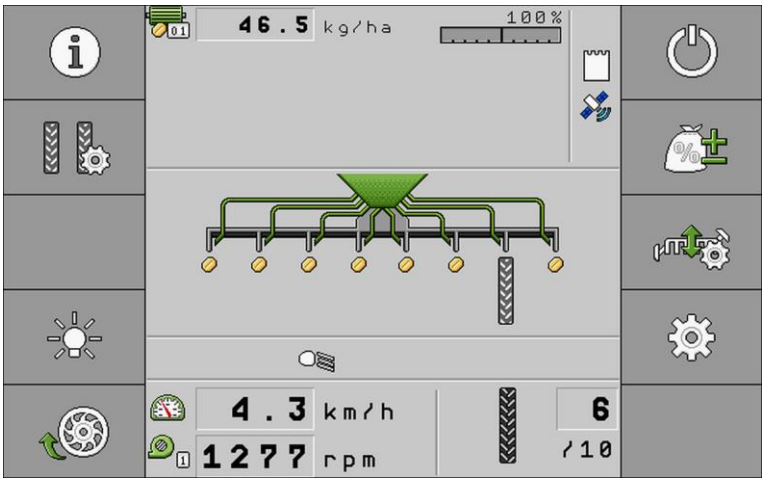
MÜLLER ELEKTRONIK
A TRIMBLE COMPANY

Installation and operating instructions

DRILL-Controller



Version: V2.20180403

30285011-02-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
Product: DRILL-Controller
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1 For your safety

1.1 Basic safety instructions

Operation

Be sure to always comply with the following instructions during operation:

- Read the operating instructions to the agricultural device which you want to control by using the product.
- Before you leave the vehicle cab, ensure that all automatic mechanisms are deactivated or manual mode is activated.
- Keep children away from the implement and the job computer.

Servicing

Keep the system in a functional condition. To do so, follow these instructions:

- 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.
- Before charging the tractor battery, always disconnect the tractor from the job computer.
- The product does not include any user-serviceable parts. Do not open the casing. If the casing is opened, its imperviousness can be changed.

1.2 Intended use

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

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 hazards that could potentially cause minor or moderate physical injury or damage to property, if not avoided.

NOTICE
This signal word identifies hazards that could potentially cause damage to property, if not avoided.

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 appears 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 Safety stickers on the product

Sticker on the job computer

	Do not clean with a high-pressure cleaner.

1.5 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.

1.6 EG declaration of conformity

Herewith we declare that the product designated below, on the basis of its design and construction in the form brought onto the market by us, is in accordance with the relevant safety and health requirements of the EC Directive of Electromagnetic Compatibility 2004/108/EC. If alterations are made to the product without prior consultations with us, this declaration becomes invalid.

Product name:	ME_RE ECU-MIDI 3.0
Item number:	30303184
Variants:	3004748207, 3004765002, 30285011, 30295006, 30322453, 30322454, 30322455, 30193549, 30397040, 3040625700, 30322456
Harmonised standards applied:	EN ISO 14982:2009
	(EMC Directive 2004/108/EC)

2 About the job computer

2.1 Job computer functions

The ECU-MIDI seeder job computer is an ISOBUS job computer that can control the work of seeders.

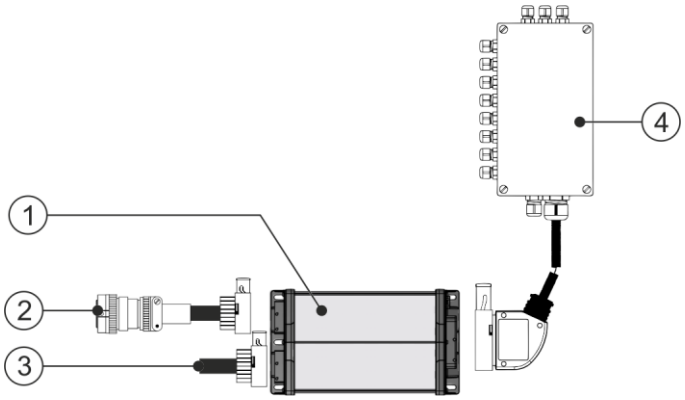
The ISOBUS job computer is the control central of the seeder. Several sensors are connected to the job computer, which monitor important implement parts. The job computer controls the implement based on these signals and on the operator's specifications. An ISOBUS terminal serves as an interface. All implement-specific data is stored in the job computer and is therefore maintained even when changing the terminal.

Among other things, the job computer 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 system consists of a job computer that is mounted on the seeder and controls the operation.



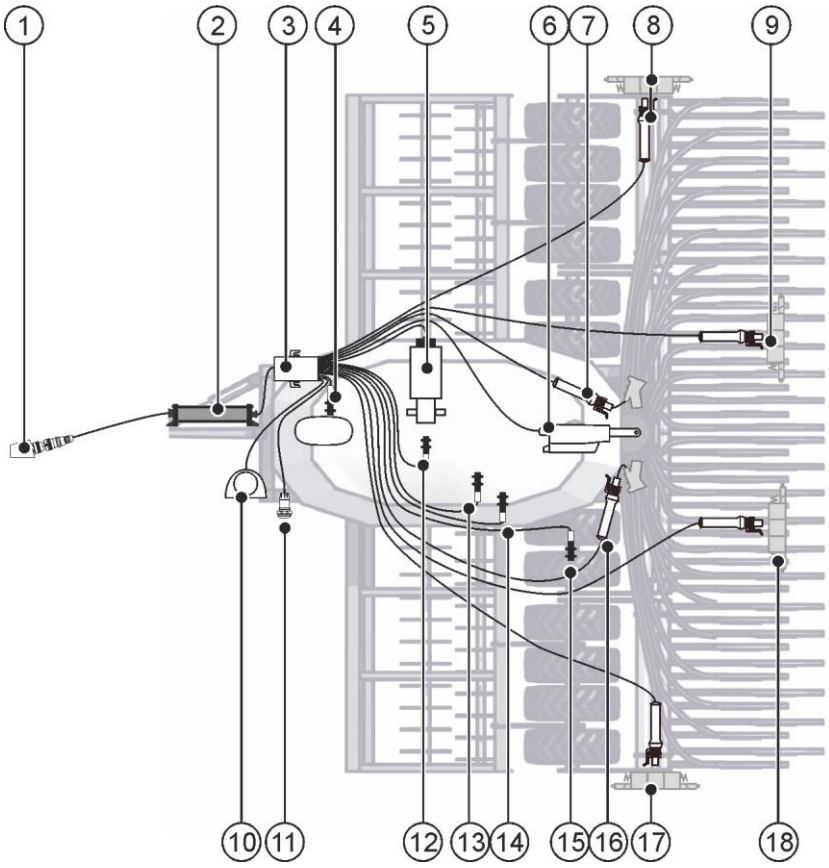
Small system with one job computer

1	ECU-Midi job computer	4	Junction box
2	ISOBUS cable		
3	CAN termination		

You can find an overview of the sensors and actuators that are connected to the junction box in the pin-out diagram.

Example

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



1	ISOBUS power socket	10	Radar sensor
2	ISOBUS job computer	11	Calibration button
3	Cable harness	12	Revolution sensor
4	Revolution sensor	13	Fill level sensor
5	Metering drive	14	Fill level sensor
6	Linear actuator	15	Work position sensor
7	Tramline valve	16	Tramline valve
8	Bout marker	17	Bout marker
9	Pre-emergence marker	18	Pre-emergence marker

2.3 Information on the rating plate

On the job computer casing you will find a nameplate. The nameplate provides a unique job computer identification.

Information on the rating plate

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 a job computer from Müller-Elektronik.

3.2 Scope of the instructions

These instructions describe all of the functions that can be actuated with the job computer. 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 appear as:

Example of a reference: [➙ 12]

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 job computer

4.1.1 Selecting the installation site

Take note of the following when selecting the installation location:

- The job computer must be installed on the seeder, not on the tractor.
- The job computer should be installed where it is protected from dust and water.
- To avoid damage due to the penetration of water, the connections on the job computer must be pointing to the sides.

4.1.2 Connecting the AMP connectors

Procedure

This is how to connect two AMP connectors:

1. Pull out the red locking device of the AMP socket all the way to the end.

   ⇨ You will hear a loud clicking sound.
   ⇨ The openings for inserting the locking pins of the connector are visible.

2. Insert the plug into the socket. It should be possible to easily insert the locking pins in the openings.

   ⇨ The connector is loosely inserted in the socket.

3. Press in the red locking device.

   ⇨ You will hear a loud clicking sound.
   ⇨ A part of the locking device comes through to the other side of the socket.

⇨ You have connected and locked the connector with the socket.

4.1.3 Separating the AMP connectors

Procedure

This is how to separate two AMP connectors:

1. Press in both ends of the red locking device in direction of the connector.

⇨ You will hear a loud clicking sound.

⇨ The locking device has been released.

2. Pull out the red locking device of the AMP socket all the way to the end.
3. Pull the connector out of the socket.

4.2 Connecting the job computer to the ISOBUS

To connect the job computer to the power supply and to the ISOBUS terminal, you have to connect the ISOBUS cable to an ISOBUS power socket on the tractor.

Procedure

This is how to connect the job computer to the ISOBUS:

1. Take the ISOBUS cable from the job computer.
2. Unscrew the dust protection cap.

⇨

3. Insert the ISOBUS connector into the ISOBUS power socket on the tractor.
4. Lock the connector. For basic vehicle harnesses from Müller-Elektronik, turn the connector clockwise. For other ISOBUS basic vehicle harnesses, the procedure depends on the model.
   ⇨ The connector fits tightly.
5. Screw the dust protection cap of the connector and the socket together.

⇨

6. When the work is completed, separate the connection and screw the dust protection cap back on.

⇨

4.3 Installing the junction box

Take note of the following when selecting the installation location:

- Ensure that cables cannot be damaged by the moving implement.
- The cable glands must be facing downwards.

4.3.1 Connecting the sensors and actuators to the junction box

Every sensor and every actuator that is mentioned in the pin-out diagram must be connected to the junction box mentioned in the pin-out diagram.

This can be done in two ways:

- The sensor or actuator ends with a short cable and an AMP connector.
  In this case, you will receive a fitting extension cable for each sensor. You must insert the extension cable in the junction box and connect it to the fitting terminal.
- The sensor or actuator ends with a long cable without a connector. You have to insert it in the junction box and connect it to the fitting terminal.

The terminal to which you must connect the cable core depends on the respective implement and on the type of sensor or actuator. There is a sticker on the lid of the junction box showing the assignment of the clippers.

NOTICE

Risk of short-circuit
When exchanging the polarity of cable cores, machine sensors can be damaged by a short-circuit.

- Pay attention to the polarity of the cable cores and the terminals.

