OPERATING INSTRUCTIONS

Field-IQ ISOBUS

HOEING-CONTROLLER MIDI 3.0

PTx Trimble

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Legal Notices

Agriculture Business Area

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1

For Your Safety

- Basic Safety Instructions
- Intended Use
- Layout and Meaning of Warnings
- User Requirements
- Safety Stickers on the Product
- Disposal
- EU Declaration of Conformity

Basic Safety Instructions

Operation

- Be sure to always comply with the following instructions during operation:
- 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 ECU.
- Carefully read and follow all safety instructions in this manual and in the machine’s manual.
- Observe all applicable regulations on accident prevention.
- Follow all recognized safety, industrial and medical rules as well as all road traffic laws.

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 product.
- Before performing any welding on the tractor or the implement, always disconnect the power supply to the ECU.
- The ECU and the cabling must not be repaired. Unauthorised attempts at repairs can fail and cause hazardous malfunctions.
- Use only original accessories as spare parts.

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 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.

Layout and Meaning of Warnings

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

DANGER!

THIS SIGNAL WORD IDENTIFIES HAZARDS THAT COULD POTENTIALLY CAUSE DAMAGE TO PROPERTY, IF NOT AVOIDED.

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.

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.

User Requirements

- Learn to operate the product in accordance with the instructions. Nobody must operate the product before reading these instructions.
- Read and carefully observe all safety instructions and warnings contained in these Operating Instructions and in the manuals of any connected vehicles and farm equipment.
- If there is anything within these instructions that you do not understand, please do not hesitate to contact us or your dealer. PTx Trimble's Customer Services department will be happy to assist you.

Safety Stickers on the Product



Do not clean with a high-pressure cleaner.

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.

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 ECU

Harmonized standards applied: EN ISO 14982:2009 (EMC Directive 2014/30/EU)

In conformity with further EU directives: Directive 2011/65/EU (RoHS 2)

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About These Instructions

- Target Group of These Operating Instructions
- Diagrams in this Manual
- Directional Information in These Instructions

Target Group of These Operating Instructions

These operating instructions are intended for operators of hoeing machines that are equipped with the HOEING-Controller MIDI 3.0 system with the standard configuration.

The instructions will show you:

- The meaning of the icons on the screen;
- Where to find the settings that are relevant for a function in the application;
- How to configure the application;
- How to calibrate components that need to be calibrated.

The instructions do not explain how to operate the hoeing machine. It is not a substitute for the hoeing machine manufacturer's instruction manual.

Diagrams in this Manual

The screenshots of the software interface are intended to serve as a reference. They help you in finding your way around the software screens.

The information shown on the screen depends on various factors:

- the implement type,
- the implement configuration,
- the implement status.

Possible differences:

- The implement has different colors on the terminal than in the instructions.
- Different background color.
- The icons described in the instructions appear in a different position on the screen.
- Some of the described functions are not available in the system.

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.

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About the ECU

- ECU Functions
- System Overview
- Rating Plate

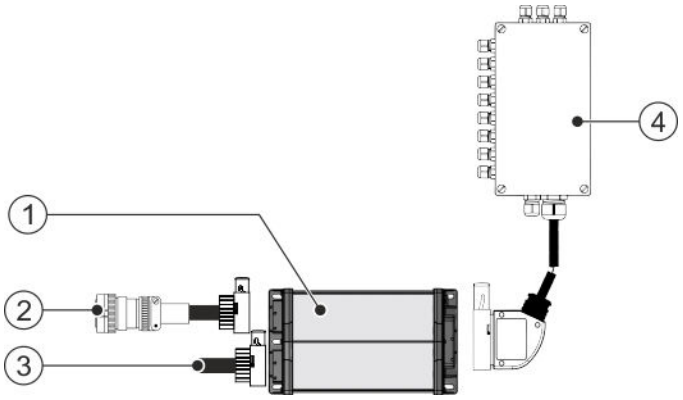
ECU Functions

The HOEING-Controller MIDI 3.0 ECU is an ISOBUS ECU that can control the operation of hoeing machines.

The ISOBUS ECU is the control central of the hoeing machine. Several sensors are connected to the ECU, which monitor important implement parts. The ECU 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 ECU and is therefore maintained even when changing the terminal.

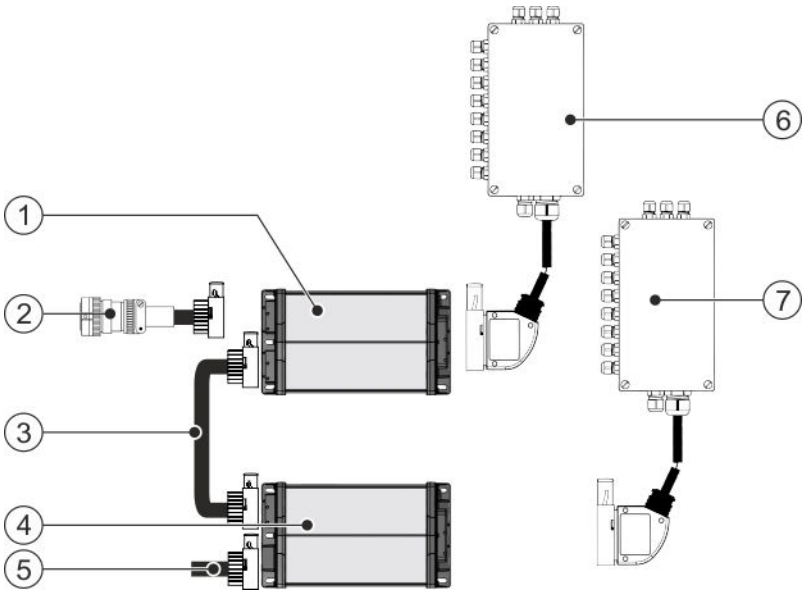
System Overview

The system consists of one or several ECUs that are mounted on the hoeing machine and control the operation.



