MÜLLER ELEKTRONIK
A TRIMBLE COMPANY

Installation and operating instructions

PLANTER-Controller

Version: V5.20191001

30285015-02-EN

Read and follow these instructions. Keep these instructions in a safe place for later reference. Please note that there might be a more recent version of these instructions on the homepage.

Company details

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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 EU declaration of conformity

Herewith we declare that the design and construction of this product and its identical variants, as well as the form brought onto the market by us, is in accordance with the relevant safety and health requirements of the EU Directive of Electromagnetic Compatibility 2014/30/EU. If alterations are made to the product without prior consultations with us, this declaration becomes invalid.

MIDI 3.0 job computer

Harmonised standards applied:	EN ISO 14982:2009
	(EMC Directive 2014/30/EU)
In conformity with further EU directives:	Directive 2011/65/EU (RoHS 2)

2 About the job computer

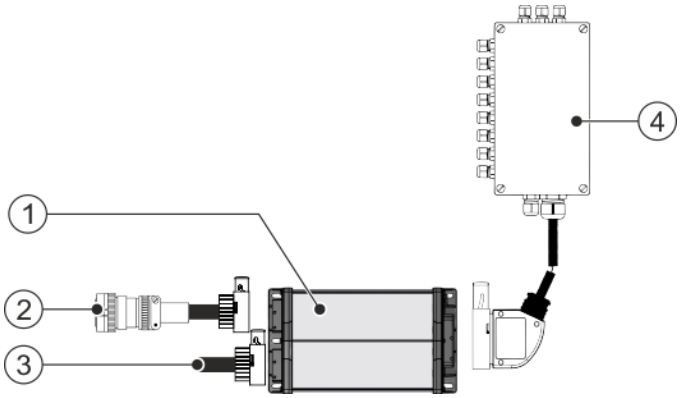
2.1 Job computer functions

The ECU-MIDI planter job computer is an ISOBUS job computer that can control the operation of planters.

The ISOBUS job computer is the control central of the planter. 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.

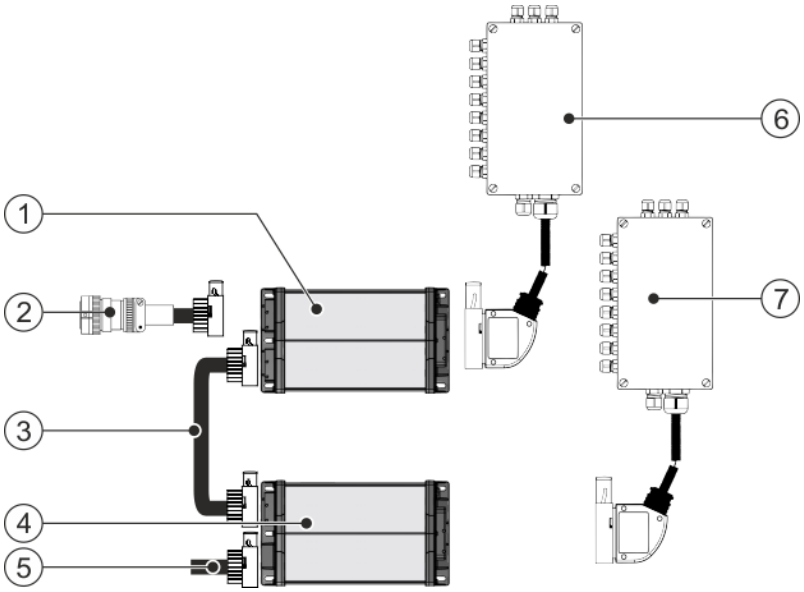
- Speed recording from different sources
- Monitoring of the fan speed
- Monitoring and shutoff for each individual row
- Grouping of rows into sections

2.2 System overview



Small system with one job computer

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



Large system with two job computers

1	ECU-MIDI master job computer	5	CAN termination
2	ISOBUS cable	6	Master junction box
3	Connecting cable between the job computers	7	Slave junction box
4	ECU-MIDI slave job computer		

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

2.3 Rating plate

Abbreviations on the rating plate

Abbreviation	Meaning
K.-Nr.:	Customer number If the product was manufactured for an agricultural machinery manufacturer, the agricultural machinery manufacturer's item number will be shown here.
HW:	Hardware version
ME-NR:	Müller-Elektronik item number
DC:	Operating voltage The product may only be connected to voltages within this range.
SW:	Software version upon delivery
SN:	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 precision planters 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: [➙ 11]

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

4 Mounting and installation

4.1 Installing the 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 planter, 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 connector 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 connection in 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.

Please note that the cable cores for the ultrasonic sensor trigger always need to be connected to Pins 2 and 3.

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

☑ The junction box is not powered.

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

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

Each terminal consists of two openings:
- The upper opening of the terminal opens 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 no 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 are not using wire end sleeves, you first have to use the screwdriver.