Procedure

1. Remove the cable coating so that all cable cores are exposed.
2. Insert the cable to the end of the coat. There should only be cable cores inside the junction box. The cable coating must end at the junction box casing. This is the only way to ensure that you have enough space in the junction box to be able to guide all of the cable cores to the terminals.
3. Remove the cable coating of the cable cores ca. 1 cm from the end of the cable core.
4. **CAUTION! Pay attention to the proper polarity of the cable cores and the terminals.**
5. Connect the cable cores to the terminals.
   To do so, use the information on the lid of the junction box, on the relay circuit board and in the pin-out diagram.
6. With screw terminals, use wire end sleeves. Wire end sleeves may not be used with spring-loaded terminal blocks.
7. Close the screw connections of the junction box.
   After screwing them shut, the glands should be sealed.
8. Close unused openings in the casing of the junction box with blind caps.

4.3.2 Inserting the cable core into a terminal

There is at least one terminal block with three rows of terminals in the junction box.

Each terminal consists of two openings:
- The upper opening of the terminal opens, among other things, the lower opening.
- The bottom opening of the terminal serves to insert and clamp one cable core.

Procedure

☑ You have prepared a small flat screwdriver that fits the upper opening of the terminal. You only need this screwdriver if there are wire end sleeves on the cable cores.

☑ You have cut the cable to the proper length and have exposed the cable cores according to the instructions, or you have a finished cable from Müller Elektronik.

☑ The tractor engine is switched off.

☑ The junction box is not powered.

☑ There is no voltage on the components to be connected.

1. Find the proper connectors for the cable cores to be connected.
   To do so, use the information on the lid of the junction box, on the relay circuit board and in the pin-out diagram.
2. Insert the cable core into the opening in the lower part of the terminal. If you use wire end sleeves, you first have to use the screwdriver.
   ⇨ You hear the cable core click into place.

⇨ The cable core will be held by the terminal.

⇨ You have clamped the cable core.

4.3.3 Connecting the junction box to the job computer

Procedure

1. Connect the AMP connector of the junction box onto the proper job computer.

4.4 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

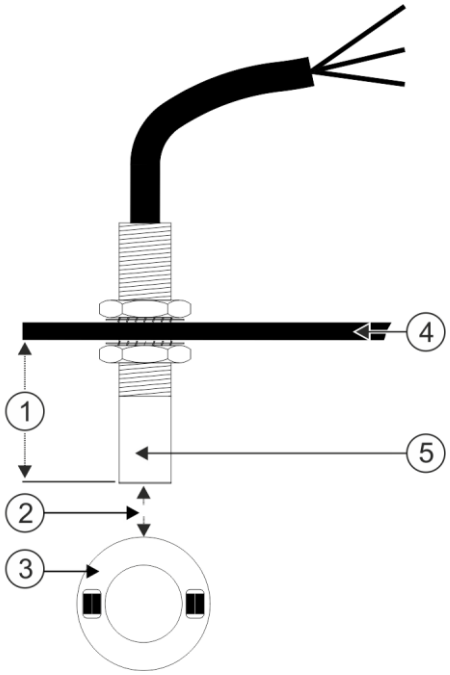
4.4.1 Installing the revolution sensors

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

Pin	Cable color	Designation
3	green	Signal

Spare part number

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

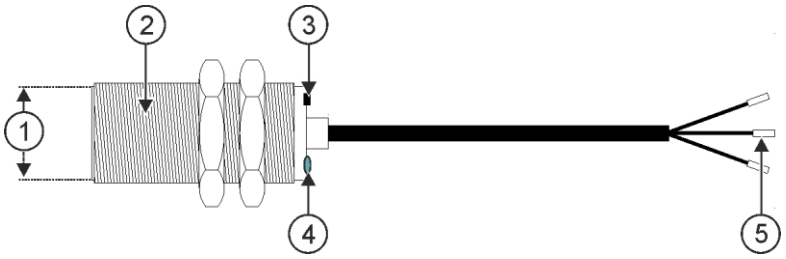
4.4.2 Installing the fill level sensor

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

Pin	Cable color	Designation
2	brown	12VE
3	black	Signal

Spare part number

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

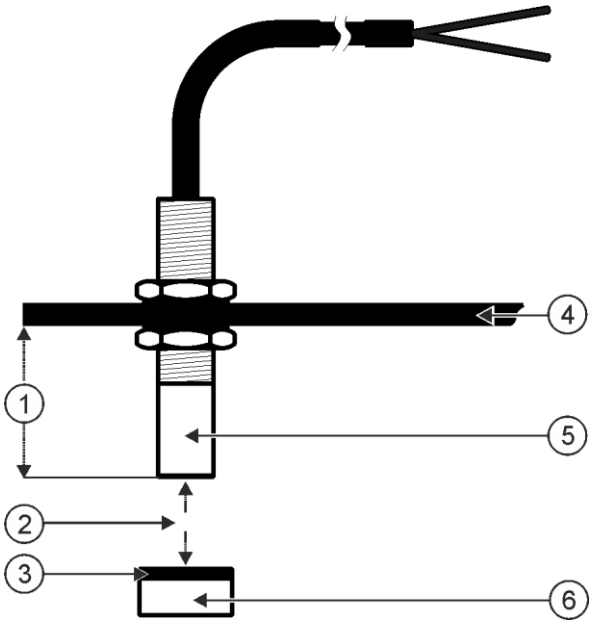
4.4.3 Installing the work position sensors

Reed contact sensors are suitable as work 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

4.4.4 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

4.5 Installing actuators on the implement

The following actuators can be installed on the implement:

Purpose	Actuator - according to the operating mode
Supplying power to the metering unit	Metering drive
Control of the calibration flaps, tramlines or half widths	Linear actuator
Control of the tramlines	Solenoid valve

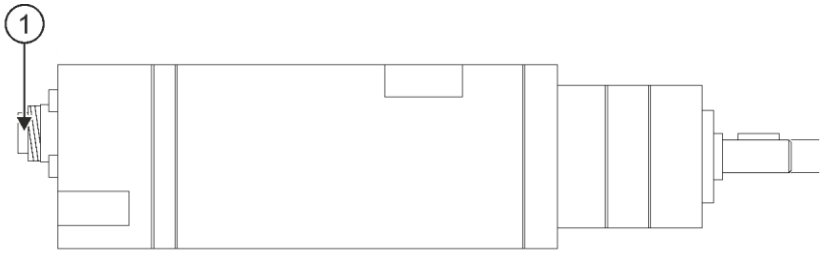
4.5.1 Installing the metering drives

Metering drives are used for supplying power to the metering units.

Functional principle

Depending on the PWM signal, the metering drive rotates faster or slower. The ratio between the impulse and pause is then higher or lower.

Schematic overview



1	7-pin connector		

Assignment

Pin	Cable colour	Designation
1	red	Motor +
2	red	Motor +
3	white	- Power supply Encoder
4	brown	- Power supply Encoder
5	blue	Motor -
6	blue	Motor -
7	green	Sig. Encoder

Spare part number

Item number	Designation
30285050	Electrical metering drive
30285055	1m cable for electrical metering drive

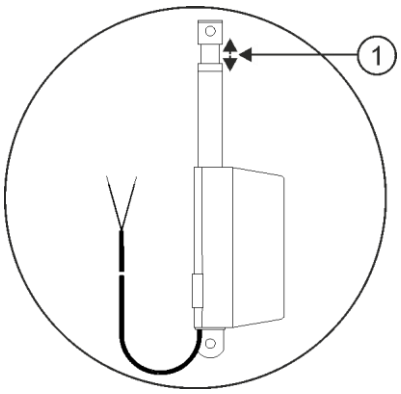
4.5.2 Installing linear actuators

Linear actuators are suitable for controlling the calibration flaps, tramlines or half widths.

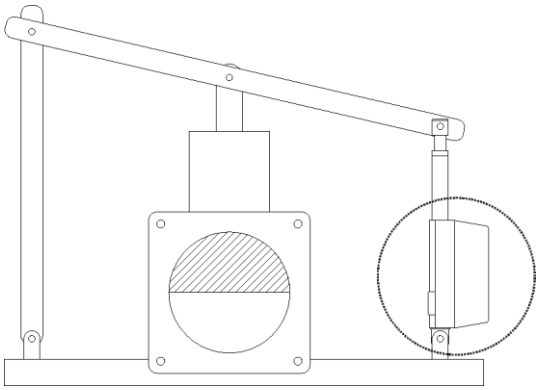
Functional principle

The height of the shutter determines the size of the opening through which the material flows.

Schematic overview



1	Stroke length: max. 200mm		



Assignment

The direction of rotation of the linear actuator is influenced depending on the connection of the actuator (positive pole or negative pole). The linear actuator rotates in either one or the other direction.

Spare part number

Item number	Designation
302130	Linear actuator Linak LA 32.3-200-12 VDC/TC

4.5.3 Installing solenoid valves

Solenoid valves are suitable for controlling the tramlines.

Functional principle

Solenoid valves can only have the status open or closed. The solenoid valve is either completely open or completely closed. Solenoid valves are used e.g. for field sprayers and seeders. On field sprayers, they are used as section valves, which switch the sections of an implement on or off. On seeders, solenoid valves can be use to switch tramlines on and off.

Assignment

The free-wheel diode determines the polarity of the cable cores. Pay attention to this polarity when connecting the cable cores.

4.6 Connecting the cable harness to the implement

You must connect each of the individual components of the implement to a specific connector on the cable harness (item number: 30285030). You can see the numbering on the individual connectors of the cable harness.

3-pin AMP connector

Number	Components
1	Radar sensor
2	Work position sensor
3	Fan speed sensor
4	Metering shaft 1 speed sensor
5	Upper level sensor Hopper 1
6	Lower level sensor Hopper 1
7	Calibration button
8	Left motor for tramline control

Number	Components
9	Right motor for tramline control

2-pin AMP connector

Number	Components
1	Left bout marker
2	Right bout marker
3	Left pre-emergence marker
4	Right pre-emergence marker

5-pin AMP connector

Number	Components
1	Half-width motor

7-pin connector

Number	Components
1	Metering drive

5 Basic control principles

5.1 Switching on the job computer

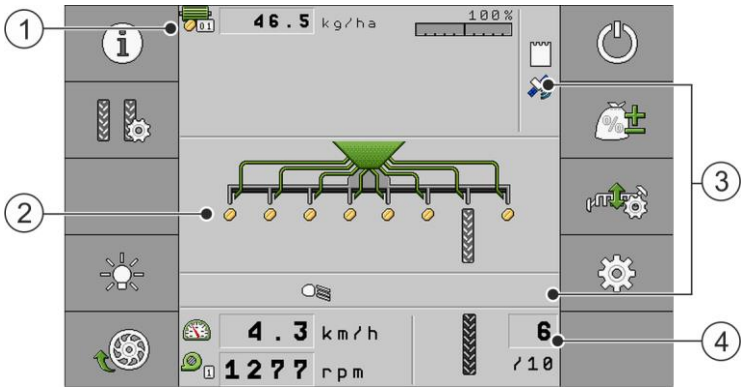
Procedure

1. Connect the ISOBUS cable of the job computer to the ISOBUS connector on the tractor.
2. Start the ISOBUS terminal.
   - ⇨ The job computer is started together with the terminal.
   - ⇨ When starting up for the first time, the job computer initially has to transmit lots of information to the terminal. This can take a few minutes.
   - ⇨ When all of the data from the job computer application has been loaded, their icon appears on the terminal:  .
3. Open the job computer application. To do so, follow the instruction for the ISOBUS terminal.
   - ⇨ The work screen of the job computer appears.