Small system with one ECU

Item	Description
1	Primary ECU-MIDI ECU
2	ISOBUS cable
3	CAN termination
4	Junction box



Large system with two ECUs

Item	Description
1	Primary ECU-MIDI ECU
2	ISOBUS cable
3	Connector cable between the ECUs
4	Secondary ECU-MIDI ECU
5	CAN termination
6	Primary junction box
7	Secondary junction box

Each ECU is responsible for controlling selected functions of the hoeing machine and receives signals from selected sensors. For systems with two or more ECUs, each uses identical ECUs and junction boxes.

Rating Plate

Abbreviations on the Rating Plate

Abbreviation	Meaning
SW	Software version upon delivery
HW	Hardware version
DC	Operating voltage The device may only be connected to voltages within this range.
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.
S/N	Serial number

Symbols on the Rating Plate

Symbol	Meaning
CE	The concept and design of the product as well as the model we put on the market comply with the applicable legal provisions of the EU.
EAC	The concept and design of the product as well as the model we put on the market comply with the applicable legal provisions of the EAWU.
UKCA	The concept and design of the product as well as the model we put on the market comply with the applicable legal provisions of the United Kingdom.

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Installation

- Installing the ECU
- Connecting the ECU to the ISOBUS
- Installing the Junction Box

Installing the ECU

Instructions for Safe Installation

To prevent damage to the system components, consider the following during installation:

- Install the ECU where it is protected from dirt. You therefore avoid unintentional cleaning of the ECU by the implement operator using a high-pressure cleaner.
- In the installed position, the connectors and the pressure compensation membrane must be facing to the side.
- Fasten the ECU with four fixing bolts and a flat washer (lock washers can cause cracks in the plastic on the long term) on a conducting spot on the implement chassis. In case of improper installation, the ESD discharges can cause malfunctions.
- All of the sockets and connectors that are not used must be protected from dust and water using suitable dummy connectors.
- All of the connectors must be tightly sealed. This makes them waterproof.
- The connection cable must be mechanically supported in the area of the installation site (distance < 150 mm) so that an in-phase stimulation takes place.
- Do not use the system if some of its parts are damaged. Damaged parts can cause malfunctions and lead to injuries. Replace damaged components.
- Only use original components.

Connecting the AMP Connectors

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.



Separating the AMP Connectors

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.

Connecting the ECU to the ISOBUS

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

To connect the ECU to the ISOBUS:

1. Take the ISOBUS cable from the ECU.
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 PTx Trimble, 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.



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.

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 sensor connection cable for each sensor. You must insert the sensor connection 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.

> **CAUTION – 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.

Before you begin, make sure:

- 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.

   > **CAUTION – Pay attention to the proper polarity of the cable cores and the terminals.**
4. 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.

5. Close the screw connections of the junction box.

   After screwing them shut, the glands should be sealed.

6. Close unused openings in the casing of the junction box with blind caps.

Inserting the Cable Core into a Terminal

Each terminal consists of two openings:

- The upper opening or the orange opening point of the terminal opens the lower opening.
- The bottom opening of the terminal serves to insert and clamp one cable core.

Before you begin, make sure:

- 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 PTx Trimble.
- 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.

Connecting the Junction Box to the ECU

1. Connect the AMP connector of the junction box onto the proper ECU.

5

Basic Control Principles

- Switching On the ECU
- Layout of the Work Screen
- Function Icons on the Work Screen
- Displaying the Hoeing Frame
- Icons Beside the Implement Image
- Control Units

Switching On the ECU

WARNING – Risk of injury from moving machine parts

Movement of the machine may seriously injure persons or damage property.

Before activating the ECU:

Make sure that no one is close to moving machine parts.

1. Connect the ISOBUS cable of the ECU to the ISOBUS connector on the tractor.
2. Start the ISOBUS terminal.

   The ECU is started together with the terminal.

   When starting up for the first time, the ECU initially has to transmit lots of information to the terminal. This can take a few minutes.

   When all of the data from the ECU app has been loaded, the icon for the app appears on the terminal:

3. Open the ECU app. Follow the instructions for the ISOBUS terminal.

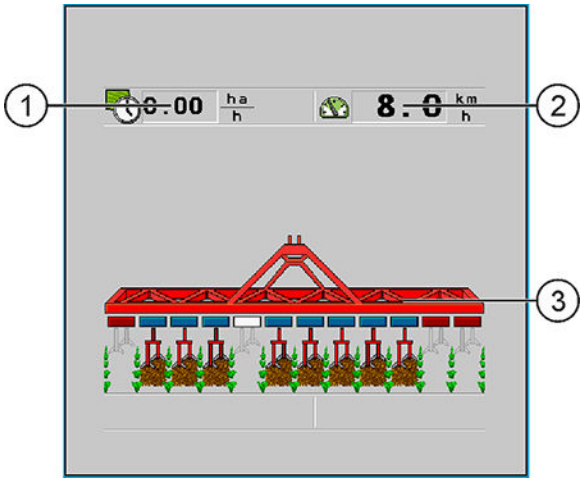
   The work screen of the ECU appears.