⇨ 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
Seed counter	Optical sensor

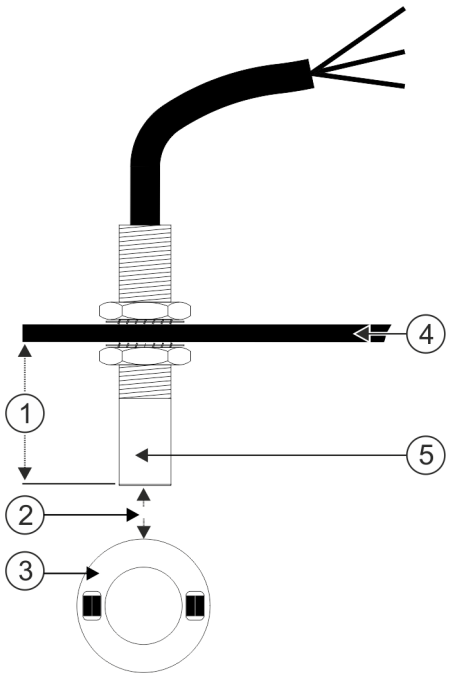
4.4.1 Installing the revolution sensors

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	0 VE
2	brown	12 VE

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

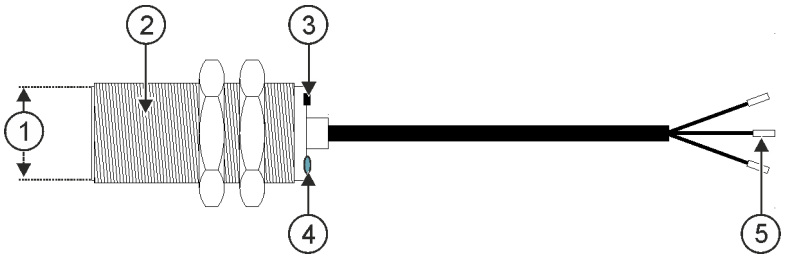
4.4.2 Installing the fill level sensor

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	0 VE

Pin	Cable color	Designation
2	brown	12 VE
3	black	Signal

Spare part number

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

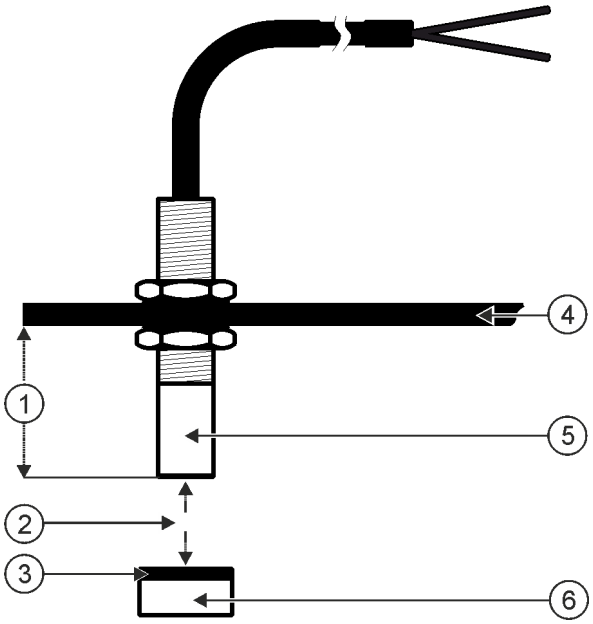
4.4.3 Installing the work position sensors

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 line 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

4.4.5 Installing the seed counter

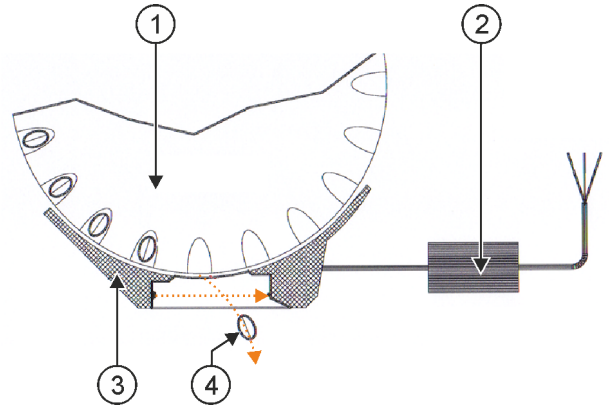
Optical sensors are suitable as seed counters.

Functional principle

A signal is sent when a seed passes through the photo sensor.

The sensor consists of a sending and a receiving part. The sender (photodiode) produces an invisible beam of light. The receivers (phototransistors) absorb this beam of light. The interruption of the beam of light (e.g. by a seed) produces a brief mass impulse.

