Installation and operating instructions

DRILL-Control

Version: V3.20151130_rev.2

30283620-02-EN

Read and follow these operating instructions.

Keep these operating instructions in a safe place for later reference.

Company details

Document

Installation and operating instructions
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Contents

1 For your safety

1.1 Basic safety instructions

Please read the following safety instructions carefully before using the product for the first time.

- Read the operating instructions to the agricultural device which you want to control by using the product.
- Do not make any unauthorized modifications to the product. Unauthorized modifications or use may impair safety and reduce the service life or operability of the unit. Modifications are considered unauthorized if they are not described in the product documentation.
- Never remove any safety mechanisms or stickers from the product.
- The product does not include any user serviceable parts. Do not open the casing.
- Before you leave the vehicle cabin, ensure all automatic mechanisms are deactivated or manual mode is activated.
- Before charging the tractor battery, always disconnect the tractor from the job computer.
- Keep children away from the implement and from the job computer.

1.2 Intended use

The job computer is only intended for use in the agricultural sector. The manufacturer is not liable for any other installation or use of the job computer.

The manufacturer cannot be held liable for any personal injury or property damage resulting from such non-compliance. All risk arising from improper use lies with the user.

Intended use also includes compliance with the conditions for operation and repairs prescribed by the manufacturer.

All applicable accident prevention regulations and all other generally recognized safety, industrial, and medical standards as well as all road traffic laws must be observed. Any unauthorized modifications made to the equipment will void the manufacturer's warranty.

1.3 Layout and meaning of warnings

All safety instructions found in these Operating Instructions are composed in accordance with the following pattern:

	**WARNING** This signal word identifies medium-risk hazards, which could potentially cause death or serious physical injury, if not avoided.

	**CAUTION** This signal word identifies low-risk hazards, which could potentially cause minor or moderate physical injury or damage to property, if not avoided.

NOTICE
This signal word identifies actions which could lead to operational malfunctions if performed incorrectly. These actions require that you operate in a precise and cautious manner in order to produce optimum work results.

There are some actions that need to be performed in several steps. If there is a risk involved in carrying out any of these steps, a safety warning will appear in the instructions themselves.

Safety instructions always directly precede the step involving risk and can be identified by their bold font type and a signal word.

Example

1. **NOTICE! This is a notice. It warns that there is a risk involved in the next step.**
2. Step involving risk.

1.4 Disposal

When it has reached the end of its service life, please dispose of this product as electronic scrap in accordance with all applicable waste management laws.

2 About the on-board integrated display/controller

2.1 Functions of the on-board integrated display/controller

DRILL-Control is an on-board integrated display/controller.

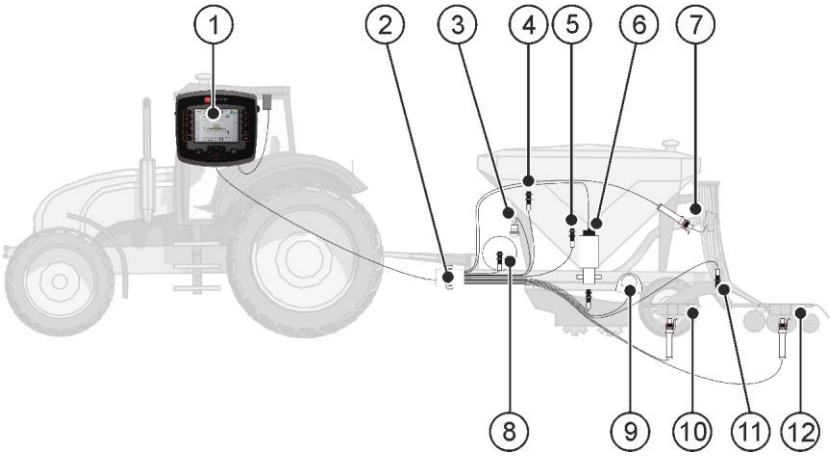
A job computer is built into the on-board integrated display/controller, which can control the work of seeders. When a job computer is mentioned within these instructions, it always refers to the DRILL-Control on-board integrated display/controller.

Among other things, the on-board integrated display/controller can perform the following tasks:

- Monitoring of the metering shaft
- Control of the bout marker
- Control of the tramline valves
- Starting the calibration using the calibration button
- Control of the half width shutoff system
- Control of the pre-emergence marker
- Monitoring of the fan speed

2.2 System overview

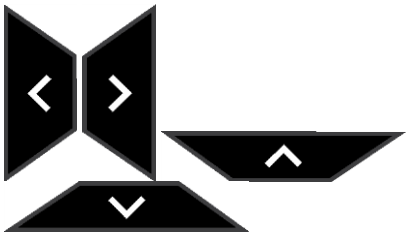
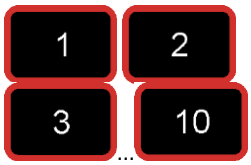
The following diagram shows an example of how an implement can be structured:



1	DRILL-Control	7	Tramline valve
2	Cable harness	8	Revolution sensor
3	Calibration button	9	Radar sensor
4	Fill level sensor	10	Bout marker
5	Fill level sensor	11	Work position sensor
6	Electrical metering drive	12	Pre-emergence marker

2.3 Overview of keys

DRILL-Control on-board integrated display/controller

Keys	Function
	Switches the on-board integrated display/controller on and off.
	Confirms entries.
	Creates screenshots.
	Navigate within individual screens.
	Performs the function shown on the screen.

2.4 Information on the nameplate

A rating plate can be found on the casing of the on-board integrated display/controller. The rating plate clearly identifies the on-board integrated display/controller.

Information on the nameplate

1	Client's item number If the product was manufactured for an agricultural machinery manufacturer, the agricultural machinery manufacturer's item number will be shown here.	4	Operating voltage The product may only be connected to voltages within this range.
2	Hardware version	5	Software version at the time of delivery. If you update the software, this version will no longer be up-to-date.
3	Müller-Elektronik item number	6	Serial number

3 About these Operating Instructions

3.1 Who is the target user for these Operating Instructions?

These Operating Instructions are intended for operators of seeders equipped with the DRILL-Control on-board integrated display/controller manufactured by Müller-Elektronik.

3.2 Scope of the instructions

These instructions describe all of the functions that can be actuated with the on-board integrated display/controller. This means that some chapters may not be relevant for the operation of certain implements.

3.3 Directional information in these instructions

All directional information in these instructions, such as "left", "right", "forward", "back", is relative to the movement direction of the vehicle.

3.4 Layout of operating instructions

The operating instructions explain step by step how you can perform certain operations with the product.

We use the following symbols throughout these Operating Instructions to identify different operating instructions:

Type of depiction	Meaning
1. **2.**	Actions that must be performed in succession.
⇨	Result of the action. This will happen when you perform an action.
⇨	Result of an operating instruction. This will happen when you have completed all steps.
☑	Requirements. In the event that any requirements have been specified, these must be met before an action can be performed.

3.5 Layout of references

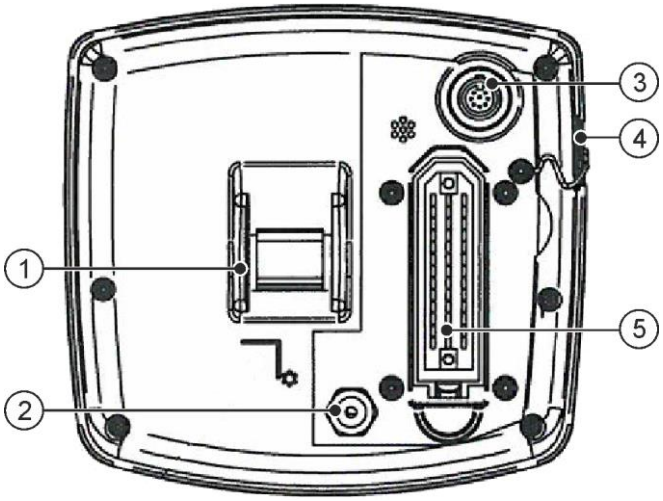
If any references are given in these Operating Instructions, they will appear as:

Example of a reference: [➞ 11]

References can be identified by their square brackets and an arrow. The number following the arrow shows you on what page the section starts where you can find further information.

4 Mounting and installation

4.1 Installing the on-board integrated display/controller



DRILL-Control - rear view

1	Attachment for the bracket.	3	8-pin flange socket. ASD interface for the use of SECTION-Control.
2	Power connection cable For connection to the battery connection cable.	4	USB port To connect a USB memory device.
		5	39-pin multipole connector To connect the junction box.

