

ELECTRICS
documentation
BW 154 AP – 4i
BW 174 AP – 4i
BW 174 AP – 4f
BW 174 AP/AC – Hybrid

- Version 2.03 -

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2 Confirmation of changes

2.1 Document

No.	Date	Description of changes	resp.
1.00	01/06/2015	Creation of version 1.00	
2.00	18/09/2017	Creation of version 2.00	Fondel
2.01	06/03/2019	Hybrid version added	Weinheimer

2.2 Software

Vers.	Date	Description of changes	resp.
1.08	01/06/2015	Latest version	

1. *Only the most important software changes are listed here. A detailed breakdown can be found in the corresponding software change report.

3 Displayed monitoring activities with fault reactions

Reaction Signal	Symbol on fault indicator	Warning Code output without buzzer	Warning Code output with buzzer	Engine stop Code output with buzzer
Engine oil pressure			5112	5112
Coolant filling level			5024 after 5 s	5025 after 10 s
Engine air filter			5026 after 5 s	
Water separator in fuel filter			5028 after 5 s	
Coolant temperature 1			5116	
Hydraulic oil filter		5500 after 5 s		5501 after 300 s
Hydraulic oil temperature			5504 after 20 s	5505 after 120 s
Seat contact			1300	
Seat position			1310	
Arm rest, left			1320	

4 Known faults

Despite the fault monitoring of inputs and outputs on the ESX control, the ESX control is not able to detect all faults. The following list contains a selection of known fault reactions of the control, which mostly have a different cause to the one described in this documentation.

Effect:	Cause:	Remedy:

5. How to proceed when replacing components?

Each machine of the product family BW 154 and BW 174 is individually adjusted during initial commissioning. This adjustment or teaching process is necessary to make sure that the travel and steering functions are almost identical on all machines. The basis for these adjustment procedures are the tolerances of the components used, e.g. hydraulic pump for travel system, proportional valves for steering, steering angle sensors and ESX control. These tolerances apply to both mechanical and electrical functions and are unavoidable for manufacturing reasons.

To enable simple and quick adjustment procedures we have decided to do without expensive tools. All you need is this manual. By following the described procedure, it is possible to put a machine back into operation after the replacement of one of the components specified above and to re-establish the usual functional quality with almost no previous knowledge. Even an incorrectly or incompletely conducted teaching procedure can be repeated without any issues as often as necessary.

5.1 How to proceed when replacing an ESX control (A34)?

Since the control stores all teach values of the machine, each teaching procedure must be performed with the new control after a replacement.

Important! Before carrying out one of the following steps, the machine type may have to be set first (see section 6.3)!

However, if the correct machine type is displayed after initial start-up, skip this step.

When changing the machine type, all previously made settings will be lost!

Depending on the equipment status and manufacturing date of the machine, it may be necessary to make all or some of the following settings in order to prepare the control:

- Set the type of chip spreader (see section 6.10).
- Set the edge cutter (see section 6.11).

For the performance of teaching procedures, the following sequence has been found to be most effective:

- Automatic determination of surge currents on steering valves (see section 6.7)
- Calibration of the angle transducers (see section 6.5)
- Automatic detection of surge currents in the travel system (see section 6.8)

5.2 How to proceed when replacing a data collector module (A 80)?

The data collector module requires teaching after replacement. The following sequence is to be followed:

The engine must not be running and the selector switch S 159 must be in service position.

1. Use code **9999** to change to Service mode.
2. Enter code **8887** to enable it.
3. Enter code **8889** to teach the module.
4. Restart the machine.

5.3 How to proceed when replacing a travel pump?

- Automatic detection of surge currents in the travel system (see section 6.8)

5.4 How to proceed when replacing a steering valve?

- Automatic determination of surge currents on steering valves (see section 6.7)

5.5 How to proceed when replacing a steering angle sensor?

- Adjustment of the angle transducers (see section 6.6)
- Calibration of the angle transducers (see section 6.5)

Note: Calibration of angle transducers must always be performed for both body bolsters.

5.6 Which components can be replaced without a subsequent adjustment procedure?

- Speed sensor
- All switches in the dashboard
- Travel lever (S 55)
- BLM IO module (A 70)
- Seat position switch (B 178, B 179)
- Steering setpoint transmitter (A 45)
- Vibration pump (Y 56, Y 57)
- Vibration motors
- Travel motors
- Diesel engine
- Steering cylinders, if the steering angle transducer has not been removed.
- Gear pumps for steering/charge system

Note: A final function test of the complete machine is highly recommended.

5.7 Software update

If the BMESX control of the machine works with a software later than version 1.00, observe the following process:

1. Connect the diagnostics cable to the machine and programming computer.
2. Switch on the ignition, the diesel engine must not run!
3. Choose the software and use the flash tool to install it on the machine.
4. After a successful flashing process switch the ignition off.
5. Switch on the machine; the first boot process after the update may take a little longer, because it may be necessary to write new parameters.
6. Run a function test of the machine.

No further settings/parametrization required.

6. Functions of the ESX control

6.1 General display functions and operation

Apart from its normal display function, the LCD display is also able to show fault codes, previously represented by means of the 3-digit fault code display.

Currently existing faults and warnings are indicated by flashing. If several faults are detected, the displayed fault codes will change in a 3 second cycle.

Display values are permanently displayed, whereby values from **0000** to **9999** are possible. Negative values are identified by a “minus sign”.

The following section describes the operation of the LCD screen via the travel lever buttons.

6.1.1 Calling up service mode

For this purpose the display must be switched via input mode to service mode. This is accomplished using the **two yellow** info buttons “INFO 1” and “INFO 2” on the back of the travel lever. Navigation in input and service mode takes place using the green buttons on the front and the blue buttons on the back of the travel lever.



The travel lever must be in locked braking position in order to activate input mode! Input mode is switched on by simultaneously pressing both INFO buttons for a period of approx. 3 seconds.

6.1.2 Entering input codes

Input mode starts with flashing of the left digit. Here you have the possibility to switch to service mode using access code “**9999**”. The green buttons can be used to increase or reduce the values of the corresponding digit. Using one of the blue buttons, you can move to the next digit (left or right). Once the last right hand digit has been entered, the code is transferred to the control by pressing the right hand blue button once again.

If the access code has been entered correctly, the “spanner” icon is displayed and the first input digit flashes again. Individual operating states of the machine can now be requested by transferring the input code to the control (as described above).

By pressing both INFO buttons again for approx. 3 seconds, another input code can be entered. Service mode is quit by entering code “**0000**” or by switching the ignition off.

If the travel lever is shifted out of the brake lock while in service mode, all machine functions will be reactivated with the exception of the LCD screen, which remains in service mode and continues to display the operating values requested last.

6.2 Driving against the closed brake

To enable testing of brake efficiency according to the relevant standard, the valve plug must **not** be pulled off the brake valve on this machine, as the control would in this case detect a line interruption in the current path to the brake.

In order to conduct this test the code number **0500** must be entered at the display module. Entering the code number stops the brake from releasing.

If the travel lever is now moved, the travel pump is operated in accordance with the selected travel direction. At the same time the display module shows the measured control current for the travel pump.

In order to terminate this function and release the brake, you must either enter code number **0501** or switch the ignition off.

Training course for BW 154/174 AP – 4i/f**6.3 Setting the machine type**

Since the same control can be used for all pivot steered tandem rollers, the machine type must be set to the right one during the initial installation or in case of a replacement. This setting of the machine type is necessary, as although the functions of the machines are identical, the valves, hydraulic pumps, hydraulic motors, etc. are not. When setting the machine type, all settings required for the respective machine type are made.

For easier control of the set machine type, this appears on the display for 3 seconds whenever the ignition is switched on. The following table shows the assignment of the various machine types to the machine codes.

The range of serial numbers must be strictly observed!

Machine type	First serial number	Last serial number	Machine type code
BW 154 AP 4i	101 870 65 1001	101 870 67 xxxx	7320
BW 154 ACP 4i	101 870 67 1001	101 870 66 xxxx	7321
BW 154 APO 4i	101 870 16 1001	101 870 16 xxxx	7322
BW 154 AP 4i AM	101 870 64 1001	101 870 60 xxxx	7325
BW 154 ACP 4i AM	101 870 66 1001	101 870 62 xxxx	7326
BW 174 AP 4i	101 870 76 1001	101 870 76 xxxx	7352
BW 174 AP 4i	101 870 91 1001	101 870 91 xxxx	7352
BW 174 AP 4i	101 870 93 1001	101 870 93 xxxx	7352
BW 174 AP 4f	101 870 95 1001	101 870 95 xxxx	7353
BW 174 ACP 4f	101 870 58 1001	101 870 58 xxxx	7354
BW 174 ACP4i AM	101 870 56 1001	101 870 56 xxxx	7356
BW 174 AP 4i AM	101 870 75 1001	101 870 75 xxxx	7357
BW 174 AP 4i AM	101 870 90 1001	101 870 90 xxxx	7357
BW 174 AP 4i AM	101 870 92 1001	101 870 92 xxxx	7357
BW 174 AP 4f AM	101 870 94 1001	101 870 94 xxxx	7358
BW 174 ACP 4f AM	101 870 57 1001	101 870 57 xxxx	7359
BW 174 APO 4i	101 870 17 1001	101 870 17 xxxx	7360
BW 174 APO 4f	101 870 18 1001	101 870 18 xxxx	7361
BW 174 AP hyb AM	101 870 38 1001	101 870 38 xxxx	7385
BW 174 ACP hyb AM	101 870 39 1001	101 870 39 xxxx	7386

Do not operate a machine with incorrect type setting, because this could lead to unacceptably long braking distances and very abrupt movements!
After replacing a control, always compare the machine type set on the control with the actual machine type and correct the setting, if required!



Note:	Parameters can only be configured when the engine is not running!
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Note:	This function can only be activated/deactivated when the travel lever is locked in the brake gate. (→ Input mode)
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The following procedure must be used for initial start-up of a control:

- The control has been installed in the machine.
- Switch the ignition on. Approx. 4 seconds after switching on, the letters **C O D E** are displayed for a period of approx. 3 seconds. After this the display changes and shows code **7 3 0 0**.
- Use the Arrow Up or Arrow Down keys to select the correct machine code from the list of codes.
- Confirm the selection with the Arrow Right key.
- After a period of approx. 7 seconds, the set machine code, e.g. **7357**, is displayed for approx. 3 seconds. The new parameters are loaded according to the machine type setting. **Do not switch the ignition off during this time!**
- After this switch the ignition off and on again to accept the configuration.
- After this the normal display will appear again.

The following applies to a correction of the machine type code after it has been set.

- Enter code number **9 9 9 9** (activation of service mode).
- Enter code number **7 0 1 0**. This code number activates the function “set machine type”.

The display module now permanently shows the code **7 3 0 0**.

- Select the machine code from the table above and confirm it with the Arrow Right key. The control switches itself off and on again automatically after confirming with the Arrow Right key.
- Use the Arrow Up or Arrow Down keys to select the correct machine code from the list of codes.
- After a period of approx. 7 seconds, the set machine code, e.g. **7 3 5 7**, is displayed for approx. 3 seconds. The new parameters are loaded according to the machine type setting. **Do not switch the ignition off during this time!**
- After this switch the ignition off and on again to accept the configuration.
- After this the normal display will appear again.

Attention:	A machine must not be operated with incorrect type settings, as the proper functioning of the control system is otherwise not guaranteed!
	New controls are delivered with a default machine type setting 7 3 0 0. This does not enable driving or steering of the machine. It only serves the purpose of commissioning.

6.4 Setting the cross-slope sensor

In order to ensure correct working of the machine, the cross-slope sensor must be correctly set before commissioning. For this purpose the machine must be parked on horizontal ground.

- If necessary, use code **9 9 9 9** to set the machine to Service mode
- Enter code number **1 2 6 0** to display the cross-slope sensor value.
- Now the cross-slope sensor must be mechanically adjusted, until the display shows the value "0".
A tolerance of +/- 10 is in this case permissible.

6.5 Calibration of the angle transducers

In order to ensure correct steering of the machine, both angle transducers for front and rear drums must be calibrated. This calibration is only required during initial commissioning in the factory, after a service during which the angle transducers have had to be disassembled or replaced, or after the replacement of the ESX control.

Calibration of angle transducers must be performed as follows:

- The driver's seat must face towards the dashboard!
- For the following steps, the steering mode selector switch may be set to either one of the steering modes "steering front" or "steering rear". If another steering mode is selected, the "calibration of angle transducer" function will not be activated. If the "calibration of angle transducers" function is active and a steering mode other than the ones specified above is selected, the "calibration ..." function will be aborted! In this case the whole configuration procedure must be repeated!
- The machine must not be driven during the calibration process.
- If necessary, use code **9999** to set the machine to Service mode
- Enter code number **2010**. This code number is used to activate the "calibration of angle transducer" function; the display will permanently show the value **2010**. This code number **must** be entered to perform the following steps.
- Important: For the input of the corresponding position code, the travel lever must be engaged in the brake lock!
- In order to steer to any position the travel lever must be shifted out of the brake lock.

Calibrating the front stops:

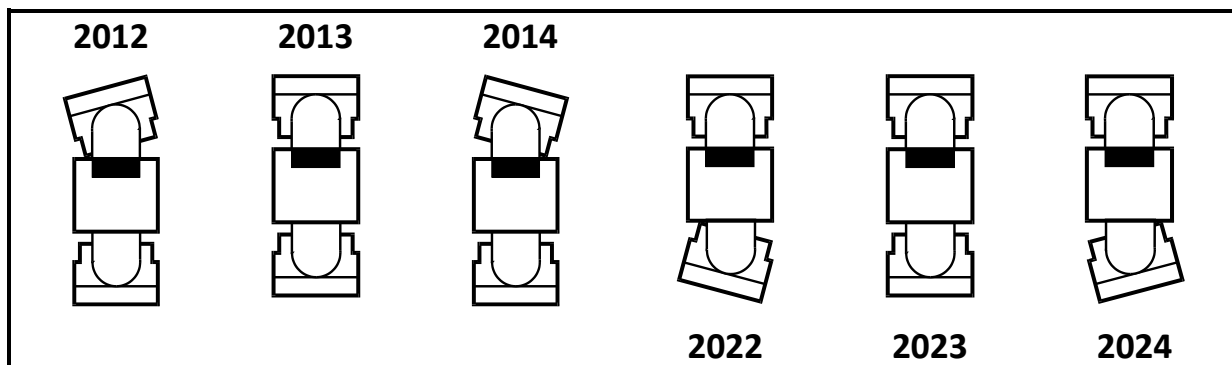
- Steer the front drum against the left hand stop. Once the left hand stop of the front drum is reached enter code number **2012**; the display then permanently shows the value **2012**.
- Steer the front drum against the right hand stop. Once the right hand stop of the front drum is reached enter code number **2014**; the display then permanently shows the value **2014**.

Calibrating the rear stops:

- Steer the rear drum against the left hand stop. Once the left hand stop of the rear drum is reached enter code number **2022**; the display then permanently shows the value **2022**.
- Steer the rear drum against the right hand stop. Once the right hand stop of the rear drum is reached enter code number **2024**; the display then permanently shows the value **2024**.

Calibrating the straight ahead position:

- Steer the front drum to straight ahead position. Once the straight ahead position of the front drum is reached enter code number **2013**; the display then permanently shows the value **2013**.
- Steer the rear drum to straight ahead position. Once the straight ahead position of the rear drum is reached enter code number **2023**; the display then permanently shows the value **2023**.



If a value is calibrated that is not within the tolerance range of the respective position, the value **9999** will be output after entering the corresponding position code. Correction is possible.

Once all positions have been actuated and all codes have been entered, the “calibration of angle sensors” function is automatically finished. The new values will only become valid after restarting the machine.

If the “calibration of angle transducers” function is to be terminated prematurely, you must either enter code number or switch the ignition off. In this case the whole configuration procedure must be repeated!

Note: You must always calibrate both drums!
The new values will only become valid after restarting the machine!

6.6 Adjusting the angle transducers

To ensure that the position detection of the steering works optimally, the angle transducers of the front and rear drum must be adjusted. This adjustment determines the position of the angle transducers to the body bolster. The angle transducers only need to be adjusted during initial commissioning in the factory or after a service during which the angle transducers were disassembled or replaced. The adjustment of angle transducers is performed as follows:

- Steer both drums to “straight ahead position”. For this step the angle transducers must have already been calibrated, as otherwise “straight ahead position” cannot be reached. See also **Calibration of angle transducers** on page 15.
 Note: In order to adjust both drums to straight ahead position, switch off the crabwalk (green indicator goes out) and change from steering mode “front steering” to “rear steering” and back to “front steering” **while** the machine is moving. This makes use of the automatic zero position of the drums when changing the steering mode. During the changeover, steering is not allowed and it must be ensured that the automatic zero positioning of the drums has been carried out. Afterwards, do not steer, stop the machine and switch off the engine.
- For the following steps you must **shut the engine down** and switch the ignition off.
- If necessary, use code **9 9 9 9** to set the machine to Service mode
- Enter code number **2 0 3 0** to adjust the front angle transducer. The displayed value should be between **1 1 7 0 0** and **1 2 3 0 0**, the ideal value would be **1 2 0 0 0**. If the value is outside this range, the angle transducer needs to be adjusted. For this purpose loosen the fastening screws in the slots of the transducer and turn the angle transducer until the value is inside the required range. If the adjustment range in the slotted holes is not sufficient, the coupling between the transducer and body bolster must be released and also turned. Once the angle transducer has been adjusted retighten all screws and check the display value again!
- Enter code number **2 0 4 0** to adjust the rear angle transducer. The displayed value should be between **1 1 7 0 0** and **1 2 3 0 0**, the ideal value would be **1 2 0 0 0**. If the value is outside this range, the angle transducer needs to be adjusted. For a description of the adjustment procedure please refer to the previous item.
- After the adjustment of one or both angle transducers, the angle transducers **must** be calibrated again. See also **Calibration of angle transducers** on page 15.

Note: Even if only one of the angle transducers have been adjusted, both transducers must be calibrated again! See also section 6.5.

Training course for BW 154/174 AP – 4i**6.7 Automatic detection of surge currents on steering valves**

To enable a sensitive and exact function of the steering the surge currents of the four control solenoids and both steering valves must be measured. The surge currents are automatically adjusted after entering a code number so that no ammeter is required.

The surge currents must only be adjusted during initial commissioning in the factory, after a service during which the control on a steering valve or the complete steering valve has been replaced and after the replacement of the ESX control.