Please note that after starting, the job computer checks whether you have defined the utilized terminal as the standard. If not, the job computer waits the selected time of the parameters “Wait. Time for Pref. VT” and “Wait. Time for Pref. TC” before it establishes a connection to a different terminal.

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.

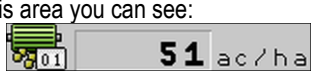


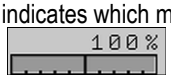
Work screen for a seeder

1	Information on the metering drives	3	Activated additional functions
2	Information on the rows	4	Seeder status information

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.
-  - The ISOBUS-TC application is activated.
-  - SECTION-Control is activated and in automatic mode.
-  - A hopper has issued an alarm.
-  - The implement is in work position.
-  - The early stop function is activated.

Status information

In this area you can see:

-  - The current speed of the implement.
-  - The current fan speed. 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 Operating the implement on the field

6.1 Adjusting the display on the work screen

The area of the work screen in which status information appears is divided into a maximum of four areas:

- "**Display top left**"
- "**Display bottom left**"
- "**Display top right**"
- "**Display bottom right**"

Depending on the configuration, you can assign different displays to the respective areas. The following table shows the possible displays. A number on an icon means that the display can be selected multiple times, for example if the machine has several hoppers.

Icon	Unit	Meaning
	km/h	Current driving speed
		Tramline rhythm
	rpm	Fan speed
	bar	Fan pressure
	%	Relative remaining quantity
	ha	Absolute remaining quantity
	%	Relative metering drive speed
	bar	Coulter pressure
	cm	Working depth

Procedure

1. Select the area on the work screen for which you want to change the display.
   ⇨ The "**Display selection**" screen appears.
2. Select the status that should be shown in the selected area.
3.  - Confirm.

6.2 Setting target rate

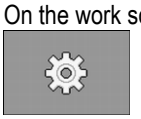
On the "**Settings**" screen, you can configure or view the following parameters:

- "**Product**"

Defines the currently selected product.

- "**Target Rate**"
  Defines how much seed or fertilizer should be spread per hectare.
- "**Status**"
  Shows whether the associated product is currently activated.
- "**Calibration Factor**"
  For a seeder, defines how much seed or fertilizer is spread per rotation of the metering shaft.
- "**Min. Speed**"
  Defines the minimum working speed that is required for spreading.
- "**Max. Speed**"
  Defines the maximum possible working speed for spreading.

Procedure

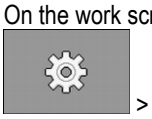
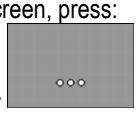
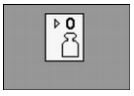
1. On the work screen, press:
   
   ⇨ The "**Settings**" screen appears.
2. Configure the parameters.

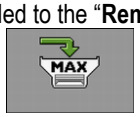
6.3 Hopper filling

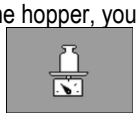
Before working, you can fill the hopper and enter how much seed or fertilizer is in the hopper. Only then can the remaining quantity be shown during operation.

Procedure

☑ You have assigned a product to the hopper. [→ 56]

1. On the work screen, press:
    >  > ()
   ⇨ The "**Settings / Hopper**" screen appears.
2. Select the hopper that you want to fill.
   ⇨ You can see the currently selected hopper by the number in the upper area of the screen.
3.  - Press.
   ⇨ The "**Filling / Hopper**" screen appears.
4.  - Open the hopper cover. Press and hold the button until the hopper cover is opened.
   ⇨ The hopper is ready for filling.
   ⇨ The currently adopted hopper content appears in the "**Remaining quantity**" parameter.
5. Fill the hopper with the desired quantity of fertilizer.
6.  - Close the hopper cover. Press and hold the button until the hopper cover is closed.
   ⇨ You can now enter how much fertilizer is in the hopper.
7.  - Set the remaining quantity to "**0**" if the hopper was empty before filling.

8. For the “**Refill**” parameter, enter the quantity of fertilizer that you have added to the “**Remaining quantity**”. If you have completely filled the hopper, you can also press the 

button.
If you have a weighing system, press the  button to adopt the current measured value.
⇨ The “**Remaining quantity**” parameter will be updated.

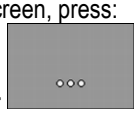
⇨ You have filled the hopper.

6.4 Unloading the hopper

If there still remains in the hopper after finishing work, you can empty it.

Procedure

☑ Seeding is stopped.

1. On the work screen, press:
 >  > () > 
⇨ The “**UNLOAD**” screen appears.
2. Select the metering unit that you want to use to unload the hopper.
3.  - Start unloading.
4. Start the unloading procedure on the implement. Proceed as described in the operating instructions from the implement manufacturer.
⇨ The “**Calculated value**” parameter shows the quantity that was unloaded until now.
5. Wait until the hopper is unloaded.
6. Stop the unloading procedure on the implement. Proceed as described in the operating instructions from the implement manufacturer.
7.  - Confirm.

6.5 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.

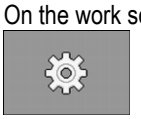
Procedure

☑ 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.

☑ If you have activated the “**Fan Monitor. Calibration**” parameter, the fan must be stopped.

1. On the work screen, press:


⇨ The “**Settings**” screen appears.

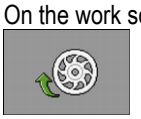
2. Select the product for which you want to perform the calibration test.
3.  - Press.
   ⇨ The “**Calibration**” screen appears.
4. Select the metering unit for which you want to perform the calibration test.
5. In the input box under the text “**Working Speed**”, enter the speed you want to use later on when seeding.
6. Enter the target rate with which you want to work later. [→ 28]
7. Enter a calibration factor, if known. For new products, the optimal calibration factor is calculated automatically.
8. Select the mode that you want to use for calibration. If you select “**Manual**”, you don't need to enter any other values. For “Area”, “Time” or “Revolutions”, you also have to enter the respective value up to which you want to calibrate.
9.  - Press to save the entered data in the database.
10.  - Fill the metering cells with seed or with fertilizer.
    ⇨ The metering cells rotate for a few seconds until the defined angle from the “**Angle Pre-assignment**” parameter has been reached
11.  - Start the calibration.
12. Start the calibration on the implement. Proceed as described in the operating instructions from the implement manufacturer.
13. Wait until the required quantity has been applied. The job computer calculates a weight from the available data and shows it in the field beside the text “**Calculated Value**”.
14. Terminate the calibration on the implement. Proceed as described in the operating instructions from the implement manufacturer.
    ⇨ A screen with the text appears on the terminal screen: “**3. Results**”.
15. Weigh the seed that was applied during the calibration.
16. Enter the weight into the “**Weighed Value**” field.
    ⇨ The job computer calculates the deviation in percent between the calculated and the weighed value.
    ⇨ The job computer calculates the minimum and the maximum speed at which these target rates are possible using the selected metering roll.
    ⇨ When the calibration button is pressed again, the calibration test continues counting from the weighed value.
17.  - Confirm.

⇨ The job computer saves all of the data on the product in the product database. [→ 53]

6.6 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.

6.7 Start seeding

Procedure

☑ The implement is moving.

☑ The implement is lowered.

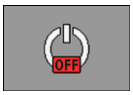
☑ The metering cells are filled with seed.

☑ The fan has reached the minimum revolution speed.

1.  - Start seeding.

6.8 Stop seeding

Procedure

1.  - Stop seeding.
   ⇨ The following message appears in the work screen: “Application is stopped.”

⇨ All of the metering drives are stopped.

6.9 Adjusting the target rate during operation

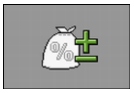
You can amend the target rate while working.

Function icon	Meaning
	Increases the target rate. The target rate will be raised by the value you defined in the “Adjustment” parameter. [➞ 53]
	Reduces the target rate.
	Restores the target rate back to 100%.

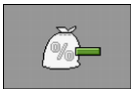
Procedure

☑ You have defined the "**Target Rate**" [→ 28] and "**Adjustment**" [→ 53] parameters.

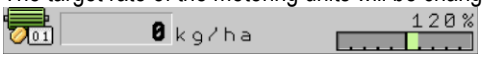
1. On the work screen, press:



⇨ Function icons for target rate adjustment 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.

⇨ After one minute of work with the changed target rate, the display starts flashing.

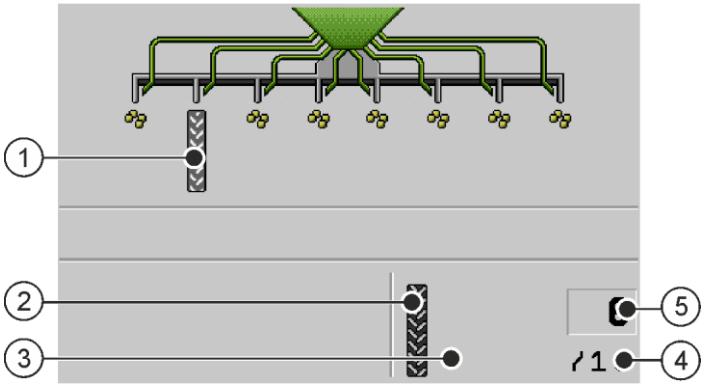
6.10 Using tramline control

The job computer can help you in creating tramlines for the tyres of other vehicles such as sprayers.

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 will be counted as soon as the time that was set for the "**Delay Cycle Switching**" parameter has been reached.



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

(1)	A tramline is being created.	(4)	Tramline rhythm length 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.		

Controls

Function icon	Meaning
	Increases the number of the track. For example, so that you can continue working again at the same track after leaving the field. This function icon is only shown when the metering unit is stopped.
	Reduces the number of the track. For example, when you have lifted the implement within a track and the job computer automatically activated the next track. This function icon is only shown when the metering unit is stopped.
	Deactivates the tramline control. If you deactivate the tramline control, the tracks are no longer counted. For example, this can be used when working the headlands. The selected tramline rhythm is then no longer relevant. If tramline control is deactivated, the following icon appears on the work screen:  If this icon appears, the bout markers are also not switched further in automatic mode.
	Opens the screen for selecting a tramline rhythm for a seeder.

Procedure

1. On the work screen, press:
   

⇨ You can change the number of the track.

⇨ You can configure the tramline control.