Procedure

1. Screw the bracket onto the on-board integrated display/controller.
2. Attach the bracket with the on-board integrated display/controller in the vehicle cab
3. Connect the on-board integrated display/controller with the junction box.
4. Connect the power connection cable with the battery connection cable.

4.2 Installing the sensors on the implement

The following sensors can be installed on the implement:

Purpose	Sensor type – according to the operating mode
Revolution sensor	Hall element sensor
Fill level sensor	Capacitive sensor
Work position sensor	Reed contact sensor
Vehicle speed sensor	Radar sensor

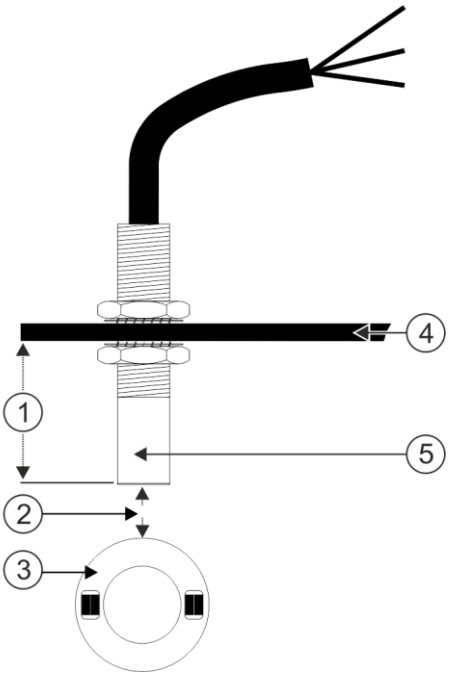
4.2.1 Installing the revolution sensors

Hall element sensors are suitable as revolution sensors.

Functional principle

The Hall element establishes a connection between the green and the white cable cores. To do so, the magnet must be held with the red side in front of the blue cap on the sensor.

Schematic overview



1	Min. 25 mm	4	Attachment angle
2	Distance 5-10 mm	5	Sensor (blue cap)
3	Ring with magnets		

Connector pin assignment

3-pin AMP connector

Pin	Cable color	Designation
1	white	0VE
2	brown	12VE
3	green	Signal

Spare part number

Item number	Designation
30303623	Hall element sensor with 3-pin AMP connector, switching distance: 5-10 mm

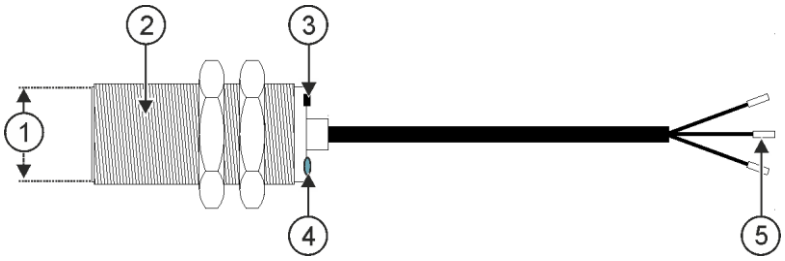
4.2.2 Installing the fill level sensor

Capacitive sensors are suitable as fill level sensors.

Functional principle

A signal is sent when the flat upper side of the sensor is covered, e.g. with seed.

Schematic overview



1	Flat upper side of the sensor	4	LED; shows whether the sensor reacts
2	Capacitive sensor	5	Wire ferrules
3	Adjustment screw to change the reacting distance		

Connector pin assignment

3-pin AMP connector

Pin	Cable color	Designation
1	blue	0VE
2	brown	12VE
3	black	Signal

Spare part number

Item number	Designation
30303650	Capacitive sensor with 3-pin AMP connector

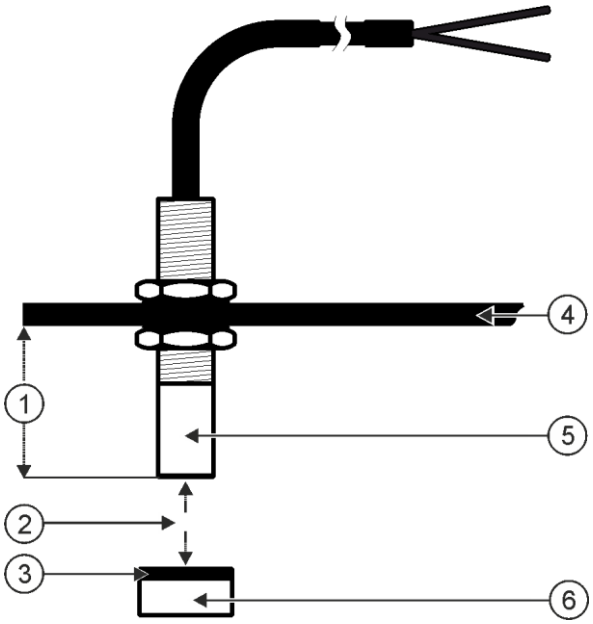
4.2.3 Installing the working position sensors

Reed contact sensors are suitable as working position sensors.

Functional principle

A signal is sent when the red side of a magnet is held in front of the red cap of the sensor. This creates a connection between the signal wire and the ground wire of the sensor.

Schematic overview



1	Min. 25 mm	4	Attachment angle
2	Distance 15-25mm	5	Sensor (red cap)
3	South pole of the magnet (red side)	6	Magnet (nonmagnetic attachment, e.g. V2A, copper, brass)

Connector pin assignment

3-pin AMP connector

Pin	Cable colour	Designation
1	white	0VE
2	brown	
3	green	Signal

Spare part number

Item number	Designation
30303615	Reed contact sensor with AMP plug

4.2.4 Installing the speed sensor

Radar sensors are suitable as speed sensors.

Consult the operating instructions for the radar sensor to find out how it has to be installed.

Spare part number

Item number	Designation
30258321	Vansco type 740 radar sensor with 1 m cable and with 3-pin AMP connector

5 Basic control principles

5.1 Switching on the on-board integrated display/controller

Procedure

☑ You have installed the on-board integrated display/controller. [→ 13]

1.  - Switch on the on-board integrated display/controller.

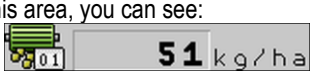
⇨ The work screen appears.

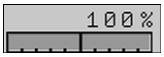
5.2 Layout of the work screen

The work screen is the part of the screen where you can see the current status of the implement based on the icons shown. Depending on the implement equipment, not all of the icons are always shown.

Information on the metering drives

In this area, you can see:

- 

- The seed rate for each connected metering drive. The number indicates which metering drive is meant. The current value is always shown here.
- 

- The changed target rate you have entered.

Information on the rows

In this area, you can see:

- What is being spread in each row:
  -  - Seed
- Whether a tramline is being created on the right side or the left side of the implement:
  -  - The implement is creating a tramline on the side that is marked with this icon.

Information on the additional functions

In this area, you can see if specific functions are activated.

-  - The waterhole mode is activated.
-  - The metering cells are being filled with seed.
-  - Both bout markers are being used.
-  - The left bout marker is being used.
-  - The right bout marker is being used.
-  - No bout marker is being used.

-  - The left bout marker is being used and the change mode of the bout marker is activated.
-  - The right bout marker is being used and the change mode of the bout marker is activated.
-  - The obstacle mode is activated.
-  - A hopper has issued an alarm.
-  - The implement is in working position.
-  - The early stop function is activated.

Status information

In this area, you can see:

-  - The current speed of the implement.
-  - The current speed of the fan. The number indicates which fan is meant.
-  - Whether a tramline is being created.
-  - Whether tramline control is deactivated.
-  - Which track you are currently driving on.

6 Configuring the basic settings of the on-board integrated display/controller

6.1 Setting the date / time

Procedure

1. On the work screen, press:
   > > ( ) >
2. / - Navigate to the date and time.
3. OK - Confirm.
4. / - Select the desired parameter.
5. OK - Confirm.
6. > - Terminate the settings.

6.2 Setting the brightness

Procedure

1. On the work screen, press:
   > > ( ) >
2. / - Increase or decrease the brightness.

⇨ The bar in the middle of the screen shows the current brightness.

6.3 Selecting the language

Procedure

1. On the work screen, press:
   > > ( ) >
2. / - Navigate to the language settings:
   .
3. OK - Confirm.
4. / - Select the desired language.

