control Unit. Check the wiring between Drive control unit and Motor for continuity
28 S01	Wire off	Motor Phase Connection (Rear)	Check Wiring -A05 <=> -M02
28 S02	Wire off	Magnetic Brake short circuit (Rear)	Check Wiring
28 S03	Wire off	Magnetic Brake wire off (Rear)	Check Wiring
28 S04	Wire off	Speed sensor wire off (Rear)	Check Wiring
28 S05	Wire off	--	--
28 S06	Wire off	Motor Thermistor Wire off (Rear)	Check Wiring
<b>29</b>	<b>CAN Error Rear</b>		<b>Only in AWD</b>
29 S01	CAN Error Rear	Rear controller Time Out	No response from Drive control; Check wiring of CAN
29 S02	CAN Error Rear	Rear controller security bit error	Check the CAN-Bus
30	Overspeed	Overspeed or sensor fault	Check Parameters and the speed sensor

## 9. Drive

### 9.2.3 Brake at rear-wheel drive

If the machine has an X-AC drive, the rear wheel brake must also be unlocked. To do so, push the lever at the rear on the right side of the machine, figure 9.4 -A from right to left until it engages. Indication appears on the multifunction display Fig. 9.4 -B when the rear wheel brake is taken out of service. The machine can no longer be driven! Disassembly is in reverse order.

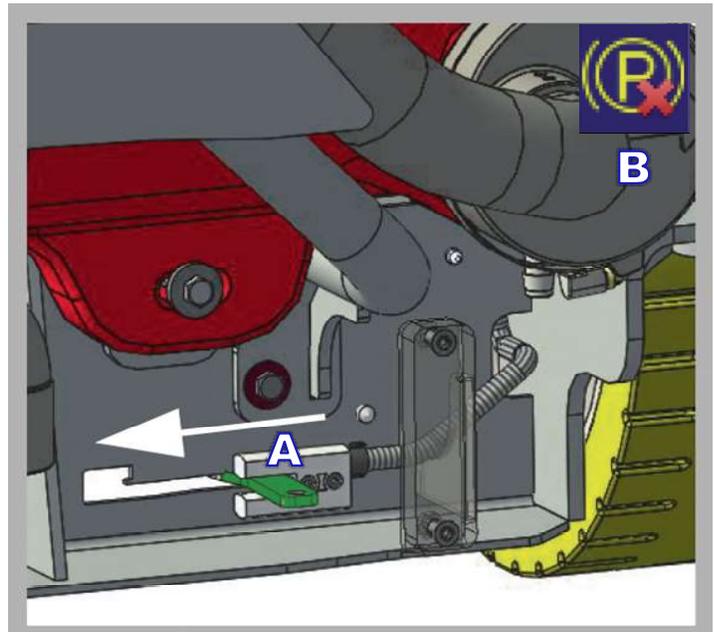


Figure 9.4

## **9. Drive**

### 9.2.4 Steering angle sensor

In All wheel drive mode, the speed of the rear axle has to be adapted to the steering angle of the front wheel drive.

For this reason a rotary sensor is installed at the front wheel drive. After the sensor is replaced, the sensor may need accurate adjustment.

The procedure is described on the following page.

Figure 9.5 indicates the positions of all components; Table 9.1 is a list of this components.

## 9. Drive

### 9.2.4 Steering angle sensor

#### Steps for adaption of the steering angle sensor (PN 01372660) to the drive motor (PN 01371270)

##### Instruction

Bring the front wheel to center position.

Install the bushing pos. 100 in the Flange plate.

Put the shaft pos. 20 in the bushing pos. 100.

Align the key groove of the shaft transverse to the driving direction.

Press the washer pos.150; spur gear pos.110 und washer pos.170 to the shaft. (with a threaded rod or a long screw)

Fit screw pos.130 and washer pos.180. (with threadlocker e.g. Loctite 243) (Tightening torque 9.3 Nm)

Install the feather key pos.200 and grease the upper end of the shaft as a corrosion protection. (e.g. Mobilgrease MB2 )

Install the potentiometer (PN 01372660) at the Base plate (Pos. 10) and screw together. Attention!

Install the sensor shaft in center position (2.5 turns in both direction possible)! Tightening torque 1,5 Nm.