Schematic overview



1	Metering wheel	3	Optical sensor
2	Signal amplifier	4	Seed

Connector pin assignment

3-pin AMP connector

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

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

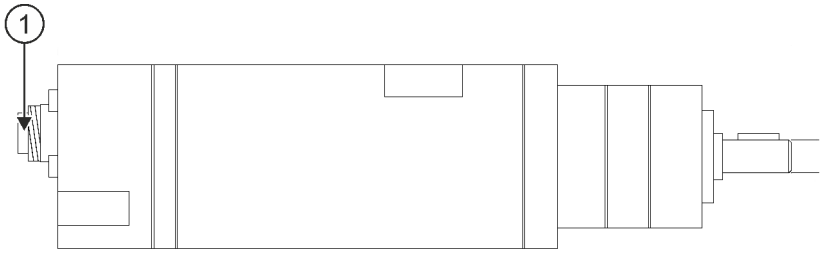
4.5.1 Installing the metering drives

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

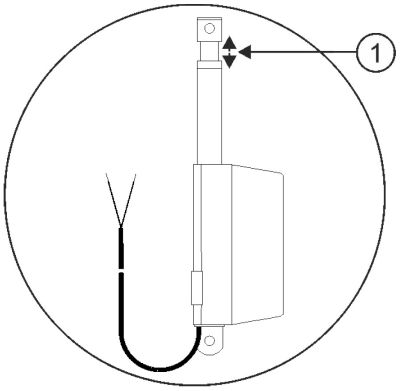
Item number	Designation
30285050	Electrical metering drive
30285055	1m cable for electrical metering drive

4.5.2 Installing linear actuators

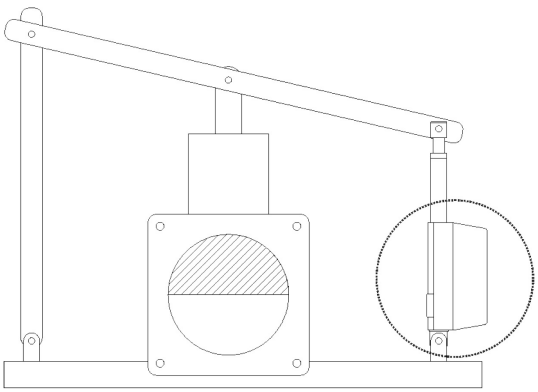
Functional principle

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.

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.

5 Basic control principles

5.1 Switching on the job computer

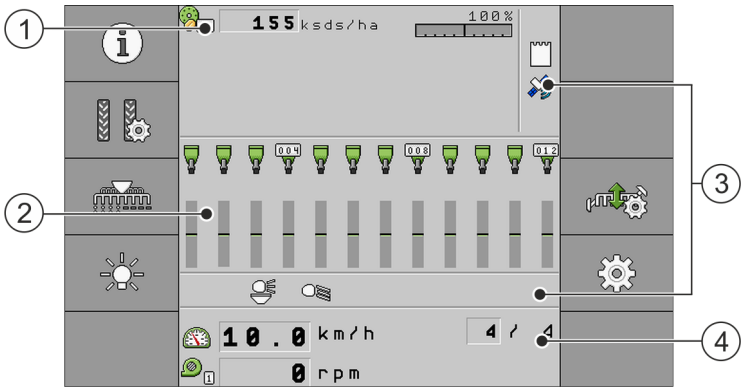
Procedure

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.

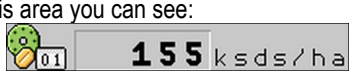


Work screen for a precision planter

1	Information on the metering drives	3	Activated additional functions
2	Information on the rows	4	Status information on the precision planter

Information on the metering drives

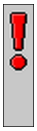
In this area you can see:

- 

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

Information on the rows

In this area you can see:

- The current status of the seeding per row.
  -  - The target rate is maintained.
  -  - The target rate is exceeded within the deviation tolerance.
  -  - The target rate is undercut within the deviation tolerance.
  -  - The target rate is exceeded beyond the deviation tolerance.
  -  - The target rate is undercut beyond the deviation tolerance.
  -  - No seed flow detected or seed flow detected in an inactive row.
-  - Whether a tramline is being created.
-  - The numbering of the rows.

Information on the additional functions

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

-  - The waterhole mode is activated.
-  - The ISOBUS-TC application is activated.
-  - SECTION-Control is activated and in automatic mode.
-  - The implement is in work position.

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

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 should be applied per hectare.
- "**Status**"
  Shows whether the associated product is currently activated.
- "**Calibration Factor**"
  For precision planters, defines how many seeds are applied per revolution of the metering wheel.
- "**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 Using tramline control

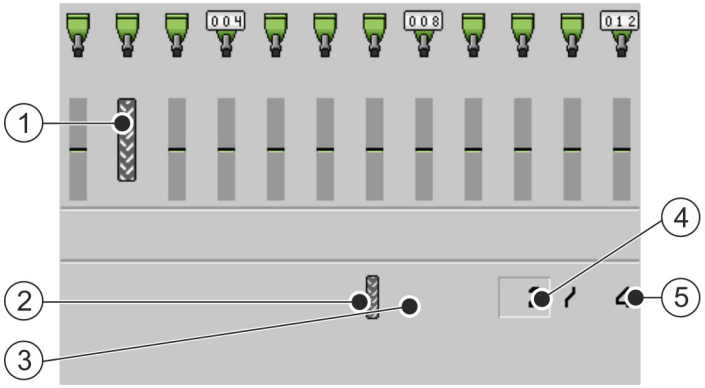
The job computer can help you in creating tramlines for the tyres of other vehicles such as sprayers.

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.

When the TRAMLINE-Management automatic tramline system is activated, you do not need to make any other settings, and therefore the individual function icons for using tramline control are not shown.