5. OK - Confirm.

⇨ You have selected the desired language.

⇨ When you exit the screen, the on-board integrated display/controller is restarted.

7 Operating the implement on the field

7.1 Setting target rate

On the "**Settings / Metering Unit**" screen, you can configure or view the following parameters for each metering unit:

- "**Metering Unit**"
  Defines the currently selected metering unit.
- "**Target rate**"
  Defines how much seed or fertilizer should be spread per hectare.
- "**Min. Speed**"
  Defines the minimum speed that is required for application.
- "**Max. Speed**"
  Defines the maximum possible speed for spreading.
- "**Calibration Factor**"
  For a seeder, defines how much seed or fertilizer is spread per rotation of the metering shaft.
- "**Adjustment**"
  Defines by how much percent the target rate should be changed when you change it manually during the application. [→ 25]

Procedure

1. On the work screen, press:
   
   ⇨ The "**Settings / Metering unit**" screen appears.
2. Configure the parameters.

7.2 Performing a calibration

The operating instructions of the implement explain when to perform a calibration.

You can only perform a calibration when the machine is ready for operation.

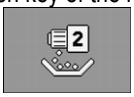
Procedure

☑ You have prepared the implement and its metering drives for calibration as described in the operating instructions from the implement manufacturer.

☑ The hopper is filled with a sufficient quantity of seed or fertilizer. Do not fill the hopper all the way, so that it is easier to remove or adjust a metering roll if necessary.

☑ The implement is at a standstill.

1. On the work screen, press:
   
   ⇨ The "**Settings / Metering unit**" screen appears.
2. Select the metering unit for which you want to perform the calibration test.
   ⇨ You can see the currently selected metering unit by the number in the upper area of the screen.
3. Enter the target rate with which you want to work later. [→ 23]
4. Press the function key of the metering drive for which you want to perform the calibration: e.g.:
   

   or
   

⇨ The "**Calibration**" screen appears.

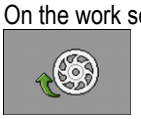
5. In the input box under the text "**Speed correct?**", enter the speed you want to use later on when seeding.
6.  - Fill the metering cells with seed or with fertilizer.
   ⇨ The metering cells turn for several seconds.
7.  - Start the calibration.
8. Start the calibration on the implement. Proceed as described in the operating instructions from the implement manufacturer.
9. Wait until the required quantity has been applied.
10. Terminate the calibration on the implement. Proceed as described in the operating instructions from the implement manufacturer.
    ⇨ A screen appears on the monitor with the text: "**3. Quantity**".
    ⇨ The job computer calculates a weight from the data available and displays it in the field next to the text "**3.Quantity**". It is possible that the displayed weight is different than the calibration weight.
11. Weigh the seed that was applied during the calibration.
12. Enter the weight in the field next to the text "**3. Quantity**".
    ⇨ The job computer calculates the minimum and the maximum speed at which these target rates are possible using the selected metering roll.

⇨ The job computer saves all of the data on the product in the product database.

7.3 Filling metering cells with seed

To be able to spread seeds from the beginning and avoid blank spots at the start of the field, you must fill the metering cells of the seeder before you start driving. You can also use the pre-metering function.

Procedure

1. On the work screen, press 
   ⇨ As long as the metering cells are being filled, the following icon appears on the work screen: 
2. Only start driving once the icon is turned off.

7.4 Start seeding

Procedure

☑ The implement is moving.

☑ The implement is lowered.

☑ The metering cells are filled with seed.

☑ The fan has reached the minimum revolution speed.

1. 

- Start seeding.

7.5 Stop seeding

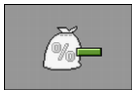
Procedure

1.  - Stop seeding.
   ⇨ On the work screen, the following message appears: "Application is stopped."

⇨ All of the metering drives are stopped.

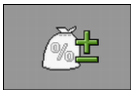
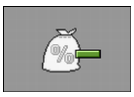
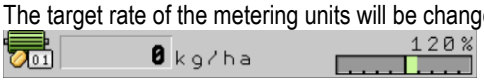
7.6 Adjusting the target rate during operation

You can adjust the target rate while working.

Function icon	Meaning
	Increases the target rate. The target rate is changed by the value that you defined in the "Adjustment" parameter. [→ 23]
	Reduces the target rate.
	Restores the target rate back to 100%.

Procedure

☑ You have defined [→ 23] the "**Target Rate**" and "**Adjustment**" parameters.

1. On the work screen, press:
   
   ⇨ Function icons for the adjustment of the target rate appear.
2.  ,  or  - Change the target rate.
   ⇨ The target rate of the metering units will be changed:
   

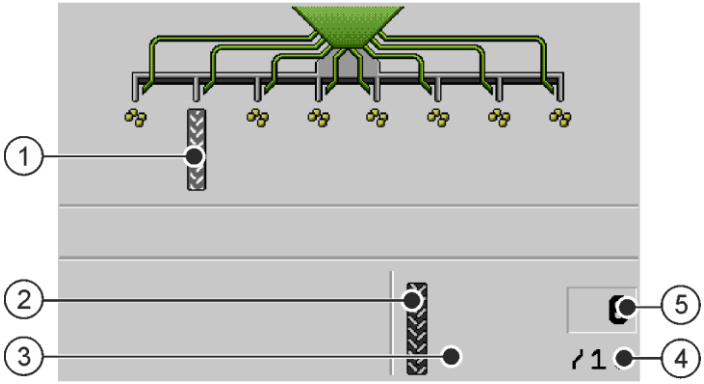
   ⇨ The job computer regulates the seeding according to the new target rate.

7.7 Using tramline control

The job computer can help you to create tramlines for the tires of other vehicles, for example, a sprayer.

A tramline is created by closing the seed tubes to the seeding coulters. This creates an area behind the implement where there is no seeding.

When the tramline control is activated, the tracks are counted to create the tramlines for the defined tracks. The tracks are counted as soon as the implement is lifted out of the soil.



Areas on the work screen that are relevant for the creation of tramlines

1	A tramline is being created.	4	Length of the tramline rhythm Number of tracks until the tramline rhythm is repeated.
2	A tramline is being created on the left side of the implement.	5	Number of the current track
3	Tramline control is not active on this side of the implement. Therefore, no tramline will be created for this track. No icon appears.		

Procedure

1. On the work screen, press:

⇨ You can change the number of the track.

⇨ You can configure the tramline control.

7.7.1 Configuring the tramline control

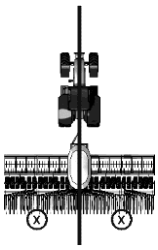
Procedure

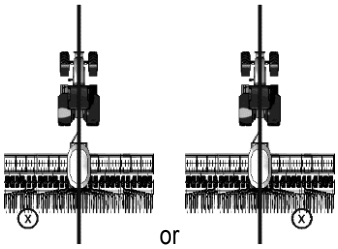
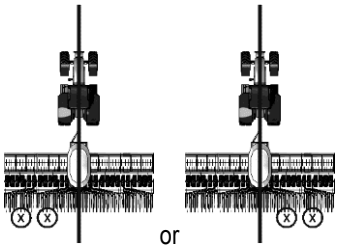
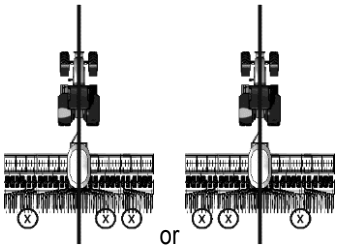
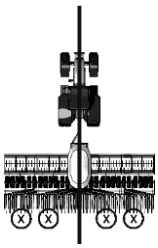
To configure tramline control, proceed as follows:

1. Determine the implement type. [→ 26]
2. Select a tramline rhythm. [→ 27]

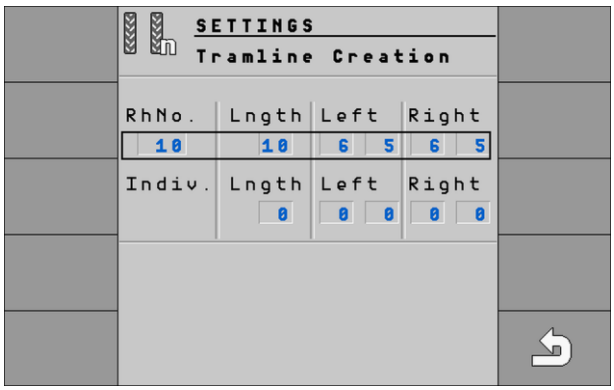
7.7.2 Determining the machine type

If you are working with a seeder with tramline control, you have to know where and how many tramline mechanisms are installed on your seeder. The following overview shows how tramline mechanisms can be installed on your seeder.