Layout of the Work Screen

The work screen is always shown during work and informs you of the status of the hoeing machine.

The work screen is divided into several areas. In each area, information on specific topics may appear.

When configuring the ECU, the areas can be changed for a hoeing machine model from a specific manufacturer. For this reason, the following graphs only show the standard version of the overview.



Areas on the work screen

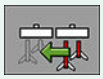
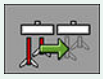
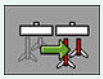
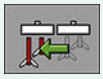
Item	Description
1	Display of the area output per hour
2	Display of the hoeing frame
3	Display of the speed

You can read about the information that appears in these areas in the following sections.

Function Icons on the Work Screen

Function icons appear beside the work screen, which perform functions when they are tapped. Their position and operation depend on the type of ISOBUS terminal.

In the table below, you can see the meaning of the function icons on the work screen.

Icon	Function
	Starts and stops hoeing operation.
	Lowers the sections with hoeing elements from right to left.
	Lowers the sections with hoeing elements from left to right.
	Raises the sections with hoeing elements from left to right.
	Raises the sections with hoeing elements from right to left.
	Opens the “Results” screen.
	Opens the “Parameters” screen.
	Switches between road and working mode.
	Opens the “Folding” screen.
	Opens the screen with the additional functions.
	Reduces the Down pressure.
	Increases the Down pressure.

Icon	Function
	Activates or deactivates the automatic Down pressure regulation.
	Activates additional function A.
	Activates additional function B.
	Activates additional function C.
	Activates additional function D.
	Increases the Tines pressure.
	Reduces the Tines pressure.
	Increases the Tines angle.
	Reduces the Tines angle.

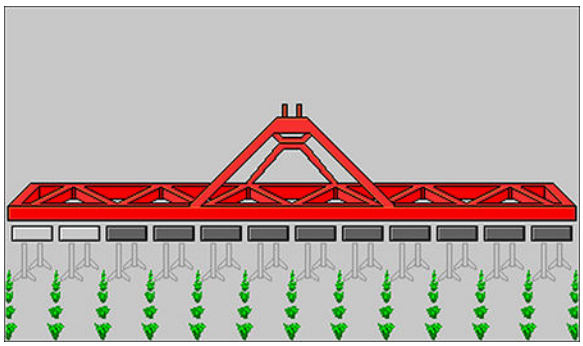
Displaying the Hoeing Frame

In the hoeing frame display, you can find the following information:

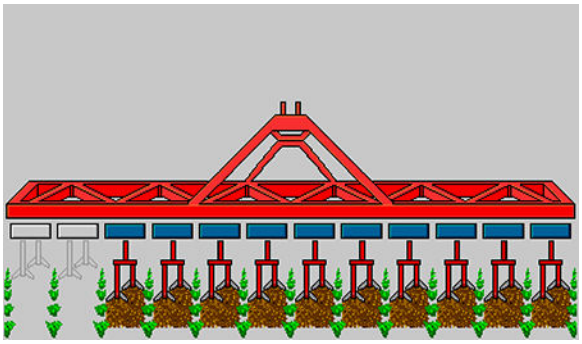
- Number of sections with the respective hoeing elements
- Which sections with the respective hoeing elements are pre-selected or switched off
- Which sections with the respective hoeing elements are lifted or lowered

The following diagrams show how the hoeing elements in the display of the hoeing frame may look.

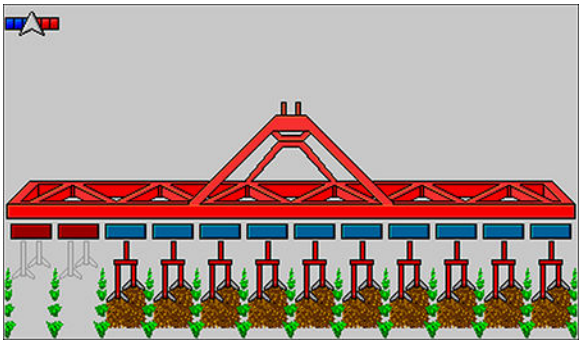
Each rectangle corresponds to a section. One section can consist of multiple hoeing elements.



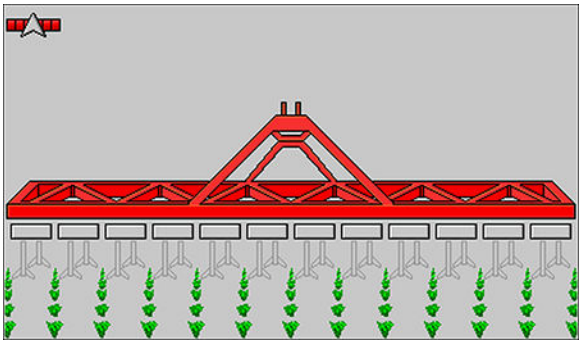
Hoeing elements 1 and 2 are raised and deactivated.



Hoeing elements 1 and 2 are raised. All other hoeing elements are lowered and in operation.

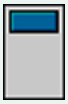


When SECTION-Control is activated, the blue-red SECTION-Control icon also appears.



When SECTION-Control is not possible, this icon is red.