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

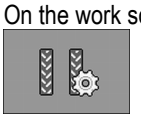
1	A tramline is being created.	4	Number of the current track
2	A tramline is being created on the left side of the implement.	5	Tramline rhythm length Number of tracks until the tramline rhythm is repeated.
3	Tramline control is not active on this side of the implement. Therefore, no tramline will be 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 or the working conditions are met.
	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 or the working conditions are met.

Function icon	Meaning
	Deactivates the advancing of tramline control. If you deactivate the advancing of 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 the advancing of 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. This function icon is hidden when the implement does not have a tramline system.
	Opens the screen for selecting a tramline rhythm for a seeder. Opens the screen to configure the tramline control for a precision planter.

Procedure

1. On the work screen, press:
   

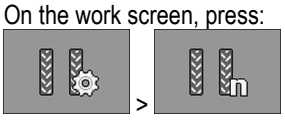
⇨ You can change the number of the track.

⇨ You can configure the tramline control.

6.3.1 Configuring the tramline control

Procedure

This is how to configure the tramline control on a precision planter:

1. On the work screen, press:
   
   ⇨ The **“Settings / Tramlines”** screen appears.
2. Configure the parameters.

⇨ You have configured the tramline control for the precision planter.

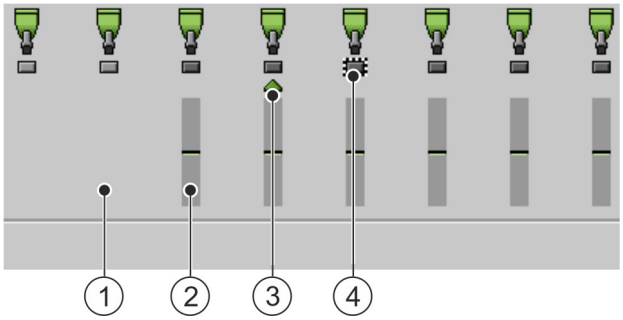
- **“Sprayer Working Width”**
  Defines the working width of the sprayer for which you want to create the tramline.
- **“Track Width”**
  Defines the track width of the tractor.
- **“Rows per Tramline”**
  Defines how many rows you want to switch off for creating a tramline.
- **“Working Start”**
  Defines where you want to start working.
  - **“Left Field Edge”**
  - **“Right Field Edge”**

6.4 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.

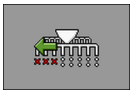
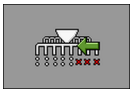
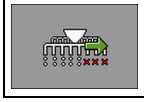


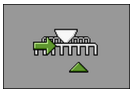
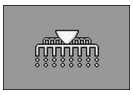
Example: Switched rows on a precision planter

1	Switched-off row	3	Current cursor position
2	Switched-on row	4	Marked row

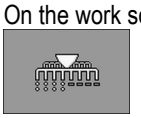
For precision planters, the rows may have the following statuses:

-  - The row is activated during application.
-  - The row is deactivated during application by SECTION-Control or the user.
-  - The row will be activated as soon as the application has been started.
-  - The row remains deactivated as soon as the application has been started.
-  - The row is marked to be permanently switched on or off.

Function icon	Meaning
	Switches off from left to right.
	Switches on from right to left
	Switches off from right to left.
	Switches on from left to right.

Function icon	Meaning
	Moves the cursor on the work screen from left to right.
	Moves the cursor on the work screen from right to left.
	Marks the section/row that was selected with the cursor for switch-off. Switches on a marked, switched-off section/row.
	Switches all of the marked sections/rows off or on.
	Switches everything on.

Procedure

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

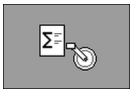
6.5 Viewing results

6.5.1 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**” [→ 37] screen.

Function icon	Meaning
	Resets the counter.
	Calls up the “**Total Results**” screen.
	Calls up the “**Row Results**” screen.
	Calls up the “**Task List**” 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.

6.5.2 Total results

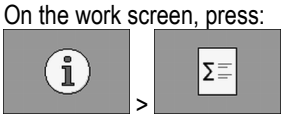
On the "**Total results**" screen, you see the counter that documents the work performed since the initial startup of the job computer.

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

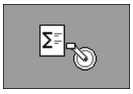
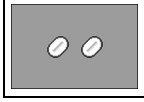
1. On the work screen, press:



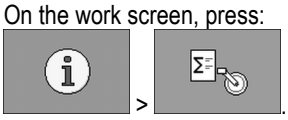
⇨ The "**Total Results**" screen appears.

6.5.3 Row Results

On the "**Row Results"** screen, you can see how many seeds were spread in each row. These results can only be seen with implements that have counter results for each row.

Function icon	Meaning
	Resets the counter.
	Shows the total counted seeds per row.
	Shows the percentage of skips per row. The value is always based on the last 250 counted seeds.
	Shows the percentage of multiples per row. The value is always based on the last 250 counted seeds.
	Shows the percentage of singulations per row. The value is always based on the last 250 counted seeds.

1. On the work screen, press:



⇨ The "**Row Results**" screen appears.

2. Use the function icons to switch between the individual results.

6.5.4 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.