6.10.1 Configuring the tramline control

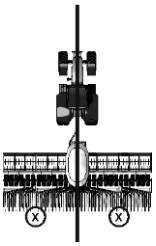
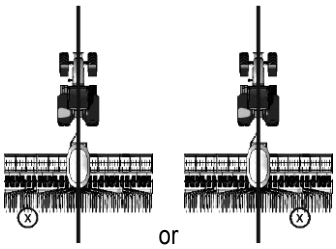
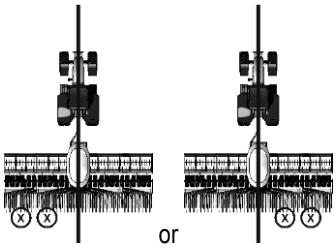
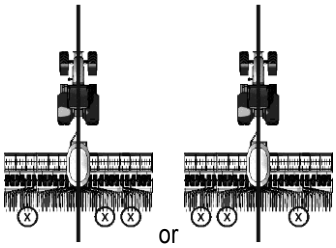
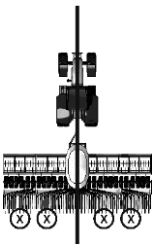
Procedure

To configure tramline control, proceed as follows:

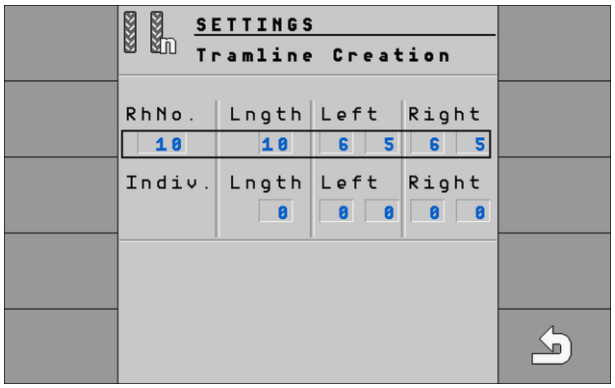
1. Determine the implement type. [→ 34]
2. Select a tramline rhythm. [→ 36]

6.10.2 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.
 or	▪ One tramline mechanism on one side of the seeder.
 or	▪ Two tramline mechanisms on one side of the seeder.
 or	▪ 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.

6.10.3 Selecting tramline rhythm



*"**Settings / Tramline**" screen for a seeder*

RhNo.	Number of the tramline rhythm
Length	Number of tracks until the tramline rhythm is repeated.
Left, right	This shows the passes in which the "left" or "right" seed tubes are closed in order to create a tramline. Up to two track numbers can be entered for each direction.
Indiv	Here you can define your own tramline rhythm.

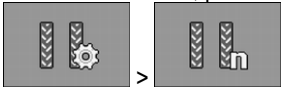
Procedure

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. [→ 34]

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 sections.
3. Find out which section contains the proper tramline rhythm for you.
   ⇨ Even numbers - Even tramline rhythms [→ 37]
   ⇨ Uneven numbers - Uneven tramline rhythms [→ 40]
   ⇨ Decimal numbers - Special tramline rhythms [→ 41]
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:
   
   ⇨ The "**Settings / Tramlines**" screen appears.

6. Select the proper rhythm number.

   Enter an individual tramline rhythm if the rhythm number indicated in the table is “999”. [→ 44]

⇨ You can start working.

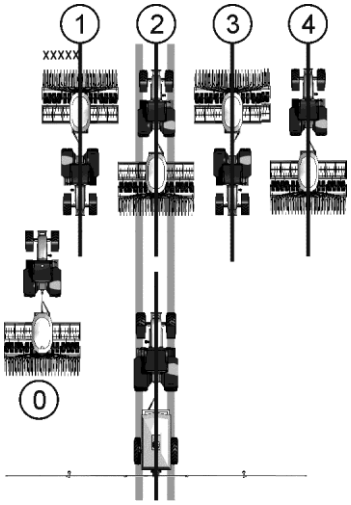
Creating an even tramline rhythm

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



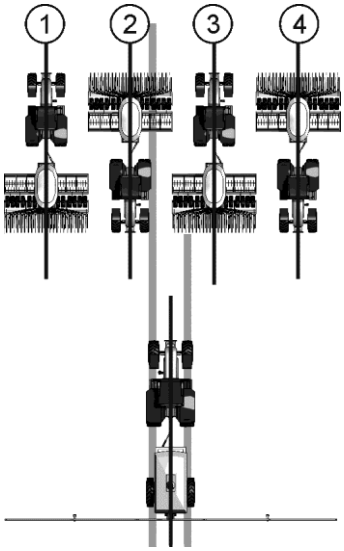
- The figure shows the 4s tramline rhythm.
- The tramlines are created during track 2. (ex.: working width of the sprayer = 12 m, working width of the seeder = 3 m)
- Track 0 must be performed separately. To avoid overlapping, use the “Half width shutoff sys.” function.
- The tramline control must be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

Possible position of the flaps	Result of the calculation	RhNo.	Length	left		right	
	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

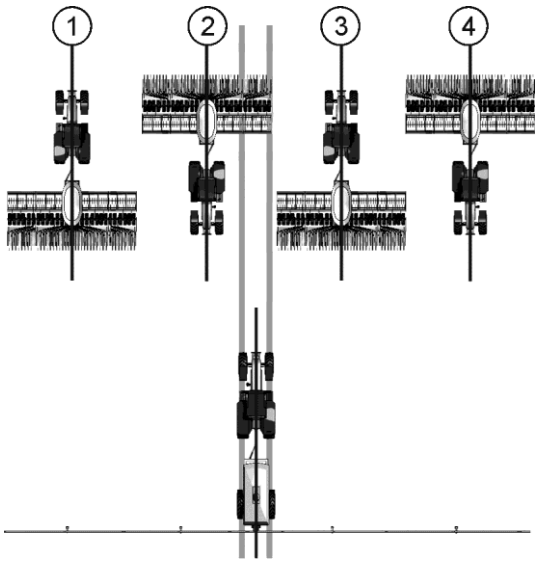
Possible position of the flaps	Result of the calculation	RhNo.	Length	left		right	
	2	2L	2			2	1
	4	4L	4	3	2		
	6	6L	6			4	3
	8	8L	8	5	4		
	10	10L	10			6	5
	12	12L	12	7	6		
	14	14L	14			8	7

Working start at the right field edge

Possible position of the flaps	Result of the calculation	RhNo.	Length	left		right	
	2	2R	2	2	1		
	4	4R	4			3	2
	6	6R	6	4	3		
	8	8R	8			5	4
	10	10R	10	6	5		
	12	12R	12			7	6
	14	14R	14	8	7		

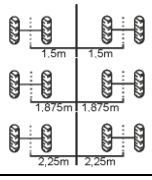
Creating tramlines on one side of the seeder and with two tramline mechanisms

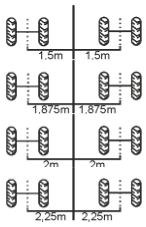
Example



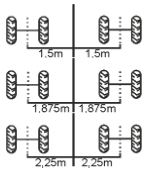
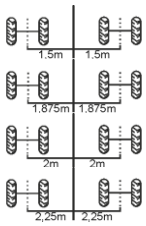
- The figure shows an individual tramline rhythm.
- The tramlines are created during track 2. (ex.: working width of the sprayer = 24m, working width of the seeder = 6m)

Working start at the left field edge

Possible position of the flaps	Result of the calculation	RhNo.	Length	left		right	
	2	999	2				1

Possible position of the flaps	Result of the calculation	RhNo.	Length	left		right	
	4	999	4		2		
	6	999	6				3

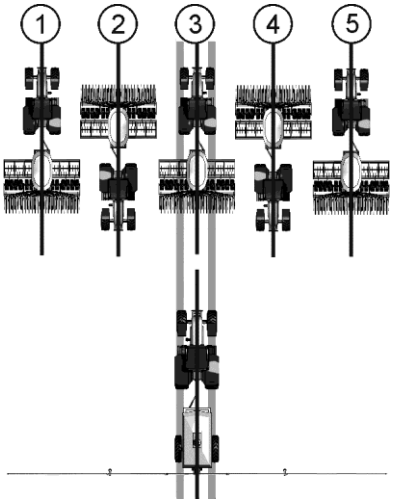
Working start at the right field edge

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 = 15m, working width of the seeder = 3 m)

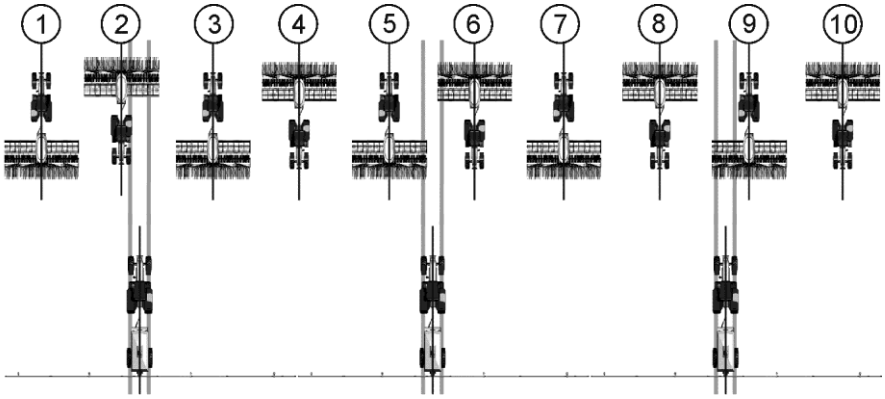
Possible position of the flaps	Result of the calculation	RhNo.	Length	left		right	
	3	3	3		2		2
	5	5	5		3		3
	7	7	7		4		4
	9	9	9		5		5
	11	11	11		6		6

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.

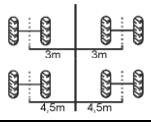
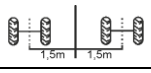
- There is one tramline mechanism on one side of the seeder and two tramline mechanisms on the other side of the seeder.
- Two tramline mechanisms are installed on both sides of the seeder.