The measurement is identical for all four solenoids:

Example BW 174 AP-4i

After entering the respective code number the current is increased by the control solenoid in 5 mA increments, starting from 750 mA. After each increase, the system waits for 2 seconds. If a change in drum angle is measured after the waiting time, the surge current is reached. In order to enhance the measuring result this measurement is performed three times. The final surge current is the mean value of these three measurements. This surge current is automatically stored and is valid from the next start of the machine.

For all other machine types the same procedure is used, however, currents and times will vary. Before the measurement, it is essential to ensure that the steering is “bled”, as an air cushion in the steering cylinders would have a negative effect on the measurement and therefore on the steering performance of the machine. Sufficient bleeding is achieved by performing a few quick steering movements from end stop to end stop at full engine speed.

The automatic measurement of the steering valve surge currents is performed as follows:

- The brake must be released!
- The engine must run at full speed!
- If necessary, use code **9999** to set the machine to Service mode

Enter code number **2000**. This code number is used to activate the “automatic measurement of steering valve surge currents” function; the display then prompts you to enter the start code.

- Code no. **2001** starts the automatic detection of surge currents.
- Front and rear surge currents are detected successively.
- During the measurement the actual current is displayed (display value in mA).
- **Caution! During the measurement the respective drum cannot be steered!**
- **Do not drive while the measurement is in progress!**
- Once the measurement is completed the display will show the value **OK** or **1111** for 5 seconds, followed by the code number **0000**. Once the four surge currents have been measured the machine must be shut down in order to switch off the “automatic measurement of steering valve surge currents” function. The new surge current values are valid from the next start.

Note: **During the measurement, the machine needs to be parked on level ground.**
 Before the measurement both drums need to be steered to straight ahead position.

6.8 Automatic detection of surge currents in travel system

For a sensitive and exact function of the travel system the surge currents in the travel system must be determined for both travel directions. The surge currents are automatically determined after entering a code number so that no ammeter is required.

The surge currents must only be determined during initial commissioning in the factory, after a service during which the control of a travel pump or the complete travel pump has been replaced and after the replacement of the ESX control.

The measurement follows the same pattern to either travel direction: after entering the corresponding code number, the current applied by the triggering magnet of the travel pump is increased in 5 mA increments, starting with 250 mA. After each current increase the system waits for 3 seconds. If a considerable drum movement is measured during the waiting time, the surge current is reached. In order to enhance the measuring result this measurement is performed three times. The final surge current is the mean value of these three measurements. This surge current is automatically stored and is valid from the next start of the machine.

Before the measurement, it is essential to ensure that the machine is parked on level ground and has a sufficient distance for movement forwards and backwards, as the machine will move to the respective direction during measurement.

Caution! First set the machine to input mode (code “9999”). Make absolutely sure that the speed sensor (in front right hydraulic motor) is working correctly. For a function test enter code number **1106** at the display module. This code can be used to display the number of path pulses from the speed sensor. The displayed value must change when the machine is driven.

If this value does not change even though the machine is moving, the measurement must not be performed!

The speed sensor must first be restored to its proper condition, otherwise the movement of the drum cannot be detected. (See also: “Resetting the surge currents in the travel system”)

Caution! During the measurement the machine will move when the surge current is reached! Do not leave the machine while the measurement is in progress! During the measurement keep an eye on your environment! To stop the machine reset the travel lever to neutral position!
--

The automatic measurement of the travel system surge currents is performed as follows:

- The speed selection switch **must** be in position ECO.
- If necessary, enter code number “9999” to access service mode.
- Then enter **1090**. This code number activates the “automatic detection of surge currents in the travel system” function; the display now shows “0000” with the first digit flashing. This code number **must** be entered to perform the following steps. **From this point the machine can no longer be operated with the travel lever! The travel lever will only function again after the teach function has been completed or the machine has been restarted.**
- The measurements (forward/reverse) must be started by entering a code number. The code number required to teach the travel direction is as follows:

Determination of control surge currents	1091
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- After the input of the above code number, the display shows “F O R W”. Shifting the travel lever forwards starts the first surge current measurement for forward travel.
- During the measurement, the actual current is displayed (display value = current in mA).
- Once the surge current measurement is finished, the display will show **OK** for a period of 5 seconds.

- After this wait time the display reading changes to “**B A C K**”. Now shift the travel lever backwards to start the surge current measurement in reverse.
- During the measurement, the actual current is displayed (display value = current in mA).
- After completion of the measuring process in reverse the display will show **O K** again.
- The travel lever must now be returned to braking position.
- Once both surge currents have been learned correctly and the travel lever is in “braking position”, the display shows the reading “**D O N E**”, the values are saved and the function is completed. Now the machine can be operated again with the travel lever. The new surge current values for the travel system are valid from the next machine start-up.
- The teach function can at any time be aborted by operation of the emergency stop or the ignition switch.

6.9 Fault log – displaying and deleting

Switch on the “show stored faults” function:

- Enter code number **0700** (! **WITHOUT** service code **9 9 9 9**). This code number enables the “show stored faults” function.

The faults stored in the BMESX are displayed in flashing mode. If several faults are stored, these are successively displayed in cycles of 3 seconds. After the last fault has been displayed, the first fault will appear again. If no faults are stored in the BMESX, the display will show “-----”.

The fault log can alternatively also be displayed with code 0705.

- Enter code number **0705** (! **WITHOUT** service code **9 9 9 9**). This code number enables the “show stored faults” function. The first saved fault is displayed. You can now navigate through the fault log by just using the green “Up” and “Down” buttons. Once the last saved fault is reached, the system will jump back to the first saved fault. When actuating the blue button on the left, the system will display the frequency of the respective fault; when pressing the blue button on the right, the display will show the operating hour at which the fault occurred the last time.



Switch off the “show stored faults” function:

- Enter code number **0701** (! **WITHOUT** service code **9 9 9 9**). This code number disables the “show stored faults” function.

Note:	Apart from the stored faults the current faults are also displayed.
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Note:	This function can only be activated/deactivated when the travel lever is locked in the brake gate. (→ Input mode)
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6.9.1 Deleting all stored faults

Execute the “delete all stored faults” function:

- The engine must not be running!
- Enter code number **0710** (!**WITHOUT** service code 9999).
- Switch the ignition off and on again.

All stored faults are now deleted.

Note:	The stored faults can only be deleted when the engine is <u>not</u> running.
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Note:	This function can only be activated/deactivated when the travel lever is locked in the brake gate. (→ Input mode)
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6.10 Adjusting the chip spreader type

BOMAG offers chip spreaders for pivot steered tandem rollers:

- Spreading beam type chip spreader.

For comfortable control of the spreading beam type chip spreader (precision spreader) developed by BOMAG the control must be adjusted accordingly. This adjustment then enables activation and deactivation of the spreading process with the vibration push button (red button) in the travel lever. Another switch for the change-over between vibration and chip spreader operation, which has to be actuated accordingly, is available (on the dashboard). This switch is also assessed by the control in order to detect the operating mode.

BW 154/170 range/drive of chip spreader to vibration pump:

Since the chip spreader for these machines is driven by the vibration pump, the machine cannot be used with vibration when working in chip spreading mode.

Activating the spreading beam type chip spreader:

- Enter code number **3 1 4 2**. This code number is used to activate the “setting the chip spreader type” function; the display will permanently show the value **0 0 0 0**. This code number **must** be entered to perform the following step.
- Enter code number **3 1 4 4** to activate the spreading beam type chip spreader. The indicator light goes out.
- If the chip spreader function is to be deactivated again, please enter code **3 1 4 3**
- If the chip spreader is additionally slidable to the side, this option must also be set; for this purpose, enter the code **3 1 5 2**.
- Switch off the ignition of the machine. The spreading beam type chip spreader will become active during the next start; function as described above.

Note: **During the input, the diesel engine of the machine should not be running!**
Any change to the setting of the chip spreader type will only become effective after switching the ignition off and back on again!

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6.11 Activating edge cutters

For pivot steered tandem rollers BOMAG offers edge cutters for the following positions:

- Without
- Front right only
- Front left only
- Left and right

For correct control of the edge cutters the control must be set accordingly. With these settings it is then possible to move the edge cutter up and down with the joystick buttons. Another switch for the change-over between vibration and chip spreader operation, which has to be actuated accordingly, is available (in the right arm rest). This switch is also assessed by the control in order to detect the operating mode. The edge cutters can only be moved in vibration operation. If the machine is equipped with two edge cutters, the edge cutter to be moved must first be selected with an additional selector switch. The up or down movement is then controlled with the up/down buttons (green) on the joystick.

Activating the edge cutter:

- Enter code number **3 1 3 1**. This code number is used to activate the “setting the edge cutter” function; the display will permanently show the value **0 0 0 0**. This code number **must** be entered to perform the following step.
- Only right edge cutter, code **3 1 3 3**
- Edge cutter at left and right, code **3 1 3 4**
- Only left edge cutter, code **3 1 3 5**
- Switch off the ignition of the machine. The edge cutters will be activated during the next start; function as described above.

Note: During the input, the diesel engine of the machine should not be running!
Any change to the setting of the edge cutters will only become effective after switching the ignition off and back on again!

6.12 Initializing the LCD display

- In isolated cases it may happen that various indicator lights on the display light up, even though the corresponding function has not been triggered: e.g. the chip spreader light or the arm rest indicator lights up, even though the arm rest is in bottom position. In this case the LCD needs to be restarted.
- Switch the ignition on, do NOT enter code **9 9 9 9** to change to Service mode.
- Enter code **9 5 5 7**. Wait 5 seconds and switch the ignition off again.
- Then switch the ignition back on -> the display is restarted, this takes about 15 seconds. Then switch the ignition off and on again. The display should now show all conditions correctly.

6.13 Inspection of DPF system on Kubota engines

On machines with electronically controlled diesel engines of type Kubota V 3307 or V 3800, the correct functioning of the DPF control switch can be tested.

- If necessary, use code **9 9 9 9** to set the machine to Service mode.
- Enter code number **5 1 6 0**.
- Set the switch to position “DPF regeneration suppression” -> the display shows **100**.
- Set the switch to position “DPF AUTO” -> the display shows **10**.
- Set the switch to position “DPF Regeneration request” -> the display shows **1**.

Proceed as follows to check the degree of saturation of the DPF:

- If necessary, use code **9 9 9 9** to set the machine to Service mode.
- Enter code number **5 1 6 1**.
- The displayed value represents the DPF load in %.

6.14 End of line test for machines with Deutz Tier 4 f engines

After initial commissioning, all machines with SCR system (DEF-System) must be subjected to an End Of Line (EOL) test. This is indicated by the reference code **"5180"**. This reference code may also appear after a replacement of the control.

The EOL test is performed as follows:

- Switch ignition on and start the engine.
- Before the EOL test can be started, the coolant temperature must be higher than 4 °C and the travel lever must be in the brake gate.
- **"9999"** - Activate service mode
- **"5180"** - Enable EOL test
- **"5181"** - Start EOL test
- The regeneration button must subsequently be moved to the right.
- The display shows **"EOL"**, as long as the test is running (between 5 and 10 minutes). The engine speed is additionally increased automatically.

Once the EOL test has been successfully completed, the display will show the information **"DONE"** for approx. 10 seconds and the reference code **"5180"** is no longer displayed.

The following faults may occur during the EOL test:

- **6186** Fault before EOL test is started, check pre-conditions, check fault log.
- **6187** Diesel engine is not running.
- **6188** Excessive soot load.
- **6189** Check OXY cat sensors.
- **6190** Fault during EOL test, check fault log.
- **6191** Travel lever is not in brake gate.
- **6192** Engine has left work position.
- **6193** Excessive exhaust gas temperature after SCR cat.
- **6194** Differential pressure in SCR cat is too high.
- **6195** Air system not ready, air system is not yet heated up.
- **6196** Engine is not warmed up.
- **6197** Stationary conditions are not fulfilled.
- **6198** SCR system is not ready.
- **6199** Check Nox sensors.

Eliminate any possible faults and restart the EOL test.

6.15 BW174 AP hybrid (machine type codes 7385 & 7386 only)

The following section refers to the hybrid version of the BW174 AP. This machine has two major differences compared to the standard BW174 AP: firstly, the Kubota V3307 4f or stage V engine is used in combination with a hydraulic hybrid system and, secondly, the vibration system is equipped with two separately controllable pumps. The rest of the machine is largely identical to the standard BW174 AP.

The hybrid system's functions are only available from a hydraulic oil temperature of 20 °C – with colder oil the system is inactive. The machine can also be operated without an active hybrid system.

The hybrid system is mainly used to cover peak loads during start-up of the vibratory exciters. This means that the entire loading/unloading regime is coupled with the switching on and off of the vibration and is initiated when the load limit is reached.

With this BW174 AP version, the exciters are additionally started with a time delay in order to equalise the load peaks that occur. (Depending on direction of travel)

The hybrid system of this machine – a combination of valve block, pump/engine assembly A10VO, two 10 litre bladder accumulators and the hybrid control unit A174 – can be seen as a sub-module and system of Bosch Rexroth. The control and fault evaluation of the hybrid unit is carried out exclusively via the hybrid control unit A174. The loading/unloading request of travel control A34 is transmitted via a defined software interface via the CAN bus – comparable to communication between the travel control and the engine control unit. If necessary, the hybrid system can also hydraulically “assist” the machine's fan circuit if its basic speed or cooling power is insufficient.

6.16 Calibration functions of the hybrid module

When replacing components of the hybrid system, calibration procedures may need to be performed.

REFERENCE CODES 5530 and 5531 mean that the prop valve and angle sensor have not been taught.

Recalibration must be performed after replacing the hybrid control unit A174, the proportional valve Y415 or the angle sensor B320. The described reference codes only appear for a brand-new factory control unit – the replacement of Y415 or B320 is not automatically detected by the software.

Note: The hybrid system is not activated as standard. It is important that the sequence of the teach-in processes is observed: First the proportional valve – then the angle sensor! The teach-in of the hybrid system should take place at a hydraulic oil temperature of at least 40 °C!

The automatic calibration of the hybrid proportional valve is carried out as follows:

- Start the engine.
- Enter code **9 9 9 9** to set the machine to service mode.
- Enter code number **5 6 7 8**.
- The engine speed must be set to MAX! The speed is automatically raised to approx. 2500 rpm.
- The brake must be applied!
- The hydraulic oil temperature must be at least 40 °C.
 - If one of the above three conditions is not met, “**B R A K E**” appears if the brake has not been applied, “**U P**” if the speed selector switch is not set to MAX or the current hydraulic oil temperature in °C if it is below the limiting value. “**W A I T**” appears on the display when waiting for feedback from the hybrid control unit.
- Wait until code number **0 0 0 0** is displayed.
- Enter code number **5 6 7 9**; automatic determination of the calibration values now starts. The hybrid hydraulic unit is heard swivelling out. During calibration, the various states of calibration are shown on the display (the values shown need not be observed further, they are used for development and diagnostic purposes). This process should not take longer than 90 seconds.
- **Do not drive during calibration!**

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- Once the measurement is completed, the display shows the value **D O N E** for 5 seconds, followed by the code number **0 0 0 0**. If the calibration of the proportional valve has been successfully completed with the display **D O N E**, the engine speed must be set back to ECO and the machine switched off normally with the ignition key so that the calibration data is saved.

The automatic calibration of the hybrid swing angle sensor is carried out as follows:

- Start the engine.
- Enter code **9 9 9 9** to set the machine to service mode.
- Enter code number **5 6 7 8**.
- The engine speed must be set to MAX! The speed is automatically raised to approx. 2550 rpm.
- The brake must be applied!
- Wait until code number **0 0 0 0** is displayed.
- Enter code number **5 6 8 0**; automatic determination of the calibration values now starts. The hybrid hydraulic unit is heard swivelling out once again. During calibration, the various calibration states are shown on the display (also purely for development and diagnostic purposes). The teach-in process should not take longer than 20 seconds.
- **Do not drive during calibration!**
- Once the measurement is completed, the display shows the value **D O N E** for 5 seconds, followed by the code number **0 0 0 0**. If the calibration of the swing angle sensor has been successfully completed with the display **D O N E**, the engine speed must be set back to ECO and the machine switched off normally with the ignition key so that the calibration data is saved.

6.17 Testing mode – manual control of the hybrid module

Since the hybrid system usually only intervenes in limiting cases, there is a mode to manually control the various functions and test them while stationary.

The following conditions are required: The travel lever must be in the brake notch, the diesel engine must be running and the hydraulic oil temperature must be at least 20 °C; in addition, travel lever mode must be selected via selector switch S159 according to the following figure:



To activate manual mode, the access code **9 9 9 9** to change to service mode must be entered, followed by the input code **5 6 8 3** to change to the required mode – if the hybrid system is not active, “**O f f**” is displayed; if the mode is left due to one of the conditions described above, “**E x i t**” is displayed.

If the mode is successfully activated, the current storage pressure is shown in bar on the display. Since this is the hydraulic pressure and not the gas pressure in the accumulator, the displayed pressure may well be 0 bar after starting the machine. When the charge valve is opened for the first time, the pressure should suddenly reach p0 of the bladder accumulator and follow the pump pressure during charging.

The following explains which keys are assigned to which function:

Button 2: discharge request (-80 Nm)

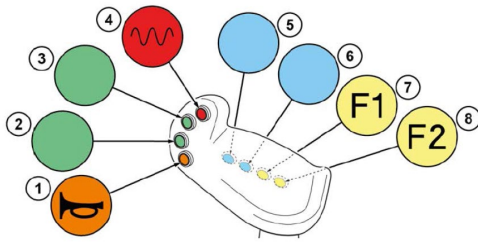
(Restriction: discharging is only possible if the accumulator pressure is a min. 220 bar)

Button 3: charge request (100 Nm)

If **buttons 2 and 3 are pressed at the same time**, the “brake request” is set and 120 Nm braking torque is requested; the pump pressure is displayed instead of the accumulator pressure.

If **buttons 5 and 6 are pressed at the same time**, a defined fan assist is requested – the current pump pressure is also displayed.

An overview of the assignment of functions:

Button press	Action	Indicated value on the display [bar]	Assignment of buttons
No button	-	Accumulator pressure	
2	Discharging	Accumulator pressure	
3	Charging	Accumulator pressure	
2 & 3	Brake assist	Pump pressure	
5 & 6	Fan assist	Pump pressure	

The described actions are active as long as the respective buttons (combinations) on the travel lever are pressed. The working range during charging/discharging is usually between the minimum pressure 130–150 bar and the maximum pressure 260–290 bar. A pump pressure between 290–310 bar is generated for “brake assist”. The pump pressure for fan assist is below 140 bar.