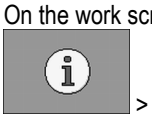
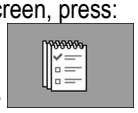
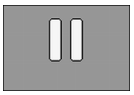
You can maintain up to 30 task counters. Each can be started or stopped at any time.

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.

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.

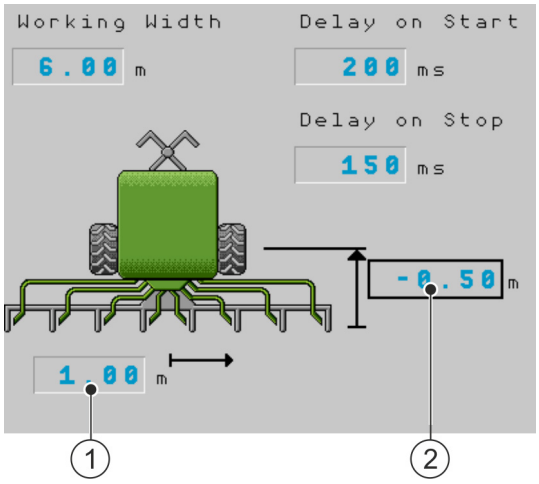
The distances you enter depend on whether the implement is towed, mounted on the tractor or self-propelled.

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.

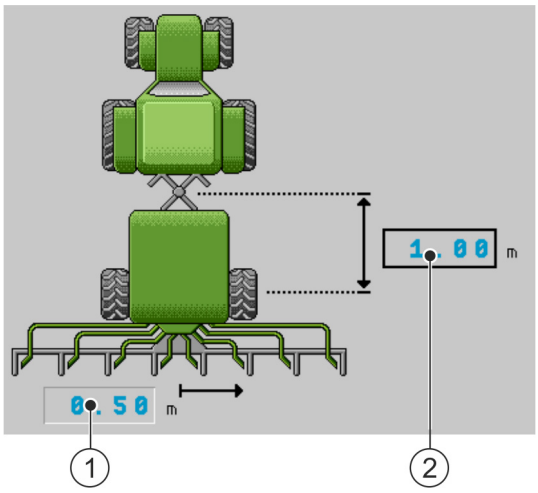
For example, there are the following distances on a trailed machine with one connector:

Distances for a boom



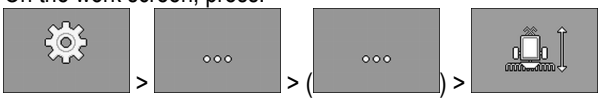
1	Offset Y Distance from the centre point of the implement axle to the centre point of the coulter bar. Positive value: Centre point of the coulter bar is to the right of the centre point of the axle. Negative value: Centre point of the coulter bar is to the left of the centre point of the axle.
2	Offset 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 X Distance from the machine axle to the connector on the tractor. For mounted machines, “0.00” must always be entered. Positive value: Connector on the tractor is in front of the machine axle. Negative value: Connector on the tractor is behind the machine 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 [→ 36]
Impulse-transmitting speed sensor mounted on the implement	Calibrating the speed sensor with the 100m method [→ 36]

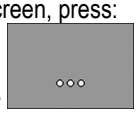
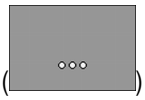
Source	To configure the speed source
Simulated speed	Entering the simulated speed [→ 37]

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

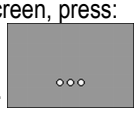
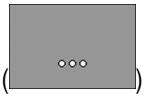
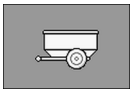
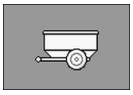
When calibrating the speed sensor with the 100m method, you determine the number of impulses received by the speed sensor in a distance of 100m. When you know the amount of impulses, the job computer can calculate the current speed.

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.

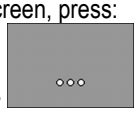
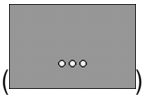
CAUTION

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.

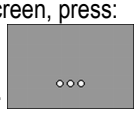
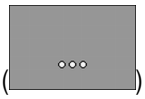
⇨ The desired speed will be simulated.