Statuses of the Hoeing Elements

Status	Description
	Hoeing element is deactivated and lifted by manual switching off of the sections.
	Hoeing element is deactivated and lifted by the main switch.
	Hoeing element is activated and lowered.

Status	Description
	Hoeing element is activated and lifted by SECTION-Control.
	Hoeing element is permanently deactivated.
	Section is deactivated and lifted by the folding sensor or transport sensor.

When the hoeing elements are automatically switched using SECTION-Control, you have to ensure that the hoeing elements are not deactivated using an S-Box or a joystick. In this case, the hoeing element would be marked with a red cross and remain deactivated.

Statuses of the Hoeing Elements with SECTION-Control and with S-Box

Status	Status defined by SECTION-Control	Status via S-Box or joystick
	Lowered hoeing element	Raised hoeing element
	Raised hoeing element	Raised hoeing element

Icons Beside the Implement Image

Icon	Description
	Sections are switched via SECTION-Control.
	The SECTION-Control application has closed all sections. Examples for the cause: • The hoeing machine is outside of the field boundary or in an area that has already been worked • Hoeing machine on the headland Other causes are also possible.
	Beacon is switched on.
	The working lights are switched on. If a second working light is used, it is shown by a number.

Icon	Description
	Road mode is activated.
	Additional function A is switched on.
	Additional function B is switched on.
	Additional function C is switched on.
	Additional function D is switched on.
 	The first number displays the current pressure or weight based on the analog Down pressure sensor. The second number displays the target pressure or weight for the automatic Down pressure functionality. In case the icon with the “MANU” is shown, the Down pressure functionality works in manual mode. Icon displays the current PWM output percentage value for the Down pressure functionality.
	Displays the current percentage tines pressure value based on the analog tines pressure sensor.
	Displays the current percentage tines angle value based on the analog tines angle sensor.

Control Units

The following options are available for operating the ECU:

- Using the function buttons on the screen
- Using AUX-N operating devices
- Using the PTx Trimble joystick
- Using the PTx Trimble S-Box
- Using an external keypad

You can find more information on the configuration and operation in the following sections:

- Configuring the control units
- Operating the PTx Trimble joystick
- Viewing the assignment of the joystick
- Preview mode for the PTx Trimble Joystick

6

Operating the ECU on the Field

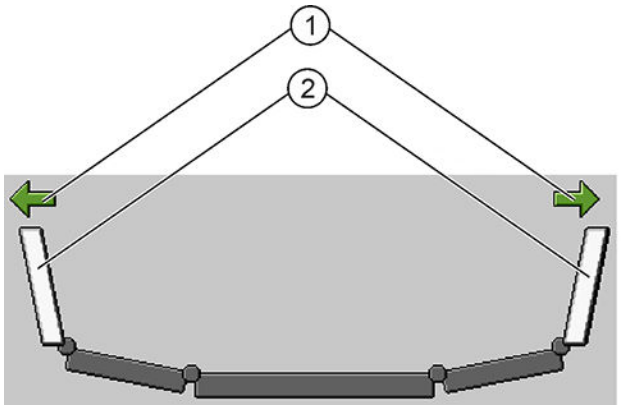
- Folding and Unfolding the Hoeing Frame
- Folding and Unfolding Security
- Starting the Hoeing Operation
- Stopping the Hoeing Operation
- Operating the Sections
- Documenting Work Results
- Operating the PTx Trimble Joystick
- Using the ISB Shortcut Button

Folding and Unfolding the Hoeing Frame

This function folds and unfolds the hoeing frame of the hoeing machine.

To reach the screen with this function:





Representation of the hoeing frame on the "Folding" screen based on the example of a classic hoeing frame

Item	Description
1	Icon: Part of the hoeing frame will be folded or unfolded The arrows appear for folding parts of the hoeing frame and indicate the direction of movement
2	Folding parts of the hoeing frame

To fold or unfold the individual parts of the hoeing frame, use the function icons on the "Folding" screen. Different function icons are shown depending on the hoeing frame. The part of the hoeing frame that is folded or unfolded by each function icon is always shown by the color and the arrows on the respective function icon.

Folding and Unfolding Security

The various folding functions can be equipped with a security mechanism that blocks the execution of the function. Depending on the configuration of the machine, the folding functions can be executed if the following conditions are true:

- The work is stopped.
- The application is in road mode.

Starting the Hoeing Operation

Before you begin, make sure:

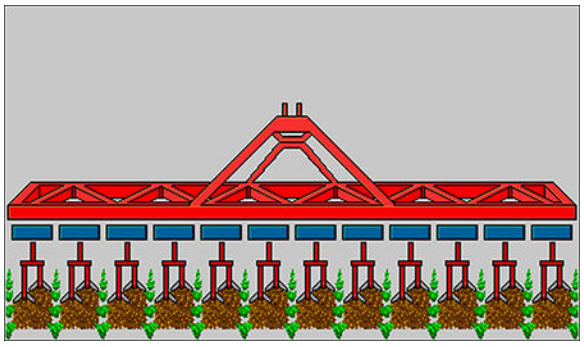
- The tractor with the hoeing machine is on the field.
- You have configured the ECU.
- You have unfolded the hoeing frame.
- The speed must be higher than the “Hoeing off Below” parameter.

To start hoeing:

1. Ensure all the conditions are met.
2.  - Start hoeing operation.

   The hoeing machine start hoeing.

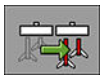
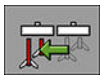
   The icons under the hoeing frame change:

   You have started hoeing operation.