Manual mode can be exited either by releasing the brake (travel lever out of brake notch, seat occupied, arm rest down) or by changing the ignition!

Training course for BW 154/174 AP – 4i**7. Description of signals in the electronic modules****7.1 Description of the signals on the ESX control**

Notes:

1. Wherever the value of 12 V is mentioned in the following text, it refers to the current battery voltage under due consideration of voltage drops in the lines.

ESX terminal	Signal description	Nominal values (voltage/current)
X35:1	AGND = Analogue ground: Ground potential for analogue signals (travel lever, travel speed range switch, steering mode switch, angle transducers ...)	approx. 0 V measured against ground (Pot 31)
X35:2	---	---
X35:3	Output warning buzzer Digital output (max. 2.5 A)	Warning buzzer active ⚡ approx. 12 V Warning buzzer inactive ⚡ 0 V
X35:4	Interface RS232 RXD , not used for normal operation. Communication interface for parameter changes	Measurement not possible!
X35:5	Interface RS232 TXD , not used for normal operation. Communication interface for parameter changes	Measurement not possible!
X35:6	Pressure sensor of travel pump	Min. 4 mA up to max. 20 mA
X35:7	Input seat position confirmation switch	Seat position switch Voltage measured against ground Position "front" ⚡ approx. 0 V Position "back" ⚡ approx. 5 V
X35:8	Input steering mode selector switch (5 stages) Analogue input/voltage input 0 to 8.5 V	Position of speed range selector switch voltage measured against AGND Synchronized steering ⚡ 6.4 to 7.8 V Automatic steering ⚡ 5.1 to 6.2 V Front steering ⚡ 3.8 to 4.7 V Rear steering ⚡ 2.5 to 3.1 V Diagonal steering ⚡ 1.3 to 1.6 V
X35:9	Input crabwalk selector switch (24 stages) Analogue input/voltage input 0 to 8.5 V	Position of crabwalk switch Voltage measured against AGND Left hand stop ⚡ 7.4 to 8.9 V Zero position ⚡ 4.0 to 4.8 V Right hand stop ⚡ 0.3 to 0.4 V
X35:10	Switch regeneration suppression DPF	Switch actuated ⚡ approx. 12 V Switch not actuated ⚡ 0 V
X35:11	Output control light seat position confirmation switch	Proximity switch for seat position and switch for seat position show identical seat position ⚡ approx. 0 V measured against ground.

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ESX terminal	Signal description	Nominal values (voltage/current)
		Proximity switch for seat position and switch for seat position do not show the same seat position → output voltage changes between approx. 0 V and approx. 12 V measured against ground.
X35:12	Input drum speed sensor rear installed	Signal changes between approx. 0 V and 5 V, when machine is moving.
X35:13	Input arm rest left	Arm rest bottom → 0 V Arm rest top → > 0.5 V
X35:14	Input BTS brake (from travel lever) Digital input active high	Brake released → approx. 12 V Brake applied → 0 V
X35:15	Input seat contact switch Digital input active high	Seat actuated → 0 V Seat not actuated → > 0.5 V
X35:16	---	---
X35:17	---	---
X35:18	Input sensor bearing 1 track 1 Digital input active low This signal is used to detect the rotary movement of the steering wheel. When turning the steering wheel slowly one can measure the digital signals.	Condition 1 → approx: 5 V measured against AGND Condition 0 → approx: 0 V measured against AGND
X35:19	Input sensor bearing 1 track 2 Digital input active low This signal is used to detect the rotary movement of the steering wheel. When turning the steering wheel slowly one can measure the digital signals.	Condition 1 → approx: 5 V measured against AGND Condition 0 → approx: 0 V measured against AGND
X35:20	Output travel pump forward PWM digital output (max. 4 A)	valid current range: approx. 0.35 A to 1.6 A, when driving in this direction, otherwise 0 A
X35:21	Output travel pump reverse PWM digital output (max. 4 A)	valid current range: approx. 0.35 A to 1.6 A, when driving in this direction, otherwise 0 A
X35:22	---	---

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ESX terminal	Signal description	Nominal values (voltage/current)
X35:23	Voltage supply for sensors This output supplies steering angle sensor and steering unit. Without this voltage the control cannot work correctly and will switch to override mode (limp home function)	Nominal voltage = 8.5 V Permissible range: approx. 7.65 to 9.35 V This voltage must be measured against AGND.
X35:24	Output amplitude switch-over Digital output (max. 2.5 A)	Active, i.e. high amplitude  approx. 12 V Inactive, i.e. low amplitude  0 V
X35:25	Output water pump 1	Pump running  approx. 12 V Pump not running  0 V
X35:26	Interface CAN bus 1 wire - is used for communication with data collector, LCD display and BOP.	Measurement not possible!
X35:27	Interface CAN bus 1 wire + is used for communication with MESX, data collector, LCD display and BOP.	Measurement not possible!
X35:28	Input D+	Here 12 V must be applied to be able to switch on the control!
X35:29	Input steering angle, front Analogue input/current input 0 to 20 mA	Right hand stop  4 to 8 mA Left hand stop  16 to 20 mA Straight ahead position  10 to 14 mA
X35:30	Input steering angle, rear Analogue input/current input 0 to 20 mA	Left hand stop  4 to 8 mA Right hand stop  16 to 20 mA Straight ahead position  10 to 14 mA
X35:31	---	
X35:32	Input cross-slope sensor	0.5 V to 4.5 V
X35:33	Interface CAN bus 2 wire - is used to communicate with the travel lever.	Measurement not possible!
X35:34	Transducer vibration frequency front	0 to 70 Hz
X35:35	Transducer vibration frequency rear	0 to 70 Hz
X35:36	Input hydraulic oil filter 2x differential pressure switch Digital input active low	Pressure switch hydraulic oil Voltage measured against ground Closed  approx. 0 V Open  approx. 12 V
X35:37	---	---
X35:38	Input seat position switch 1 (inside) left	Switch detects metal  approx. 12 V Switch does not detect metal  approx. 0 V
X35:39	Input seat position switch 2 (outside) right	Switch detects metal  approx. 12 V Switch does not detect metal  approx. 0 V

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ESX terminal	Signal description	Nominal values (voltage/current)
X35:40	Input sensor bearing 2 track 1 Digital input active low This signal is used to detect the rotary movement of the steering wheel. When turning the steering wheel slowly one can measure the digital signals.	Condition 1  approx: 5 V measured against AGND Condition 0  approx: 0 V measured against AGND
X35:41	Input sensor bearing 2 track 2 Digital input active low This signal is used to detect the rotary movement of the steering wheel. When turning the steering wheel slowly one can measure the digital signals.	Condition 1  approx: 5 V measured against AGND Condition 0  approx: 0 V measured against AGND
X35:42	Output Vibration pump	Off  approx. 0 V On  approx. 12 V
X35:43	Output warning horn	Off  approx. 0 V On  approx. 12 V
X35:44	---	---
X35:45	Output engine shut down relay	Engine stop  approx. 12 V Engine running or not yet started  0 V
X35:46	Output steering valve front left PWM digital output (max. 4 A)	Valid current range: approx. 0 to 1.8 A
X35:47	Output steering valve front right PWM digital output (max. 4 A)	Valid current range: approx. 0 to 1.8 A
X35:48	Output steering valve rear left PWM digital output (max. 4 A)	Valid current range: approx. 0 to 1.8 A
X35:49	Output steering valve rear right PWM digital output (max. 4 A)	Valid current range: approx. 0 to 1.8 A
X35:50	Output valve vibration rear off	Vib front on  approx. 0 V Vib front off  approx. 12 V
X35:51	Output valve vibration front off	Vib rear on  approx. 0 V Vib rear off  approx. 12 V
X35:52	Switch to request regeneration at standstill DPF	Switch actuated  approx. 12 V Switch not actuated  0 V
X35:53	Interface CAN bus 2 wire + is used to communicate with the travel lever.	Measurement not possible!
X35:54	Voltage supply for electronics (via emergency stop button)	Control running  approx. 12 V Control not running  0 V

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ESX terminal	Signal description	Nominal values (voltage/current)
X35:55	Ground connection electronics	approx. 0 V measured against ground
X35:56	Voltage supply for outputs (permanent voltage)	approx. 12 V measured against ground
X35:57	Voltage supply for outputs (permanent voltage)	approx. 12 V measured against ground
X35:58	Voltage supply for outputs (permanent voltage)	approx. 12 V measured against ground
X35:59	Voltage supply for outputs (permanent voltage)	approx. 12 V measured against ground
X35:60	Voltage supply for outputs (permanent voltage)	approx. 12 V measured against ground
X35:61	---	
X35:62	Output water pump right	Pump running  approx. 12 V Pump not running  0 V
X35:63	---	---
X35:64	Output brake valve	Off  approx. 0 V On  approx. 12 V
X35:65	Ground connection	approx. 0 V
X35:66	Ground connection	approx. 0 V
X35:67	Ground connection	approx. 0 V
X35:68	Ground connection	approx. 0 V

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7.2 Description of signals on the data collector

Notes:

Wherever the value of 12 V is mentioned in the following text, it refers to the current battery voltage under due consideration of voltage drops in the lines.

PIN data collector	Signal description	Nominal values (voltage/current)
X26:1 grey	Input indicator right Digital input active high	Direction indicator right active ⚡ approx. 12 V Direction indicator right inactive ⚡ 0 V
X26:2 grey	Input indicator left Digital input active high	Direction indicator left active ⚡ approx. 12 V Direction indicator left inactive ⚡ 0 V
X26:3 grey	Input engine running (D+) Digital input active high	Engine running ⚡ approx. 12 V Engine stopped ⚡ 0 V
X26:4 grey	Input engine air filter Digital input active low	Filter blocked ⚡ 0 V Filter OK ⚡ approx. 7 V
X26:5 grey	Input coolant supply Digital input active low	Coolant level too low ⚡ 0 V Coolant supply sufficient ⚡ approx. 7 V
X26:6 grey	---	
X26:7 grey	---	
X26:8 grey	Input engine preheating active Digital input active high	Preheating off ⚡ 0 V Preheating active ⚡ 12 V
X26:9 grey	---	
X26:10 grey	Input water tank low level left Digital input low high (normally closed)	Water level above minimum ⚡ 0 V Water level below minimum ⚡ approx. 7 V
X26:11 grey	---	
X26:12 grey	Ground connection	0 V (measured against ground)
X27:1 black	Input water level FREE Analogue input (current)	4–20 mA = valid range
X27:2 black	Input fuel level Analogue input	The voltage signal changes with the filling level in the fuel tank. Fuel tank empty ⚡ 1200 mV Fuel tank full ⚡ 12 mV

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PIN data collector	Signal description	Nominal values (voltage/current)
X27:3 black	Hydraulic oil temperature sensor, ground	
X27:4 black	Voltage supply for monitoring of water separation (PIN X27:9)	Voltage supply OK. ⚡ approx. 12 V No voltage supply ⚡ 0 V
X27:5 black	Ground connection	0 V (measured against ground)
X27:6 black	Interface CAN-Bus 1 Wire +, is used for communication with MESX, ESX, LCD-display and BOP.	Measurement not possible!
X27:7 black	Interface CAN-Bus 1 Wire -, is used for communication with MESX, ESX, LCD-display and BOP.	Measurement not possible!
X27:8 black	Voltage supply (permanent voltage)	Control running ⚡ approx. 12 V Control not running ⚡ 0 V
X27:9 black	Input water separation Current input	If a sufficient amount of water has been separated, a low current flows over the contacts and the water in the separator bowl. This input analyses this current. No water separated ⚡ I = 0 A Water separated ⚡ I* 0.03 mA
X27:10 black	Input hydraulic oil temperature	Measurement not possible!
X27:11 black	Input water level Analogue input (resistance)	
X27:12 black	Not used	---

Training course for BW 154/174 AP – 4i**7.3 Description of signals on the travel lever**

Notes:

Wherever the value of 12 V is mentioned in the following text, it refers to the current battery voltage under due consideration of voltage drops in the lines.

PIN travel lever	Signal description	Nominal values (voltage/current)
X23:1	Voltage supply (permanent voltage)	Electronics working ⚡ approx. 12 V Electronics not working ⚡ 0 V
X23:2	Ground connection	0 V (measured against ground)
X23:3	Output BTS brake Digital output (max. 4 A)	Brake opens ⚡ approx. 12 V Brake closes ⚡ 0 V
X23:4	Output BTS (not used) Digital output (max. 4 A)	---
X23:5	Output voltage supply for additional analogue evaluations This output supplies the switches, which are connected to the travel lever. This voltage is required to connect and evaluate further analogue switches to the travel lever.	Nominal voltage = approx. 5.0 V Permissible range: approx. 4.8 to 5.2 V This voltage must be measured against AGND.
X23:6	GND for switch	0 V
X23:7	Multiple contact switch for travel speed	0.5–4.5 V
X23:8	Not used	---
X23:9	Input low amplitude Digital input active high	Low amplitude active ⚡ approx. 12 V Low amplitude inactive ⚡ 0 V
X23:10	Input high amplitude Digital input active high	High amplitude active ⚡ approx. 12 V High amplitude inactive ⚡ 0 V
X23:11	Switch, vibration MANUAL/AUTOMATIC	Automatic active ⚡ approx. 12 V Manual active ⚡ 0 V
X23:12	Not used	---
X23:13	Switch for travel lever mode Edge Cutter	
X23:14	Switch for travel lever mode Service	
X23:15	Multiple contact switch for travel speed	0.5–4.5 V
X23:16	Interval switch for spraying system	0.5–4.5 V
X23:17	CAN High 2+	Measurement not possible!
X23:18	CAN Low 2-	Measurement not possible!

Training course for BW 154/174 AP – 4i**7.4 Description of signals on the display module**

Notes:

If 12 V is mentioned in the following text, it refers to the actual battery voltage

PIN display	Signal description	Nominal values (voltage/current)
X28:1	Voltage supply (permanent voltage “ignition on”)	Electronics working ⚡ approx. 12 V Electronics not working ⚡ 0 V
X28:2	Ground connection	0 V (measured against ground)
X28:3	Interface CAN bus 1 wire + is used for communication with MESX, ESX, data collector and BOP.	Measurement not possible!
X28:4	Interface CAN bus 1 wire - is used for communication with MESX, ESX, data collector and BOP.	Measurement not possible!
X28:5	Voltage supply (permanent voltage “Battery +” for RTC)	Electronics working ⚡ approx. 12 V Electronics not working ⚡ 0 V
X28:6	Not used	---
X29:1	Input water spraying pump 1 Digital input active high	Pump left ⚡ approx. 12 V Pump off ⚡ 0 V
X29:2	Input water spraying pump 2 Digital input active high	Pump right ⚡ approx. 12 V Pump off ⚡ 0 V
X29:3	Input engine speed low idle Digital input active high	High idle active ⚡ approx. 12 V High idle inactive ⚡ 0 V
X29:4 X32:8	Input engine speed high idle Digital input active high	Low idle active ⚡ approx. 12 V Low idle inactive ⚡ 0 V
X29:5	Switch for StVZO	StVZO illumination off ⚡ 0 V StVZO illumination on ⚡ approx. 12 V
X29:6	Not used	---
X29:7	Output voltage supply for additional digital evaluations This output supplies the engine speed switch and the switch for frequency adjustment. This voltage is required to connect and evaluate further digital switches to the LCD.	Voltage supply active ⚡ approx. 12 V Voltage supply inactive ⚡ 0 V
X29:8	Not used	---

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7.5 Description of signals in the BLM IO module

BLM terminal	Signal description	Nominal values (voltage/current)
X22:1	Supply, ground	
X22:2	Potential 15	Must be applied to 12 V!
X22:3	Ground	
X22:4	Ground	
X22:5	Input not assigned	---
X22:6	Output reversing alarm horn front	Horn on ☞ 12 V Horn off ☞ 0 V, no consumer connected 2.9 V
X22:7	Output reversing alarm horn rear	Horn on ☞ 12 V Horn off ☞ 0 V, no consumer connected 2.9 V
X22:8	Output valve water spraying system edge cutter front	Valve on ☞ 12 V Valve off ☞ 0 V, no consumer connected 2.9 V
X22:9	Output relay K78, emulsion pump	Relay on ☞ 12 V Relay off ☞ 0 V, no consumer connected 2.9 V
X22:10	Output hydraulic valve Y 20, edge cutter up	Valve on ☞ 12 V Valve off ☞ 0 V, no consumer connected 2.9 V
X22:11	Output hydraulic valve Y 21, edge cutter down	Valve on ☞ 12 V Valve off ☞ 0 V, no consumer connected 2.9 V
X22:12	Output edge cutter left UP	Valves on ☞ 12 V Valves off ☞ 0 V, no consumer connected 2.9 V
X22:13	Output hydraulic valve Y 66, chip spreader operation	Valve on ☞ 12 V Valve off ☞ 0 V, no consumer connected 2.9 V
X22:14	Input supply voltage	12 V measured against ground
X22:15	Supply, ground	
X22:16	Not assigned	
X22:17	Not assigned	
X22:18	Not assigned	---
X22:19	Output hydraulic valve Y 131, chip spreader up/left	Valve on ☞ 12 V Valve off ☞ 0 V, no consumer connected 2.9 V

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BLM terminal	Signal description	Nominal values (voltage/current)
X22:20	Input, emulsion spraying on/off	
X22:21	Output hydraulic valve Y 67, chip spreader down/right	Valve on ☞ 12 V Valve off ☞ 0 V, no consumer connected 2.9 V
X22:22	Output relay chip spreader	Valves on ☞ 12 V Valves off ☞ 0 V, no consumer connected 2.9 V
X22:23	Input emulsion spraying interval on/off	
X22:24	Not used	
X22:25	Input switch S36 drum pre-selection vibration, front	Vibration front only selected ☞ 12 V Otherwise ☞ 0 V
X22:26	Output valve Y 06 spraying system	Valves on ☞ 12 V Valves off ☞ 0 V, no consumer connected 2.9 V
X22:27	Input switch S36 drum pre-selection vibration, rear	Vibration rear only selected ☞ 12 V Otherwise ☞ 0 V
X22:28	Input supply voltage	12 V measured against ground
X22:29	Supply, ground	
X22:30	CAN - Bus, CAN -	Measurement not possible!
X22:31	CAN - Bus, CAN +	Measurement not possible!
X22:32	Not used	
X22:33	Not used	
X22:34	Input switch S5 spraying pre-selection, drum and edge cutter	Drum spraying system and edge cutter selected ☞ 12 V Otherwise ☞ 0 V
X22:35	Output valve Y 99 edge cutter spraying system	Valve on ☞ 12 V Valve off ☞ 0 V, no consumer connected 2.9 V
X22:36	Solenoid valve edge cutter left DOWN	---
X22:37	Activation input, to switch on the module	Here ☞ 12 V must be applied, otherwise operation not possible
X22:38	Not assigned	---
X22:39	Not assigned	---
X22:40	Not assigned	---
X22:41	Input switch S5 spraying pre-selection, edge cutter only	Only edge cutter spraying system selected ☞ 12 V Otherwise ☞ 0 V
X22:42	Input supply voltage	12 V measured against ground

8. Description of fault codes on the ESX control

8.1 Overview

Fault code	Fault description
0 0 0 0 – 0 9 9 9	General faults/warnings/machine tests
1 0 0 0 – 1 9 9 9	Fault in travel system
2 0 0 0 – 2 4 9 9	Fault in steering system
2 5 0 0 – 2 9 9 9	Fault in remote control
3 0 0 0 – 4 4 9 9	Faults in work functions (vibration, attachment plates, rotor, chip spreader, edge cutter or spraying system)
4 5 0 0 – 4 9 9 9	Fault in measuring systems
5 0 0 0 – 5 4 9 9	Fault diesel engine
5 5 0 0 – 5 9 9 9	Fault hydraulic system
6 0 0 0 – 6 9 9 9	Fault anti-theft warning system, positioning system, access system, time account, etc.
7 0 0 0 – 7 4 9 9	Input of machine codes/
7 5 0 0 – 7 8 9 9	Input of codes for measuring technology
7 9 0 0 – 7 9 9 9	Operating hours, load spectrum, etc.
8 0 0 0 – 8 9 9 9	Severe software error ¹
9 0 0 0 – 9 9 9 9	Faults of external IO nodes on one of the CAN buses (joystick, data collector, Dios module, LCD display, BLM module, engine control units, etc.) ¹

¹ These faults are only broken down partly hereunder!

