Operating manual



Seed tube monitoring

Fertiliser line monitoring



MG5393 BAG0127.6 06.19 Printed in Germany Please read this operating manual before first commissioning. Keep it in a safe place for future use!



en



Reading the instruction

Manual and following it should seem to be inconvenient and superfluous as it is not enough to hear from others and to realize that a machine is good, to buy it and to believe that now everything should work by itself. The person in question would not only harm himself but also make the mistake of blaming the machine for possible failures instead of himself. In order to ensure success one should enter the mind of a thing, make himself familiar with every part of the machine and get acquainted with how it's handled. Only in this way could you be satisfied both with the machine and with yourself. This goal is the purpose of this instruction manual.

Leipzig-Plagwitz 1872. Rud. Sark!



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1 User Information

The User Information section supplies information on use of the operating manual.

1.1 Purpose of the document

This operating manual

- describes the operation.
- provides important information on safe and efficient handling of the machine.
- is a component part of the machine and should always be kept with the machine or the traction vehicle.
- keep it in a safe place for future use.

1.2 Locations in the operating manual

All the directions specified in the operating manual are always seen from the direction of travel.

1.3 Diagrams used

Handling instructions and reactions

Activities to be carried out by the user are given as numbered instructions. Always keep to the order of the handling instructions. The reaction to the handling instructions is given by an arrow.

Example:

- 1. Handling instruction 1
- → Reaction of the machine to handling instruction 1
- 2. Handling instruction 2

Lists

Lists without an essential order are shown as a list with bullets.

Example:

•

- Point 1
- Point 2

Number items in diagrams

Numbers in round brackets refer to the item numbers in the diagrams. The first number refers to the diagram and the second number to the item in the figure.

Example (Fig. 3/6)

- Figure 3
- Item 6



2 General Safety Instructions

2.1 Representation of safety symbols

Safety instructions are indicated by the triangular safety symbol and the highlighted signal word. The signal word (DANGER, WARNING, CAUTION) describes the gravity of the risk and has the following significance:

Ń	DANGER Indicates an immediate high risk, which will result in death or serious physical injury (loss of body parts or long-term damage) if not avoided. If the instructions are not followed, then this will result in imme- diate death or serious physical injury.
	WARNING
	Indicates a medium risk, which could result in death or (serious) physical injury if not avoided.
	If the instructions are not followed, then this may result in death or serious physical injury.
$\mathbf{\Lambda}$	CAUTION
	Indicates a low risk, which could incur minor or medium-level physical injury or damage to property if not avoided.
	Indicates an obligation to special behaviour or an activity re- quired for proper machine handling.
	Non-compliance with these instructions can cause faults on the machine or in the environment.
<u>_</u>	NOTE
	Indicates handling tips and particularly useful information.
	These instructions will help you to use all the functions of your machine to the optimum.



3 Product description

The system uses sensors to monitor the seed application.

The data is displayed on the ISOBUS terminal (AMATRON 3, for example).

AMATRON 3: After the AMATRON 3 is switched on, select the ISO-BUS mode.

4 Overview





5 Mounting and connecting

5.1 Connecting sensors in the loop

Sensors are connected together in a loop.

- 1. The first sensor in the loop is connected to connection B of the A/B cable harness.
- 2. Connect the other plug of sensor 1 and connect sensor 2.
- Repeat this process with all the sensors to complete the loop. A minimum of 2 sensors must be connected in a loop, up to a maximum 54 sensors. 8 loops are possible with a maximum of 432 sensors.
- 4. Connect the last sensor in the loop to connection A of the A/B cable harness.

The sensors are numbered according to their respective sequence in the loop and according to the loop type (seed or fertiliser).

- Loop 1: sensor 1 to sensor 54 Example: seed 1 to 54
- Loop 2: sensor 1 to sensor 54 Example: fertiliser 1 to 54
- Loop 3: sensor 1 to sensor 54 Example: seed 55 to 109
- Loop 4: sensor 1 to sensor 54 Example: fertiliser 55 to 109



The locking tabs must engage when inserting.