Install the base plate (pos.10) with the potentiometer and fix it with the screw pos.120. (with threadlocker e.g. Loctite Tightening torque 9.3 Nm)

Check Ohms resistance at Pin 2 and Pin 3 of the plug of the potentiometer (2,5 kOhm)

# 9. Drive

## 9.2.4 Steering angle sensor

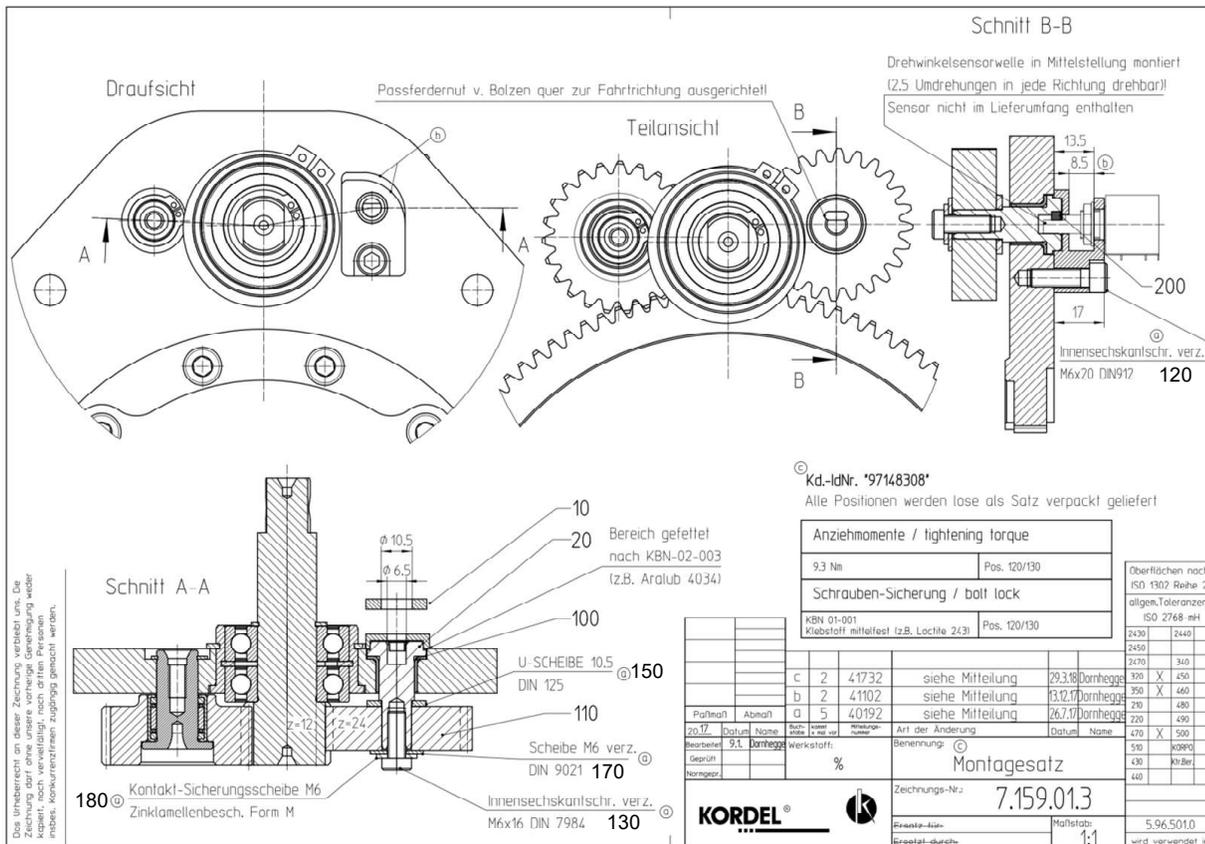


Figure 9.5  
Slide 100

## 9. Drive

### 9.2.4 Steering angle sensor

#### Parts List

Pos	Kordel-No.	Description	Description 2	Amount	Length	Unit
10	71.0565.4	Base plate sensor		1	0	Pc.
20	64.0402.4	Shaft		1	0	Pc.
100	143 1214121	Flange bushing	Normal	1	0	Pc.
110	164 0000178	Spur gear	M =2 / Z = 24	1	0	Pc.
120	307 0602041	Screw M6x20 DIN 4762	8.8 Verzinkt	1	0	Pc.
130	309 0601641	Screw M6x16 DIN 7984	8.8 Verzinkt	1	0	Pc.
150	400 0105201	Washer 10.5 DIN 125	Verz.	1	0	Pc.
170	406 0064000	Washer 6.4 DIN 9021		1	0	Pc.
180	413 0006315	Lock Washer 6	ZK. LAM. Form M	1	0	Pc.
200	440 0300800	Feather key A 3x3x8 DIN 6885		1	0	Pc.