8.2 Description of fault reactions

Fault reaction	Description of fault reaction
1	Warning. Fault code is displayed.
2	Warning. Fault code is displayed. Audible signal
3	Impairment of function , the faulty function is overridden by a limp home function. Fault code is displayed. Audible signal
4	Fault of a partial function , the partial function cannot be overridden by a limp home function. After the fault occurs, the machine is stopped. The travel lever must be returned to the braking gate. The machine can then still be driven to a limited extent (speed), but must be repaired by the service department as soon as possible. Fault code is displayed. Audible signal
5	Fault of a partial function , the partial function cannot be overridden by a limp home function. ☞ The diesel engine is shut down. The machine is no longer able to drive, e.g. because parts of the travel system or the steering systems are defective Fault code is displayed. Audible signal
6	Fatal fault. The function of the control can no longer be guaranteed. ☞ The control is switched off. ☞ The diesel engine is shut down, if possible. The fault code is displayed, the signal lamp in the monitoring module is permanently on. No audible signal!

Note: **Faults with fault reaction 1 and 2 are only warnings and are NOT stored in the fault log!**

8.3 Note codes

Notes are a special form of fault messages.

The display shows note codes in the same way as fault codes, however, these do not require any service action, because they are just notes regarding particular operating states of the machine.

Information code	Fault description	Possible causes	Input code for diagnostics
1090	Travel pump valve surge currents Surge currents of travel pump have NOT been taught. See Automatic detection of surge currents in travel system	The “teaching pump surge currents” function for the travel pump has not yet been executed. → New machine/replacement of control	
2069	Valves steering pump surge currents Surge currents for steering pump have NOT been learned. See 6.7 Automatic detection of surge currents on steering valves	The “teaching surge currents” function for the electric steering has not yet been executed. → New machine/replacement of control.	
2199	Calibration of the angle transducers Teaching of steering stops for electric steering NOT yet executed. See 6.5 Calibration of the angle transducers	The “teaching angle transducers” function for the electric steering has not yet been executed. → New machine/replacement of control.	
1300	Seat not occupied Machine does not pick up throttle and is braked to stop.	The driver has got up	
1310	Seat turned out of position Machine does not pick up throttle and is braked to stop.	The seat was turned and is in an impermissible position or the new position has not yet been confirmed	
1320	Arm rest raised Machine does not pick up throttle and is braked to stop.	The arm rest has been raised or the magnetic switch under the left hand arm rest is defective.	
3100	Water tanks empty	Water pump running, but water tank is empty.	
5180	EOL test required See also 6.14.	Performance of EOL test for SCR system → New machine/replacement of control.	

FaultLocation		Output brake valve, Y04			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
1001	No or too low current flow out of this output	X35:64	Excessive current in current path	1001	5
1002	The output to the valve has ground contact, or the output current is higher than permitted.	X35:64			5
1003	Supply voltage Ub is applied to the valve output, even though the valve is not switched.	X35:64	Current path has connection to +Ub (15 or 30)		5
1004	The output was switched off because of too high temperature. As soon as the switch has cooled down the output will be switched on again.	X35:64			5

FaultLocation		Input BTS brake			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
1005	Plausibility conflict in evaluation of travel lever X- axis to the brake contact signal	X35:14	Line breakage in current path Current path has connection to +Ub (15 or 30) Software or hardware fault in travel lever, replacement required	1005	5

FaultLocation		Output warning buzzer, H07			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
1011	Too high current flow out of this output Output was switched off!	X35:03	Excessive current in current path Short circuit to ground (31) in the current path		3
1012	Although the output is switched off, voltage is present	X35:03	Current path has connection to +Ub (15 or 30)		3

FaultLocation		Output backup warning (front), H114			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
1015	No or too low current flow out of this output	X22:6	Line breakage in current path		3

1016	Too high current flow out of this output Output was switched off!	X22:6	Short circuit to ground (31) in the current path Excessive current in current path	3
1017	Although the output is switched off, voltage is present	X22:6	Current path has connection to +Ub (15 or 30)	3

FaultLocation **Output backup warning (rear), H14**

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
1020	No or too low current flow out of this output	X22:7	Line breakage in current path		3
1021	Too high current flow out of this output Output was switched off!	X22:7	Excessive current in current path Short circuit to ground (31) in the current path		3
1022	Although the output is switched off, voltage is present	X22:7	Current path has connection to +Ub (15 or 30)		3

FaultLocation **Travel lever, S55**

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
1025	Summarizing error X-axisError in redundant evaluation of axis	CAN 2	Software or hardware fault in travel lever, replacement required	1022	3
1026	Cable breakage X-axisSignal outside the valid range (see signal description)	CAN 2	Software or hardware fault in travel lever, replacement required	1022	3
1027	Parameterization X-axis	CAN 2	Software or hardware fault in travel lever, replacement required	1022	3
1028	Direction evaluation X-axisThe direction of travel lever movement could not be determined	CAN 2	Software or hardware fault in travel lever, replacement required	1022	3
1029	Differential error X-axisError in redundant evaluation of travel lever signal	CAN 2	Software or hardware fault in travel lever, replacement required	1022	3
1030	Software error X-axisSoftware does not work correctly	CAN 2	Software or hardware fault in travel lever, replacement required		3
1031	Summarizing error Y-axisError in redundant evaluation of axis	CAN 2	Software or hardware fault in travel lever, replacement required	1021	3

1032	Cable breakage Y-axisSignal outside the valid range (see signal description)	CAN 2	Software or hardware fault in travel lever, replacement required	1021	3
1033	Parameterization Y-axis	CAN 2	Software or hardware fault in travel lever, replacement required	1021	3
1034	Direction evaluation Y-axisThe direction of travel lever movement could not be determined	CAN 2	Software or hardware fault in travel lever, replacement required	1021	3
1035	Differential error Y-axisError in redundant evaluation of travel lever signal	CAN 2	Software or hardware fault in travel lever, replacement required	1021	3
1036	Software error Y-axisSoftware does not work correctly	CAN 2	Software or hardware fault in travel lever, replacement required		3
9130	Fault: CAN node monitoring bus 2, connected CAN node does not respond, check CAN connection and voltage supply to the node	System			2
9170	Fault: CAN node monitoring bus 2, connected CAN node does not send messages, check CAN connection and voltage supply to the node	System			2
9290	Fault: CAN node monitoring bus 2, missing messages were recognized, check CAN connection and voltage supply to the node	System			1
9312	Hardware initializing error	System			1
9530	Fault: CAN node monitoring bus 2, internal software fault in node	System			2
9570	Fault: CAN node monitoring bus 2, connected CAN node does not respond, check CAN connection and voltage supply to the node	System			3

FaultLocation

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
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1040	Ground Connection faultySignal outside the valid range	X23:6		1040 1041	3
1041	Supply connectionSignal outside the valid range	X25:2	Line breakage in current path	1041	2
1042	Signal lineSignal outside the valid range	X23:15	Line breakage in current path	1040	3
8131	Internal fault	System			3

FaultLocation		Output valve travel pump forward, Y16			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
1070	The required control power cannot be transmitted to the proportional solenoid.	X35:20	Line breakage in current path	1070	2
1071	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:20	Current path has connection to +Ub (15 or 30)	1070 1071	5
1072	Output to proportional valve shorted to ground.	X35:20	Short circuit to ground (31) in the current path Excessive current in current path	1070	2
1073	The required control power cannot be transmitted to the proportional solenoid.	X35:20	Line breakage in current path	1070	2
1074	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:20	Current path has connection to +Ub (15 or 30)	1070 1071	5
1075	Output to proportional valve shorted to ground.	X35:20	Excessive current in current path Short circuit to ground (31) in the current path	1070	2
1076	Fault current regulator	X35:20	Software parameter fault, software update may be required. Line breakage in current path Excessive current in current path	1070 1071	5

1077	Fault current regulator	X35:20	Excessive current in current path Software parameter fault, software update may be required. Line breakage in current path	1070	5
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FaultLocation		Output valve travel pump reverse, Y17			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
1080	The required control power cannot be transmitted to the proportional solenoid.	X35:21	Line breakage in current path	1080 1081	2
1081	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:21	Current path has connection to +Ub (15 or 30)	1080	5
1082	Output to proportional valve shorted to ground.	X35:21	Excessive current in current path Short circuit to ground (31) in the current path	1080 1081	2
1083	The required control power cannot be transmitted to the proportional solenoid.	X35:21	Line breakage in current path	1080 1081	2
1084	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:21	Current path has connection to +Ub (15 or 30)	1080 1081	5
1085	Output to proportional valve shorted to ground.	X35:21	Short circuit to ground (31) in the current path Excessive current in current path	1080	2
1086	Fault current regulator	X35:21	Excessive current in current path Line breakage in current path Software parameter fault, software update may be required.	1080 1081	5
1087	Fault current regulator	X35:21	Line breakage in current path Excessive current in current path Software parameter fault, software update may be required.		5

FaultLocation		Teach function travel pump flow controller			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac

1090	Informative code - The teach function for the travel pump surge currents has NOT yet been successfully performed. Please follow the adjustment instructions	System	Informative code - Follow the adjustment instructions	1
1091	Error in teaching the surge current forward The current limit was reached and the function terminated.	System	Drums: blocked	3
1092	Error in teaching the surge current reverse The current limit was reached and the function terminated	System	Drums: blocked	3

FaultLocation		Input speed sensor travel motor B60			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
1105	No pulses from the speed sensor are detected, ven though the travel pump is actuated.	X35:12	Short circuit to ground (31) in the current path	1105	3
			Hardware defect sensors, replacement required	1106	
			Current path has connection to +Ub (15 or 30)		
			Line breakage in current path		
1106		X35:12	Informative code - Follow the adjustment instructions	1105 1106	3

FaultLocation		Input inclination sensor, B57			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
1260	Supply connectionSignal outside the valid range (see signal description)	X35:32	Line breakage in current path No voltage supply (+Ub Pot 15 or 30)		3
1261	Ground connectionSignal outside the valid range (see signal description)	X35:32	Line breakage in current path	1260 1262	3
1262	The cross-slope sensor is not properly mounted, or the machine is not standing level when learning.	X35:32	Line breakage in current path	1260 1262	3
1263		X35:32	Informative code - Follow the adjustment instructions	1260 1262	1

8145	Hardware initializing error	System	4
8146	Hardware initializing error	System	4

FaultLocation		Input pressure sensor travel drive, B112			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
1270	Signal faultThe current signal is not transferred	X35:6	Line breakage in current path		3
1271	Signal rangeThe current signal is outside the valid range (see signal specification)	X35:6	Hardware defect sensors, replacement required	1270 1272	3
1272	Pressure sensor does not measure any pressure	X35:6	Hydraulic problems		3
1273		X35:6	Informative code - Follow the adjustment instructions		1

FaultLocation		Input seat contact switch, S06			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
1300	Informative message, no fault! Driver's seat not occupied (driver not seated!) or cable breakage in signal line	X35:15	Line breakage in current path		0

FaultLocation		Detection of seat position			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
1310	Informative message, no fault! Seat outside travel position, or seat position has not been confirmed with switch S 31.	System	Hardware defect sensors, replacement required		0
1315	Plausibility error, signals from switches 1 and 2 not plausible	System	Sensors not correctly installed or not adjusted Hardware defect sensors, replacement required Line breakage in current path	1313 1314	2

FaultLocation		Input seat position switch 1, B178			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac

1311	Hardware defect, replace control	X35:38	ESX hardware defect, hardware replacement may be necessary	2
1313	Cable breakage or sensor defective	X35:38	Hardware defect sensors, replacement required Line breakage in current path	2

FaultLocation Input seat position switch 2, B179

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
1312	Hardware defect, replace control	X35:39	ESX hardware defect, hardware replacement may be necessary		2
1314	Cable breakage or sensor defective	X35:39	Hardware defect sensors, replacement required Line breakage in current path		2

FaultLocation Arm rest, left

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
1320	Informative message, no fault! Left arm rest raised. Machine does not pick up throttle and is braked to stop.	X35:13			0

FaultLocation Input arm rest switch, B132

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
1321	Signal faultSignal outside the valid range	X35:13	Line breakage in current path Hardware defect sensors, replacement required		2
1322	Short circuit	X35:13	Excessive current in current path Current path has connection to +Ub (15 or 30) Short circuit to ground (31) in the current path		2
1323	System fault, replace control	X35:13	ESX hardware defect, hardware replacement may be necessary		2

8140	Hardware initializing error	System			3
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FaultLocation Output steering valve Y92, front left steering

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
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2020	The required control power cannot be transmitted to the proportional solenoid.	X35:47	Valve coil defective Line breakage in current path	2
2021	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:47	Current path has connection to +Ub (15 or 30)	5
2022	Output to proportional valve shorted to ground.	X35:47	Short circuit to ground (31) in the current path Excessive current in current path	2
2023	The required control power cannot be transmitted to the proportional solenoid.	X35:47	Valve coil defective	2
2024	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:47	Current path has connection to +Ub (15 or 30)	5
2025	Output to proportional valve shorted to ground.	X35:47	Short circuit to ground (31) in the current path Excessive current in current path	2
2026	Fault current regulator	X35:47	Line breakage in current path Excessive current in current path Software parameter fault, software update may be required.	2
2027	Fault current regulator	X35:47	Excessive current in current path Software parameter fault, software update may be required. Line breakage in current path	2

FaultLocation		Output steering valve Y93, front right steering			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
2030	The required control power cannot be transmitted to the proportional solenoid.	X35:46			2
2031	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:46	Current path has connection to +Ub (15 or 30)		5

2032	Output to proportional valve shorted to ground.	X35:46	Short circuit to ground (31) in the current path Excessive current in current path	2
2033	The required control power cannot be transmitted to the proportional solenoid.	X35:46	Line breakage in current path Valve coil defective	2
2034	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:46	Current path has connection to +Ub (15 or 30)	5
2035	Output to proportional valve shorted to ground.	X35:46	Short circuit to ground (31) in the current path Excessive current in current path	2
2036	Fault current regulator	X35:46	Line breakage in current path Software parameter fault, software update may be required. Excessive current in current path	2
2037	Fault current regulator	X35:46	Software parameter fault, software update may be required. Line breakage in current path Excessive current in current path	2

FaultLocation		Output steering valve Y35, rear right steering			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
2040	The required control power cannot be transmitted to the proportional solenoid.	X35:49	Valve coil defective Line breakage in current path	2123	2
2041	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:49	Current path has connection to +Ub (15 or 30)		5
2042	Output to proportional valve shorted to ground.	X35:49	Short circuit to ground (31) in the current path Excessive current in current path		2
2043	The required control power cannot be transmitted to the proportional solenoid.	X35:49	Valve coil defective Line breakage in current path		2

2044	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:49	Current path has connection to +Ub (15 or 30)	5
2045	Output to proportional valve shorted to ground.	X35:49	Excessive current in current path Short circuit to ground (31) in the current path	2
2046	Fault current regulator	X35:49	Excessive current in current path Line breakage in current path Software parameter fault, software update may be required.	2
2047	Fault current regulator	X35:49	Excessive current in current path Line breakage in current path Software parameter fault, software update may be required.	2

FaultLocation		Output steering valve Y36, rear left steering			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
2050	The required control power cannot be transmitted to the proportional solenoid.	X35:48	Line breakage in current path Valve coil defective		2
2051	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:48	Current path has connection to +Ub (15 or 30)		5
2052	Output to proportional valve shorted to ground.	X35:48	Short circuit to ground (31) in the current path Excessive current in current path		2
2053	The required control power cannot be transmitted to the proportional solenoid.	X35:48	Line breakage in current path Valve coil defective		2
2054	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:48	Current path has connection to +Ub (15 or 30)		5
2055	Output to proportional valve shorted to ground.	X35:48	Short circuit to ground (31) in the current path Excessive current in current path		2

2056	Fault current regulator	X35:48	Software parameter fault, software update may be required. Excessive current in current path Line breakage in current path	2
2057	Fault current regulator	X35:48	Software parameter fault, software update may be required. Line breakage in current path Excessive current in current path	2

FaultLocation		Teach function surge current steering front right			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
2065	Teach function aborted because current beyond the permissible limiting values.	System	Drums: blocked		2

FaultLocation		Teach function surge current steering front left			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
2066	Teach function aborted because current beyond the permissible limiting values	System	Drums: blocked		2