5.2 Connecting the cable harnesses

- 1. Connect a cable harness to the first module (master).
- 2. Connect the CAN Bus adapter cable harness to the ISO extension cable harness as well as the "Module In" plug.
- 3. Connect the tramline switch with the machine (if necessary, assemble the lifting switch kit with matching plug and connect with the lifting switch input. See the "Lifting switch plug assembly" for more information).
- 4. The lifting switch must be connected with the first module in the system. The tramline plug is not used for other module cable harnesses. In this case, all tramline lines must be wound up and secured.
- 5. Connect mating plug B of loop 1 of the A/B cable harness with the mating plug of the first sensor in the loop.
- 6. Connect the mating plug A of loop 1 of the A/B cable harness with the last sensor in the loop.
- 7. If required, connect an extension cable harness with the plugs of loops 1 and 2.
- 8. Connect the "Module Out" plug with the "Module In" plug of the next module cable harness.
- 9. Connect the other modules and cable harnesses as shown in steps 4 9.
- 10. Connect a terminator with the "Module Out" plug of the last module cable harness.



5.3 Examples for the system layout

Example 1: connecting one loop





Example 2: connecting 2 loops





Sensor installation in the fertiliser / seed tube hoses

Mechanical metering



Pneumatic metering



Fertiliser monitoring



Seed monitoring



Mounting the working position sensor



Mount the sensor at an appropriate position. Working position \rightarrow sensor dampened No working position \rightarrow sensor not dampened

Working position:





Headlands:





When operating the machine for the first time, the system performs an automatic configuration of the connected modules and loops. In order to access the information display screen, you have to acknowledge a warning first.

During the initial automatic configuration, a message indicates that the number of expected modules does not correspond with the actual number of modules.



If the machine is in working position, the following error message appears:

Sa	400 Saatgutsensor(en) Verstopft					
1	2	3	4	5		
)					1



6.1 Initial configuration





Operating states of the system

The system has 4 operating states:

NOT READY state

Occurs depending on the configuration saved in the initialisation and start-up phase. Then the status changes to "Ready" or "Failed". If the hardware configuration does not match the stored configuration, alarms are triggered.

READY STATE

In this state, the machine is inactive, which means that the system is in standby. Usually it is put into the operating state using the lifting switch if the machine is activated / deactivated.

RUN state

The machine is in working mode and the sensor monitoring is active.

• Failed state

This screen has a red background, and is displayed if a system, power supply or communication error occurs. Such an error must be corrected before the system can function again.

7 Operating the system

When putting into operation, the last saved configuration of the system is compared with the hardware configuration. An alarm is given if there is a deviation.

The system is activated / deactivated via the working position sensor. An alarm is given each time the system status is changed.

Only one active alarm message can be displayed at a given time. As soon as it has been acknowledged, the next alarm is displayed if necessary.

The system is equipped with a redundant communication between the sensors in order to prevent the entire system from switching off in event of a defective sensor. Blocked / defective sensors are shown on the screen with detailed information.

The monitoring status can be displayed via two screens:

- Information display (system overview and status of all connected loops)
- Loop configuration (status of individual loops / sensors)



7.1 Information display

The information display

- shows all loops within a system,
- shows the number of connected sensors for a loop / module,
- identifies blockages.
- (1) The current loop status as a symbol
- (2) Number of sensors on the loop
- (3) Alarm message
- (4) Call up details for the alarm message
- (5) Product that is spread
- (6) Set sensitivity of the sensors.









Function cal	l up via:	Function field	Buttons
Back to the information display		<	
Increase sensitivity of the sensors (1 - 10)		Seed T	
		Fertiliser	
Reduce sensitivity of the sensors (1 - 10)		Seed VI	
		Fertiliser	
Loop configuration			I
Setting the monitoring for the tramlines			
Call up the module diagnosis			
(Shift-key)			
System overview			
Details for alarm messages			
			Detail
Back to the information display			
Loop status symbol:	- Goo	d communication	
, A	- Limit	ed communication	
	- No c	ommunication	
	- (gree	en) Blockage detected, go	od communication
	- (yello	ow) Blockage detected, lir	nited communication



7.2 Display loop configuration



As soon as the loops and sensors have been allocated, functions are displayed on the screen for the loop configuration for the modules and sensors installed in the loop. The selected loop is shown as Loop #1, 2 at the top in the screen.

The loop configuration display shows critical system parameters for the selected loop, including the sensor status, seed rate, and sensor problems. A legend with colour code describes the current sensor status.

Loop configuration



- (1) Sensor in the loop with status display.
- (2) Selected sensor (flashing).
- (3) Seed rate display with update every second.
- (4) State input field:
- On (active sensor in the loop) or
- Off (inactive sensor in the loop) interrupts the alarm output for a specific sensor during operation.
- (5) Results of the 3 sensor tests.
- (6) Sensor voltage An alarm is triggered at values less than 10V.
- (7) Software version.
- (8) Entering the initial configuration.
- (9) Function fields.
- (10) Legend for the sensor status.