⇨ 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

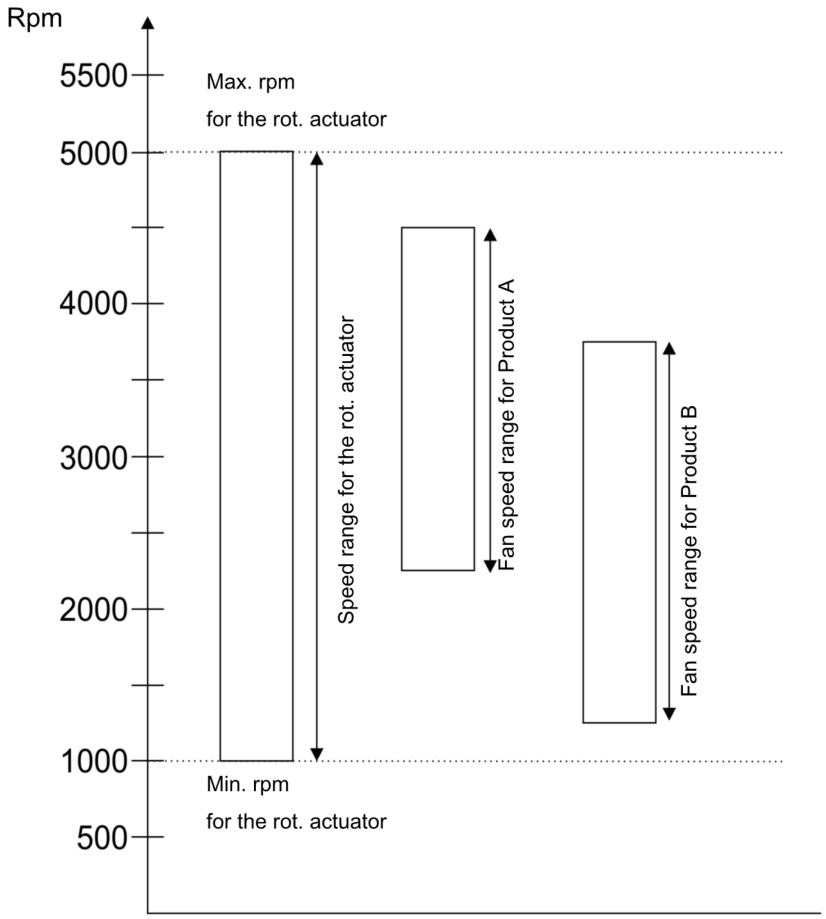
Enter the gear ratio between the metering unit and the product.

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 [→ 39] 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

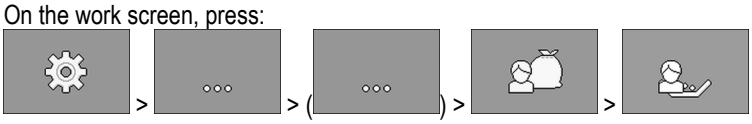
For each product, enter the deviation from the target rate above which an alarm should be triggered.

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

For a precision planter, enter the number of seeds spread per revolution of the metering wheel.

7.4.2 "Working Speed" parameter

Shows the value that was set during the calibration test.

7.4.3 "Target Rate" parameter

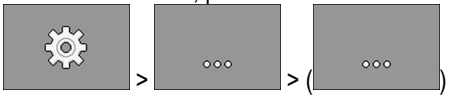
Shows the value that was set during the calibration test.

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.

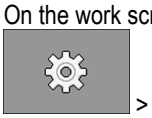
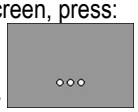
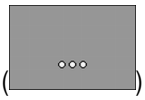
2. Configure the parameters.

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.
- "**No**"
  Per default, the job computer is always in work position.
  In this case, the job computer does not receive external information about the work position.

Procedure

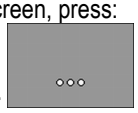
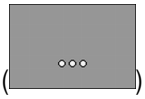
1. On the work screen, press:
    >  > ()
   ⇨ The "**Settings**" screen appears.
2. Configure the "**Work Position**" parameter.

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.

7.8 Grouping the sections

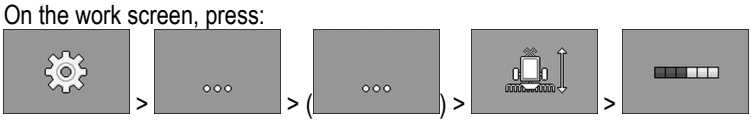
If you are working with more sections than can be processed by the terminal, you must group the sections together. Each section group will be then considered as one section.

When grouping the sections, the following must be considered:

- You can only group sections if they are assigned to a metering unit.
- The groups will not be saved. When the job computer has been restarted, the sections are no longer grouped.

- You may only start the TASK-Controller after the sections have been grouped, so that the implement description is correctly configured and SECTION-Control can work with the grouped sections.

Procedure

1. On the work screen, press:

   ⇨ The "**Section Grouping**" screen appears.
2. Move the cursor between the section that you want to group together.
3.  - Confirm.
4. Repeat this procedure for the desired sections.
   ⇨ In the bottom area of the screen, you can see the maximum number of section groups that can be created and how many section groups are currently assigned.

⇨ You have successfully grouped the sections.

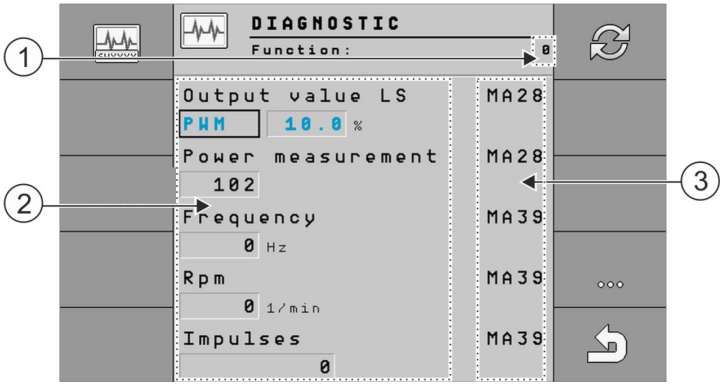
8 Troubleshooting

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		

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.
  - "**+/-**"

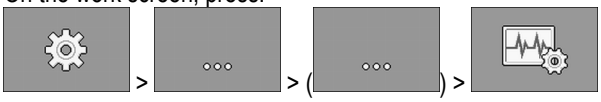
    The linear actuator is moving in one direction. The direction in which the linear actuator is moving depends on the respective connection.
  - "**-/+**"

    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.