Stopping the Hoeing Operation

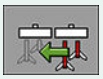
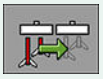
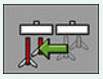
You can stop hoeing in the following ways:

1.  - Stop hoeing immediately.
2.  or  - Raise the hoeing elements consecutively.

Operating the Sections

To operate this function the user needs the PTx Trimble joystick first of all.

Use the following function keys to operate the function:

Icon	Description
	Lowers the sections with hoeing elements from right to left.
	Lowers the sections with hoeing elements from left to right.
	Raises the sections with hoeing elements from left to right.
	Raises the sections with hoeing elements from right to left.

Documenting Work Results

You can document your work in the “Counters” screen.

On the “Results” screen, there are two types of counters:

- Trip counter – documents the work until it is deleted.
- Total counter – documents the work since initial start-up.

You can find various information on the “Results” screen. Depending on the configuration and equipment of the implement, different work results can appear.

- **Work time** – Duration of the application.
- **Distance** – Distance driven during the application.
- **Area** – Applied area.

To reach the screen with this function:



Use the following function keys to operate the function:

Icon	Description
	Resets the “Area” counter.
	Resets the “Distance” counter.
	Resets the “Work time” counter.
	Pressed briefly: Continue to the total counters Pressed long: Back to the work screen
	Clears the contents of the displayed trip counter.

Icon	Description
	Stops the trip counter. • The documentation of the work will be stopped until the terminal is restarted or the function button is pressed again. • The icon is flashing on the work screen: 
	Next trip counter. (Optional function)
	Activates the trip counter. (Optional function)
	Previous trip counter. (Optional function)

Operating the PTx Trimble Joystick

With the PTx Trimble joystick, you can activate and deactivate the hoeing machine functions.

Three functions are assigned to each button. The position of the side switch determines the function that is executed when a button is pressed.

Position of the switch	Color of the LED
	Red
	Yellow
	Green

Before you begin, make sure the work screen is called up.

To operate the PTx Trimble joystick:

1. Move the side switch into the desired position and hold.

   The LED on the PTx Trimble joystick lights up in the corresponding colour.
2. Press button with the desired function.

   The function is executed.

Preview Mode for the PTx Trimble Joystick

The preview mode of the joystick can only be used when your joystick works with the AUX1 auxiliary protocol.

When pressing the button for the first time, the preview mode shows the button assignment on the screen. This makes it easier for beginners to activate the right function. As a standard, preview mode is deactivated on new ECUs.

When you press a joystick button for the first time after starting, no function will be executed. The button assignment of the joystick appears on the screen instead. The display remains until the time set in the configuration has expired.

If you press a joystick button during the display, its function will be executed. (Assignment remains on the screen until the time expires).

From now on, you can operate the joystick without the help display appearing.

The help display only appears again of you press a button and simultaneously move the rocker switch on the side to a different position.

To activate the preview mode:

1. Switch to the “AUX controls” screen:

    > >

2. For the “PTx Trimble Joystick” parameter, set the value to “PTx Trimble Joystick”.

   The “Joystick assistant” parameter appears.

3. Set the check mark for the parameter.
4. If necessary, change the display time.

Viewing the Assignment of the Joystick

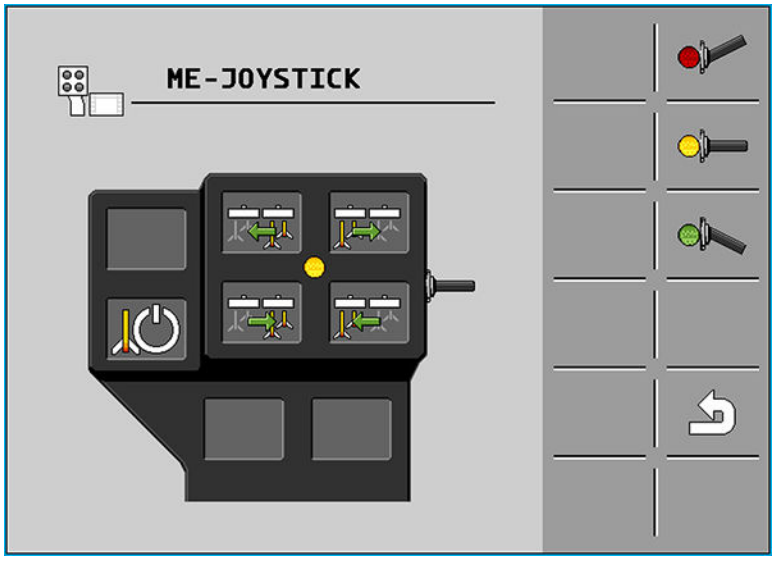
The assignment of the joystick can only be viewed when your joystick works with the AUX1 auxiliary protocol.

To display the button assignment on the screen:

Before you begin, make sure the PTx Trimble Joystick is configured.

1.  - Press.

   The button assignment appears:



2. You can also activate the Preview mode.

Using the ISB Shortcut Button

If you are using your terminal with an ISB short-cut button, you can use it to directly terminate various functions of the implement, depending on the configuration.

The following functions can be configured:

- Hoeing machine

  All of the hoeing machine functions are stopped.