The current status of the sensors in a loop is displayed using a special colour code. The sensor legend describes the sensor status after communication, power, and sensor tests have been carried out.



Function call up via:	Function field
Back to the information display	←
Selects the next loop	\
Selects the previous loop	
Selects the next sensor in the loop	
Selects the previous sensor in the loop	
Carry out a communication test	
Carry out a self-test	
Carry out a performance test	120

Functions of the buttons on the control terminal

- Yellow fields can be marked and selected to enter the settings. •
- The selected field has a red border. •



- Activate selected field.
- Seed / fertiliser / off
- Sensors in the loop
- Select sensors in the loop
- State On / Off



7.3 Setting the monitoring for the tramlines



The monitoring of the seeding tubes that are used for producing the tramlines can be switched off when creating the tramline.

This prevents error messages caused by the seeding tubes regarding the tramlines.

Fahrgasse Einst.						
	Module 1					
Input	Input Typ Ho/Ni Senor					
1	Düng	НО	ZUWEIS			
2	Düng	НО	ZUWEIS			
3	Aus					
4	Aus					
5	Aus					
6	6 Aus					
Zubehör Leistung Elm						

Example:

1-12 monitored seeding tubes

X seeding tubes for tramlines







7.4 System tests

The current system status is tested or reset by 3 tests.

A communication test must be successfully performed before a power supply test can be carried out.

Following completion of each test, the respective status is displayed with 3 sensor legends.



Communication test



A communication test must be carried out in event of the following errors in the system:

- Signal failure between the modules and sensors
- Configuration deviation
- Loop deviation

One of 3 states is displayed after the system test:

- "Good" (test / confirmation the system operation)
- "Limited" (test / confirmation of system operation with one sensor communication line)
- "Fail" (test / confirmation of a complete communication failure that has to be corrected). In such a case, a full screen alarm is triggered and the error type is displayed.



Good Green Lines of Sensor Communication. Blocked Sensor/Good Green Blocked with Two Lines of Sensor Communication. Limited Yellow One Line of Sensor Communication. Blocked Sensor/Limited Blocked with One Line of Sensor Communication. Yellow Fail No Lines of Sensor Communication. Red 🕈 Unknown Blue No Information Available. Red [•] Off User Configured to Ignore Sensor. Close

Failed communication test

Sensor legend of the communication test



SENSOR LEGEND OF THE COMMUNICATION TEST

This legend identifies seven possible sensor states:

GOOD

Sensor and communication lines have passed the self test and are are operating properly.

BLOCKED SENSOR / GOOD

A sensor problem has been detected that has to be corrected. The communication lines are operating properly.

LIMITED

A communication error has been determined between 2 sensors. The communication is still taking place between the remaining sensors of the loop, but is limited (1 line).

BLOCKED SENSOR / LIMITED

A problem has been determined with one sensor as well as a communication error between the sensors. The communication is still taking place between the remaining sensors of the loop, but is limited (1 line).

FAIL

A communication error has been determined between several sensors and / or modules and the system no longer functions.

UNKNOWN

A deviation has been determined in the configuration. The number of detected sensors does not correspond to the expected number.

OFF

The sensor has been set to "Off" on the screen for the loop configuration, which is why the sensor is ignored and the alarm message is disabled.

Power test



A power supply fault has occurred between the sensors.

Carry out a power test as follows:

Press "Power Test" on the screen for the loop configuration. One of the 2 states is displayed after the system test:

- "Good" (test / confirmation of the power supply)
- "Unknown" (test / confirmation of a power supply failure)

The results of this test are displayed on the screen for the loop configuration



Sensor test



Possible causes for a sensor error could be:

- Low voltage
- Dirty sensors

One of 2 states is displayed following the sensor test

- Check mark (successful)
- Question mark (sensor status unknown)

Carry out a sensor test as follows:

- 1. Press "Sensor Test" on the screen for the loop configuration. A self-test window is displayed while testing all sensors.
- → The self-test can be cancelled at any time using the "Cancel" button.
- 2. After completing the self test, press the green "OK" button to exit the screen.



Sensor legend

Self-test window





7.5 System overview

	The system overview indicates the numb assigned to each module.	er of loops and modules		
	On the information display			
	Inhit.Verz Calling up the system overview on the system display			
	Back to the information display			
System overview	Number of Medules	1		
	Number of Modules	1		
	Loops Module 1	1		

7.6 Diagnosis module

Information display:





Each module is equipped with a total of 3 diagnostics screens that are only intended for information purposes and cannot be edited. These screens can be accessed when the system is active.