	▪ One tramline mechanism on each side of the seeder.

	▪ One tramline mechanism on one side of the seeder.
	▪ Two tramline mechanisms on one side of the seeder.
	▪ One tramline mechanism on one side and two tramline mechanisms on the other side of the seeder.
	▪ Two tramline mechanisms on each side of the seeder.

7.7.3 Selecting tramline rhythm



*"**Settings / Tramlines**" for a seeder*

RhNo.	Number of the tramline rhythm
Lngth	Number of tracks until the tramline rhythm is repeated.
Left, Right	Here, you can see the tracks for which the seed tubes are close on the "left" or "right" to create a tramline. Up to two track numbers can be entered for each direction.
Indiv.	Here, you can define you own tramline rhythm.

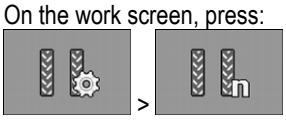
Procedure

This is how to select the proper tramline rhythm:

☑ You know the working width of your implement.

☑ You know the working width of your sprayer.

☑ You know which side of your seeder is used to create tramlines and how many tramline mechanisms your seeder has on each side. [→ 26]

1. Decide whether you want to start working on the left or the right field edge.
2. Perform the following calculation:
   Working width of the sprayer:Working width of the seeder
   e.g.: 12:3=4; 15:3=5 or 20:3=6.67
   ⇨ The following results are possible: Even numbers (2; 4; 6; etc.), uneven numbers (3; 5; 7; etc.) and decimals (1.5; 4.5; 5.33; etc.)
   ⇨ Depending on the result, you have to select a different tramline rhythm. You can find the results in the "Results of the calculation" column in the following chapters.
3. Find out which chapter contains the proper tramline rhythm for you.
   ⇨ Even numbers - Even tramline rhythms [→ 28]
   ⇨ Uneven numbers - Uneven tramline rhythms [→ 32]
   ⇨ Decimal numbers - Special tramline rhythms [→ 33]
4. Select the table with the proper rhythm numbers in the chapters mentioned in step 3. The tables can differ depending on the side of the seeder that is used to create the tramlines, the number of tramline mechanisms on the seeder and the working start.
5. On the work screen, press:
   
   ⇨ "**Settings / Tramlines**" screen appears.
6. Select the proper rhythm number.
   OR
   Enter an individual tramline rhythm if the rhythm number indicated in the table is "999". [→ 36]

⇨ You can start working.

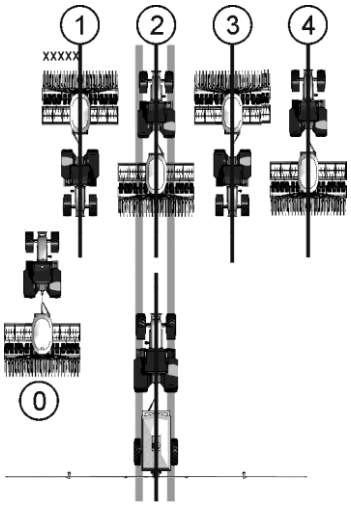
Creating an even tramline rhythm

Two even tramline rhythms can be created during one or two passes.

- In one pass if the tramlines are created on both sides of the seeder.
- In two passes if the tramlines are created on one side of the seeder and a tramline mechanism is installed on the side.
- In one pass if the tramlines are created on one side of the seeder and two tramline mechanisms are installed on the side.

Creating tramlines on both sides of the seeder simultaneously

Example

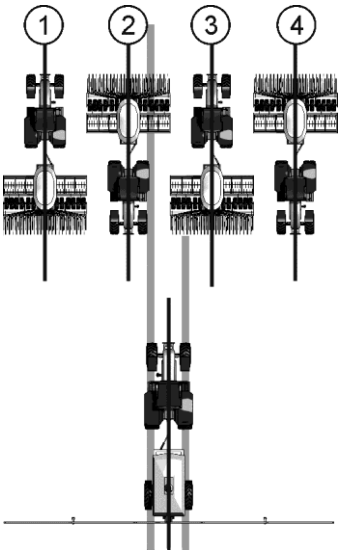


- The figure shows the 4S tramline rhythm.
- The tramlines are created during track 2. (ex.: working width of the sprayer = 12 m, working width of the seeder = 3 m)
- Track 0 must be performed separately. To avoid overlapping, use the "Half width shutoff system" function.
- The tramline control must be deactivated for track 0.

Possible position of the flaps	Result of the calculation	RhNo.	Length	Left		Right	
	2	2S	2		1		1
	4	4S	4		2		2
	6	6S	6		3		3
	8	8S	8		4		4
	10	10S	10		5		5
	12	12S	12		6		6
	14	999	14		7		7

Creating tramlines on one side of the seeder and with only one tramline mechanism

Example



- The figure shows an individual tramline rhythm.
- The tramlines are created during tracks 2 and 3. (ex.: working width of the sprayer = 12 m, working width of the seeder = 3 m)

Working start at the left field edge

Possible position of the flaps	Result of the calculation	RhNo.	Length	Left		Right	
	2	999	2			1	2
	4	999	4	2	3		
	6	999	6			3	4
	8	999	8	4	5		
	10	999	10			5	6
	12	999	12	6	7		
	14	999	14			7	8

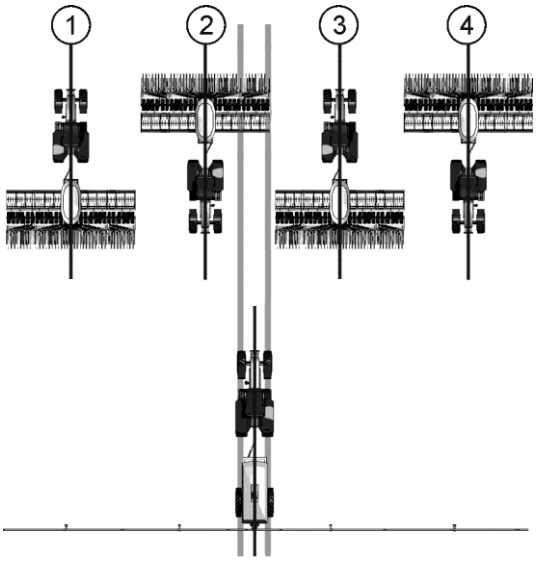
Working start at the right field edge

Possible position of the flaps	Result of the calculation	RhNo.	Length	Left		Right	
	2	999	2	1	2		
	4	999	4			2	3
	6	999	6	3	4		

Possible position of the flaps	Result of the calculation	RhNo.	Length	Left		Right	
	8	999	8			4	5
	10	999	10	5	6		
	12	999	12			6	7
	14	999	14	7	8		

Creating tramlines on one side of the seeder and with two tramline mechanisms

Example



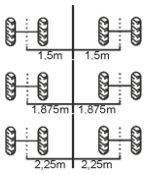
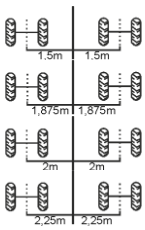
- The figure shows an individual tramline rhythm.
- The tramlines are created during track 2. (ex.: working width of the sprayer = 24 m, working width of the seeder = 6 m)

Working start at the left field edge

Possible position of the flaps	Result of the calculation	RhNo.	Length	Left		Right	
1,5m 1,5m 1,875m 1,875m 2,25m 2,25m	2	999	2				1
1,5m 1,5m 1,875m 1,875m 2m 2m 2,25m 2,25m	4	999	4		2		

Possible position of the flaps	Result of the calculation	RhNo.	Length	Left		Right	
	6	999	6				3

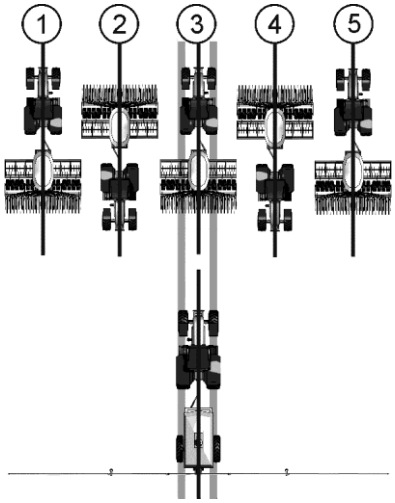
Working start at the right field edge

Possible position of the flaps	Result of the calculation	RhNo.	Length	Left		Right	
	2	999	2		1		
	4	999	4				2
	6	999	6		3		

Creating uneven tramline rhythms

Uneven tramline rhythms are always created in one track. Uneven tramline rhythms can only be created if the tramlines are created with both sides of the seeder.