7

Configuring the ECU

- Entering the Hoeing Machine Parameters
- Configuring the Control Units
- Configuring the ISO Settings
- Selecting and Configuring the Speed Sensor
- Configuring Segments
- Entering the Hoeing Machine Geometry
- Configuring the Pressure Regulation
- Configuring the ECU as a Sprayer in the Task Controller
- Configuring the Units
- Assigning the Joystick Buttons
- Configuring the Tine Sensors

Entering the Hoeing Machine Parameters

To change the value of the parameter:

1. Switch to the “Parameters” screen:

   The “Parameters” screen appears.
2. Select the field under the "Hoeing off Below" parameter.

   The data input screen appears.
3. Enter the desired value.

   The new value appears on the “Parameters” screen.

The parameters appearing on your screen depend on the type and configuration of your hoeing machine.

Parameter	Description
Hoeing off below	(Minimum working speed) If the hoeing machine falls below the minimum working speed, the following happens: • The hoeing operation will be switched off automatically. • An icon appears on the work screen. When the value is set to 0, this function is deactivated.
Ground pressure target rate	Target rate for the ground pressure.

Configuring the Control Units

The joystick and S-Box control units are configured on a screen.

1. Switch to the “Parameters” screen:

   The “AUX controls” screen appears.
2. Configure parameter.

Selecting and Configuring the Speed Sensor

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

The configuration procedure can differ depending on the speed source.

Parameter	Description
Wheel Impulses	Number of impulses the wheel sensor sends to the ECU on a 100m distance. Used to calculate the speed. The number is determined by the wheel sensor calibration.

Selecting the Speed Source

Supported speed sources:

- "Sensor" – Sensors that are installed on the implement and connected to the ECU:
  - Examples: Wheel sensor, radar sensor, impulse-transmitting GPS speed sensor
  - Configuration: Configure the number of impulses per 100 meters.
- "ISOBUS" – Sensors that are installed on the tractor and whose signal is received through the ISOBUS.
  - Examples: GPS receiver, wheel sensor on the tractor, signal socket
  - Configuration: For systems without option of selecting the sensor input, the "Wheel impulses" parameter must be set to 0.
- "Auto" – Some systems enable automatic detection of the speed source.
  - Mode of operation: If a speed signal is detected on the ISOBUS, this speed will be used as a basis. In the case of signal failure, the ECU will take the impulses from the sensor connected to the ECU as a basis for determining the speed.
  - Configuration: For systems that have two sensor types, it is recommended to calibrate the sensor that is connected to the ECU. In other cases, set the "Wheel Impulses" parameter to 0.

To configure the speed source:

1. On the work screen, press the following keys successively:

   The "Speed" screen appears.
2. Configure the "Speed source" parameter.

If the "Speed source" parameter does not appear on the "Speed" screen, and the speed signal should be received through the ISOBUS, proceed as follows:

Before you begin, make sure the speed signal can be received through the ISOBUS.

1. Switch to the "PARAMETERS" screen:

   
2. Set the "Wheel impulses" parameter to "0".

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 ECU can calculate the current speed.

If you know the number of impulses for the wheel sensor, you can also enter this number manually.

You can enter different pulse values for up to three different wheels.

Before you begin, make sure:

- The wheel sensor, radar sensor or GPS speed sensor is installed on the implement.
- A distance of 100m has been measured and marked. The distance must correspond to the field conditions. It should therefore lead over a meadow or a field.
- The tractor with connected implement is ready for a 100m drive and is at the start of the marked distance.

1. Ensure that all prerequisites have been fulfilled.
2. Switch to the “CALIBRATION – wheel impulses” screen:

    > >
3.  - Start calibration.

   The following function icons appear:

    - Stop calibration.

    - Abort calibration.
4. Drive the previously measured 100m distance and stop at the end.

   During the drive, the currently determined impulses are displayed.
5.  - Stop calibration.
6.  - Exit the screen.

   The number of impulses appears on the “Wheel impulses” line

Configuring the Reverse Driving Sensor

The following signal sources are possible:

- “None” - The ECU should not expect a reverse driving signal. Even if a reverse driving signal is transmitted through the ISOBUS, the ECU will ignore the signal.

- “ISOBUS” - The reverse driving signal is sent by the tractor or a different ECU through the ISOBUS.
- “Sensor” - A reverse driving sensor is connected to the junction box or cable harness of the ECU.

To select the reverse signal source:

1. Switch to the “Speed” screen:

    >

2. Select the box below the “Reverse drive sensor” parameter.

   The available signal sources appear. See the description at the beginning of this section.

3. Select the signal source.
4. Restart the ECU.

“Simulated Speed” Function

The simulated speed function is only used during tests and when looking for faults. It simulates the movement of the implement when the implement is at a standstill.

By activating the “Simulated speed” function, it is possible for customer service employees to check the correct functioning of a sensor.

By default, the value is set at 0 km/h and the function is switched off.

After restarting the computer, the function is always deactivated.

The most recently set value is saved and used for the next activation.

1. Switch to the “Speed” screen:

    >

2.  - Activate the simulated speed. By pressing again you can deactivate the function.

   The “Simulated speed” line appears.

3. Enter the speed to be simulated on the “Simulated speed” line.
4.  - Exit the screen.

   The set speed and the flashing  icon appear on the work screen.

Configuring Segments

Configuring the Status of the Sections

You can configure the status for each section.

The following section statuses are possible:

Icon	Description
	The section is permanently activated.
	The section is permanently deactivated and lifted.
	The section is permanently deactivated and lowered.
	The section is removed.