Table 9.1

## 10. Service messages

Service-Code	Description	Remedy
1.2.5.1.	Thermo switch brush motor 1 (left)	Check current consumption of brush motor (-M03) and wiring of the thermo switch
1.2.5.2.	Thermo switch brush motor 2 (right)	Check current consumption of brush motor (-M04) and wiring of the thermo switch
1.2.5.3.	Thermo switch brush motor 3 (center)	Check current consumption of brush motor (-M05) and wiring of the thermo switch
1.2.6.1.	Brush motor 1 (left) overload	Short circuit in the brushmotor (-M03) or in it's wiring; Brush motor overload
1.2.6.2.	Brush motor 3 (center) overload	Short circuit in the brushmotor (-M05) or in it's wiring; Brush motor overload
1.2.6.3.	Lifting element brush deck	Overload of the brush deck lifting element or short circuit
1.2.6.8.	Brush motor 2 (right) overload	Short circuit in the brushmotor (-M04) or in it's wiring; Brush motor overload
1.4.6.1.	Lifting element squeegee	Overload of the squeegee lifting element; short circuit
1.4.6.3.	Blocking protection Suction motor 1	Short circuit in the suction motor (-M16) or in it's wiring
1.4.6.4.	Blocking protection Suction motor 2	Short circuit in the suction motor (-M17) or in it's wiring
1.5.5.1.	Malfunction Filling sensor solution tank	Sensor value out of it's range; recalibrate the sensor (See chapter 2.2.2)

## 10. Service messages

Service-Code	Description	Remedy
2.2.5.1.	Thermo switch broom motor	Current consumption broom motor and wiring thermo switch (option pre sweep)
2.3.5.1.	Thermo switch side broom motor left and right	Current consumption side broom motors and wiring thermo switches (option side broom)
2.3.6.1	Blocking protection side broom motor left and right	Short circuit in the side broom motors or in it's wiring (option side broom)
2.3.6.4.	Blocking protection side broom lifting element	Lifting element side broom overloaded (option side broom)
3.1.1.2.	Fleetrekorder communication interruption	Check wiring between machine control unit and Fleetrecorder (CAN-Bus)
3.1.6.E.	Power fuses (group signal)	Check fuses on the -A01 board, The voltage between -A01.X1 and -A01.X2 is insufficient
3.2.6.5.	Backup battery weak	Replace backup battery; Type CR2032
3.2.6.6.	Backup battery empty	Replace backup battery; Type CR2032
3.3.1.1.	Service intervall expired	Reset the service intervall with the Hako diagnosis

## 10. Service messages

Service-Code	Description	Remedy
3.3.1.5.	SD-Card on the Display	Re format the SD-card with the diagnosis system, if error repeats, replace the SD-card with a new one
3.3.6.2.	Group signal low power output overload	Overload of small consumer outputs (e.g. buzzer, magnetic valve. Etc.)
3.4.1.1.	Malfunction drive control unit	Check wiring of the accelerator -B03 and direction switch; Message is generated by the operator panel (-A02)
3.4.1.2.	Malfunction drive control unit front	see blinking code on drive control unit
3.4.1.4.	Malfunction drive control unit rear	see blinking code on drive control unit
3.4.5.1.	over temperature drive motor front	check the wiring of the drive motor thermo switch. Is the machine used outside it's specification?
3.4.5.2.	over temperature drive motor rear (Option All-Wheel-Drive)	Check the wiring of the drive motor thermo switch. Is the machine used outside it's specification?
3.6.6.4.	Seat contact switch manipulation	See chapter 2.2.3.

## 10. Service messages

No.	Service-Code	Description	Remedy
29	4.1.3.1.	Communication problem drive control unit front	CAN-Bus-error between machine control unit and drive control unit (-A01 => -A04)
30	4.2.1.4.	Communication problem Chemical Dosing Unit	CAN-Bus-error between machine control unit and Chemical Dosing (-A01 => -A10)
31	4.2.3.1.	Communication problem drive control unit rear	CAN-Bus-error between machine control unit and drive control unit (-A01 => -A05)
32	4.3.2.1.	Communication problemSlave modul	CAN-Bus-error between machine control unit and slave control unit (-A01 => -A06)
32a	4.4.2.1.	Communication problemSlave modul	CAN-Bus-error between machine control unit and slave control unit (-A01 => -A06)
33	4.5.2.5.	Display communicatin problems	Communication between display and control unit interrupted (message is generated by the display) during switch on of the machine. This has the same meaning like the "Loading Screen"
34	4.5.3.5.	Display communicatin problems	Communication between display and control unit interrupted (message is generated by the display). Appears during operation of the machine.