FaultLocation		Teach function surge current steering rear right			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
2067	Teach function aborted because current beyond the permissible limiting values	System	Drums: blocked		2

FaultLocation		Teach function surge current steering rear left			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
2068	Teach function aborted because current beyond the permissible limiting values	System	Drums: blocked		2

FaultLocation		Teach function steering valve surge currents			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac

2069	Informative code - The teach function for the steering valve surge currents has not yet been successfully performed. (see adjustment instructions)	System	Perform teach function steering valve surge currents Informative code - Follow the adjustment instructions	1
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FaultLocation		Steering wheel, A45			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
2170	Plausibility of the sense of rotation does not match	X35:18,	Hardware defect sensors, replacement required Pin 18 and 19 mixed up by mistake Pin 40 and 41 mixed up by mistake		2
2172	Sensor 1 tracking faultThe detected steering pulses on steering sensor 1 are outside the valid range (see signal description)	X35:18, X35:19	Hardware defect sensors, replacement required Line breakage in current path		2
2173	Sensor 2 tracking faultThe detected steering pulses on steering sensor 2 are outside the valid range (see signal description)	X35:40, X35:41	Line breakage in current path Hardware defect sensors, replacement required		2
2174	Sensor 1 pulse error, sensor 1 delivers no or implausible values	X35:18, X35:19	Hardware defect sensors, replacement required No voltage supply (+Ub Pot 15 or 30)		2
2175	Sensor 2 pulse error, sensor 2 delivers no or implausible values	X35:40, X35:41	Hardware defect sensors, replacement required No voltage supply (+Ub Pot 15 or 30) Plug X40 not plugged in		2
2176	Sensor 1 electronics error	System	ESX hardware defect, hardware replacement may be necessary		2
2177	Sensor 2 electronics error	System	ESX hardware defect, hardware replacement may be necessary		2
2178	Sensor 1 software error	System	ESX hardware defect, hardware replacement may be necessary		2
2179	Sensor 2 software error	System	ESX hardware defect, hardware replacement may be necessary		2

FaultLocation		Input steering mode selector switch, S89			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
2181	Ground Connection of sensor/switch faultyThe voltage applied to the input is outside the specified range (see signal description).	X8:2	Hardware defect sensors, replacement required Line breakage in current path	2260 2261	2
2182	Supply connection Connection of sensor/switch faultyThe voltage applied to the input is outside the specified range (see signal description).	X8:1	Line breakage in current path Hardware defect sensors, replacement required	2260 2261	2
2183	Signal faultSignal outside the valid range (see signal description)	X35:08	Hardware defect sensors, replacement required	2260 2263	3

FaultLocation		Input crabwalk selector switch, S33			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
2185	Ground Connection of sensor/switch faultyThe voltage applied to the input is outside the specified range (see signal description).	X9:2	Line breakage in current path Hardware defect sensors, replacement required	2250 2251	2
2186	Supply connection Connection of sensor/switch faultyThe voltage applied to the input is outside the specified range (see signal description).	X9:4	Line breakage in current path Hardware defect sensors, replacement required No voltage supply (+Ub Pot 15 or 30)	2250 2251	2
2187	Signal faultSignal outside the valid range (see signal description)	X35:09	Hardware defect sensors, replacement required	2250 2251	3

FaultLocation		Input steering angle sensor front, B65			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
2190	Hardware initializing error	System	ESX hardware defect, hardware replacement may be necessary		2

2191	Signal faultSignal outside the valid range (see signal description)	X35:29	Hardware defect sensors, replacement required Line breakage in current path	2030	2
2192	Short circuit towards Ub	X35:29	Current path has connection to +Ub (15 or 30)	2030	2

FaultLocation	Steering angle sensor front, B65
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FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
2193	Teach values from memory not within the permissible range.	System	Repeat teach function for steering angle	2033 2034 2035	2

FaultLocation	Steering angle sensor rear, B66
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FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
2194	Teach values from memory not within the permissible range.	System	Repeat teach function for steering angle	2043 2044 2045	2

FaultLocation	Input rear steering angle sensor, B66
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FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
2195	Hardware initializing error	System	ESX hardware defect, hardware replacement may be necessary		2
2196	Signal faultSignal outside the valid range (see signal description)	X35:30	Line breakage in current path Hardware defect sensors, replacement required	2040	2
2197	Short circuit towards Ub	X35:30	Current path has connection to +Ub (15 or 30)	2040	2

FaultLocation	Steering angle teach function
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FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
2198	For teaching the steering angles the driver's seat must be directed towards the front drum!	System	Informative code - Follow the adjustment instructions		3

2199	Informative code - The teach function for the steering angles has not yet been successfully performed. (see adjustment instructions)	System	Informative code - Follow the adjustment instructions	1
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FaultLocation		Steering direction monitoring				
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac	
2200	The front left hand output is triggered, however, the drums steers to the right or does not steer at all.	System	Hardware defect sensors, replacement required Hydraulic problems Drums: blocked		2	
2201	The front right hand output is triggered, however, the drums steers to the right or does not steer at all.	System	Drums: blocked Hydraulic problems Hardware defect sensors, replacement required		2	
2202	The rear left hand output is triggered, however, the drums steers to the right or does not steer at all.	System	Hardware defect sensors, replacement required Drums: blocked Hydraulic problems		2	
2203	The rear right hand output is triggered, however, the drums steers to the left or does not steer at all.	System	Hydraulic problems Hardware defect sensors, replacement required Drums: blocked		2	

FaultLocation		Output vibration pump, low amplitude, Y08				
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac	
3000	The required control power cannot be transmitted to the pump.	X35:42	Line breakage in current path		2	
3001	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:42	Current path has connection to +Ub (15 or 30)		5	
3002	Output to proportional valve shorted to ground.	X35:42	Short circuit to ground (31) in the current path		2	
3003	The required control power cannot be transmitted to the pump.	X35:42	Line breakage in current path		2	

3004	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:42	Current path has connection to +Ub (15 or 30)	5
3005	Output to proportional valve shorted to ground.	X35:42	Short circuit to ground (31) in the current path	2
3006	Fault current regulator	X35:42	Software parameter fault, software update may be required.	2
3007	Fault current regulator	X35:42	Software parameter fault, software update may be required.	2
3008	Hardware initializing error	X35:42	Initialization fault	2
3009	Hardware initializing error	X35:42	Initialization fault	2

FaultLocation		Vibration frequency controller, low amplitude			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3011	Frequency adaptation, saved control values are outside limiting values	System	Software parameter fault, software update may be required. Parameter error, possibly machine type incorrectly chosen, control see adjustment instructions		0
3012	Frequency adaptation, controller has reached upper limiting value	System			0
3013	Frequency adaptation, controller has reached lower limiting value	System			0
3014	Frequency/speed to high	System			2
3015	Hardware initializing error	System	Initialization fault		3
3016	Hardware initializing error	System	Initialization fault		3
3061	Frequency adaptation, saved control values are outside limiting values	System	Software parameter fault, software update may be required. Parameter error, possibly machine type incorrectly chosen, control see adjustment instructions		0
3062	Frequency adaptation, controller has reached upper limiting value	System			0
3063	Frequency adaptation, controller has reached lower limiting value	System			0
3064	Frequency/speed to high	System			2

3065	Hardware initializing error	System	Software or hardware fault in travel lever, replacement required Initialization fault	3
3066	Hardware initializing error	System	Software or hardware fault in travel lever, replacement required Initialization fault	3

FaultLocation		Input speed transducer vibration motor front, B16			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3017	Cable breakage or sensor defective	System	Hardware defect sensors, replacement required Line breakage in current path		1

FaultLocation		Output vibration pump, high amplitude, Y07			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3020	The required control power cannot be transmitted to the proportional solenoid.	X35:42	Line breakage in current path	3001	2
3021	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:42	Current path has connection to +Ub (15 or 30)	3066	5
3022	Output to proportional valve shorted to ground.	X35:42	Short circuit to ground (31) in the current path	3067	2
3023	The required control power cannot be transmitted to the proportional solenoid.	X35:42	Line breakage in current path		2
3024	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:42	Current path has connection to +Ub (15 or 30)		5
3025	Output to proportional valve shorted to ground.	X35:42	Short circuit to ground (31) in the current path		2
3026	Fault current regulator	X35:42	Software parameter fault, software update may be required.		2
3027	Fault current regulator	X35:42	Software parameter fault, software update may be required.		2

3028	Hardware initializing error	X35:42	Initialization fault	2
3029	Hardware initializing error	X35:42	Initialization fault	2

FaultLocation	Vibration frequency controller, high amplitude
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FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3031	Frequency adaptation, saved control values are outside limiting values	System	Parameter error, possibly machine type incorrectly chosen, control see adjustment instructions Software parameter fault, software update may be required.		0
3032	Frequency adaptation, controller has reached upper limiting value	System			0
3033	Frequency adaptation, controller has reached lower limiting value	System			0
3034	Frequency/speed to high	System			2
3035	Hardware initializing error	System	Initialization fault		3
3036	Hardware initializing error	System	Initialization fault		3
3081	Frequency adaptation, saved control values are outside limiting values	System	Software parameter fault, software update may be required. Parameter error, possibly machine type incorrectly chosen, control see adjustment instructions		0
3082	Frequency adaptation, controller has reached upper limiting value	System			0
3083	Frequency adaptation, controller has reached lower limiting value	System			0
3084	Frequency/speed to high	System			2
3085	Hardware initializing error	System	Initialization fault		3
3086	Hardware initializing error	System	Initialization fault		3

FaultLocation	Output vibration pump rear, low amplitude, Y10
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FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3050	The required control power cannot be transmitted to the proportional solenoid.	X35:44	Line breakage in current path	3063	2

3051	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:44	Current path has connection to +Ub (15 or 30)	3063	5
3052	Output to proportional valve shorted to ground.	X35:44	Short circuit to ground (31) in the current path		2
3053	The required control power cannot be transmitted to the proportional solenoid.	X35:44	Line breakage in current path		2
3054	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:44	Current path has connection to +Ub (15 or 30)		5
3055	Output to proportional valve shorted to ground.	X35:44	Short circuit to ground (31) in the current path		2
3056	Fault current regulator	X35:44	Software parameter fault, software update may be required.		2
3057	Fault current regulator	X35:44	Software parameter fault, software update may be required.		2
3058	Hardware initializing error	X35:44	Initialization fault		2
3059	Hardware initializing error	X35:44	Initialization fault		2

FaultLocation Input speed transducer vibration motor rear, B17

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3067	Cable breakage or sensor defective	System	Hardware defect sensors, replacement required Line breakage in current path		1

FaultLocation Output vibration pump rear, high amplitude, Y09

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3070	The required control power cannot be transmitted to the proportional solenoid.	X35:44	Line breakage in current path	3066	2
3071	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:44	Current path has connection to +Ub (15 or 30)	3066	5
3072	Output to proportional valve shorted to ground.	X35:44	Short circuit to ground (31) in the current path		2

3073	The required control power cannot be transmitted to the proportional solenoid.	X35:44	Line breakage in current path	2
3074	Supply voltage Ub is applied to the proportional valve output, even though the output is not switched.	X35:44	Current path has connection to +Ub (15 or 30)	5
3075	Output to proportional valve shorted to ground.	X35:44	Short circuit to ground (31) in the current path	2
3076	Fault current regulator	X35:44	Software parameter fault, software update may be required.	2
3077	Fault current regulator	X35:44	Software parameter fault, software update may be required.	2
3078	Hardware initializing error	X35:44	Initialization fault	2
3079	Hardware initializing error	X35:44	Initialization fault	2

FaultLocation		Output amplitude changeover relay, K43, K65			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3090	The required control power cannot be transmitted to the relay	X35:24	Line breakage in current path		3
3091	Output to relay shorted to ground.	X35:24	Short circuit to ground (31) in the current path		3
3092	Supply voltage Ub is applied to the relay output, even though it is not switched.	X35:24	Current path has connection to +Ub (15 or 30)		3

FaultLocation		Water sprinkling system, tank filling level			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3100	Informative message - water tank empty and pump running	X26:10			0

FaultLocation		Input tank level sensor, water sprinkling system			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3103	Signal faultSignal outside the valid range (see signal description)	X27:11	Initialization fault Parameter error, possibly machine type incorrectly chosen, control see adjustment instructions		1

FaultLocation					
Water sprinkling system, sprinkling interval switch A1					
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3105	Ground Connection of sensor/switch faultyThe voltage applied to the input is outside the specified range (see signal description).	X17:03	Initialization fault		3
3106	Supply connection Connection of sensor/switch faultyThe voltage applied to the input is outside the specified range (see signal description).	X17:1			3
3107	Signal faultSignal outside the valid range (see signal description)	X23:12	No analogue ground from ESX Line breakage in current path	3107	3
FaultLocation					
Relay output water sprinkling system pump 1, K80					
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3110	The required control power cannot be transmitted to the relay	X35:25	Line breakage in current path	3112	3
3111	Output to relay shorted to ground.	X35:25	Short circuit to ground (31) in the current path		3
3112	Supply voltage Ub is applied to the relay output, even though it is not switched.	X35:25	Current path has connection to +Ub (15 or 30)		3
FaultLocation					
Relay output water sprinkling system pump 2, K79					
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3115	The required control power cannot be transmitted to the relay	X35:62	Line breakage in current path	3113	3
3116	Output to relay shorted to ground.	X35:62	Short circuit to ground (31) in the current path		3
3117	Supply voltage Ub is applied to the relay output, even though it is not switched.	X35:62	Current path has connection to +Ub (15 or 30)		3
FaultLocation					
Output sprinkling valve edge cutter, right, Y99					
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac

3120	The required control power cannot be transmitted to the valve.	X22:8	Line breakage in current path	3
3121	The output to the valve has ground contact, or the output current is higher than permitted.	X22:8	Short circuit to ground (31) in the current path	3
3122	Supply voltage Ub is applied to the valve output, even though the valve is not switched.	X22:8	Current path has connection to +Ub (15 or 30)	3

FaultLocation Relay output emulsion sprinkling system pump, K78

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3125	The required control power cannot be transmitted to the valve	X22:9	Line breakage in current path		3
3126	The output to the valve has ground contact, or the output current is higher than permitted.	X22:9	Short circuit to ground (31) in the current path		3
3127	Supply voltage Ub is applied to the valve output, even though the valve is not switched.	X22:9	Current path has connection to +Ub (15 or 30)		3

FaultLocation Output sprinkling valve Y06

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3135	The required control power cannot be transmitted to the valve	X22:26	Line breakage in current path		3
3136	The output to the valve has ground contact, or the output current is higher than permitted.	X22:26	Short circuit to ground (31) in the current path		3
3137	Supply voltage Ub is applied to the valve output, even though the valve is not switched.	X22:26	Current path has connection to +Ub (15 or 30)		3

FaultLocation Output sprinkling valve edge cutter, left, Y191

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3145	The required control power cannot be transmitted to the valve	X22:35	Line breakage in current path		3

3146	The output to the valve has ground contact, or the output current is higher than permitted.	X22:35	Short circuit to ground (31) in the current path	3
3147	Supply voltage Ub is applied to the valve output, even though the valve is not switched.	X22:35	Current path has connection to +Ub (15 or 30)	3
FaultLocation		Output valve edge cutter, right, up Y20		
FCode	FaultDescription	Terminal	Possible Cause	Diag Reac
3150	The required control power cannot be transmitted to the valve	X22:10	Line breakage in current path	3
3151	The output to the valve has ground contact, or the output current is higher than permitted.	X22:10	Short circuit to ground (31) in the current path	3
3152	Supply voltage Ub is applied to the valve output, even though the valve is not switched.	X22:10	Current path has connection to +Ub (15 or 30)	3
FaultLocation		Output valve edge cutter, right, down Y21		
FCode	FaultDescription	Terminal	Possible Cause	Diag Reac
3155	The required control power cannot be transmitted to the valve	X22:11	Line breakage in current path	3
3156	The output to the valve has ground contact, or the output current is higher than permitted.	X22:11	Short circuit to ground (31) in the current path	3
3157	Supply voltage Ub is applied to the valve output, even though the valve is not switched.	X22:11	Current path has connection to +Ub (15 or 30)	3
FaultLocation		Output valve chip spreader, Y66		
FCode	FaultDescription	Terminal	Possible Cause	Diag Reac
3165	The required control power cannot be transmitted to the valve	X22:13	Line breakage in current path	3
3166	The output to the valve has ground contact, or the output current is higher than permitted.	X22:13	Short circuit to ground (31) in the current path	3

3167	Supply voltage Ub is applied to the valve output, even though the valve is not switched.	X22:13	Current path has connection to +Ub (15 or 30)	3
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FaultLocation		Output valve chip spreader adjustment up, Y131			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3170	The required control power cannot be transmitted to the valve	X22:19	Line breakage in current path		3
3171	The output to the valve has ground contact, or the output current is higher than permitted.	X22:19	Short circuit to ground (31) in the current path		3
3172	Supply voltage Ub is applied to the valve output, even though the valve is not switched.	X22:19	Current path has connection to +Ub (15 or 30)		3

FaultLocation		Output valve chip spreader adjustment down, Y67			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3175	The required control power cannot be transmitted to the valve	X22:21	Line breakage in current path		3
3176	The output to the valve has ground contact, or the output current is higher than permitted.	X22:21	Short circuit to ground (31) in the current path		3
3177	Supply voltage Ub is applied to the valve output, even though the valve is not switched.	X22:21	Current path has connection to +Ub (15 or 30)		3

FaultLocation		Output changeover of chip spreader movement direction Y192 and			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3180	The required control power cannot be transmitted to the valve	X22:22	Line breakage in current path		3
3181	The output to the valve has ground contact, or the output current is higher than permitted.	X22:22	Short circuit to ground (31) in the current path		3
3182	Supply voltage Ub is applied to the valve output, even though the valve is not switched.	X22:22	Current path has connection to +Ub (15 or 30)		3

FaultLocation		Output valve edge cutter, left, up Y239			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3190	The required control power cannot be transmitted to the valve	X22:12	Line breakage in current path		3
3191	The output to the valve has ground contact, or the output current is higher than permitted.	X22:12	Short circuit to ground (31) in the current path		3
3192	Supply voltage Ub is applied to the valve output, even though the valve is not switched.	X22:12	Current path has connection to +Ub (15 or 30)		3
FaultLocation		Output valve edge cutter, left, down Y240			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
3195	The required control power cannot be transmitted to the valve	X22:36	Line breakage in current path		3
3196	The output to the valve has ground contact, or the output current is higher than permitted.	X22:36	Short circuit to ground (31) in the current path		3
3197	Supply voltage Ub is applied to the valve output, even though the valve is not switched.	X22:36	Current path has connection to +Ub (15 or 30)		3
FaultLocation		Input D+ detection			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5017	Engine running but no D+ signal present	X26:03	Generator or charge regulator defective Line breakage in current path		0
FaultLocation		Input engine oil pressure monitoring B06			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5020	Warning: No oil pressure	X26:07			0
5021	Fault: No oil pressure	X26:07			5
FaultLocation		Input coolant level monitoring B55			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac