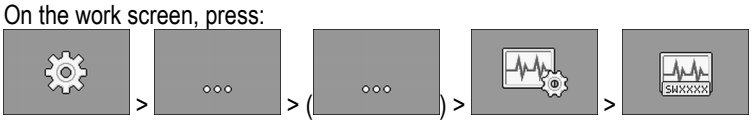
⇨ On the screen, you can see the measured values and possible settings for the individual functions.

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.

8.2 Alarm messages

8.2.1 ISO alarms

Alarm message overview

ID	Alarm text	Possible cause	Possible solution
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	There are several terminals with the	Change the number (function instance)

ID	Alarm text	Possible cause	Possible solution
	number.	same number on the ISOBUS (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.
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	Database is full.	The database is full.	You must first delete a dataset to be able to save a new one.
060	Entry cannot be adopted. Value has been corrected.	The boom width cannot be divided by the assigned sections.	Check the boom width and the number of sections.

8.2.2 Hydraulic alarms

Alarm message overview

ID	Alarm text	Possible cause	Possible solution
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	Possible solution
400	The configured target rotational speed for the fan is invalid. Product: xxxx.	The set target rotational speed is outside of the defined limits of the fan drive for the respective product.	Change the minimum and maximum limit for the target rotational speed of the product.
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.
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 machine.	The machine is not in work position.	Raise the machine.
406	The metering unit has been stopped because the machine has not been completely raised. Raise the machine.	The machine has not been completely raised.	Raise the machine.
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.
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.

ID	Alarm text	Possible cause	Possible solution
413	Application has been stopped because the forward speed was too high.	The forward speed is too high.	Reduce the driving speed.
414	The metering unit has been stopped because the machine has not been completely raised. Raise the machine.	The machine has not been completely raised.	Raise the machine.
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.
417	Calibration flap is open. Please close it.	The calibration flap is open although the seeder is currently spreading.	Close the calibration flap.
418	Calibration flap is closed. Please open it.	The calibration flap is closed although a calibration test is currently being performed.	Open the calibration flap.

8.2.4 Machine-specific alarms

Alarm message overview

ID	Alarm text	Possible cause	Possible solution
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.

ID	Alarm text	Possible cause	Possible solution
609	Seed flow detected.	Seed flow has occurred in a tramline.	Check the tramline control.
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.
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.
622	Calibration button is activated.	The calibration button has been activated before the calibration screen has been called up.	Let go of the calibration button.
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.
636	No seed during pre fill.	No seed or too little seed was detected during pre-metering.	Ensure that enough seed is available.
638	Motor is at standstill.	The MRC motor is at a standstill.	Check the cable.
639	Current too high.	The MRC motor requires too much current.	Check if something is stuck.
640	Rot. speed not reached.	The MRC module has not reached the required rotational speed.	Check the cable. Check the seeding units.
641	Power voltage too low.	The power voltage on the MRC module is too low.	Check the cable.
642	Electronic voltage too low.	The electronic voltage on the MRC module is too low.	Check the cable.

ID	Alarm text	Possible cause	Possible solution
643	Sensor voltage too low.	The sensor voltage on the MRC module is too low.	Check the cable.
650	Connection lost.	The connection to the AIRidium® sensor has been disconnected.	Check the cable.
651	Undefined Module Index.	An error has occurred on the AIRidium® module.	You must contact Customer Service.
660	Connection lost.	The connection to the CAN repeater has been disconnected.	Check the cable.
663	Voltage is too low.	The voltage is lower than the pre-set minimum supply voltage.	Check the cable and the power supply.
664	Error detected in PLANTirium® sensor. Degree of conta. too high.	The sensor is soiled. The sensitivity does not match the selected product.	Clean the sensor and/or change the sensitivity in the product.
665	Error detected in PLANTirium® sensor. Sensor transmit. defective.	The sensor transmitter is defective.	Check the cable on the sensor.
666	Error detected in PLANTirium® sensor. Supply voltage undercut.	The minimum supply voltage has been undercut.	Check the cable.
667	Error detected in PLANTirium® sensor. LIN bus communication error	A LIN bus communication error has occurred. The sensor does not receive messages from the LIN bus.	Check the cable.
668	Working speed is outside the speed range..	The working speed is too high or too low.	Make sure that you are in the speed range that was determined during calibration.
669	Error detected in PLANTirium® sensor. Connection lost.	The connection to the PLANTirium® sensor has been disconnected.	Check the cable on the sensor.
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.
680	Connection lost.	The connection to the monitoring/control module has been disconnected.	Check the cable.
681	Undefined Module Index.	A non-configured monitoring/control module has been found.	Check the number of configured or connected modules.
686	Supply voltage is too low.	The supply voltage on the	Check the cable.