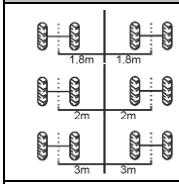
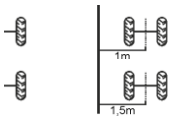
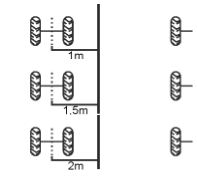
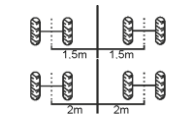
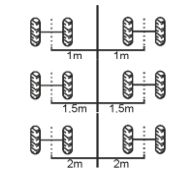
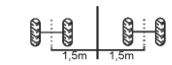
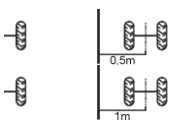
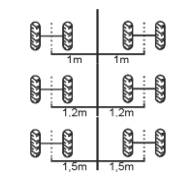
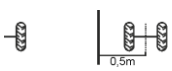
Example



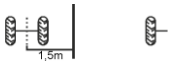
- The figure shows tramline rhythm 20.
- The tramlines are created during tracks 2, 5, 6 and 9. (ex.: working width of the sprayer = 20m, working width of the seeder = 6m)

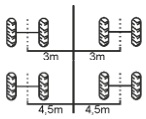
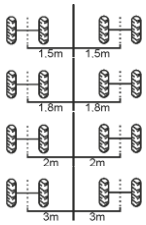
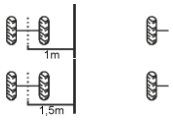
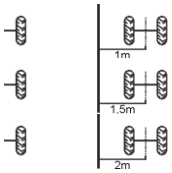
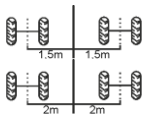
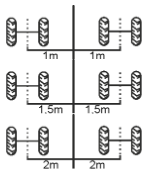
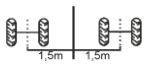
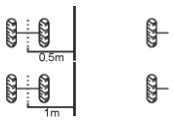
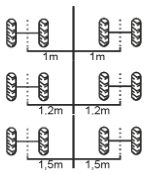
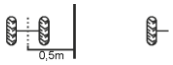
Working start at the left field edge

Possible position of the flaps	Result of the calculation	RhNo.	Length	left		right	
	1.33	999	4	3	2	1	4
	1.5	22	6	4	3	6	1
	2.5	16	10	7	4	9	2

Possible position of the flaps	Result of the calculation	RhNo.	Length	left		right	
							
	2.67	62L	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	63L	14	3	12	7	8
	5.33	24	16	9	8	14	3
	5.5	65L	22	14	9	3	20
	6.67	64L	20	10	11	4	17
	7.5	30	30	27	4	19	12
	9.33	999	28	14	15	5	24

Working start at the right field edge

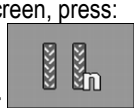
Possible position of the flaps	Result of the calculation	RhNo.	Length	left		right	
	1.33	999	4	1	4	3	2

Possible position of the flaps	Result of the calculation	RhNo.	Length	left		right	
	1.5	23	6	6	1	4	3
	2.5	15	10	9	2	7	4
	2.67	62R	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	63R	14	7	8	3	12
	5.33	25	16	14	3	9	8
	5.5	65R	22	3	20	14	9
	6.67	64R	20	4	17	10	11
	7.5	31	30	19	12	27	4
	9.33	999	28	5	24	14	15

6.10.4 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:
    > 
   ⇨ The "**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 individual tramline rhythm.
4. The values you have entered will remain in the screen also when you have selected some other tramline rhythm. To use an individual tramline rhythm, you always have to select the "**RhNo.**" "**999**".

6.11 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

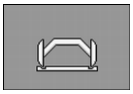
Operation with these systems can then look like this:

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.

6.11.1 Operating bout markers

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

Function icon	Meaning
	Use the left bout marker only. The bout marker is not changed when lifting the implement. 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 at the same time. You can use this function e.g. if you do not have a pre-emergence marker on the implement.
	Use the right bout marker only. 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. Press:  or 
   ⇨ The work screen shows which bout marker has been lowered.
3. To activate automatic bout marker control press: 
   ⇨ The left bout marker is lowered.
4. Press  again to switch between the left and the right bout markers.

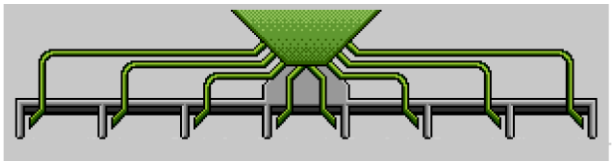
⇨ Depending on the settings, an icon for the bout marker appears on the work screen.

6.11.2 Operating section control

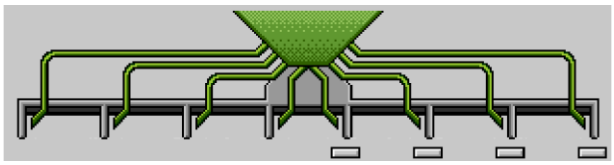
With section control, you can switch the sections of your implement.

The size of the respective sections that you can switch depends on the implement type and equipment.

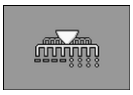
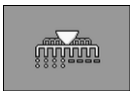
On the work screen, you can see which sections are switched on or off.



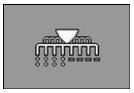
Example: Both sections are open.



Example: The right half width is shut off.

Function icon	Meaning
	Switches the left half width on or off.
	Switches the right half width on or off.

Procedure

1. On the work screen, press: 
2. Perform the desired switching.

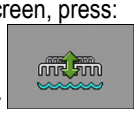
6.11.3 Using the waterhole mode

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.

6.12 Viewing results

6.12.1 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.

In addition, you can view the results for each product on the “**PRODUCT DATABASE**” [➙ 53] screen.

Function icon	Meaning
	Resets the counter.
	Calls up the "**Total Results**" screen.
	Calls up the "**Task List**" screen.
	Calls up the "**Results / hopper**" screen.

The following counters are available:

- “**Area**” - Area on which the implement was in work position.
- “**Quantity**” - Applied quantity.
- “**Area Output**” - Applied area per hour.

Procedure

1. On the work screen, press:
   
   ⇨ The “**Results**” screen appears.

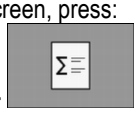
6.12.2 Total results

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

The following counters are available:

- “**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**” - Applied area.
- “**Area Output**” - Applied area per hour.
- “**Total Quantity**” - For each metering unit.

Procedure

1. On the work screen, press:
    > 

⇨ The “**Total Results**” screen appears.

6.12.3 Task Counter

The task counter serves to document task-related results. The data cannot be exported. The function is intended for users who are working without ISO-XML.

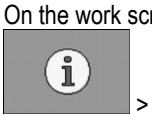
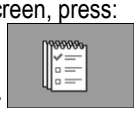
You can maintain up to 30 task counters. Each can be started or stopped at any time.

The following counters are available:

- “**Area**” - Area on which the implement was in work position.
- “**Quantity**” - Applied quantity.
- “**Total Time**” - Time for which the job computer was spreading.

Procedure

To start and stop a task counter:

1. On the work screen, press:
 > 
⇨ The “**Task List**” screen appears.
2. In the “**Task**” parameter, select a task or create or new task.
3. Use the “**Renaming**” parameter to give the task a different name.
4. In the “**Product**” parameter, select the product that you want to spread with this task.
5.  - Start the counter.
⇨ A green icon appears beside the task name. This means that the counter has been started.
6.  - Stop the counter.
7.  - You can also clear the counter.

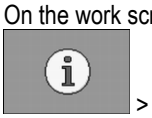
6.12.4 Remaining quantity results

On the “**Results / hopper**” screen, you see the counters that show the quantity remaining in the hopper and how much work can still be performed with the remaining hopper content.

The following counters are available:

- “**Rem. quantity**” - Remaining hopper content.
- “**Rem. area**” - The area that can still be worked with the current hopper content.
- “**Rem. distance**” - The distance that can still be covered with the remaining hopper content.

Procedure

1. On the work screen, press:
 > 

⇨ The “**Results / hopper**” screen appears.

7 Configuring the job computer for work

7.1 Entering the geometry

The geometry of an agricultural implement is defined as a series of parameters describing its dimensions.

The geometry is important particularly for all systems that are GPS-controlled.

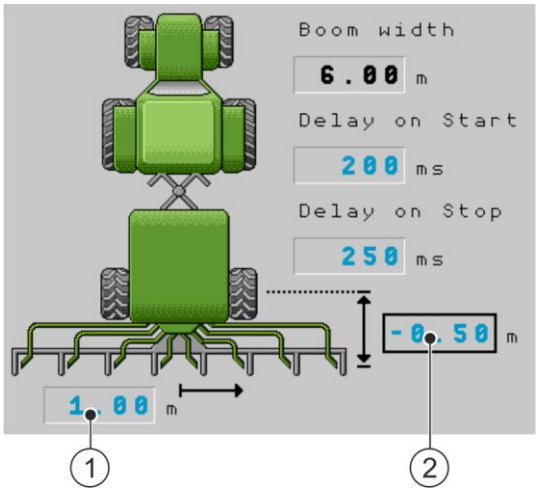
The distances you enter depend on whether the implement is towed, mounted on the tractor or self-propelled.

You must enter the distances for the boom and for the connectors.

In doing so, ensure that the centre point of the implement axle is always the point of origin for all distances. Measurements towards the front are always positive, and measurements towards the rear are always negative.

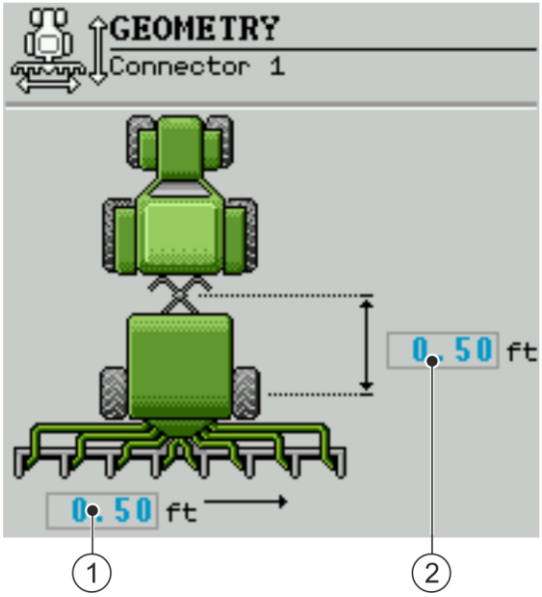
The following distances are possible:

Distances for a boom



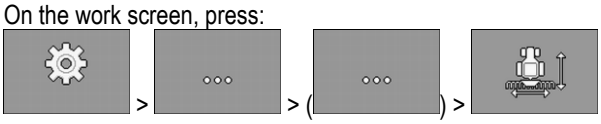
1	Offset Y Distance from the centre point of the implement axle to the centre point of the coulter bar. Positive value: Centre point of the coulter bar is to the right of the centre point of the axle. Negative value: Centre point of the coulter bar is to the left of the centre point of the axle.
2	Offset X Distance from the implement axle to the coulter bar. Positive value: Coulter bar is in front of the axle. Negative value: Coulter bar is behind the axle.

Distances for a connector



1	Offset Y – This value is not shown on the screen. Distance from the connector on the tractor to the centre point of the implement axle. Positive value: Centre point of the implement axle is to the right of the connector on the tractor. Negative value: Centre point of the implement axle is to the left of the connector on the tractor.
2	Offset X Distance from the implement axle to the connector on the tractor. For mounted implements, “0.00” must always be entered. Positive value: Connector on the tractor is in front of the implement axle. Negative value: Connector on the tractor is behind the implement axle.