5024	Warning: Coolant filling level too low	X26:05		0
5025	Fault: Coolant filling level too low	X26:05		5

FaultLocation

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5026	Warning: Air filter dirty	X26:04		5025	1
5027	Fault: Air filter dirty	X26:04		5025	5

FaultLocation

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5028	Warning: Water in fuel filter	X27:4		5026	0
5029	Fault: Water in fuel filter	X27:4		5026	5

FaultLocation

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5045	Wire breakage at the output to the relay				1
5046	Supply voltage Ub is applied to the relay output, even though it is not switched.				1
5047	Insufficient current flow at output to relay				1

FaultLocation

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5050	Signal faultSignal outside the valid range (see signal description)	X27:2	Hardware defect sensors, replacement required Line breakage in current path	5050	1

FaultLocation

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5061	Signal faultSignal outside the valid range (see signal description)	System			0

FaultLocation					
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5062	Signal faultSignal outside the valid range (see signal description)	System			0
FaultLocation		Engine control unit			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5101	Information message - The engine control unit reports a fault, the engine was stopped	System			1
5102	Information message - Engine control unit reports an more than one errors	System			
5110	Error message - Engine control unit reports an error	System			1
5111	Engine oil level not correct	System			1
5112	Fault: No oil pressure	System			0
5113	Turbo charger pressure not correct	System			1
5114	Fault: Intake manifold temperature	System			1
5115	Fault: Ambient pressure sensor	System			1
5116	Fault: Engine temperature sensor	System			0
5117	Fault: Diesel temperature sensor	System			1
5118	Fault: Engine speed sensor	System			1
5119	Fault: Water in fuel filter	System			1
5120	Communication fault with engine control unit	System			1
5122	Engine control unit not in speed controlling mode, or does not pick up any speed commands	System			1
5126	Communication fault with engine control unit	System			1
5127	Fault: Coolant filling level too low	System			1

5128	Fault: Injection pressure in rail system	System	1
5130	Fault: Oil pressure sensor	System	1
5131	Fault: Turbocharger pressure sensor	System	1
5132	Fault: Ambient pressure sensor	System	1
5133	Fault: Engine temperature sensor	System	1
5134	Fault: Engine speed sensor	System	1
5135	Fault: Water in fuel filter	System	1
5136	Fault: Ambient pressure sensor	System	1
5137	Fault: Coolant level sensor	System	1
5138	Fault: Sensor for injection pressure in rail system	System	1
5139	Fuel pump	System	1
5140	Error message - Engine control unit reports a fault, which has not been classified. Engine diagnose required.	System	1
5141	The engine control unit has shut down the engine as a protective measure, caused by a fault.		3
5142	Fault pressure limiting valve		3
5143	Fault: Injection pressure in rail system		3
5144			1
5145			1
5152	Information code - Regeneration level 2	System	1
5153	Information code - Regeneration level 3	System	0
5154	Information code - Regeneration level 4	System	3
5155	Information code - Regeneration level 5	System	3

5156	Information code - external regeneration required	System	3
5157	Stand still regeneration can not be started.	System	3
5160	Information code - automatic regeneration active	System	1
5161	Information code - parked regeneration active, if possible do not interrupt.	System	1
5165	Warning: SCR tank filling level	System	1
5170	Communication fault with engine control unit - check CAN-bus 2	System	1
9400	Communication fault with engine control unit	System	3

FaultLocation		Exhaust gas after-treatment			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5180	Information message, no fault!The EndOfLine test (EOL test) has not been performed.	Motor			1
6064	Fault: No DEF system pressure building up!	Motor			0
6068	Fault: DEF system pressure outside of limit values!	Motor			0
6069	Fault: Regeneration requirement ignored too long!	Motor			0
6070	Engine oil change required	Motor			3
6071	DPF filter change required	Motor			3
6072	DPF filter change required, system response is active	Motor			3
6073	Power reduction Step 1	Motor			0
6074	Power reduction Step 2	Motor			0
6200		Motor			0

6201	Motor	0
6202	Motor	0
6203	Motor	0
6204	Motor	0
6205	Motor	0

FaultLocation		Output EGAS actuator diesel engine, M39			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5200	The required control power cannot be transmitted to the relay	X35:64			3
5201	Supply voltage Ub is applied to the relay output, even though it is not switched.	X35:64			2
5202	Output to relay shorted to ground.	X35:64			3
5203	Insufficient current flow at output to relay	X35:64			3
5205	EGAS actuator does not move, even though current is flowing.	X35:64			3

FaultLocation		Input feedback potentiometer EGAS actuator diesel engine, M39			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5204	Signal outside the valid range	X35:31			3
5206	Supply connection Connection of sensor/switch faultyThe voltage applied to the input is outside the specified range (see signal description).	X35:31			3
5207	Ground Connection of sensor/switch faultyThe voltage applied to the input is outside the specified range (see signal description).	X35:31			3

FaultLocation		EGAS actuator diesel engine, M39			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac

5209 Informative code - The teach function for the EGAS actuator has not yet been successfully performed. (see adjustment instructions)

1

FaultLocation		Output pump speed fan, Y190			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5302	The required control power cannot be transmitted to the valve	X35:22			2
FaultLocation		Input hydraulic oil filter			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5500	Warning: Hydraulic oil filter dirty	X35:37	Check filter, if necessary clean or replace as per service instructions	5500	1
5501	Fault: Hydraulic oil filter dirty	X35:37	Check filter, if necessary clean or replace as per service instructions	5500	5
FaultLocation		Input hydraulic oil return flow filter pressure switch B25			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5502	Warning: Hydraulic oil return flow filter pressure switch	X26:11	Check filter, if necessary clean or replace as per service instructions	5502	0
5503		X26:11	Check filter, if necessary clean or replace as per service instructions	5502	5
FaultLocation		Input hydraulic oil temperature sensor B98			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5504	Warning: Hydraulic oil temperature too high	X27:10			0
5505	Fault: Hydraulic oil temperature too high	X27:10			3
5506	Signal faultThe current signal is not transferred	X27:10			3
FaultLocation					
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac

5510	System	Sensors not correctly installed or not adjusted No voltage supply (+Ub Pot 15 or 30) Current path has connection to +Ub (15 or 30) Short circuit to ground (31) in the current path Component or wiring defective	3
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5531	System		1
5534	System		1
5535	System		1
5536	System		1
5537	System		1

FaultLocation

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5511		System	Valve coil defective Line breakage in current path Current path has connection to +Ub (15 or 30) Short circuit to ground (31) in the current path		3

FaultLocation

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5512		System			1
5513		System	No voltage supply (+Ub Pot 15 or 30) CAN communication fault		1
5515		System	Hydraulic problems		1
5516	Sensor supply voltage	System			3
5519		System	Informative code - Follow the adjustment instructions		1

5520		System		3
5525	Fault: System voltage	System	No voltage supply (+Ub Pot 15 or 30)	3
5526		System		3
5527		System		3
5529		System		1
5547		System	Hydraulic problems	1

FaultLocation

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5514		System	Sensors not correctly installed or not adjusted Component or wiring defective Line breakage in current path Current path has connection to +Ub (15 or 30) Short circuit to ground (31) in the current path Hydraulic problems		3

FaultLocation

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5517		System	Sensors not correctly installed or not adjusted Sensor mixed up by mistake Hydraulic problems		3

FaultLocation

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
5518		System	Valve coil defective Hydraulic problems		3
5530		System			1

5532	System	Line breakage in current path Short circuit to ground (31) in the current path	1
5533	System	Current path has connection to +Ub (15 or 30)	1
5538	System	Hydraulic problems	1
5539	System	Hydraulic problems	1

FaultLocation				
FCode	FaultDescription	Terminal	Possible Cause	Diag Reac
5522		System	Sensor mixed up by mistake Hydraulic problems Sensors not correctly installed or not adjusted	3

FaultLocation				
FCode	FaultDescription	Terminal	Possible Cause	Diag Reac
5523		System	Sensor mixed up by mistake Sensors not correctly installed or not adjusted Hydraulic problems	3

FaultLocation				
FCode	FaultDescription	Terminal	Possible Cause	Diag Reac
5524		System	Valve coil defective Short circuit to ground (31) in the current path Current path has connection to +Ub (15 or 30) Line breakage in current path	3
5544		System	Hydraulic problems	1

5545		System	Hydraulic problems	1
5546		System	Hydraulic problems	1
FaultLocation				
FCode	FaultDescription	Terminal	Possible Cause	Diag Reac
5540		System	Hydraulic problems	1
5541		System	Hydraulic problems	1
FaultLocation				
FCode	FaultDescription	Terminal	Possible Cause	Diag Reac
5542		System	Hydraulic problems	1
5543		System	Hydraulic problems	1
FaultLocation Exhaust Gas Recirculation (EGR)				
FCode	FaultDescription	Terminal	Possible Cause	Diag Reac
6000	Fault: Differential pressure below limit value!	Motor		0
FaultLocation DEF quality sensor, B222				
FCode	FaultDescription	Terminal	Possible Cause	Diag Reac
6001	Plausibility error, DEF tank fill level	Motor		0
6002	Fault: DEF tank temperature has exceeded upper limit value.	Motor		0
6003	Fault: DEF tank temperature has dropped below lower limit value.	Motor		0

6009	Supply connection sensor/switch faultyThe voltage applied to the input is outside the specified range (see signal description).	Motor	0
6010	Ground Connection of sensor/switch faultyThe voltage applied to the input is outside the specified range (see signal description).	Motor	0
6011	Fault: Temperature too high!	Motor	0
6012	Fault: Temperature invalid!	Motor	0
6013	Warning: bad DEF quality!	Motor	0
6014	Supply connection sensor/switch faultyThe voltage applied to the input is outside the specified range (see signal description).	Motor	0
6015	Ground Connection of sensor/switch faultyThe voltage applied to the input is outside the specified range (see signal description).	Motor	0
6016	Fault: DEF quality invalid!	Motor	0
6023	Supply connection sensor/switch faultyThe voltage applied to the input is outside the specified range (see signal description).	Motor	0
6024	Ground Connection of sensor/switch faultyThe voltage applied to the input is outside the specified range (see signal description).	Motor	0
6065	Fault: CAN message failed!	Motor	0
6066	Fault: CAN message failed!	Motor	0

FaultLocation	Diesel particulate filter (DPF)				
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
6004	Plausibility error, DPF differential pressure	Motor			0
6005	Fault: Differential pressure below limit value!	Motor			0
6060	Fault: Excessive ash load!	Motor			0
6061	Fault: Excessive soot load!	Motor			0
FaultLocation	DEF metering valve, Y293				
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
6006	Short circuit towards Ub	Motor			0
6007	Cable breakage or sensor defective	Motor			0
6008	The output to the valve has ground contact, or the output current is higher than permitted.	Motor			0
6062	Fault: Valve blocked!	Motor			0
FaultLocation	DEF supply module				
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
6017	Fault: Pressure too high!	Motor			0
6039	Fault: Temperature invalid!	Motor			0
6040	Fault: Temperature invalid!	Motor			0
6041	Signal outside the valid range	Motor			0
6050	Fault: Temperature has dropped below lower limit value!	Motor			0
6051	Fault: Temperature implausible!	Motor			0
FaultLocation	Temperature sensor upstream of SCR catalyst, B223				
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
6018	Fault: Temperature has exceeded upper limit value!	Motor			0

6019	Fault: Temperature has dropped below lower limit value!	Motor	0
6020	Fault: Temperature implausible!	Motor	0
6021	Fault: Temperature too high!	Motor	0
6022	Fault: Temperature too low!	Motor	0

FaultLocation DEF pump, M41

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
6025	Supply voltage Ub is applied to the output to the pump, even though the output is not switched.	Motor			0
6026	Output to pump shorted to ground	Motor			0
6027	Cable breakage or sensor defective	Motor			0

FaultLocation DEF suction valve, Y291

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
6028	Supply voltage Ub is applied to the output to the pump, even though the output is not switched.	Motor			0
6029	Output to pump shorted to ground	Motor			0
6030	Cable breakage or sensor defective	Motor			0
6063	Fault: Valve blocked!	Motor			0
6067	Fault: Valve blocked!	Motor			0

FaultLocation Temperature sensor upstream of OXY catalyst, B214

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
6031	Fault: Temperature too high!	Motor			0
6033	Fault: Temperature implausible!	Motor			0
6034	Fault: Temperature has exceeded upper limit value!	Motor			0
6035	Fault: Temperature has dropped below lower limit value!	Motor			0

FaultLocation	Temperature sensor downstream of OXY catalyst, B215				
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
6032	Fault: Temperature too high!	Motor			0
6036	Fault: Temperature implausible!	Motor			0
6037	Fault: Temperature has exceeded upper limit value!	Motor			0
6038	Fault: Temperature has dropped below lower limit value!	Motor			0
FaultLocation	Temperature sensor upstream of SCR catalyst, B224				
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
6042	Fault: CAN message failed!	Motor			0
6043	Fault: CAN message failed!	Motor			0
6044	Fault: CAN message failed!	Motor			0
6054	Cable breakage or sensor defective	Motor			0
6055	Short circuit	Motor			0
6057	Fault: Lambda has exceeded upper limit value!	Motor			0
6059	Fault: Lambda has dropped below lower limit value!	Motor			0
FaultLocation	Temperature sensor downstream of SCR catalyst, B225				
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
6045	Fault: CAN message failed!	Motor			0
6046	Fault: CAN message failed!	Motor			0
6047	Fault: CAN message failed!	Motor			0
6052	Cable breakage or sensor defective	Motor			0
6053	Short circuit	Motor			0
6056	Fault: Lambda has exceeded upper limit value!	Motor			0

6058 Fault: Lambda has dropped below lower limit value! Motor 0

FaultLocation		Pressure sensor upstream of SCR catalyst, B305			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
6048	Fault: Pressure has exceeded upper limit value!	Motor			0
6049	Fault: Pressure has dropped below lower limit value!	Motor			0

FaultLocation		EndOfLine test (EOL test)			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
6186	Warning: Error before EOL test has started (read out error log)!	Motor			0
6187	Warning: Diesel engine not running!	Motor			0
6188	Fault: Excessive soot load!	Motor			0
6189	Warning: Check OXY cat sensors!	Motor			0
6190	Warning: Error during EOL test (read out error log)!	Motor			0
6191	Warning: Check parking brake (travel lever in brake gate?)!	Motor			0
6192	Warning: Diesel engine no longer at operating point!	Motor			0
6193	Warning: Temperature downstream of Oxy catalyst too high!	Motor			0
6194	Warning: Differential pressure too high!	Motor			0
6195	Warning: EAT system not warmed up!	Motor			0
6196	Warning: Diesel engine not warmed up!	Motor			0
6197	Warning: Stationary conditions not met!	Motor			0
6198	Warning: SCR system not ready!	Motor			0

6199 Warning: Check NOx sensors! Motor 0

FaultLocation		Machine type management			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
7011	Fault is used, but cannot be displayed, but may be disregarded.				4
7012	Machine type conflict After replacing the control the machine type does not match the old one.	System			2

FaultLocation		Software Approval System			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
7020	Software Approval Missing	System			4
7021	Software release incomplete	System			3
7022	Software release incomplete	System			3
7029	Software release incomplete	System			4

FaultLocation		Travel control			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
8001	Internal fault	System			2
8002	Internal fault	System			2
8003	Internal fault	System			2
8004	Internal fault	System			2
8005	Internal fault	System			2
8006	Internal fault	System			2
8007	Internal fault	System			2
8007	Internal fault	System			2
8008	Internal fault	System			2
8009	Internal fault	System			2
8010	Internal fault	System			4
8011	Internal fault	System			4

8012	Internal fault	System	4
8013	Internal fault	System	4
8015	Internal fault	System	4
8016	Internal fault	System	1
8017	Internal fault	System	1
8029	DASA data read-back process was not successful, another attempt is required	System	3
8030	DASA data write process was not successful, another attempt is required	System	3
8032	DASA data read-back process was not successful, another attempt is required	System	3
8040	Internal fault	System	2
8041	Internal fault	System	2
8042	Internal fault	System	2
8043	Internal fault	System	2
8044	Internal fault	System	2
8045	Internal fault	System	2
8301	Internal fault	System	3
8302	Internal fault	System	3
8303	Internal fault	System	3
8304	Internal fault	System	3
8305	Internal fault	System	3
8306	Internal fault	System	3
8307	Internal fault	System	3
8308	Internal fault	System	3
8309	Internal fault	System	3
8330	Internal fault	System	3
8400	Internal fault	System	4

8401	Internal fault	System		4
8402	Internal fault	System		4
8403	Internal fault	System		4
8404	Internal fault	System		4
8405	Internal fault	System		4
8406	Internal fault	System		4
8407	Internal fault	System		4
8408	Internal fault	System		4
8409	Internal fault	System		4
8940	Internal fault	System		1
8941	Internal fault	System		1
8942	Internal fault	System		1
8943	Internal fault	System		1
8945	Internal fault	System	Software does not match the hardware – program the right software	4
8950	Internal fault	System		1
8951	Internal fault	System		1
8952	Internal fault	System		1
8953	Internal fault	System		1
8954	Internal fault	System		1
8956	Internal fault	System		1
8970	Fault: Overvoltage 8.5 V supply	System		4
8971	Fault: Undervoltage 8.5 V supply	System		4
8979	Fault: System voltage	System		4
8980	Warning: System voltage under 11V	System		1
8981	Fault: System voltage under 10V	System		2
8996	Internal fault	System		4

8997	Internal fault	System	4
8998	Internal fault	System	4
8999	Internal fault	System	4
9000	Internal fault	System	4
9001	Internal fault	System	4
9002	Internal fault	System	1
9003	Internal fault	System	1
9004	Fault: CAN communication Bus 1, check bus hardware	System	1
9005	Fault: CAN communication Bus 1, check bus hardware	System	2
9006	Fault: CAN communication Bus 1, check bus hardware	System	1
9007	Internal fault	System	1
9008	Internal fault	System	1
9008	Internal fault	System	1
9009	Internal fault	System	4
9009	Internal fault	System	4
9011	Internal fault	System	3
9012	Internal fault	System	3
9013	Internal fault	System	3
9014	Internal fault	System	3
9015	Internal fault	System	3
9016	Internal fault	System	3
9017	Internal fault	System	3
9018	Internal fault	System	3
9019	Internal fault	System	3
9020	Internal fault	System	3