1. Switch to the “Implement data” screen:

   The “Sections” screen appears.
2. Select the tool for which you want to permanently switch off the sections.
3. Press on the icon for the current section status.
4. Select the desired new status.
5.  - Save the changes.
6. Confirm.

Switching Sections Off Permanently

You can permanently switch off any section. This is useful, for example, if the tramlines on the field are designed for a smaller hoeing machine than yours.

Switching off the outer sections has the following effects:

- With TRACK-Leader: The newly calculated working width will not be taken into account for the calculation of the headland width.
- With SECTION-Control: After switching off the outer sections, you will need to change the “Line spacing” parameter so that the distance between the guidance lines matches the actual working width. You cannot change the “Working width” parameter.
- The actual working width changes. However, as the hoeing machine has not changed:
  - Do **not** change the “Working width” parameter.
  - Do **not** change the hoeing machine geometry.

Removing Sections

You can remove each section. This can be useful when the row spacing or the working width changes.

Removing sections has the following effects:

- With TRACK-Leader: The newly calculated working width will be taken into account for calculation of the headland width.
- With SECTION-Control: The “Line spacing” parameter will be automatically adjusted.
- Removed sections will not be actuated.
- Removed sections will no longer be shown in the tool settings.

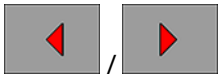
Configuring the Number of Sections and Hoeing Elements

You can configure the number of sections and hoeing elements for up to 10 different tools.

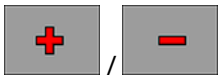
In general, the number of sections and hoeing elements was already adjusted for your implement during the configuration of the ECU. However, an adjustment may be necessary if, for example, the number of hoeing elements that are installed on a section has changed.

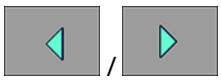
1. Switch to the “Implement data” screen:

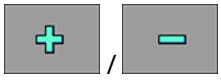
   The “Implement data” screen appears.
2. Select the tool for which you want to make changes.
3. As an option, you can give the tool a new name in the “Name" parameter.
4.  - Select the segment that you want to edit.

   You can see the currently selected segment by the black frame.

   In the “Section number” parameter, you can see the current number and the maximum number of sections.
5.  - Add or remove a section to or from the segment.

   The number in the “Section number” parameter changes.
6. Repeat the procedure for other sections if necessary.
7.  - Select the section that you want to edit.

   You can see the currently selected section by the black frame.

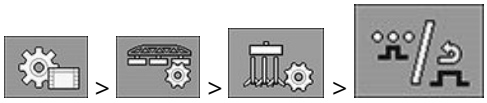
   In the “Hoeing elem. no.” parameter, you can see the current number and the maximum number of hoeing elements.
8.  - Add or remove a hoeing element to or from a section.
9. The number in the “Hoeing elem. no.” parameter changes.

10. Repeat the procedure for other hoeing elements if necessary.
11.  - Save the change.
12. Confirm.
13.  - Exit the screen.
14. Restart the ECU.

Configuring the Spacing of the Hoeing Elements

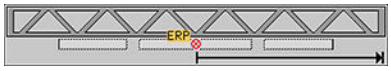
You can configure different spacings for the hoeing elements. The spacings that can be configured depend on the type of hoeing machine.

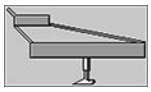
1. To enter the spacing, switch to the “Implement data” screen:

   The “Implement data” screen appears.

   On the screen, you can see all of the dimensions that can be configured for the respective type of hoeing machine.
2. In the “Element” parameter, select whether you want to change the current setting for all hoeing elements or only for  /  one specific hoeing element. All of the hoeing elements can be selected, regardless of the section status.
3. Change the desired dimensions. The following dimensions can be changed:

    - Offset of the implement on the tractor, measured from the outer right end. The removed sections are not shown here.

    /  - Offset of individual hoeing elements related to the value defined in the Geometry [? 35]. For removed section elements, the following icon is shown: 

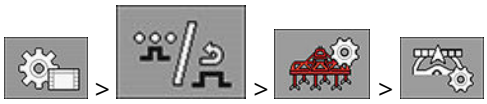
   “Size” - Working width of the respective hoeing element.
4.  - Save the changes.
5. Confirm.
6.  - Exit the screen.
7. Restart the ECU.

System Delay When Switching the Sections

For SECTION-Control to be able to precisely raise and lower the individual sections with the hoeing elements, you must determine how many milliseconds is takes from the time when the hoeing elements are lowered until hoeing operation begins. Afterwards, the ECU will switch the hoeing elements earlier or later accordingly.

Before you begin, make sure you are using the automatic SECTION-Control.

1. Read the operating instructions for the TRACK-Leader app to find out how to determine the delay times.
2. Determine the delay times.
3. Open the ECU application.
4. On the work screen, press:

   The “SECTION-Control” screen appears.
5. Enter the determined delay times under “Delay on start” and “Delay on stop”.

Parameter	Description
Delay on Start	Time required between starting to lower a hoeing element and reaching the working depth. If the implement switches too late, increase the delay. If the implement switches too early, reduce the delay.
Delay on Stop	Time during which hoeing operation still takes place after the hoeing element has been raised. If the implement switches too late, increase the delay. If the implement switches too early, reduce the delay.

Restoring Segments to the Factory Settings

You can reverse all of the changes made to the segments and reset them to the factory settings.

1. Switch to the “Implement data” screen:

   The “Implement data” screen appears.
2.  - Press.
3. Confirm.