Procedure

1. On the work screen, press:
   
   ⇨ The “**Geometry**” screen appears.
   ⇨ On the screen, you can see which measurements need to be taken and where they can be entered.
2. Enter the measured values.

⇨ You have entered the geometry.

In addition, you can enter the delays when switching the implement on and off for each boom.

If the implement switches too late, increase the delay.

If the implement switches too early, reduce the delay.

7.2 Selecting and configuring the speed source

You must enter the source from which the job computer shall obtain the current speed.

The configuration procedure can differ depending on the speed source.

Possible speed sources

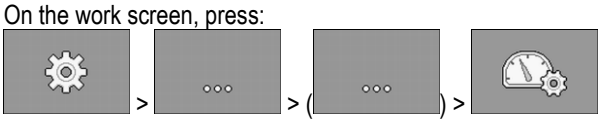
Source	To configure the speed source
Speed signal from the tractor. (GPS receiver signal or a sensor)	Using the speed signal from the tractor [→ 51]
Impulse-transmitting speed sensor mounted on the implement	Calibrating the speed sensor with the 100m method [→ 51]
Simulated speed	Entering the simulated speed [→ 52]

7.2.1 Using the speed signal from the tractor

Some implements do not have a speed sensor. Instead, the speed signal is transmitted through the ISOBUS cable from the tractor to the job computer of the implement.

Procedure

☑ Seeding is stopped.

1. On the work screen, press:
   
   ⇨ The "**Calibration / Speed**" screen appears.
2.  - Press.
   ⇨ In the "**Speed Source**" parameter, the value "**Tractor**" appears.
3.  - Confirm.

7.2.2 Calibrating the speed sensor with the 100m method

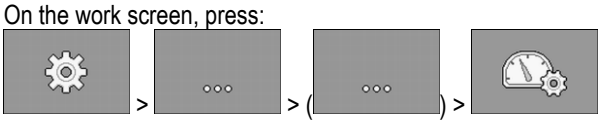
When calibrating the speed sensor with the 100m method, you determine the number of impulses received by the speed sensor in a distance of 100m. When you know the amount of impulses, the job computer can calculate the current speed.

To determine the speed, we recommend using the GPS speed sensor (13000 impulses / 100 m) to record the forward speed.

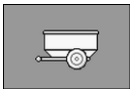
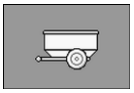
After the first calibration, you can manually enter the number of impulses as the value of the "**Calibration Factor** " parameter.

Procedure

☑ Seeding is stopped.

1. Drive the implement onto the field.
2. Mark the tyre position on the ground. You can use a stone for instance.
3. Measure a straight route of 100 m and mark the end.
4. On the work screen, press:
   

⇨ The “**Calibration / Speed**” screen appears.

5.  - Press.
   ⇨ In the “**Speed Source**” parameter, the value “**Implement**” appears.
6.  - Optionally, change to the “**Implement (2)**” value if two speed sources are installed on the machine.
7.  - Call up the “**Calibration**” screen.
   ⇨ The “**Calibration**” screen appears.
8.  - Start the calibration.
9. Drive the marked distance.
   ⇨ While driving, the counted impulses are shown in the “**No. of Impulses**” field.
10.  - Press when you have reached your destination.
    ⇨ Calibration will be finished.

7.2.3 Entering the simulated speed

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

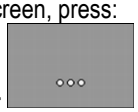
⚠ CAUTION

Injury caused by working machine
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

☑ Seeding is stopped.

1. On the work screen, press:
    >  > () > 
   ⇨ The “**Calibration / Speed**” screen appears.
2.  - Press.
   ⇨ In the “**Speed Source**” parameter, the value “**Simulation**” appears.
3. In the “**Sim. Speed**” parameter, enter the speed to be simulated.
4.  - Confirm.

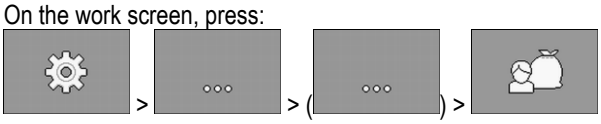
⇨ The desired speed will be simulated.

⇨ When you reboot the job computer, the simulated speed will automatically be set to the value “0”.

7.3 Configuring products

You can configure all of the products that you work with in the product database.

Procedure

1. On the work screen, press:

   ⇨ The “**PRODUCT DATABASE**” screen appears.
2. Select the product that you want to configure.
3. Configure the parameters.
   ⇨ You have configured the product.

In addition, you can view the results for each product on the “**PRODUCT DATABASE**” screen.

7.3.1 “Product” parameter

Select the desired product.

7.3.2 “Rename” parameter

Enter a name or a number to identify the product.

7.3.3 “Product Type” parameter

Enter a product type. The icons displayed on the work screen depend on the selected product type.

You must always select a product type.

- “**Undefined**”
- “**Seed**”
- “**Solid fertilizer**”

7.3.4 “Note” parameter

You have the option of entering a note for the product.

7.3.5 “Adjustment” parameter

Enter the percent value by which the target rate should be changed when you change it manually during the application.

7.3.6 “Gear Ratio” parameter

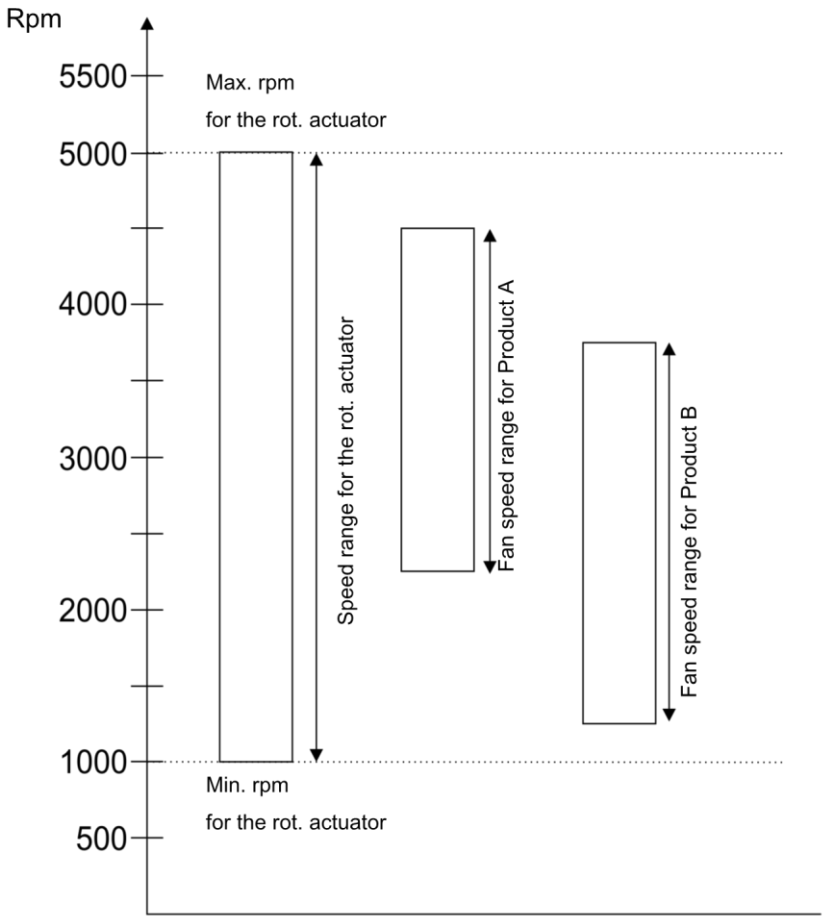
Enter the gear ratio between the metering unit and the product.

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

7.3.7 “Fan Speed Target Rate” parameter

Enter the target speed for the fan that is required to spread the respective product.

The speed is only taken into account if you have assigned a fan to the hopper containing the product.



The minimum and maximum fan speed for a product must always be within the speed range of the rotational actuator.

If a fan speed has been set for a product that is outside the speed range of the rotational actuator, the job computer automatically adjusts the fan speed as follows:

- If the fan speed for a product is above the maximum speed of the rotational actuator, the fan speed is set to the maximum speed of the rotational actuator.
- If the fan speed for a product is below the minimum speed of the rotational actuator, the fan speed is set to the minimum speed of the rotational actuator.
- If a limit of the speed range of the rotational actuator is exceeded or fallen below by the set fan speed plus the fan speed tolerance [→ 54] the respective tolerance value is increased or decreased.

7.3.8 “Fan Speed Tolerance” parameter

For each product, enter the upper and lower tolerance for the fan speed at which the product should still be spread. If the tolerance limit is exceeded or undercut, an alarm message is displayed.

7.3.9 "Fill Level Alarm Threshold" parameter

Select the level at which the alarms for the hopper fill level should be displayed.

The following alarm thresholds are possible:

- "**Low/Empty**"
  The "**Hopper is low.**" and "**Hopper is empty.**" alarms are activated.
- "**Empty**"
  Only the "**Hopper is empty.**" alarm is activated.
- "**deactivated**"
  All fill level alarms are deactivated.

7.3.10 "Deviation Tolerance" parameter

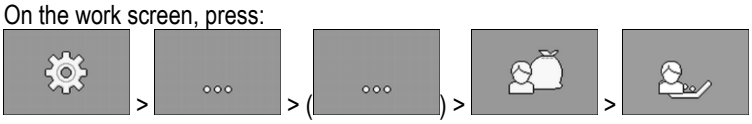
For each product, enter the deviation from the target rate above which an alarm should be triggered.

The left value is valid for a deviation upwards, and the right value for a deviation downwards.

7.4 Displaying the calibration data for the products

For all of the products in the product database, you can display the determined calibration data from the calibration test.

Procedure

1. On the work screen, press:
   
   ⇨ The "**CALIBRATION DATA**" screen appears.
2. Select the product with the corresponding metering unit for which you want to display the calibration data.
   ⇨ You will see the calibration data for the respective product.
3.  - You can also delete the calibration data for the respective product.

7.4.1 "Calibration Factor" parameter

You can only edit the calibration factor when this function is activated. Otherwise, the value that was determined during calibration will always be shown.

7.4.2 "Working Speed" parameter

Shows the value that was set during the calibration test.

7.4.3 "Target Rate" parameter

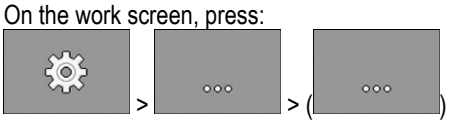
Shows the value that was set during the calibration test.

7.5 Associating products with a hopper

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

- "**Hopper**"
  Defines the currently selected hopper.
- "**Assigned Product**"
  Defines which product should be assigned with a hopper.

Procedure

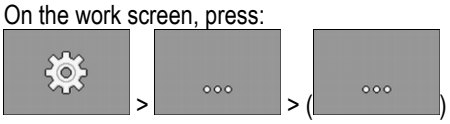
1. On the work screen, press:
   
   ⇨ The "**Settings / Hopper**" screen appears.
2. Configure the parameters.