Example



- The figure shows tramline rhythm 5.
- The tramlines are created during track 3. (ex.: working width of the sprayer = 15 m, working width of the seeder = 3 m)

Possible position of the flaps	Result of the calculation	RhNo.	Length	Left		Right	
	3	3	3		2		2

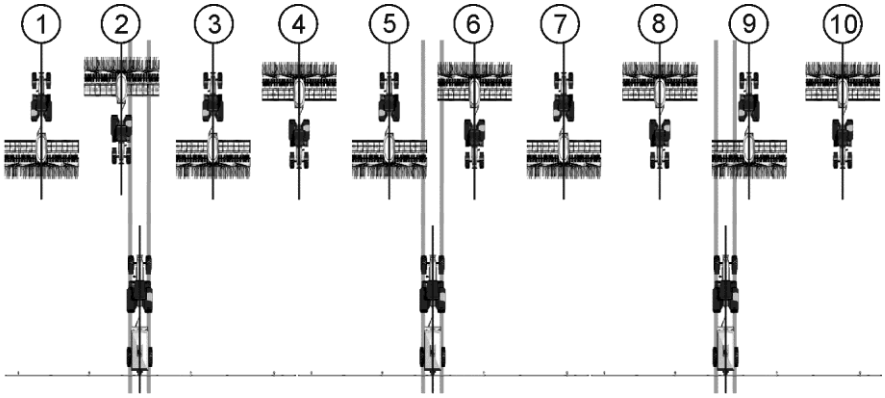
Possible position of the flaps	Result of the calculation	RhNo.	Length	Left		Right	
	5	5	5		3		3
	7	7	7		4		4
	9	9	9		5		5
	11	11	11		6		6

Creating special tramline rhythms

Special tramline rhythms are always created in four tracks. Special tramline rhythms can only be created if the tramlines are created with both sides of the seeder.

- There is one tramline mechanism on one side of the seeder and two tramline mechanisms on the other side of the seeder.
- Two tramline mechanisms are installed on both sides of the seeder.

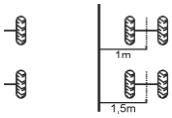
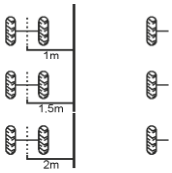
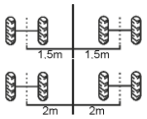
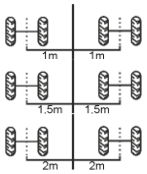
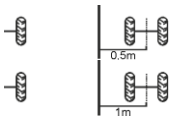
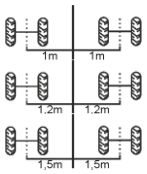
Example



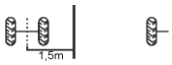
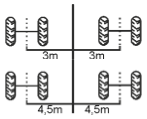
- The figure shows tramline rhythm 20.
- The tramlines are created during tracks 2, 5, 6 and 9. (ex.: working width of the sprayer = 20 m, working width of the seeder = 6 m)

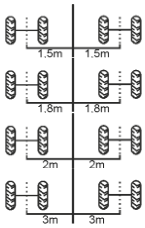
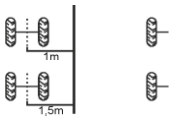
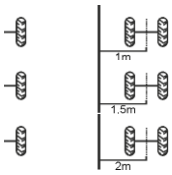
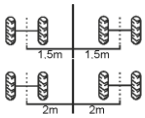
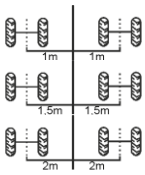
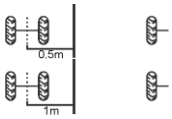
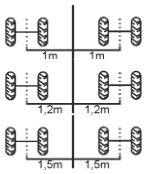
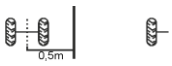
Working start at the left field edge

Possible position of the flaps	Result of the calculation	RhNo.	Length	Left		Right	
1,5m	1.33	999	4	3	2	1	4
3m 3m 4,5m 4,5m	1.5	22	6	4	3	6	1
1,5m 1,5m 1,8m 1,8m 2m 2m 3m 3m	2.5	16	10	7	4	9	2

Possible position of the flaps	Result of the calculation	RhNo.	Length	Left		Right	
	2.67	999	8	5	4	7	2
	3.33	20	10	9	2	6	5
	3.5	28	14	13	2	9	6
	4.5	18	18	16	3	12	7
	4.67	999	14	3	12	7	8
	5.33	24	16	9	8	14	3
	5.5	999	22	14	9	3	20
	6.67	999	20	10	11	4	17
	7.5	30	30	27	4	19	12
	9.33	999	28	14	15	2	24

Working start at the right field edge

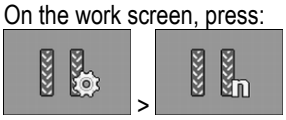
Possible position of the flaps	Result of the calculation	RhNo.	Length	Left		Right	
	1.33	999	4	1	4	3	2
	1.5	23	6	6	1	4	3

Possible position of the flaps	Result of the calculation	RhNo.	Length	Left		Right	
	2.5	15	10	9	2	7	4
	2.67	999	8	7	2	5	4
	3.33	21	10	6	5	9	2
	3.5	29	14	9	6	13	2
	4.5	19	18	12	7	16	3
	4.67	999	14	7	8	3	12
	5.33	25	16	14	3	9	8
	5.5	999	22	3	20	14	9
	6.67	999	20	4	17	10	11
	7.5	31	27	19	12	27	4
	9.33	999	28	2	24	14	15

7.7.4 Programming individual tramline rhythms

If you realize that the tramline rhythms stored do not match your work method, you can program an individual tramline rhythm.

Procedure

1. On the work screen, press:
   
   ⇨ "**Settings / Tramlines**" screen appears.
2. In the "**RhNo.**" field, select rhythm number "**999**".
   ⇨ All of the parameters for the stored tramline rhythms are hidden.
3. Configure the "**Length**", "**Left**" and "**Right**" parameters for the individual tramline rhythm.
4. The entered values remain on the screen even if you select a different tramline rhythm. To use the individual tramline rhythm, you always have to select "**RhNo.**" "**999**".

7.8 Operating the hydraulic system with the job computer

The Müller-Elektronik job computer is used to adjust the position of the hydraulic valves so that the oil pressure is routed to specified parts of the seeder.

When operating the seeder with the job computer, remember that the job computer cannot control the oil pressure.

You have to use the control unit in the tractor to generate pressure in the system.

Example

Operation with these systems can then look like this:

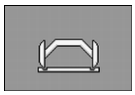
1. Press a function key on the on-board integrated display/controller. For example,  for the left-hand bout marker.
   ⇨ The function icon appears on the work screen. This confirms that the hydraulic valve is ready and this function can now be controlled hydraulically.
2. Actuate the control unit of the hydraulic system in the tractor that is responsible for the bout marker.
   ⇨ The pressure builds up.
   ⇨ The left bout marker is lowered.
3. If you now remove the pressure from the valve, the left-hand bout marker will be lifted.
   ⇨ The function icon must appear on the work screen, both when you lower the bout marker and when you lift it.

The following sections explain which hydraulic functions can be operated with the job computer.

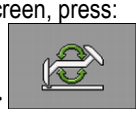
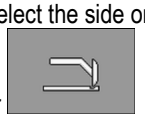
7.8.1 Operating bout markers

You can use bout markers as you work to mark a pass.

Function icon	Meaning
	Only use the left bout marker. The bout marker is not changed when lifting the implement.

Function icon	Meaning
	For example, to work on the headlands.
	Deactivate both bout markers.
	Lift the bout marker to pass over obstacles. The implement itself is not lifted.
	Use both bout markers simultaneously. You can use this function e.g. if you do not have a pre-emergence marker on the implement.
	Only use the left bout marker. The bout marker is not changed when lifting the implement. For example, to work on the headlands.
	Use the bout markers alternately. The bout marker is always changed when you lift the implement.
	Change the bout markers manually. The bout marker is changed when you press the function key.