DIAGNOSTICS SCREEN 1

Diagnostics screen 1

Diagnostik	a b a ch
Modul #1	HUDEIC
Mod Input Erkannt Ni	
Mod Output Sinn: Ni	Nächste S.
ECU Leist: 11.87V	
Software Version: 00.20	
Baudatum/Stunde: 12 10 17 08	
BootBlock Version: 00.03	
Seriennummer: 28	
Anzahl der Module: 1	
1 vo 3	

MODULE IN DETECT

Represents the state "High" or "Low" for eliminating the error. High = open and Low = earthed

MODULE OUT SENSE

Represents the state "High" or "Low" for eliminating the error. High = open and Low = earthed

ECU POWER

The Electrical Control Unit (ECU) value is equivalent to the detected ECU voltage or the low voltage side of the system, which is used for the power supply of the sensors and modules. This value is generally identical or nearly identical with the tractor battery voltage.

SOFTWARE VERSION

Software version of the module.

BUILD DATE / HOUR

Date / hour of module production.

BOOT BLOCK VERSION

Boot block version of the module.

SERIAL NUMBER

Each module is has a serial number that is printed on a label.

NUMBER OF MODULES

Number of detected modules connected to the system.



DIAGNOSTICS SCREEN 2

The second diagnostics screen identifies the detected number of loops connected to a module.

The voltage and current intensity are displayed for each loop.

Diagnostik Arbeit Modul #1 1 Loop System Spannng Loop Strom Nächste S 1 A 11.83U 00.12A 1 B 11.84V 00.12A 00.00V 00.00A 2 A 00.00U 00.00A 2 B Loop erkannt: 1 2 vo 3

DIAGNOSTICS SCREEN 3

System output values for connected components are displayed on the third diagnostics screen.

TRAMLINE INPUTS 1-6

Tramline values will be available in a future version of the software.

LIFT SWITCH

The value displays the output signal of the lift switch as "High" or "Low".

"High" - open position; the system is deactivated.

"Low" - the lift switch is earthed / the system is active.

VT ENABLE

This value is set to "Low".

Diagnostics screen 3

Diagnost		
Modul #	1	HUDelt
Fahrgasse Input1:	Ηo	
Fahrgasse Input2:	Нo	Nächste S.
Fahrgasse Input3:	Ho	
Fahrgasse Input4:	Ho	
Fahrgasse Input5:	Нo	
Fahrgasse Input6:	Нo	
HochHebe-Schalter	Ni	
VT aktiv:	Ni	
	3 vo 3	

Diagnostics screen 2



8 Maintenance



At the start of the season and weekly

Component	Servicing work		
Tube hoses	Rinse out with water		
	Check for defects, replace if necessary		
Sensors	Clean with bottle brush		

9 ALARMS

Alarms are shown in the event of deviation from the normal parameters.

- Level 100 alarms refer to critical warning messages in conjunction with system problems or loop deviations..
- \rightarrow The cause must be eliminated before continuing with operation.
- Level 200 alarms refer to power failures with loops and sensors.
- Level 300 alarms refer to sensor faults.
- Level 400 alarms refer to blockages and module errors.

	ALARM	PROBABLE CAUSE	CORRECTIVE ACTION
100	Loop shutdown	The module voltage is above the maximum operating value of 18V. Loop is automatically switched off.	 Check all cable harnesses for loose connections. The vehicle charging system is not being regulated. Check vehicle charging system for correct voltage.
101	ECU low voltage	The module voltage is below the minimum value of 11V.	 Check all cable harnesses for loose connections. The vehicle charging system is not being regulated. Check vehicle charging system for correct voltage.
102	ECU high volt- age	The module voltage is below the maximum value of 16V.	 The vehicle charging system is not being regulated. Check vehicle charging system for correct voltage.
103	Low voltage	The loop voltage is below the mini- mum value of 11V.	 The module voltage may be too low. Check all cable harnesses for loose connections.
			 The vehicle charging system is not being regulated. Check vehicle charging system for correct voltage.
104	High voltage	The loop voltage is above the maxi- mum value of 16V.	 The module voltage may be too high. Check all cable harnesses for loose connections.
			 The vehicle charging system is not being regulated. Check vehicle charging system for correct voltage.
105	High current	The current of the loop is more than 5 Amps.	 Check for crimped wires, defective pins or faulty sensors.
			2) Check the system earth.
106	Position failure	Fault with the module position.	 Check the module cable harnesses. If required, check if pin 5 of the module in or module out plug is earthed using a voltmeter.
107	Accessory Power Short	Accessory Power is shutdown due to a possible faulty harness with the module identified on the Alarm screen.	1) Check accessory power harness to the module for pinched or damaged wires.3
200	Communica- tion_Failed	A communication error has been determined between 2 sensors. The	1) Check for loose sensors or ones that are not secure.
	sensor in loop	communication between the sensors is limited.	 Check if pin 2 and 3 of the communication cable are defective.
201	Loop communi- cation	Several faults in the communication line between the sensors. Loop is not	 Check for several faults in the communication lines for pin 2 and 3.
			2) Check for loose connections.
202	Loop communi- cation	Module failure. Loop is functional, but with limited communication. A com- munication error has been determined between 2 sensors.	 Check the connections of module, A/B loops or extension cable harness.