9021	Internal fault	System	3
9022	Internal fault	System	3
9023	Internal fault	System	3
9024	Internal fault	System	3
9025	Internal fault	System	3
9026	Internal fault	System	3
9050	Internal fault	System	4
9051	Internal fault	System	4
9052	Internal fault	System	1
9053	Internal fault	System	1
9054	Fault: CAN communication Bus 2, check bus hardware	System	1
9055	Fault: CAN communication Bus 2, check bus hardware	System	2
9056	Fault: CAN communication Bus 2, check bus hardware	System	1
9056	Fault: CAN communication Bus 2, check bus hardware	System	1
9057	Internal fault	System	1
9058	Internal fault	System	1
9059	Internal fault	System	4
9061	Internal fault	System	3
9062	Internal fault	System	3
9063	Internal fault	System	3
9064	Internal fault	System	3
9065	Internal fault	System	3
9066	Internal fault	System	3
9067	Internal fault	System	3

9068	Internal fault	System	3
9069	Internal fault	System	3
9070	Internal fault	System	3
9071	Internal fault	System	3
9072	Internal fault	System	3
9073	Internal fault	System	3
9074	Internal fault	System	3
9075	Internal fault	System	3
9076	Internal fault	System	3
9091	Internal fault	System	2
9092	Internal fault	System	2
9093	Internal fault	System	3
9094	Internal fault	System	4
9095	Internal fault	System	4
9096	Internal fault	System	2
9240	Internal fault	System	1
9250	Internal fault	System	4
9251	Internal fault	System	1
9252	Internal fault	System	1
9253	Internal fault	System	4
9254	Internal fault	System	4
9255	Internal fault	System	4

FaultLocation		Setup display			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
8220	Software incompatibility display to machine software				3

FaultLocation		BLM Module			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
9103	Communication error	X35:61	Short circuit to ground (31) in the current path Excessive current in current path		
9103	Fault: CAN node monitoring bus 1, connected CAN node does not respond, check CAN connection and voltage supply to the node	System	Excessive current in current path Short circuit to ground (31) in the current path		1
9143	Fault: CAN node monitoring bus 1, connected CAN node does not send messages, check CAN connection and voltage supply to the node	System			
9263	Fault: CAN node monitoring bus 1, missing messages were recognized, check CAN connection and voltage supply to the node	System			1
9503	Fault: CAN node monitoring bus 1, internal software fault in node	System			3
9543	Fault: CAN node monitoring bus 1, connected CAN node does not respond, check CAN connection and voltage supply to the node	System			3
9583	Fault: CAN node monitoring bus 1, internal undervoltage fault in node	System			3
FaultLocation		Keyboard for immobilizer			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
9147	Fault: CAN node monitoring bus 1, connected CAN node does not send messages, check CAN connection and voltage supply to the node	System			3
FaultLocation		Cabin module			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac

9149	Fault: CAN node monitoring bus 1, connected CAN node does not send messages, check CAN connection and voltage supply to the node	System	3
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FaultLocation		BMDAS Module			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
9110	Fault: CAN node monitoring bus 1, connected CAN node does not respond, check CAN connection and voltage supply to the node	System			1
9150	Fault: CAN node monitoring bus 1, connected CAN node does not send messages, check CAN connection and voltage supply to the node	System			3
9270	Fault: CAN node monitoring bus 1, missing messages were recognized, check CAN connection and voltage supply to the node	System			1
9311	Hardware initializing error	System			1
9510	Fault: CAN node monitoring bus 1, internal software fault in node	System			3
9550	Fault: CAN node monitoring bus 1, connected CAN node does not respond, check CAN connection and voltage supply to the node	System			3
9590	Fault: CAN node monitoring bus 1, internal undervoltage fault in node	System			3

FaultLocation		Display module			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
9111	Fault: CAN node monitoring bus 1, connected CAN node does not respond, check CAN connection and voltage supply to the node	System			1

9112	Fault: CAN node monitoring bus 1, connected CAN node does not respond, check CAN connection and voltage supply to the node	System	1
9151	Fault: CAN node monitoring bus 1, connected CAN node does not send messages, check CAN connection and voltage supply to the node	System	3
9152	Fault: CAN node monitoring bus 1, connected CAN node does not send messages, check CAN connection and voltage supply to the node	System	3
9153	Fault: CAN node monitoring bus 1, connected CAN node does not send messages, check CAN connection and voltage supply to the node	System	3
9271	Fault: CAN node monitoring bus 1, missing messages were recognized, check CAN connection and voltage supply to the node	System	1
9272	Fault: CAN node monitoring bus 1, missing messages were recognized, check CAN connection and voltage supply to the node	System	1
9511	Fault: CAN node monitoring bus 1, internal software fault in node	System	3
9512	Fault: CAN node monitoring bus 1, internal software fault in node	System	3
9551	Fault: CAN node monitoring bus 1, connected CAN node does not respond, check CAN connection and voltage supply to the node	System	3
9552	Fault: CAN node monitoring bus 1, connected CAN node does not respond, check CAN connection and voltage supply to the node	System	3

9591	Fault: CAN node monitoring bus 1, internal undervoltage fault in node	System	3
9592	Fault: CAN node monitoring bus 1, internal undervoltage fault in node	System	3
9593	Fault: CAN node monitoring bus 1, internal undervoltage fault in node	System	3
9610	Fault: CAN node monitoring bus 2, internal undervoltage fault in node	System	2

FaultLocation		BMSAZ Module			
FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
9310	Hardware initializing error	System			1

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
7011	Fault is used, but cannot be displayed, but may be disregarded.				4
7012	Machine type conflict After replacing the control the machine type does not match the old one.	System			2
7020	Software Approval Missing	System			4
7021	Software release incomplete	System			3
7022	Software release incomplete	System			3
7029	Software release incomplete	System			4
8001	Internal fault	System			2
8002	Internal fault	System			2
8003	Internal fault	System			2
8004	Internal fault	System			2
8005	Internal fault	System			2
8006	Internal fault	System			2
8007	Internal fault	System			2
8007	Internal fault	System			2
8008	Internal fault	System			2
8009	Internal fault	System			2
8010	Internal fault	System			4
8011	Internal fault	System			4
8012	Internal fault	System			4
8013	Internal fault	System			4
8015	Internal fault	System			4
8016	Internal fault	System			1
8017	Internal fault	System			1

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
8029	DASA data read-back process was not successful, another attempt is required	System			3
8030	DASA data write process was not successful, another attempt is required	System			3
8032	DASA data read-back process was not successful, another attempt is required	System			3
8040	Internal fault	System			2
8041	Internal fault	System			2
8042	Internal fault	System			2
8043	Internal fault	System			2
8044	Internal fault	System			2
8045	Internal fault	System			2
8131	Internal fault	System			3
8140	Hardware initializing error	System			3
8145	Hardware initializing error	System			4
8146	Hardware initializing error	System			4
8220	Software incompatibility display to machine software				3
8301	Internal fault	System			3
8302	Internal fault	System			3
8303	Internal fault	System			3
8304	Internal fault	System			3
8305	Internal fault	System			3
8306	Internal fault	System			3
8307	Internal fault	System			3
8308	Internal fault	System			3
8309	Internal fault	System			3

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
8330	Internal fault	System			3
8400	Internal fault	System			4
8401	Internal fault	System			4
8402	Internal fault	System			4
8403	Internal fault	System			4
8404	Internal fault	System			4
8405	Internal fault	System			4
8406	Internal fault	System			4
8407	Internal fault	System			4
8408	Internal fault	System			4
8409	Internal fault	System			4
8940	Internal fault	System			1
8941	Internal fault	System			1
8942	Internal fault	System			1
8943	Internal fault	System			1
8945	Internal fault	System	Software does not match the hardware – program the right software		4
8950	Internal fault	System			1
8951	Internal fault	System			1
8952	Internal fault	System			1
8953	Internal fault	System			1
8954	Internal fault	System			1
8956	Internal fault	System			1
8970	Fault: Overvoltage 8.5 V supply	System			4
8971	Fault: Undervoltage 8.5 V supply	System			4

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
8979	Fault: System voltage	System			4
8980	Warning: System voltage under 11V	System			1
8981	Fault: System voltage under 10V	System			2
8996	Internal fault	System			4
8997	Internal fault	System			4
8998	Internal fault	System			4
8999	Internal fault	System			4
9000	Internal fault	System			4
9001	Internal fault	System			4
9002	Internal fault	System			1
9003	Internal fault	System			1
9004	Fault: CAN communication Bus 1, check bus hardware	System			1
9005	Fault: CAN communication Bus 1, check bus hardware	System			2
9006	Fault: CAN communication Bus 1, check bus hardware	System			1
9007	Internal fault	System			1
9008	Internal fault	System			1
9008	Internal fault	System			1
9009	Internal fault	System			4
9009	Internal fault	System			4
9011	Internal fault	System			3
9012	Internal fault	System			3
9013	Internal fault	System			3
9014	Internal fault	System			3

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
9015	Internal fault	System			3
9016	Internal fault	System			3
9017	Internal fault	System			3
9018	Internal fault	System			3
9019	Internal fault	System			3
9020	Internal fault	System			3
9021	Internal fault	System			3
9022	Internal fault	System			3
9023	Internal fault	System			3
9024	Internal fault	System			3
9025	Internal fault	System			3
9026	Internal fault	System			3
9050	Internal fault	System			4
9051	Internal fault	System			4
9052	Internal fault	System			1
9053	Internal fault	System			1
9054	Fault: CAN communication Bus 2, check bus hardware	System			1
9055	Fault: CAN communication Bus 2, check bus hardware	System			2
9056	Fault: CAN communication Bus 2, check bus hardware	System			1
9056	Fault: CAN communication Bus 2, check bus hardware	System			1
9057	Internal fault	System			1
9058	Internal fault	System			1
9059	Internal fault	System			4

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
9061	Internal fault	System			3
9062	Internal fault	System			3
9063	Internal fault	System			3
9064	Internal fault	System			3
9065	Internal fault	System			3
9066	Internal fault	System			3
9067	Internal fault	System			3
9068	Internal fault	System			3
9069	Internal fault	System			3
9070	Internal fault	System			3
9071	Internal fault	System			3
9072	Internal fault	System			3
9073	Internal fault	System			3
9074	Internal fault	System			3
9075	Internal fault	System			3
9076	Internal fault	System			3
9091	Internal fault	System			2
9092	Internal fault	System			2
9093	Internal fault	System			3
9094	Internal fault	System			4
9095	Internal fault	System			4
9096	Internal fault	System			2
9103	Fault: CAN node monitoring bus 1, connected CAN node does not respond, check CAN connection and voltage supply to the node	System	Excessive current in current path Short circuit to ground (31) in the current path		1

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
9103	Communication error	X35:61	Short circuit to ground (31) in the current path Excessive current in current path		
9110	Fault: CAN node monitoring bus 1, connected CAN node does not respond, check CAN connection and voltage supply to the node	System			1
9111	Fault: CAN node monitoring bus 1, connected CAN node does not respond, check CAN connection and voltage supply to the node	System			1
9112	Fault: CAN node monitoring bus 1, connected CAN node does not respond, check CAN connection and voltage supply to the node	System			1
9130	Fault: CAN node monitoring bus 2, connected CAN node does not respond, check CAN connection and voltage supply to the node	System			2
9143	Fault: CAN node monitoring bus 1, connected CAN node does not send messages, check CAN connection and voltage supply to the node	System			
9147	Fault: CAN node monitoring bus 1, connected CAN node does not send messages, check CAN connection and voltage supply to the node	System			3
9149	Fault: CAN node monitoring bus 1, connected CAN node does not send messages, check CAN connection and voltage supply to the node	System			3

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
9150	Fault: CAN node monitoring bus 1, connected CAN node does not send messages, check CAN connection and voltage supply to the node	System			3
9151	Fault: CAN node monitoring bus 1, connected CAN node does not send messages, check CAN connection and voltage supply to the node	System			3
9152	Fault: CAN node monitoring bus 1, connected CAN node does not send messages, check CAN connection and voltage supply to the node	System			3
9153	Fault: CAN node monitoring bus 1, connected CAN node does not send messages, check CAN connection and voltage supply to the node	System			3
9170	Fault: CAN node monitoring bus 2, connected CAN node does not send messages, check CAN connection and voltage supply to the node	System			2
9240	Internal fault	System			1
9250	Internal fault	System			4
9251	Internal fault	System			1
9252	Internal fault	System			1
9253	Internal fault	System			4
9254	Internal fault	System			4
9255	Internal fault	System			4
9263	Fault: CAN node monitoring bus 1, missing messages were recognized, check CAN connection and voltage supply to the node	System			1

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
9270	Fault: CAN node monitoring bus 1, missing messages were recognized, check CAN connection and voltage supply to the node	System			1
9271	Fault: CAN node monitoring bus 1, missing messages were recognized, check CAN connection and voltage supply to the node	System			1
9272	Fault: CAN node monitoring bus 1, missing messages were recognized, check CAN connection and voltage supply to the node	System			1
9290	Fault: CAN node monitoring bus 2, missing messages were recognized, check CAN connection and voltage supply to the node	System			1
9310	Hardware initializing error	System			1
9311	Hardware initializing error	System			1
9312	Hardware initializing error	System			1
9400	Communication fault with engine control unit	System			3
9503	Fault: CAN node monitoring bus 1, internal software fault in node	System			3
9510	Fault: CAN node monitoring bus 1, internal software fault in node	System			3
9511	Fault: CAN node monitoring bus 1, internal software fault in node	System			3
9512	Fault: CAN node monitoring bus 1, internal software fault in node	System			3
9530	Fault: CAN node monitoring bus 2, internal software fault in node	System			2

FCode	FaultDescription	Terminal	Possible Cause	Diag	Reac
9543	Fault: CAN node monitoring bus 1, connected CAN node does not respond, check CAN connection and voltage supply to the node	System			3
9550	Fault: CAN node monitoring bus 1, connected CAN node does not respond, check CAN connection and voltage supply to the node	System			3
9551	Fault: CAN node monitoring bus 1, connected CAN node does not respond, check CAN connection and voltage supply to the node	System			3
9552	Fault: CAN node monitoring bus 1, connected CAN node does not respond, check CAN connection and voltage supply to the node	System			3
9570	Fault: CAN node monitoring bus 2, connected CAN node does not respond, check CAN connection and voltage supply to the node	System			3
9583	Fault: CAN node monitoring bus 1, internal undervoltage fault in node	System			3
9590	Fault: CAN node monitoring bus 1, internal undervoltage fault in node	System			3
9591	Fault: CAN node monitoring bus 1, internal undervoltage fault in node	System			3
9592	Fault: CAN node monitoring bus 1, internal undervoltage fault in node	System			3
9593	Fault: CAN node monitoring bus 1, internal undervoltage fault in node	System			3
9610	Fault: CAN node monitoring bus 2, internal undervoltage fault in node	System			2

Functional System	Brake
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Input	Description	Category	ValueRange
501	Quit function "Drive against closed brake"	1	

Functional System	System
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Input	Description	Category	ValueRange
556	Display of firmware version in display	1	2.xx
559	Display of BLM IO slave module firmware version	1	
720	Display of machine type	1	73xx see also docu
8870	Enable parameter change fault indication BLM	1	See adjustment instructions!
8880	Restore operating hour meter from DASA	1	See adjustment instructions!
8887	Enable EEPROM copying function	1	See adjustment instructions!
8888	Copy values from DASA into ESX	1	See adjustment instructions!
8889	Copy values from ESX into DASA	1	See adjustment instructions!