Procedure

1. On the work screen, press:
    > 
2. Select the side on which the bout marker should be lowered first. To do so, press: 
   or 
   ⇨ On the work screen, you can see which bout marker is lowered.
3. Activate the automatic control of the bout markers with: 
   ⇨ The left bout marker is lowered.
4. Press  again to switch between the left and the right bout markers.

⇨ Depending on the settings, an icon for the bout marker appears on the work screen.

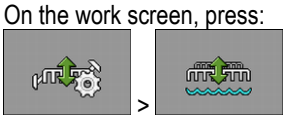
7.8.2 Using the waterhole mode

You can lift or lower the implement while working without interruption. By doing so, you prevent:

- The implement from sinking into a puddle.
- A new track from being counted.
- The tramline from being switched.

Procedure

☑ The implement is lowered.

1. On the work screen, press:


   ⇨ The icon for the waterhole mode appears on the work screen: 

2.  - Terminate the waterhole mode.

⇨ The icon for the waterhole mode disappears.

7.9 Viewing results

7.9.1 Results

The "**Results**" screen shows how much of each product you have spread and on which area.

You can reset the counters on this screen before starting work.

Function icon	Meaning
	Resets the counter.
	Calls up the "**Total results**" screen.

There are the following counters:

- **"Area"** - Area on which the implement was in working position.
- **"Quantity"** - Applied quantity.

Procedure

1. On the work screen press:


   ⇨ The "**Results**" screen will appear.

7.9.2 Total results

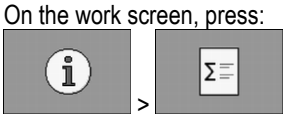
On the "**Total results**" screen, you see the counter that documents the work performed since the initial startup of the job computer.

There are the following counters:

- **"Service hours"** - Time for which the job computer is switched on.
- **"Total time"** - Time for which the job computer was spreading.
- **"Total distance"** - Processed distance.
- **"Total area"** - Processed area.
- **"Total quantity" -** For each metering drive.

Procedure

1. On the work screen, press:



⇨ "**Total results**" screen appears.

8 Configuring the on-board integrated display/controller for work

8.1 Selecting and configuring the speed source

You must enter the source from which the on-board integrated display/controller obtains the current speed. The configuration procedure can differ depending on the speed source.

Possible speed sources

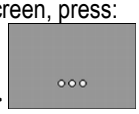
Source	To configure the speed source
Impulse-transmitting speed sensor mounted on the implement	Calibrating the speed sensor using the 100m method [→ 40]
Simulated speed	Entering the simulated speed [→ 41]

8.1.1 Calibrating the speed sensor with the 100m method

When calibrating the speed sensor with the 100m method, you determine the number of pulses received by the speed sensor in a distance of 100m. When you know the amount of impulses, the job computer can calculate the current speed.

After the first calibration, you can enter the number of impulses manually as a value for the "**Calibration factor**" parameter.

Procedure

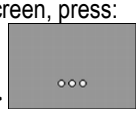
1. Drive the implement onto the field.
2. Mark the tire position on the ground. For example with a stone.
3. Measure a straight route of 100 m and mark the end.
4. On the work screen, press:
    >  > ()
   ⇨ "**Settings / Speed**" screen appears.
5. In the "**Speed source**" parameter, select the "**Implement**" value
6.  - Call up the **"Calibration"** screen.
   ⇨ "**Calibration**" screen appears.
7.  - Start the calibration.
8. Travel the marked route.
   ⇨ During travel, the counted impulses are displayed in the "**No. of impulses**" field.
9.  - Press when you have reached the end.
   ⇨ The calibration is terminated.

8.1.2 Entering the simulated speed

To test the proper functioning of a sensor, you can simulate a speed.

	**CAUTION** **Injury caused by working implement** If the function is activated when the implement is at a standstill, the driver can activate functions that can otherwise only be activated during travel. This can cause injury to persons standing close to the implement. ◦ Make sure that no one is close to the implement.

Procedure

1. On the work screen, press:
    >  > ()
   ⇨ The "**Settings / Speed**" screen appears.
2. In the "**Speed Source**" parameter, select the value "**Simulation**".
3. In the "**Sim.Speed**" parameter, enter the speed to be simulated.

⇨ The desired speed will be simulated.

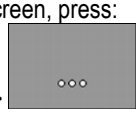
⇨ When you restart the job computer, the simulated speed will automatically be set to the value "0".

8.2 Associating products with a hopper

On the "**Settings / Hopper**" screen, you must assign a product to each hopper. The following parameters are possible:

- "**Associated product**"
  Defines which product should be associated with a hopper.
- "**Rename**"
  Defines whether the product should get a new name.
- "**Status**"
  Shows whether the associated product is currently activated.

Procedure

1. On the work screen, press:
    >  > ()
   ⇨ The "**Settings / Hopper**" screen appears.
2.  - Select the hopper to which you want to associate a product.
3. Configure the parameters.
4.  - Optionally, you can change the status of the selected product.

9 Configuring the implement equipment

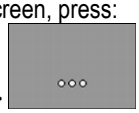
9.1 General information on the configuration

9.1.1 Performing the configuration

The equipment of the implement is configured in a separate area of the application. You will find different parameters within the area.

Procedure

To perform the calibration:

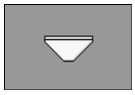
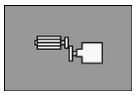
1. On the work screen, press:
    >  > () > 
   ⇨ The "**Settings**" screen appears.
   ⇨ You will find parameters for an implement element behind each function icon. The following section explains which function icon represents which implement element.

⇨ You can now configure the desired parameters.

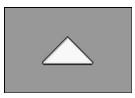
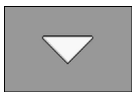
9.1.2 Layout of the configuration screen

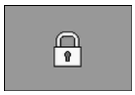
During the configuration, you will see the following screen:

Function icons for the implement elements

Function icon	Implement parts
	General equipment of the implement [→ 44]
	Hoppers [→ 44]
	Metering units [→ 44]
	Rows [→ 45]
	Sections [→ 45]

Function icons for operation

Function icon	Meaning
	Scrolls up.
	Scrolls down.

Function icon	Meaning
	Starts the screen for the next part of the same type.
	Starts the screen for the next part of the same type.
	Password entry
	Return

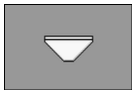
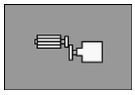
9.1.3 Sequence of the configuration

The configuration differs according to the machine type that you are using and the implement equipment. This section shows a possible sequence for the configuration of a seeder.

You can see which parameters have to be set for the individual configurations in the indicated chapters.

Procedure

☑ You have called up the configuration screen.

1. Configure the implement. [→ 44]
2.  - Configure the hoppers. [→ 44]
3.  - Configure the metering units. [→ 44]
4.  >  - Configure the rows. [→ 45]
5.  - Configure the sections that you have assigned to the rows. [→ 45]
6.  >  >  >  - Terminate the configuration.

⇨ You have configured the equipment of the implement.

9.1.4 Configuration of individual implement parts

If you want to configure individual implement parts, you can find out how to reach the respective configuration screen in the chapters on the individual implement parts. For some implement parts, there are several possible ways. Always only one possible way is mentioned.

9.2 Configuration of the implement

For the configuration of the implement, you must set the basic equipment of the implement. The implement must always be configured first.

9.2.1 "Number of rows" parameter

Enter the number of rows that the implement works with.

Seed and fertilizer are counted separately.

Example: If you have an implement that spreads seed from 8 rows and fertilizer from 8 rows, you must enter "16".

9.2.2 "Tramline system" parameter

Select whether the implement has a tramline system.

9.2.3 "Bout marker" parameter

Select whether the implement has hydraulically adjustable bout markers.

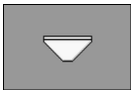
9.2.4 "Waterhole Mode" parameter

Select whether the implement has a waterhole mode.

9.3 Configuration of the hopper

This is how to call up the configuration screen:

1. On the **"Settings / Implement"** screen, press:



⇨ You can configure the hoppers.

9.3.1 "Upper Level Sensor" parameter

For each hopper, enter which sensor is used as the upper lever sensor. If there is no upper level sensor mounted on a hopper, select "No".

9.3.2 "Lower Level Sensor" parameter

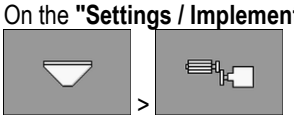
For each hopper, enter which sensor is used as the lower lever sensor. If there is no lower level sensor mounted on a hopper, select "No".