ID	Alarm text	Possible cause	Possible solution
		monitoring/control module is too low.	
688	Target rate is out of reach. Coulter pressure	The required target rate for the linear actuator has not been reached.	Check the linear actuator for blockage.
689	Target rate is out of reach. Working depth	The required setpoint for the linear actuator has not been reached.	Check the linear actuator for blockage.
690	Error detected in CAN repeater. 5 V - Voltage faulty.	The CAN repeater is faulty.	You must contact Customer Service.
691	Error detected in CAN repeater. 3.3 V - Voltage faulty.	The CAN repeater is faulty.	You must contact Customer Service.
692	Error detected in CAN repeater. 2.5 V - Voltage faulty.	The CAN repeater is faulty.	You must contact Customer Service.
693	Error detected in CAN repeater 12 VE - Voltage faulty.	The electronic voltage source is faulty.	Check the cable.
694	Error detected in CAN repeater. 12 VL - Voltage faulty.	The power voltage source is faulty.	Check the cable.
695	Error detected in CAN repeater. Error in AD conversion.	The CAN repeater is faulty.	You must contact Customer Service.
696	Error detected in CAN repeater. Error in address assignment.	An error was detected during the address teach-in procedure.	Check the cable.
697	Error detected in CAN repeater. Error in the parameter block.	The CAN repeater is faulty.	You must contact Customer Service.
698	Transmission of the log file has started. Message, when finished.		
699	Transmission of the log file completed.		

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.

ID	Meaning
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

1. 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 16 MB; SDRAM 16 MB; FRAM 16 kByte
Connections:	▪ 42-pin connector for connecting actuators/sensors ▪ 2x 16-pin connector for power supply and CAN (ISOBUS & Salve BUS) The connectors can be locked and equipped with single conductor insulations.
Interfaces:	Up to 3 CAN and 1 LIN, Ethernet via additional card (optional)
Power supply:	12 V electrical system (9-16 V), max. load 30 A
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 … +70 ºC
Housing:	Anodized aluminium continuous cast casing, plastic lid with EPDM seal and pressure compensation element, stainless steel screws
Protection rating:	IP6K6K
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 connector)
Weight:	ca. 1 kg

Additional information:

Minimum input frequency required for control:	5 Hz

9.2 42-pin connector

42-pin connector

Outputs	▪ 2x Trigger output (Lowside up to 25 mA) ▪ 14x High- and/or Lowside 4 A* (Highsides are PWM capable, thereof max. 6 with current measurement), the maximum PWM frequency of the 4 A outputs is 500 Hz ▪ 2x Highside 4 A* ▪ 1x Highside for sensor supply up to 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:	up to 23 universal inputs in total, configurable as ▪ 17x Analog 0 – 5 V ▪ 23x 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

The values are based on Tu = 25°C. At higher temperatures the load capacity is reduced. Subject to change.

9.3 Available languages

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

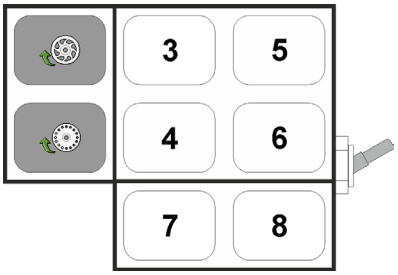
Software version	Added languages
02.00.00	BG, CS, DA, DE, EL, EN, ES, ET, FI, FR, HR, HU, IT, LT, LV, NL, NO, PL, PT, RO, RU, SK, SL, SR, SV, TR, UK

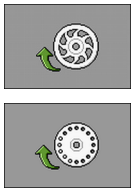
9.4 Joystick button configuration

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.

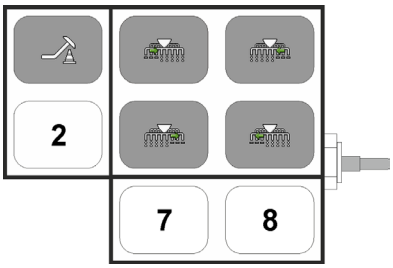


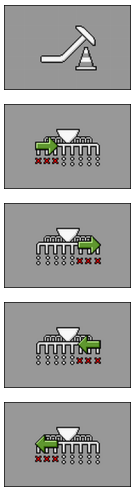


For a seeder, fills the metering cells with seed.

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.

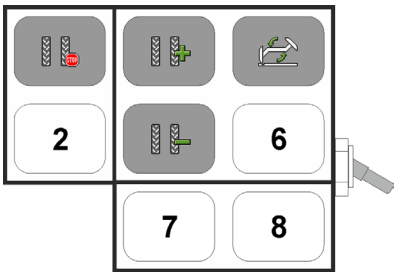
Switches off from left to right.

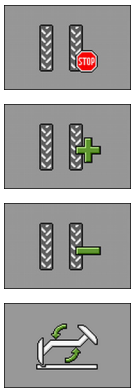
Switches on from left to right.

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.

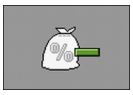
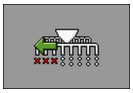
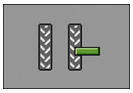
Buttons 2 and 6-8 are not assigned.

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.

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.