## 10. Service messages

Service-Code	Description	Remedy
4.6.1.2.	Internal malfunction of machine control unit	Replace the control unit (-A01)
4.6.1.3.	Malfunction of internal software	Replace the control unit (-A01)
5.2.6.1.	LDS related malfunction; Battery voltage	Working functions are inhibited. Machine can be moved to charging station with reduced speed.
7.1.5.1.	USB-Output low voltage	Short circuit at the output; Overload of the USB Output

# 10. Service messages

## 10.1 Meaning of different switch on displays

	<p>1.) Display at missing SD-Card in Dash board (Blue-Screen with time and Servicecode)</p>
	<p>2.) Display, when the operating system at the machine control system is missing, isn't started or the CAN-connection between machine control unit and dash board is interrupted ( permanent ).</p>
	<p>Both: 1.) and 2.) did occur. (Blue-Screen)</p>
	<p>3.) A SD-Card was inserted in the dash board. This SD-Card contains a wrong image file, the SD-Card was formatted or the SD-Card is defect. Different display messages are possible.</p>



## **10.2 Service alarm clock – 3.3.1.1**

The service alarm clock is set via the Hako diagnostic system.

## **11 Charger**

The battery of the SCM B260R is charged using an external charger. Information about the charger settings and the charging and service information can be found in the charger documentation. The chargers that are available for this machine can be found in the current price list.

## 12. Options

Both factory and field options are available for the Scrubmaster B260R series. The factory options are only available for new machines ex factory. The field options can be retrofitted in the machines.

The parameters for the options that require a release via the machine's control system are specified in Table 12.1.

These options include (all options are only available with the latest software version. Update the machine software to the latest version if necessary):

- Silence Kit (suction turbine speed reduction – activated as standard)
- Visual and acoustic warning signal
- Chemical dosing
- Scrubbing-suction tool
- Front-mounted sweeper attachment
- Working light
- Fleet-Recorder
- Side brush unit (only for the roller brush unit)
- Flashlight on a pole / on the roof
- Spray tool / spray nozzle
- Blue Spot

## 12. Options

To adjust and check these values, access the programming level as described in Chapter 2.4 and enable the options.

The “silence kit” is the default setting in all machines, but can be deactivated.

The mechanical installation of the field options, if necessary, is described in the supplied instructions for these field options.

The warning signal and Blue Spot options and the pre-sweep unit and the side brush system cannot be activated in a machine simultaneously.

This means: When the Blue Spot system is activated, a previously active warning signal is automatically deactivated and vice-versa.

The pre-sweep unit and the side brush system behave in the same way.

## 12. Options

Chapter	Configuration	Content	Description	B260R
<b>1</b>	<b>0</b>		<b>Silence-Kit</b>	
1	0	0	not available	x
1	0	1	available	d
<b>1</b>	<b>1</b>		<b>Warning Signal (Optical and acoustical)</b>	
1	1	0	not available	d
1	1	1	available	x
<b>1</b>	<b>2</b>		<b>Chemical Dosing Agent</b>	
1	2	0	not available	d
1	2	1	available	x
<b>1</b>	<b>3</b>		<b>TOOL</b>	
1	3	0	not available	d
1	3	1	available	x

## 12. Options

Chapter	Configuration	Content	Description	B260R
<b>1</b>	<b>4</b>		<b>Pre Sweep Unit</b>	
1	4	0	not available	d
1	4	1	available	x
<b>1</b>	<b>6</b>		<b>Working Headlight</b>	
1	6	0	not available	d
1	6	1	available	x
<b>1</b>	<b>7</b>		<b>Fleetrecorder</b>	
1	7	0	not available	d
1	7	1	available	x
<b>1</b>	<b>8</b>		<b>Side Broom</b>	
1	8	0	not available	d
1	8	1	available	x