7.6 Configuring the work position

On the "**Settings** screen, you must assign where the job computer gets information on the work position from.

- **"Tractor"**
- From a work position sensor on the implement
  The sensor, which you can select, switches further a specific component of the implement.

Procedure

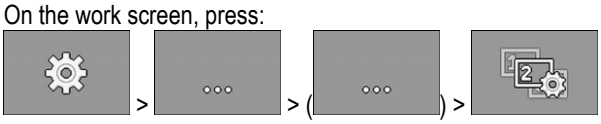
1. On the work screen, press:
   
   ⇨ The "**Settings**" screen appears.
2. Configure the "**Work Position**" parameter.

7.7 Selecting the Virtual Terminal (VT) and Task Controller (TC)

If you are using more than one terminal or more than one Task Controller, you can choose which one you want to use in each case.

Please note that after starting, the job computer checks whether you have defined the utilized terminal as the standard. If not, the job computer waits the selected time of the parameters "Wait. Time for Pref. VT" and "Wait. Time for Pref. TC" before it establishes a connection to a different terminal.

Procedure

1. On the work screen, press:
   
2. Select which Virtual Terminal (VT) you want to use.
3. Select which Task Controller (TC) you want to use.
4.  - Confirm.

⇨ You have selected the Virtual Terminal and the Task Controller.

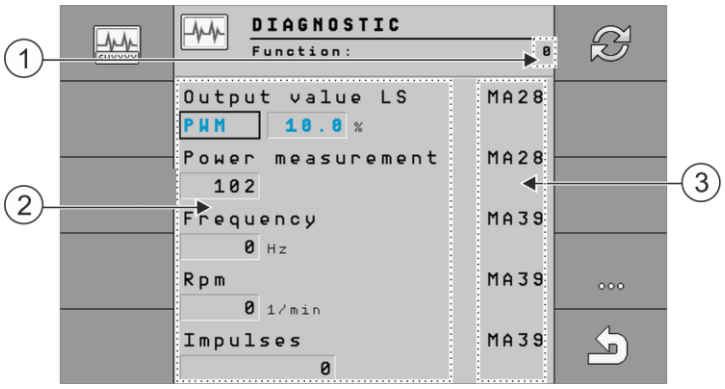
8 Troubleshooting

8.1 Diagnostic

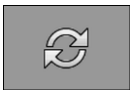
8.1.1 Performing a standard diagnostic

In the standard 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. [→ 59]
	Sets the current measured values to "0".
	Calls up the next function.

The following abbreviations are possible for the cable cores:

- "**MA**"
  MA means master job computer.
  Example: MA28 means master job computer, pin 28
- "**1S**"... "**4S**"
  1S to 4S represent the respective slave job computers.
  Example: 1S14 means first slave job computer, pin 14

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

- "**Frequency**"
  Current measured frequency of the function.
- "**Rpm**"

Current measured rpm of the function.

- "**Impulses**"
  Current measured number of impulses of the function.
- "**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.
  - "**+/-**"

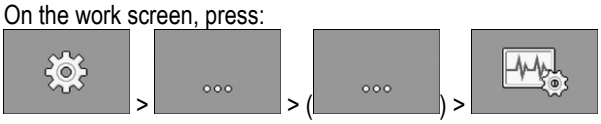
    The linear actuator is moving in one direction. The direction in which the linear actuator is moving depends on the respective connection.
  - "**-/+**"

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 appears.

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

8.1.2 Checking the version numbers

Procedure

To check the version numbers, proceed as follows:

1. On the work screen, press:

⇨ The "**Version number**" screen appears.

⇨ 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
Created on	Date on which the software was created
Pool version	Version of the pool with texts and images
Hydr. version	Version of the hydraulic system configuration
CL version MA	Version of the Control Layer configuration for the master job computer
CL version S	Version of the Control Layer configuration for the slave job computer

8.2 Alarm messages

8.2.1 ISO alarms

Alarm message overview

ID	Alarm text	Possible cause	Remedial measure
001	System has been stopped. Reboot required.	The connection to a slave job computer has been interrupted. A download manager has been activated.	Restart the job computer.
002	Configuration has been changed. The job computer is rebooting.	The configuration has been changed.	Wait until the job computer has rebooted.
003	Input is too high.	The entered value is too high.	Enter a lower value.
004	Input is too low.	The entered value is too low.	Enter a higher value.
005	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.
006	Data has been successfully imported.		
007	Error detected in the configuration.	Faulty configuration.	Check the configuration.
008	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.
009	Speed signal from CAN bus has been lost.	The cable was disconnected.	Check the cable connection.
010	Error with the initialisation of the Control Layer configuration.	There was an error in the Control Layer configuration.	Check the configuration.
011	Several terminals have the same number.	There are several terminals with the same number on the ISOBUS (function instance).	Change the number (function instance) on the terminal.
012	Several TASK-Controllers have the save number.	There are several TASK-Controllers with this number on the ISOBUS.	Change the number.
013	The task list is full.	There are too many tasks in the task list.	Delete task data that is no longer required.
014	The recording of an internal task has been stopped because the product was changed.	The product has been changed during the recording of an internal task.	Select the initial product.

ID	Alarm text	Possible cause	Remedial measure
015	The task could not be started because a different product was assigned.	A different product is stored in the task than was assigned to the hopper in the configuration.	Check which is the correct product and correct the task or the hopper assignment.
043	Dataset already exists.	An identical dataset already exists.	Check the dataset or change the name.
044	Dataset has errors.	The dataset has an error.	Check the dataset.
045	Dataset not found.	A selected dataset could not be found. You did not performed a calibration for the selected product.	Select a different data set or perform a calibration test for the selected product.
046	Loop overflow.	A conflict has occurred between the database and the implement.	Check the dataset.
047	Dataset is full.	The database is full.	You must first delete a dataset to be able to save a new one.

8.2.2 Hydraulic alarms

Alarm message overview

ID	Alarm text	Possible cause	Remedial measure
201	Hydraulic table is not compatible with the configuration.	The hydraulic table does not match with the configuration of the job computer.	Use a different hydraulic table or change the configuration.
202	Hydraulic table is not compatible. All hydraulic functions are deactivated.	The hydraulic table does not match with the configuration of the job computer.	Use a different hydraulic table.
203	Movement of the bout marker is paused. The speed is too low.	The working speed is too low.	Increase the working speed.
204	Bout marker time has not expired yet.	The bout marker time has not expired yet.	Wait until the bout marker time has expired.

8.2.3 Regulation alarms

Alarm message overview

ID	Alarm text	Possible cause	Remedial measure
401	Fan is rotating too slowly.	The current fan speed is lower than the defined value for the “Fan Speed Tolerance” parameter.	Increase the fan speed or change the tolerance limit.
402	Fan is rotating too fast.	The current fan speed is higher than the defined value for the “Fan Speed Tolerance” parameter.	Reduce the fan speed or change the tolerance limit.

ID	Alarm text	Possible cause	Remedial measure
403	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.
404	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.
405	The metering was stopped because the work position was not reached. Raise the implement.	The implement is not in work position.	Raise the implement.
406	The metering unit has been stopped because the implement has not been completely raised. Raise the implement.	The implement has not been completely raised.	Raise the implement.
407	Metering drive is stationary.	The current speed of the metering drive is lower than the minimum speed.	Stop immediately! Remove the cause.
408	Metering shaft is stationary.	The revolution sensor on the metering shaft does not register any metering shaft movement.	Stop immediately! Remove the cause.
409	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.
410	Metering drive regulation range exceeded.	The current speed of the metering drive is higher or lower than the set speed.	Drive more slowly or faster or install a larger metering roll.
411	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.
412	Application has been stopped because of a critical error.	Another error has occurred. This error always appears in combination with another error.	Fix the related error.
413	Application has been stopped because the forward speed was too high.	The forward speed is too high.	Reduce the driving speed.

ID	Alarm text	Possible cause	Remedial measure
414	Calibration was interrupted due to an alarm.		
415	Fan is rotating too fast. Metering stopped.	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.
416	Fan is rotating too slowly. Metering stopped.	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.

8.2.4 Machine-specific alarms

Alarm message overview

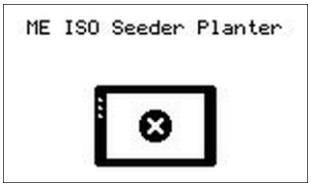
ID	Alarm text	Possible cause	Remedial measure
602	Connection lost.	The connection to an ERC module has been lost.	Check the cable.
603	Connection disrupted.	The connection to an ERC module has been disrupted.	Check the cable.
604	Supply voltage is too low.	The supply voltage for the ERC modules is too low.	Check the supply voltage and check the vehicle battery.
605	Short circuit	There is a short circuit in the ERC modules.	Check the cable.
606	Open load circuit	An open load circuit has been detected in the ERC modules.	Check the cable and check whether the shut-off clutch is available.
607	Error detected in ERC module.	Faulty configuration.	Check the configuration of the inputs and outputs.
608	No seed flow detected.	The blockage system has not detected any seed flow.	Check the blockage system.
609	Seed flow detected.	Seed flow has occurred in a tramline.	Check the tramline control.
610	Seed flow detected in a row that is switched off.	The row is defective.	Check the row.
611	Hopper is low.	There is not enough seed or fertilizer in the hopper.	Fill the hopper.
612	Hopper is empty.	There is no more seed or fertilizer in the hopper.	Fill the hopper.
613	Timeout during section switching.	The switching of the left section is taking too long.	Check if something is stuck.

ID	Alarm text	Possible cause	Remedial measure
614	Timeout during section switching.	The switching of the right section is taking too long.	Check if something is stuck.
617	The charger does not work.	There is a malfunction in the alternator of the charger.	Check the alternator of the charger.
618	No product flow detected in active row.	No product flow has been detected in an active row.	Check the product flow, there may be a blockage in one of the supply lines.
619	Excessive product flow detected in active row.	Excessive product flow has been detected in an active row.	Check the calibration.
620	Insufficient product flow detected in active row.	Insufficient product flow has been detected in an active row.	Check the calibration.
621	There is no dataset for this product.	The calibration was not performed yet for the respective product.	Perform a calibration before working with the product.
630	Connection lost.	The connection to an MRC module has been lost.	Check the cable.
631	Undefined Module Index.	A software error has occurred.	Contact Customer Service.
632	Undefined Command.	A software error has occurred.	Contact Customer Service.
633	Motor Standstill	The MRC motor is at a standstill.	Check the cable.
634	Motor current is too high.	The MRC motor requires too much current.	Check if something is stuck.
635	Deviation from set rpm too high.	The speed of the MRC motor is deviating too strongly from the target rotational speed.	Check if something is stuck.
636	No seed during pre fill.	No seed was detected during pre-metering.	Ensure that seed is available.
637	No PLANTirium sensor online.	No PLANTirium sensor was detected.	Check the wiring.
663	Voltage is too low.	The voltage is lower than the pre-set minimum supply voltage.	Check the cable and the power supply.
670	Error in blockage system. Error: Sensor:	An error has occurred in the blockage system.	Check the blockage system.
671	Error in blockage system.	An error has occurred in the blockage system.	Check the blockage system.
672	Product flow detected in inactive row.	Product flow has been detected in an inactive row.	Check the shut-off.