9.4 Configuration of the metering units

Procedure

This is how to call up the configuration screen:

1. On the **"Settings / Implement"** screen, press:



⇨ You can configure the metering units.

9.4.1 "Gear ratio" parameter

For each metering unit, enter the gear ratio between the metering shaft and the motor shaft.

Example: A gear ratio of 50/1 means that the metering shaft must rotate 50 times for the motor shaft to rotate once.

9.4.2 "Pre-start time" parameter

Enter the time by which the metering unit should start earlier when the pre-start function is activated. If you start working within this time, the job computer takes over the control. If you do not start working in this time, the metering drive switches itself off after this time.

9.4.3 "Early Stop Time“ parameter

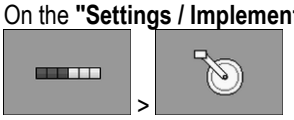
Enter the time after which the metering unit should stop when the early stop function is activated. When the function has been activated, the metering unit only stops after the entered time.

9.5 Configuration of the rows

Procedure

This is how to call up the configuration screen:

1. On the **"Settings / Implement"** screen, press:



⇨ You can configure the rows.

9.5.1 "Associated tramline" parameter

Enter the tramline with which the respective row is associated. If a row is not associated with a tramline, select "No". Based on this, the metering unit reduces the percentage of the application when switching the respective tramline.

- **"1"** – left tramline
- **"2"** – right tramline

9.6 Configuration of the sections

Procedure

This is how to call up the configuration screen:

1. On the **"Settings / Implement"** screen, press:

⇨ You can configure the sections.

9.6.1 "Working width" parameter

Enter the respective working width for each section.

10 Using the system functions of the on-board integrated display/controller

10.1 Creating screenshots

Procedure

1. Insert a USB memory device into the on-board integrated display/controller.
2.  - Press and hold for ca. 5 seconds to create a screenshot.

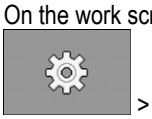
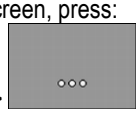
⇨ An acoustic signal is issued.

⇨ The content of the screen will be saved as an image file on the USB memory device in the "USB-BOX\me-drill-control\export" folder.

10.2 Exporting a configuration

You can export the configuration of your on-board integrated display/controller, to be able to use it e.g. on a different DRILL-Control.

Procedure

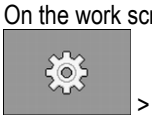
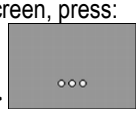
1. Insert a USB memory device into the on-board integrated display/controller.
2. On the work screen, press:
    >  > () > 
3.  - Start the export.
   ⇨  - The export was successful or  the export has failed.

⇨ If the export was successful, the configuration will be saved as a bin file on the USB memory device in the "USB-BOX\me-drill-control\export" folder.

10.3 Importing a configuration

You can import a configuration from a USB memory device to your DRILL-Control.

Procedure

1. Save the desired configuration on a USB memory device in the folder: "USB-BOX\me-drill-control\import".
2. Insert the USB memory device into the on-board integrated display/controller.
3. On the work screen, press:
    >  > () > 
4.  - Start the import.
   ⇨  - The import was successful or  the import has failed.
5. Restart the on-board integrated display/controller to work with the imported configuration.

10.4 Updating the on-board integrated display/controller

If a new software version is available for your on-board integrated display/controller, you can update it.

Procedure

☑ You have received an update file in zip format from Müller-Elektronik.

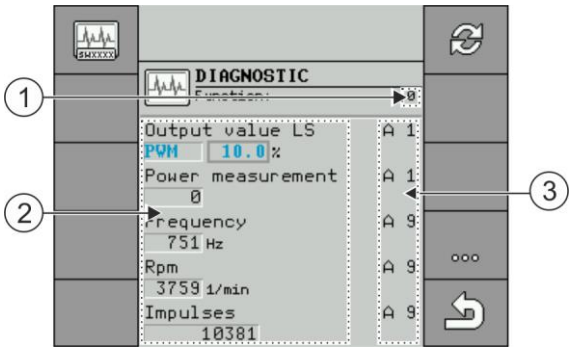
1. Unpack the zip file on an empty USB memory device.
2. Insert the USB memory device into the on-board integrated display/controller.
   ⇨ The software automatically detects that a new software version is saved on the USB memory device.
   ⇨ You will be asked whether you want to update the on-board integrated display/controller.
3. Confirm.
   ⇨ The new software will be installed on the on-board integrated display/controller.
4. Restart the on-board integrated display/controller.

11 Troubleshooting

11.1 Performing diagnostics

In the diagnostic, you can read the measured values for all of the pins that are connected to the junction box. In addition, you can test whether the functions of the job computer are working as desired.

In the diagnostic, you will see the following screen:



1	Number representing a specific function.	3	Connected cable core. You can find the meaning of the abbreviations in this section.
2	Parameters and measured values		

Function icon	Meaning
	Calls up the "**Version numbers**" screen. [→ 51]
	Sets the current measured values to "0".
	Calls up the next function.

The following abbreviations are possible for the cable cores:

- "**A**", "**B**", "**C**"
  The designations are analogous to the designations in the assignment plan of the junction box.

Depending on the functions of the individual components, the following measured values are possible:

- "**Frequency**"
  Current measured frequency of the function.
- "**Rotational Speed**"
  Current measured rotational speed of the function.
- "**Impulses**"
  Current measured number of impulses of the function.
- "**Analog value**"
  Current measured analog value of the function The analog value always increases or decreases proportionally.
  Example: The higher the position of an analog work position sensor, the higher the analog value.
- "**Power Measurement**"

Currently measured current flow of the function. The value of the power measurement always increases or decreases proportionally.
Example: The faster an electric motor is turning, the higher the value of the power measurement

- "**Input**"
  - "**low**"

    The function is deactivated. There is no voltage at the input.
  - "**high**"

    The function is activated. There is voltage at the input.

You can enter the following settings:

- "**Output value LS**"
  - "**PWM**"

    Depending on the entered PWM value, you can test whether an electric or hydraulic motor is turning at the entered PWM value.
  - "**Rev.**"

    Depending on the rpm, you can test how long it takes for an electric or hydraulic motor to reach the defined rpm.
- "**Output value HS**"
  - "**low**"

    The function is deactivated. There is no voltage at the input.
  - "**high**"

    The function is activated. There is voltage at the input.
- "**Output value HS/LS**"
  - "**low**"

    The function is activated or deactivated. Depending on how the function is switched, there either is voltage or not.
  - "**high**"
  - The function is activated or deactivated. Depending on how the function is switched, there either is voltage or not.
- "**Full Bridge**"
  With the respective selection, you can test the linear actuators.
  - "**Stop**"

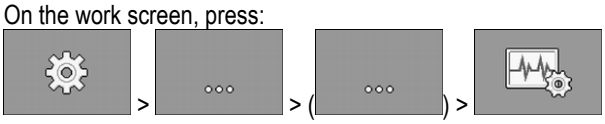
    The function is deactivated. The linear actuator is not moving.
  - "**+/-**"

    The linear actuator is moving in one direction. The direction in which the linear actuator is moving depends on the respective connection.
  - "**-/+**"

    The linear actuator is moving in one direction. The direction in which the linear actuator is moving depends on the respective connection.

Procedure

☑ Seeding is stopped.

1. On the work screen, press:

   ⇨ The "**Diagnostic**" screen will appear.

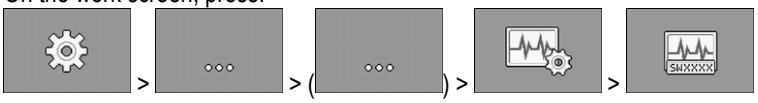
⇨ On the screen, you can see the measured values and possible settings for the individual functions.

Procedure

11.2 Checking the version numbers

Procedure

To check the version numbers, proceed as follows:

1. On the work screen, press:


⇨ The "**Version number**" screen will appear.

⇨ All version numbers are displayed.