ALARMS

203	Loop communi- cation	Module failure. Check for several faults in the communication line be- tween the module and sensor. Loop is not functional.	1)	Check the connections of module, A/B loops or extension cable harness.
204	Loop communi- cation	The number of detected sensors does not correspond to the expected number.	1)	Configure system with the correct number of sensors for the loop. Check if the number of sensors that have been entered for the loop configuration via the screen corresponds with the number of sensors in- stalled.
205	Loop mismatch	The number of detected module loops does not correspond with the expected number.	1)	Check all connections of the module cable harness- es.
206	Power commu- nication	A power failure has been detected between 2 sensors. The loop is func- tional but with limited power supply between the sensors.	1)	Check all sensors for loose connections.
207	Power commu- nication	Several faults in the power supply between the sensors. Loop is not functional. No power supply has been determined between the sensors.	1)	Check all sensors for loose connections.
208	Power commu- nication	A fault in the power supply between the module and sensor. The loop is functional but with limited power sup- ply between the module and sensor.	1)	Check all sensors and the A/B loop cable harness for loose / defective connections.
209	Power commu- nication	Several faults in the power supply between the module and sensor. The loop is not functional and there is no power supply between the module and sensor.	1)	Check module, A/B loop cable harness, and extension cable harness for loose connections.
210	Power commu- nication	Communication faults have been determined during the power test. The test has been cancelled.	1) 2) 3)	This communication fault must be eliminated before performing the test again. Check for loose connections. Loop configured incorrectly. Sensors have been detected as well as a deviation that must be correct- ed.
300	Seed sensor(s) self test failure	Sensor failure / lens dirty	1) 2)	Check for faulty sensors and replace where applica- ble. Clean the lens.
301	Fertilizer sen- sor(s) self test failure	Sensor failure / lens dirty	1) 2)	Check for faulty sensors and replace where applica- ble. Clean the lens.
306	Seed sensor low voltage	Sensor voltage too low.	1)	Check sensor connections and vehicle charging device.
307	Fertilizer sensor low voltage	Sensor voltage too low.	1)	Check sensor connections and vehicle charging device.



400	Seed blockage	The sensor flow is blocked.	1)	If the sensor is not blocked and the connections / sensors are functional, change the sensitivity value for the loop configuration via the screen for the pur- pose of troubleshooting.
401	Fertilizer blockage	The sensor flow is blocked.	2)	If the sensor is not blocked and the connections / sensors are functional, change the sensitivity value for the loop configuration via the screen for the purpose of troubleshooting.
402	Module detection mismatch	The number of detected modules does not correspond with the expected number. The number of connected modules is saved in the master mod- ule when switching off. If the number of connected module changes upon the next starting up, an alarm is trig- gered.	1)	Check if the connection of the module cable harness is loose / defective.
403	Too many mod- ules	The system has detected 4 or more modules on the CAN Bus.	1)	If the sensor is not blocked and the connections / sensors are functional, change the sensitivity value for the loop configuration via the screen for the purpose of troubleshooting.
404	Too many master modules	The system has detected 2 or more master modules on the CAN Bus.	1)	Check the module-in and module-out connections of the module cable harness.
405	Module intermit- tent	The module temporarily looses the connection to the system.	1)	Check the cable harness of the modules for loose connections.
406	Module offline	The module is not communicating / is in offline status.	1)	Check the cable harness interface connections and cable harness between all modules.
			2)	Check if the the last module, the module-out connection, is connected to a terminator.





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