8.3 Compatibility

8.3.1 Compatibility between terminal and job computer

If the following icon appears after starting the application, your terminal is not compatible with the job computer. You need a different terminal to be able to work with the job computer.



The terminal can be incompatible with the job computer for the following reasons:

ID	Meaning
018	Undefined error occurred.
019	There is not enough available storage on the terminal.
020	The resolution of the width for function icons is too low (less than 60 pixels).
021	The resolution of the high for function icons is too low (less than 32 pixels).
022	The number of physical or virtual function icons is too low (less than 8).
023	The terminal does not support the color depth of 256 colors.
024/025	The resolution of the terminal for screens is too low (less than 200 pixels).
026	Input and output configuration seems to be wrong.

8.3.2 Compatibility with ISOBUS terminals

Tables with the compatibility of individual software versions with different ISOBUS terminals can be found in the compatibility list on our website.

9 Technical specifications

9.1 Technical specifications of the job computer

ECU-Midi 3.0 job computer

1st Processor:	32-bit ARM Cortex™-M4 CPU 168 MHz, 2048 KB flash; 256 KB RAM
2nd Processor:	32-bit ARM Cortex™-M4 CPU 168 MHz, 2048 KB flash; 256 KB RAM
External memory:	SPI-Flash 8 MB; SDRAM 16 MB; FRAM 16kByte
Connections:	▪ 42-pin plug for connecting actuators/sensors ▪ 2x 16-pin plug for power supply and CAN (ISOBUS & Salve BUS) The plugs can be locked and equipped with single conductor insulations.
Interfaces:	Up to 3 CAN interfaces and LIN, Ethernet via additional card (optional)
Voltage supply:	12 V electrical system max. load 30 A (50 A fuse)
Power input (IN):	500 mA (at 14.4 V without power output, without supply to external sensors)
Standby current (OFF):	70 µA (typ.)
Temperature range:	-40 … +85 ºC
Housing:	Anodized aluminium continuous cast casing, plastic lid with EPDM seal and pressure compensation element, stainless steel screws
Protection rating:	IP66K
Environmental tests:	Vibration and shock testing in accordance with DIN EN 60068-2 Temperature testing in accordance with IEC68-2-14-Nb, IEC68-2-30 and IEC68-2-14Na Protection testing in accordance with DIN EN 60529
Dimensions:	Approx. 262 mm x 148 mm x 62 mm (L x W x H, without plug)
Weight:	ca. 1 kg

Additional information:

Minimum input frequency required for control:	5 Hz

9.2 42-pin connector

42-pin connector

Outputs	▪ 2x lowside* 1 A, ▪ 16x highside* and/or lowside* 4A (of which max. 6 with PWM and power measurement, respectively) ▪ 2x lowside* 4 A, ▪ 2x half bridge* for 12 A servo motors or PWM operation of DC motors ▪ 2x half bridge* for 10 A servo motors or PWM operation of DC motors ▪ PWM up to 16 kHz at d= 10% - 90% @resistive load
Inputs:	Total of 23 universal inputs, configurable as ▪ 17x analog 0 – 5 V ▪ 17x analog 0 – 10 V ▪ 23x NPN sensors (of which max. 17x rotational speed) ▪ 23x PNP sensors (of which max. 8x rotational speed) ▪ 14x 4 – 20 mA power input (of which max. 8x rotational speed / max. 4 with a burden < 50 Ohm) ▪ 12x Namur sensors
Interfaces:	LIN, CAN

9.3 Available languages

You can set the following languages in the software for the operation of the implement:

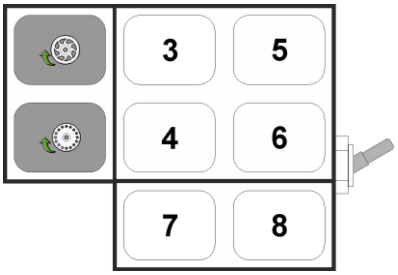
Software version	Added languages
02.00.00	BG, CS, DA, DE, EL, EN, ES, ET, FI, FR, HR, HU, IT, LT, LV, NL, NO, PL, PT, RO, RU, SK, SL, SR, SV, TR, UK

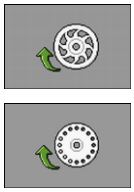
9.4 Joystick button configuration

9.4.1 Standard joystick button configuration with AUX1 protocol

If you are using a joystick with AUX1 protocol, the following functions will be activated if you press a specific button on the joystick.

The illustrations also show which position the side switch must be in.

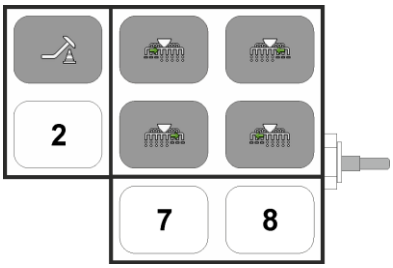


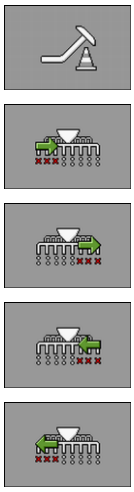


For a seeder, fills the metering cells with seed.

For a precision planter, fills the metering wheel with seed.

Buttons 3-8 are not assigned.





Lifts the bout markers to pass over obstacles. The implement itself is not lifted.

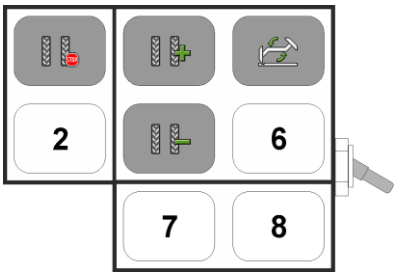
Switches off from left to right.

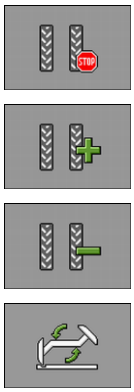
Switches on from left to right.

Switches off from right to left.

Switches on from right to left.

Buttons 2, 7, and 8 are not assigned.





Deactivates the tramline control.

Increases the number of the track.

Reduces the number of the track.

Manually changes the bout marker.

The bout marker is always changed when you lift the implement.

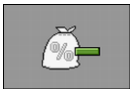
Buttons 2 and 6-8 are not assigned.

9.4.2 Available joystick functions with AUX2 protocol

If you are using a joystick with AUX2 protocol, you can assign the buttons with any of the following functions.

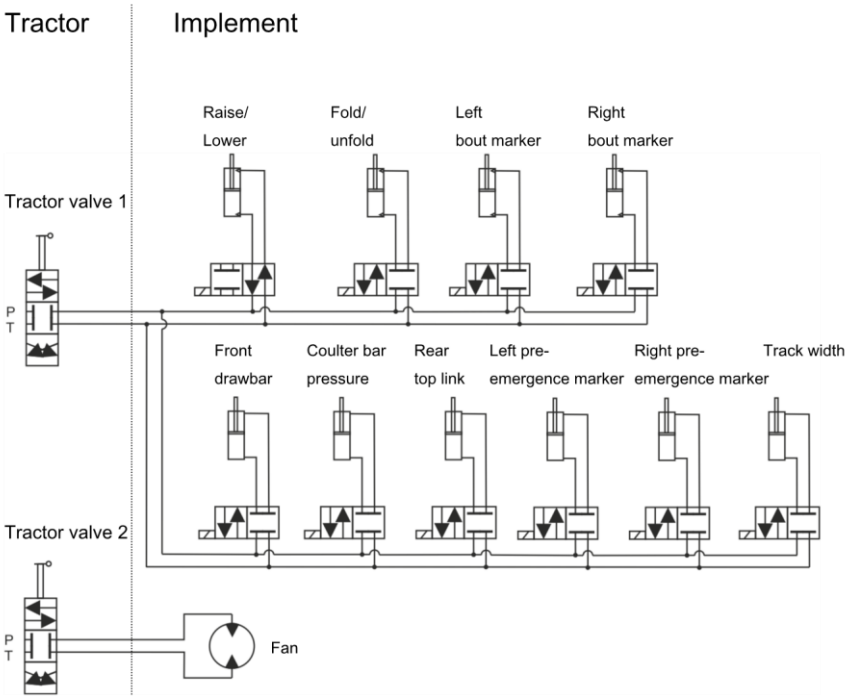
You can read how to configure the assignment of the joystick buttons in the operating instructions for the terminal.

Function icon	Meaning
	Increases the target rate.

Function icon	Meaning
	Reduces the target rate.
	Restores the target rate back to 100%.
	For a seeder, fills the metering cells with seed.
	Switches on from right to left.
	Switches off from left to right.
	Switches on from left to right.
	Switches off from right to left.
	Deactivates the tramline control.
	Increases the number of the track.
	Reduces the number of the track.

9.5 Hydraulic system of the implement

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


Tractor
Implement
Raise/
Lower
Fold/
unfold
Left
bout marker
Right
bout marker
Tractor valve 1
P
T
Front
drawbar
Coulter bar
pressure
Rear
top link
Left pre-
emergence marker
Right pre-
emergence marker
Track width
Tractor valve 2
P
T
Fan

10 Explanation of the signals in the pin-out diagram

There is an pin-out diagram for each implement model. You can obtain the pin-out diagram 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 pin-out diagram.

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 work 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.
Half width sensor	Sensor that measures the position of a half width motor.
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.
Calibration flap position sensor	Sensor that measures the position of a calibration flap.
Drawbar position sensor	Sensor that measures the position of the drawbar hydraulic cylinder.
Top link position sensor	Sensor that measures the position of the top link hydraulic cylinder.
Vacuum sensor	Sensor on a precision planter that tests whether the fan is generating sufficient vacuum to suck in the seeds.

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.
Lift seeder	Actuator that raises the implement.

English	Explanation
Fold seeder	Actuator that folds or unfolds the implement.
Half width motor	Actuator that switches the half width.
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.
Loading auger	Actuator that activates and deactivates the loading auger.
Wheel adjustment	Actuator that changes the track width.
Drawbar	Actuator that adjusts the drawbar position.
Top link	Actuator that adjusts the top link position.
Coulter pressure adjustment	Actuator that increases the coulter pressure to adjust the placement depth.
Select ERC module	Actuator that directs the ERC modules.
Working light	Actuator that switches the working lights.
Hopper light	Actuator that switches the hopper lights.
Beacon	Actuator that switches the beacon.