Functional System	Output brake valve, Y04
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Input	Description	Category	ValueRange
1001	Display voltage output brake	1	

Functional System	Travel lever, S55
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Input	Description	Category	ValueRange
1020	Display "Travel lever end positions"	1	
1021	Display "Values for axle forward reverse"	1	0..1000 = Forward0..-1000 = Reverse
1022	Display "Values for axle right left"	1	left -> - 1000..0..1000 -> right, i.e. brake gate
1025	Display "Movement direction acc. to travel lever"	1	100 = Forward0 = Neutral1 = Reverse

Functional System	Travel system
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Input	Description	Category	ValueRange
1026	Display "Movement direction of machine"	1	0 = Neutral1 = Forward2 = Reverse
1027	Display "Enabled travel range"	1	0 = locked1 = enabled
1150	Travel speed	1	Display in km/h
1151	Travel speed calculated	1	Display in km/h
1170		1	
1171		2	not documented
1172		2	not documented
1173		2	not documented

Functional System	Input travel stage selector switch, S42
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Input	Description	Category	ValueRange
1040	Display "Selected travel range"	1	0-12
1041	Display "Voltage for speed pre-selection switch"	1	
1042	Display "Voltage for speed pre-selection switch standardized to 1000"	1	0..1000
1044	Value of the corresponding speed pre-selection stage	1	0..25000 [m/min*100]

Functional System	Output valve travel pump forward, Y16
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Input	Description	Category	ValueRange
1070	Display "Actual current value travel pump forward"	1	Display in mA (0..350..1300)
1071	Display "Nominal current value travel pump forward"	1	Display in mA (0..350..1300)

1078	Initial current value (learned surge current) of the valve	1	Display in mA (permitted range 350mA..600mA)
1079	Maximum current value (derived end current) of the valve	1	Display in mA (permitted range 1100mA..1400mA)

Functional System	Output valve travel pump reverse, Y17
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Input	Description	Category	ValueRange
1080	Display "Actual current value travel pump reverse"	1	Display in mA (0..350..1300)
1081	Display "Nominal current value travel pump reverse"	1	Display in mA (0..350..1300)
1088	Initial current value (learned surge current) of the valve	1	Display in mA (permitted range 350mA..600mA)
1089	Maximum current value (derived end current) of the valve	1	Display in mA (permitted range 1100mA..1400mA)

Functional System	Teach function travel pump flow controller
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Input	Description	Category	ValueRange
1090	Release teaching surge currents travel pump	1	see also "Automatic determination of surge currents in travel system"
1091	Start teaching surge currents travel pump	1	see also "Automatic determination of surge currents in travel system"

Functional System	Input speed sensor travel motor, B60
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Input	Description	Category	ValueRange
1105	Travel speed	1	Display in m/min*100
1106	Pulses of speed sensor	1	Counts the pulses up to 99'999 and starts again at 0

Functional System	Travel drive, speed adaptation
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Input	Description	Category	ValueRange
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1235	Display of adaptation factor travel speed forward	2	8000..14000
1236	Display of adaptation factor travel speed reverse	2	8000..14000

Functional System	Input inclination sensor, B57
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Input	Description	Category	ValueRange
1260	Display inclination sensor position	1	-1000..1000
1261	Display inclination sensor value in percent gradient	1	-1000..1000 > -100 % ..100%
1262	Display inclination sensor voltage measuring value	1	0..5000 mV
1263	Display inclination sensor voltage measuring value standardized to 1000	1	0..1000
1264	Display inclination sensor status	1	0= Not Initialized, 1 = Initialized (Normal operation), 2 = Error

Functional System	Input pressure sensor travel drive, B112
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Input	Description	Category	ValueRange
1270	Display travel pressure	1	0..410 bar
1271	Display pressure sensor current measuring value in mA	1	0.0 - 22.0 mA
1272	Display pressure sensor measuring value standardized to 1000	1	0.. 1000
1273	Display pressure sensor status	1	0= Not Initialized, 1 = Initialized (Normal operation), 2 = Error

Functional System	
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Input	Description	Category	ValueRange
1280		1	not documented
1281		2	not documented

1282	2	not documented
1283	2	not documented
1284	2	not documented
1285	2	not documented
1286	2	not documented

Functional System	Input seat contact switch, S06
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Input	Description	Category	ValueRange
1300	Status seat contact switch	1	0 = seat not occupied; 1 = seat occupied

Functional System	Detection of seat position
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Input	Description	Category	ValueRange
1310	Seat position sensor position	1	1= seat forward, 2 = seat backward, 3 = seat out of locked position
1311	Seat position used to work with the machine	1	1= seat forward, 2 = seat backward, 3 = seat out of locked position
1312	Switching condition switches 1 and 2	1	100 = Switch 1 switched 1 = Switch 2 switchedThe following combinations are possible:101 = front100 = rear001 = not permitted, switch 1 possibly defective

Functional System	Input seat position switch 1, B178
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Input	Description	Category	ValueRange
1313	Switching condition switch 1 (inner)	1	0 = not switched 1= switched

Functional System	Input seat position switch 2, B179
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Input	Description	Category	ValueRange
1314	Switching condition switch 2 (outer)	1	0 = not switched 1= switched

Functional System	Arm rest, left		
Input	Description	Category	ValueRange
1320	Status arm rest left	1	1= arm rest up; 2= arm rest down
Functional System	Input arm rest switch, B132		
Input	Description	Category	ValueRange
1321	Raw measuring value (voltage in V)	1	Display in mV
1322	Travel operation status by arm rest contact	1	1= Driving permitted; 2= Driving disabled
Functional System	Teach function steering valve surge currents		
Input	Description	Category	ValueRange
2000	Enable teach function to learn steering valve surge currents	1	See adjustment instructions
2001	Start teach function to learn steering valve surge currents	1	See adjustment instructions
Functional System	Steering angle teach function		
Input	Description	Category	ValueRange
2010	Enable teach function for angle transducers	1	See adjustment instructions
2011	Start teach function for angle transducers	1	See adjustment instructions
2012	Confirmation steering stop front	1	See adjustment instructions
2013	Confirmation middle front	1	See adjustment instructions
2014	Confirmation right hand stop front	1	See adjustment instructions
2022	Confirmation left hand stop front	1	See adjustment instructions
2023	Confirmation middle rear	1	See adjustment instructions
2024	Confirmation right hand stop rear	1	See adjustment instructions

Functional System	Input steering angle sensor front, B65		
Input	Description	Category	ValueRange
2030	Show current from input front angle sensor	1	3000..21000 mA
2031	Show standardized actual angle value for front drum	1	-1000..0..1000
2032	Actual angle in degree	1	-32.0 to 32.0
2033	Stored current value in min. position	1	4000..9000 mA
2035	Stored current value in max. position	1	15000..20000 mA
Functional System	Steering angle sensor front, B65		
Input	Description	Category	ValueRange
2034	Stored current value in middle position	1	9000..15000 mA
Functional System	Input rear steering angle sensor, B66		
Input	Description	Category	ValueRange
2040	Shows current from input rear angle sensor.	1	3000..21000 mA
2041	Show standardized actual angle value for rear drum	1	-1000..0..1000
2042	Actual angle in degree	1	-32.0 to 32.0
2043	Stored current value in min. position	1	4000..9000 mA
2044	Stored current value in middle position	1	9000..15000 mA
2045	Stored current value in max. position	1	15000..20000 mA
Functional System	Output steering valve Y92, front left steering		
Input	Description	Category	ValueRange
2100	Rated current steering valve front left	1	1 mA/ Digit
2101	Actual current steering valve front left	1	1 mA/ Digit

2105	Actual voltage steering valve front left	1	1 mv/ Digit
2110	Min. current steering valve front left	1	1 mA/ Digit
Functional System		Output steering valve Y93, front right steering	
Input	Description	Category	ValueRange
2102	Rated current steering valve front right	1	1 mA/ Digit
2103	Actual current steering valve front right	1	1 mA/ Digit
2106	Actual voltage steering valve front right	1	1 mv/ Digit
2111	Min. current steering valve front right	1	1 mA/ Digit
Functional System		Steering valves Y92 and Y93 front	
Input	Description	Category	ValueRange
2112	Current range steering valve front	1	1 mA/ Digit
Functional System		Output steering valve Y36, rear left steering	
Input	Description	Category	ValueRange
2120	Rated current steering valve rear left	1	1 mA/ Digit
2121	Actual current steering valve rear left	1	1 mA/ Digit
2125	Actual voltage steering valve rear left	1	1 mv/ Digit
2130	Min. current steering valve rear left	1	1 mA/ Digit
Functional System		Output steering valve Y35, rear right steering	
Input	Description	Category	ValueRange
2122	Rated current steering valve rear right	1	1 mA/ Digit
2123	Actual current steering valve rear right	1	1 mA/ Digit
2126	Actual voltage steering valve rear right	1	1 mv/ Digit
2131	Min. current steering valve rear right	1	1 mA/ Digit

Functional System	Steering valves Y35 and Y36 front
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Input	Description	Category	ValueRange
2132	Current range steering valve rear	1	1 mA/ Digit

Functional System	Steering wheel, A45
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Input	Description	Category	ValueRange
2200		1	
2201		1	
2202		1	
2210	Show number of pulses sensor bearing 1 track 1	1	0..65535, after overflow start again 0
2211	Show number of pulses sensor bearing 1 track 2	1	0..65535, after overflow start again 0
2212	Show summarized pulses sensor bearing 1	1	0..65535, after overflow start again 0
2213	Show sense of rotation of steering sensor bearing 1	1	000 undefined001 turn right002 turn left003 error
2220	Show number of pulses sensor bearing 2 track 1	1	0..65535, after overflow start again 0
2221	Show number of pulses sensor bearing 2 track 2	1	0..65535, after overflow start again 0
2222	Show summarized pulses sensor bearing 2	1	0..65535, after overflow start again 0
2223	Show sense of rotation of steering wheel sensor bearing 2	1	000 undefined001 turn right002 turn left003 error

Functional System	Input crabwalk selector switch, S33
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Input	Description	Category	ValueRange
2250	Set stage on crabwalk selector switch	1	1..24, left hand stop = 1
2254	Set value on crabwalk selector switch	1	- 1000 .. 0 .. +1000

Functional System	Crabwalk adjustment
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Input	Description	Category	ValueRange
2255	Set value on sensors	1	- 880 .. 0 .. + 880
2256	Rated value of crabwalk on machine	1	- 880 .. 0 .. + 880

Functional System	Input steering mode selector switch, S89
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Input	Description	Category	ValueRange
2260	Set stage on steering mode selector switch	1	1.. 5, 1 = Synchronous,2 = Auto,3 = Front, 4 = Rear,5 = Diagonal
2261	Display input voltage steering mode selector switch	1	[mV/ Digit]
2263	Show active steering mode	1	0 = Error1 = Synchronous,2 = Auto,3 = Front, 4 = Rear,5 = Diagonal

Functional System	Crabwalk parameters
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Input	Description	Category	ValueRange
2320	Release parameter change crabwalk parameters	1	
2321	Set crabwalk speed to slow	1	
2322	Set crabwalk speed to fast	1	
2326	Set crabwalk adjustment also via blue buttons on	1	
2327	Set crabwalk adjustment also via blue buttons off	1	

Functional System	Vibration system
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Input	Description	Category	ValueRange
3000	Display status of vibration button	1	0 = Vibration off1 = Vibration on
3001	Display status of vibration changeover relay	1	[2 = low amplitude , 3 = high amplitude]

3002	Display amplitude mode	1	0 = Vibration off 1 = low amplitude 2 = high amplitude
3003	Display drum pre-selection	1	1 = only front 2 = only rear 3 = both drums
3004	Show pre-selected vibration mode	1	0 = Vibration off 1 = Manual 2 = Automatic 3 = Chip spreader
3005	Display of engine speed command vibration	1	Display in rpm
3006	Display "Vibration enabled"	1	0 = Vibration not released 1 = Vibration released
3020	Display front vibration frequency	1	0..70.0 [Hz]
3021	Display nominal value front vibration frequency	1	0..70.0 [Hz]
3022	Display of engine speed command vibration front	1	Display in rpm
3023	Display output current vibration pump at low amplitude front	1	Display in mA (permitted range 0 mA..1400 mA)
3024	Display output voltage vibration pump at low amplitude front	1	[mV/ Digit]
3026	Display output current vibration pump at high amplitude front	1	Display in mA (permitted range 0 mA..1400 mA)
3027	Display output voltage vibration pump at high amplitude front	1	[mV/ Digit]
3060	Display rear vibration frequency	1	0..70.0 [Hz]
3061	Display nominal value rear vibration frequency	1	0..70.0 [Hz]
3062	Display of engine speed command vibration rear	1	Display in rpm
3063	Display output current vibration pump at low amplitude rear	1	Display in mA (permitted range 0 mA..1400 mA)
3064	Display output voltage vibration pump at low amplitude rear	1	[mV/ Digit]
3065	Display adaptation value, low amplitude, rear	1	1000..8000

3066	Display output current vibration pump at high amplitude rear	1	Display in mA (permitted range 0 mA..1400 mA)
3067	Display output voltage vibration pump at high amplitude rear	1	[mV/ Digit]
3068	Display adaptation value, high amplitude, rear	1	1000..8000
3070		1	0 = Limit, 1 = no limit
3071		1	0 = Limit, 1 = no limit
3072		1	0= Off1 = On
3078		1	0 = not active,1 = active
3080	Display parameter vibration no travel speed limit	1	0 = Limit, 1 = no limit
3081	Release of change to parameter vibration no travel speed limit	1	Activate
3082	Change to parameter vibration no travel speed limit	1	Activate
3083	Change to parameter vibration no travel speed limit	1	Deactivate
3090	Display parameter option HF front	1	0 = not active,1 = active
3091	Display parameter option HF rear	1	0 = not active,1 = active
3093	Release of change parameter option HF	1	Activate
3094	Change parameter option HF	1	Activate
3095	Change parameter option HF	1	Deactivate

Functional System

Input tank level sensor, water sprinkling system

Input	Description	Category	ValueRange
3100	Display analog value level sensor water tank	1	0..100 %
3103	Display value for pressure switch (only BW 154)	1	0..100%

Functional System	Water sprinkling system, tank filling level		
Input	Description	Category	ValueRange
3102	Display switch for residual water quantity	1	0000 Switch not switched0001 Switch switched
Functional System	Water sprinkling system		
Input	Description	Category	ValueRange
3105	Enable sprinkling also at standstill for testing	1	Only with engine running, machine should not drive!!
3106	Display of sprinkling mode	1	0= Off1 = On
3107	Display of set sprinkling stage	1	1..12, 1 = left hand stop
3108	Display timer for sprinkling interval	1	
3109	Display output current relay for sprinkling pump 1	1	[mA / Digit]
3110	Display output current relay for sprinkling pump 2	1	[mA / Digit]
3111	Display of sprinkling location	1	0 = Drums only,1 = Drums and edge cutter,2 = Edge cutter only
3112	Display status of switch S114 pump 1	1	0 = Switch not operated1= Switch operated
3113	Display status of switch S114 pump 2	1	0 = Switch not operated1= Switch operated
3115	Display of the set after-sprinkling time	1	0..15 sec
3116	Enable parameter change water sprinkling system	1	
3117	End of parameter change water sprinkling system	1	
3118	Start parameter change for water sprinkling system	1	0..15 sec adjustable with Up/Down keys
Functional System	Output valve edge cutter, left, down Y240		
Input	Description	Category	ValueRange

3130	Display of edge cutter parameterization	1	0 = no edge cutter activated 1 = only right edge cutter activated 2 = edge cutters right and left activated 3 = only left edge cutter activated
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Functional System	Edge cutter
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Input	Description	Category	ValueRange
3131	Enable changes to edge cutter parameters	1	See adjustment instructions
3132	Input code - No edge cutter	1	See adjustment instructions
3133	Input code - Only right edge cutter	1	See adjustment instructions
3134	Input code - Right and left edge cutter	1	See adjustment instructions
3135	Input code - Only left edge cutter	1	See adjustment instructions
3136	Display edge cutter control	1	0 = no movement 1 = up 2 = down 3 = error
3137	Display of switch position change-over edge cutter front/rear	1	0 = front edge cutter selected 1 = rear edge cutter selected

Functional System	Chip spreader
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Input	Description	Category	ValueRange
3140	Display of chip spreader type	1	0 = no chip spreader active, 1 = chip spreader via vibration pump
3141	Display of chip spreader adjustment type	1	1 = only Up/Down 2 = additional sideways movement
3142	Enable changes to chip spreader settings	1	See adjustment instructions
3143	Input code - No spreader activated	1	See adjustment instructions
3144	Input code - Activate BOMAG spreading beam spreader	1	See adjustment instructions
3145	Display of chip spreader control	1	0 = Chip spreader not controlled 1 = Chip spreader controlled
3146	Display of push button status chip spreader on/off	1	0 = Off 1 = On

3147	Input code – Set spreader to spreading beam spreader	1	See adjustment instructions
3148	Input code – Set spreader to centrifugal spreader	1	See adjustment instructions
3150	Input code – No chip spreader adjustment	1	See adjustment instructions
3151	Input code - Chip spreader adjustment only up/down	1	See adjustment instructions
3152	Input code - chip spreader additionally laterally adjustable	1	See adjustment instructions
3153	Display – Actual movement direction of chip spreader	1	0001 = down0010 = up1001 = left1010 = right

Functional System	Input engine speed B92
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Input	Description	Category	ValueRange
5000	Display of diesel engine speed	1	0.. 3500 rpm

Functional System	Engine speed detection
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Input	Description	Category	ValueRange
5001	Display of diesel engine speed command	1	0.. 3500 rpm

Functional System	Engine speed default
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Input	Description	Category	ValueRange
5003	Display engine speed mode diesel engine, default value of switches	1	0 = Low idle speed1 = Eco mode2 = Full speed position
5004	Display input switch min (idle speed position)	1	0= Off1 = On
5005	Display input switch max (full speed position)	1	0= Off1 = On

Functional System	Input working lights
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Input	Description	Category	ValueRange
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5006	Display input switch working lights	1	0= Off1 = On
Functional System	Input coolant level monitoring, B55		
Input	Description	Category	ValueRange
5021	Display "Engine status - coolant level"	1	0= Coolant level OK1= Coolant level too low
Functional System	Input coolant temperature switch, B53		
Input	Description	Category	ValueRange
5023	Status of coolant temperature switch	1	0 = Temperature ok1 = Temperature too high > 110°C
Functional System	Input D+ detection		
Input	Description	Category	ValueRange
5024	Display D+ status of engine	1	0 = not Ok1 = ok
Functional System	Input air filter sensor, B03		
Input	Description	Category	ValueRange
5025	Display "Engine status - air filter"	1	0= Air filter OK1= Air filter soiled
Functional System	Input water separator, B124		
Input	Description	Category	ValueRange
5026	Display "Status water separator in filter"	1	0 = ok 1 = Water in filter
Functional System	Input level switch for fuel filling level, R03		
Input	Description	Category	ValueRange
5050	Display input level sensor in fuel tank	1	0..255 (raw values)
Functional System	Exhaust gas after-treatment		
Input	Description	Category	ValueRange

5161	Display DPF: Soot load	1	0..100%
5162	Display DPF: Ash load	1	0..100%

Functional System	Diesel particulate filter (DPF)
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Input	Description	Category	ValueRange
5170	Display type regeneration switch	1	0 = grid (default) grid button 1= 2=
5171	Input code enable change to regeneration switch	1	See adjustment instructions
5172	Input code regeneration switch type button	1	See adjustment instructions
5173	Input code regeneration switch type switch	1	See adjustment instructions

Functional System	Input hydraulic oil filter
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Input	Description	Category	ValueRange
5500	Display status of hydraulic oil filter differential pressure switch	1	0 = Hydraulic oil filter OK 1 = Hydraulic oil filter soiled

Functional System	Input hydraulic oil return flow filter pressure switch B25
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Input	Description	Category	ValueRange
5502	Display status of hydraulic oil filter differential pressure switch	1	0 = Hydraulic oil filter OK 1 = Hydraulic oil filter soiled

Functional System	Input hydraulic oil temperature sensor, B98
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Input	Description	Category	ValueRange
5504	Display hydraulic oil temperature status	1	0 = OK, 1 = Temperature too high
5505	Hydraulic oil temperature gauge	1	0.. 90 C

Functional System			
Input	Description	Category	ValueRange
5670		1	See adjustment instructions!
5671		1	See adjustment instructions!
5672		1	See adjustment instructions!
5673		1	See adjustment instructions!
5676		1	See adjustment instructions!
5677		1	[bar]
5678		1	See adjustment instructions!
5679		1	See adjustment instructions!
5680		1	See adjustment instructions!
5683		1	See adjustment instructions!
5686		1	See adjustment instructions!
5687		1	See adjustment instructions!
5688	Display of firmware version of control	1	

Functional System			
Input	Description	Category	ValueRange
5674		1	[bar]

Functional System			
Input	Description	Category	ValueRange
5675		1	[bar]