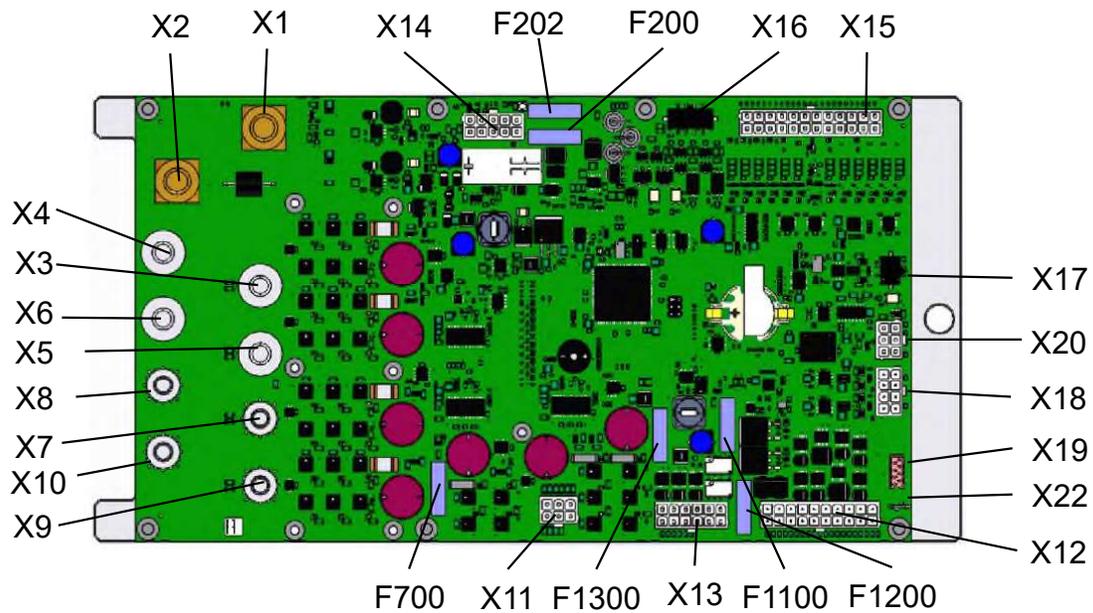
## 12. Options

Chapter	Configuration	Content	Description	B260R
<b>1</b>	<b>9</b>		<b>Second Suction Motor - only informative</b>	
1	9	1	available	d
<b>1</b>	<b>A</b>		<b>Warning Beacon on Pole</b>	
1	A	0	not available	d
1	A	1	available	x
<b>1</b>	<b>B</b>		<b>TOOL - Spinkle Nozzle (for cleaning of the recovery tank)</b>	
1	B	0	not available	d
1	B	1	available	x
<b>1</b>	<b>C</b>		<b>BlueSpot</b>	
1	C	0	not available	d
1	C	1	available	x

## 13. Electrical components

### 13.1 Machine controller A01 and slave machine controller A06

Position of connections and fuses on machine controller A01 and A06



## 13. Electrical components

### 13.1 Machine controller A01 and slave machine controller A06

Nominal current strengths of the fuses and protected outputs

Fuses A01:	F200 – 3 A/80 V	Control voltage plus
	F202 – 3 A/80 V	Control voltage minus
	F700 – 25 A/80 V	Lifting elements and side brushes – X11.1/4;2/5;3/6
	F1100 – 10 A/80 V	Small load 36 V – X12.3/13;4/14;5/15;6/16;7/17;8/18;9/19;10/20
	F1200 – 10 A/80 V	Water pump – X12.1/11
	F1300 – 10 A/80 V	Small load 24V - X13.1/7;2/8;3/9

Fuses A06:	F200 – 3 A/80 V	Control voltage plus
	F202 – 3 A/80 V	Control voltage minus
	F700 – 25 A/80 V	
	F1100 – 10 A/80 V	
	F1200 – 10 A/80 V	
	F1300 – 10 A/80 V	

## 13. Electrical components

### 13.1 Machine controller A01 and slave machine controller A06

#### Connectors on the machine control unit A01

Connectors A01:	X1 / X2	Main Power supply plus and Minus from F02
	X3/4 & X5/6	Power output brush motor 1 & 2 (M03 & M04)
	X7/8 & X9/10	Power output suction motor 1 & 2 (M16 & M17)
	X11 (6-pole)	connector lifting element squeegee and brush aggregat; Side broom motors
	X12 (20-pole)	small load output
	X13 (12-pole)	24V output; X13.1/7 – power supply position recognition lifting element brush aggregat; X13.10/11 Relaiscontact enable drive control units
	X14 (10-pole)	Input control voltage X14.1/6; output Main contactor X14.2 USB- Socket X14.3/4/8/9 5V-supply solution tank filling level sensor X14.5
	X15 (24-pole)	Analogus und digital inputs
	X18 (8-pole)	CAN-Bus connections
	X20 ( 6-pole)	Serial connector for communication Fleetrecorder
	X22 (1-pole)	VGND