Version number	Meaning
Serial number	Serial number of the job computer
HW version	Hardware version of the job computer
SW (initial)	Delivered software version on the job computer
SW (current)	Current software version on the job computer
Pool version	Version of the pool with texts and images
Hydr. version	Version of the hydraulic system configuration

11.3 Alarm messages

Overview of the alarm messages

Alarm text	Possible cause	Remedial measure
Metering drive is stationary.	The current speed of the metering drive is lower than the minimum speed.	Stop immediately! Remediate the cause.
The metering drive is rotating too fast.	You are driving too fast. The metering drive cannot work reliably at the current speed.	Drive more slowly or install a larger metering roll.
Metering drive cannot maintain target rate.	You are driving too fast or too slow. It is not possible to reach the target rate at the current speed.	Drive more slowly or faster, so that the job computer can control the target rate.
Metering drive regulation	The current speed of the metering drive is higher	Drive more slowly or faster or install a larger

Alarm text	Possible cause	Remedial measure
range exceeded.	or lower than the set speed.	metering roll.
Metering shaft is stationary.	The revolution sensor on the metering shaft does not register any movement of the metering shaft.	Stop immediately! Remediate the cause.
Fan is rotating too slowly.	The current fan speed is lower than the value for the "Min. Rotational Speed" parameter.	Increase the fan speed or change the "Min. Rotational Speed" parameter for the fan.
Fan is rotating too fast.	The current fan speed is higher than the value of the "Max. Rotational Speed" parameter.	Decrease the fan speed or change the "Max. Rotational Speed" parameter for the fan.
Pressure is too high.	The pressure of a linear sensor exceeds the value for the "Maximum Value" parameter.	Reduce the pressure or change the "Maximum Value" parameter.
Pressure is too low.	The pressure of a linear sensor is below the value for the "Minimum Value" parameter.	Increase the pressure or change the "Minimum Value" parameter.
Hopper is low.	There is not enough seed or fertilizer in the hopper.	Fill the hopper.
Hopper is empty.	There is no more seed or fertilizer in the hopper.	Fill the hopper.
Error in blockage system.	An error has occurred in the blockage system.	Check the blockage system.
Seed flow detected.	Seed flow has occurred in a tramline.	Check the tramline control.
No seed flow detected.	The blockage system has not detected any seed flow.	Check the blockage system.
Input is too high.	The entered value is too high.	Enter a lower value.
Input is too low.	The entered value is too low.	Enter a higher value.
Charger fault.	There is a malfunction in the alternator of the charger.	Check the alternator of the charger.
The metering was stopped because the working position was not reached. Raise the implement.	The implement is not in working position.	Raise the implement.
Error with the initialisation of the Control Layer configuration.	There was an error in the Control Layer configuration.	Check the configuration.
Right half width is not activated.	The right half width is shut off.	Activate the right half width.
Right half width is not shut off.	The right section is activated.	Shut off the right half width.

Alarm text	Possible cause	Remedial measure
Procedure is not allowed while a task is activated in the ISOBUS-TC application.	A task is activated in the ISOBUS-TC application.	Deactivate the task.
Seed flow detected in a row that is switched off.	The row is defective.	Check the row.
Speed signal from CAN bus has been lost.	The cable was disconnected.	Check the cable connection.
Error with the reading or writing of data to the flash memory or EEPROM.	An error has occurred while the job computer was starting.	Restart the job computer.
System has been stopped. Reboot required.	The connection to a slave job computer has been interrupted. A download manager has been activated.	Reboot the job computer.

12 Technical specifications

12.1 Technical specifications of the on-board integrated display/controller

Parameter	Value
Operating voltage	10 -16 V
Operating temperature	-20°C - +60°C
Storage temperature	-30°C - +70°C
Dimensions (W x H x D)	220 x 205 x 90 mm
EMC	In accordance with ISO 14982 / CISPR25 Interference suppression level 4
ESD protection	In accordance with ISO 10605 Level 4
Protection class	IP 54 (when all plugs are connected)
Power input	0.3A @ 13.6V, without connected sensors and actuators
Display	5.7" TFT QVGA
Processor	72MHz ARM7, 512kB Flash, 64kB RAM
RAM	16MB
Boot USB	32MB
Serial FRAM	-
Real Time Clock	Buffered by capacitor, keeps the time for more than 2 weeks without an external power supply
Keyboard	16 keys plus on/off key, all backlit
Outputs	4 high-side switches with power measurement, max. 5A per high-side 3 full bridges with power measurement max. 10A per bridge The power specifications only apply if only one high-side or one bridge is active. Total power consumption: max. 15A, 20A are permitted for short periods

12.2 Connector pin assignment

12.2.1 8-pin flange socket

These abbreviations are used in the following table:

- VE – Electronics voltage
- VL – Power voltage

8-pin flange socket Pin no.	Signal	8-pin flange socket Pin no.	Signal
1	Pulses per 100 meters	**5**	Work position sensor
2	V sensor	**6**	Radar sensor
3	0VE	**7**	RS232 RxD
4		**8**	RS232 TxD

12.2.2 39-pin multipole connector

These abbreviations are used in the following table:

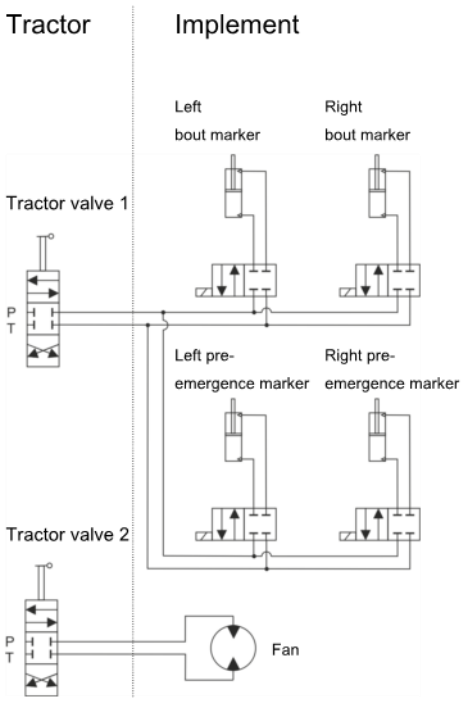
- VE – Electronics voltage
- VL – Power voltage
- A – Series A
- B – Series B
- C – Series C

39-pin connector Pin no.:	Signal	39-pin connector Pin no.:	Signal	39-pin connector Pin no.:	Signal
A1	Metering drive +	**B1**	Metering drive +	**C1**	CAN_H
A2	Metering drive -	**B2**	Metering drive -	**C2**	CAN_L
A3	Tramline valve left +/-	**B3**	Tramline valve left +/-	**C3**	Left bout marker
A4	Tramline valve left -/+	**B4**	Tramline valve left -/+	**C4**	Right bout marker
A5	Tramline valve right +/-	**B5**	Tramline valve right +/-	**C5**	0VL
A6	Tramline valve right -/+	**B6**	Tramline valve right -/+	**C6**	Right pre-emergence marker
A7	0VE	**B7**	Radar sensor	**C7**	Left pre-emergence marker
A8	Metering shaft	**B8**		**C8**	0VL

39-pin connector Pin no.:	Signal	39-pin connector Pin no.:	Signal	39-pin connector Pin no.:	Signal
	speed sensor				
A9	Engine speed sensor	**B9**	12VE	**C9**	
A10		**B10**		**C10**	Fan speed sensor
A11	Lower level sensor	**B11**	Upper level sensor	**C11**	
A12	Calibration switch	**B12**		**C12**	Work position sensor
A13		**B13**	Potentiometer supply	**C13**	V-Namur

12.3 Hydraulic system of the implement

The following figures show the standard hydraulic system of the implement:



13 Explanation of the signals in the assignment plan

There is an assignment plan for each implement model. You can obtain the assignment plan corresponding to your implement from your contact person at Müller-Elektronik.

In the next tables, you will find explanations for the texts that are found on the assignment plan.

Glossary – Input signals

English	Explanation
0VE or GNDE	0V for sensors
12VE	12V for sensors
Calibration button	Sensor that checks if the calibration button is switched.
Work position sensor	Sensor that checks if the implement is in working position
Upper level sensor	Sensor that checks if there is seed in a hopper.
Lower level sensor	Sensor that checks if there is seed in a hopper.
Metering drive speed sensor	Sensor that measures the speed of a metering drive.
Fan speed sensor	Sensor that measures the speed of a fan.
Metering shaft speed sensor	Sensor that measures the speed of a metering shaft.
Vehicle speed sensor	Sensor that measures the speed.

Glossary – Output signals

English	Explanation
0VL or GNDL	0V for actuators
12VL	12V for actuators
Metering drive	Actuator that supplies the metering unit with energy.
Bout marker	Actuator that controls the bout marker.
Pre-emergence marker	Actuator that controls the pre-emergence marker.
Tramline	Actuator that closes the tramline.
Calibration flap	Actuator that opens and closes the calibration flap.

14 Notes