## 13. Electrical components

### 13.1 Machine controller A01 and slave machine controller A06

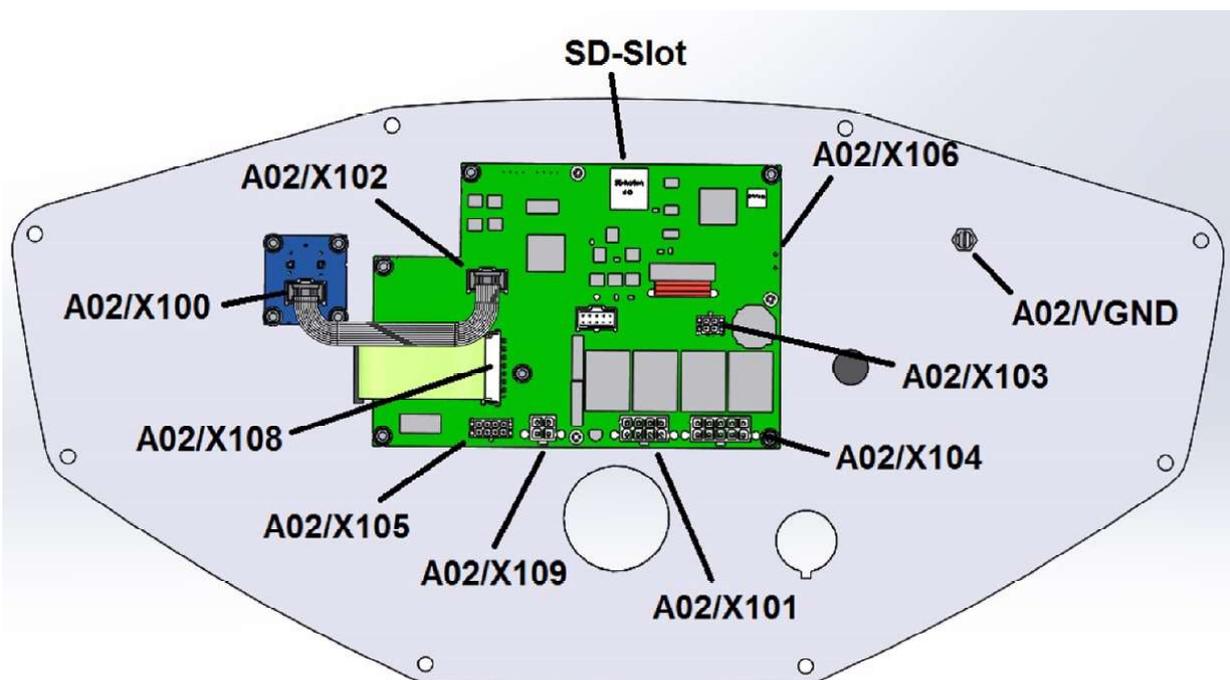
#### Connectors on the machine control unit A06 (slave)

Connectors A06:	X1 / X2	Main Power supply plus and Minus from F06
	X3/4	Power output brush motor 3 (M05)
	X14 (10-pole)	Input control voltage X14.1/6 (an F200 & F202); output Main contactor K06 (X14.2)
	X15 (24-pole)	Thermo switch M05 (X15.11/23)
	X16 (8-pole)	Coding Slave (X16.1/5)
	X18 (8-pole)	CAN-Bus connector, X18.1 - CAN1 H; X18.5 – CAN1 L
	X22 (1-pole)	VGND

## 13. Electrical components

### 13.2 Dash board A02

Position of connectors on Dash board A02



## 13. Electrical components

### 13.2 Dash board A02

#### Description of the connectors on A02

Connectors A02:	X100	Turn-Push-button (DDS)
	X101 (8-pole)	Control voltage
	X102	Connector Turn-Push-Button (DDS)
	X104 (10-pole)	potential free Relais contacts – Chemical dosing (X104.8), horn (X104.10), change over working headlight (X104.1) Machine (X104.2) / pre sweep (X104.3)
	X105 ( 8-pole)	CAN-Bus connection CAN1H (X105.1) / CAN1L(X105.2)
	X106 (1-pole)	VGND-connection to A02.VGND and Chassis
	X109 (4-pole)	direction switch



## 14. Notes