   The factory settings are being restored.

Entering the Hoeing Machine Geometry

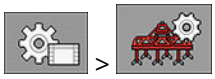
The geometry describes the dimensions of a hoeing machine.

Setting the geometry lets the software know exactly how long and how wide the hoeing machine is and where the individual sections are located.

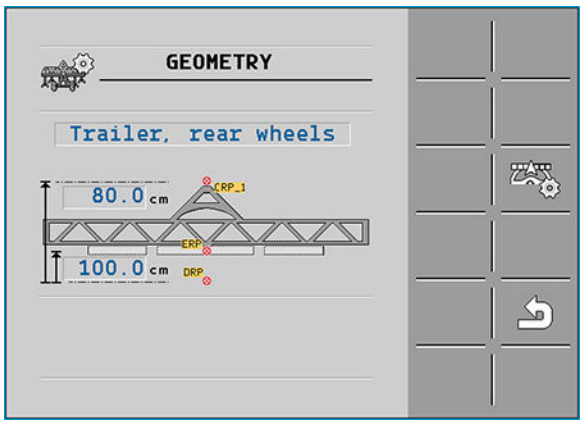
When setting the hoeing machine geometry, you must measure the following distances:

- **CRP** – Attachment point, or point from which the measurements are taken. For self-propelled hoeing machines, it can be the position of the GPS receiver, and for mounted and trailed hoeing machines, the mounting or attachment point.
- **DRP** – Pivot point of the hoeing machine, or point at which there is soil contact.
- **ERP** – Half the working width.

1. Switch to the “Geometry” screen:

   The following screen appears:

2. Select the type of hoeing machine.

   A diagram of the hoeing machine appears.

3. Measure the distances shown in the figure.
4. Enter the distances measured.

   You have configured the geometry of the hoeing machine.

   You can configure additional spacings for the hoeing elements.

Configuring the Pressure Regulation

You can configure different parameters for the pressure regulation.

In addition, depending on the type of pressure regulation used, you can configure different components.

1. Switch to the “Pressure regulation” screen:

    > 

2. Configure the desired parameters.
3. Calibrate the desired components. The following calibrations are possible:

    - Sensor calibration

    - Valve calibration

    - Weight calibration

Parameter	Description
Ground pressure target rate	Target rate for the ground pressure.
Min. target range	Minimum target rate that must be reached. If this value is undercut, an alarm message is displayed.
Max. target range	Maximum target rate that may be reached. If this value is exceeded, an alarm message is displayed.
Target rate unit	Unit that is used to calculate and display the target rate.
Regulation factor 1	Factor that indicates how fast the target pressure should be reached. It is the proportional fraction of the regulator. This regulation factor should be set first. The default value is 1.0.
Regulation factor 2	Factor that indicates how fast the target pressure should be reached. It is the integral fraction of the regulator. This regulation factor should be set second. The default value is 0.4. If the target rate cannot be reached, the setting for this regulation factor is too low. If the setting is too high, it can cause overshooting.

Performing the Sensor Calibration

If you are using a sensor to determine the pressure, you have to calibrate it before initial use.

Before you begin, make sure you have a pressure gauge to measure the hydraulic pressure.

1. Switch to the “Sensor calibration” screen:

    >  > 

2.  - Reduce the pressure until the minimum value is reached.

   The current/voltage determined for the minimum pressure is shown in the “Measured current/voltage” parameter.

3. Read the current pressure.
4. Enter the current pressure in the “Pressure for min.” parameter.
5. 

- Save the determined minimum pressure.
6.  - Increase the pressure until the maximum value is reached.

   The current/voltage determined for the maximum pressure is shown in the “Measured current/voltage” parameter.
7. Read the current pressure.
8. Enter the current pressure in the “Pressure for max.” parameter.
9. 

- Save the determined maximum pressure.
10. You have calibrated the sensor.

Performing the Valve Calibration

To improve the regulation, you can use the valve calibration to store different values that compare the opening of the PWM valve to the respective pressure.

To do so, you must calibrate the PWM valve.

1. Switch to the “Valve calibration” screen:

    > >
2. 

- Start the calibration.

   During the automatic calibration, first the maximum PWM at which the pressure no longer increases is determined.

   Second, the minimum PWM at which the pressure no longer drops is determined.

   Third, a total of five intermediate values are determined.
3. Wait until the automatic valve calibration is complete.
4.  /  - Optionally, you can also enter the values manually.

Performing the Weight Calibration

If you are working with the current weight, you must perform a weight calibration before initial use. This calibration is optional, if you are not working with the “pressure” units.

To determine the pressure using the weight, the ground pressure of a hoeing element on the ground is measured.

Before you begin, make sure you have a scale to read the weight on the implement.

1. Switch to the “Weight calibration” screen:

    > >

2.  - Reduce the weight until the minimum value is reached.
3. Read the current weight.
4. Enter the current weight in the “Weight for min.” parameter.
5. 

- Save the determined minimum weight.
6.  - Increase the weight until the maximum value is reached.
7. Read the current weight.
8. Enter the current weight in the “Weight for max.” parameter.
9. 

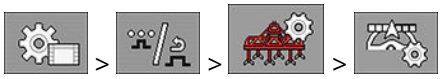
- Save the determined maximum pressure.

   You have calibrated the sensor.

Configuring the ECU as a Sprayer in the Task Controller

On some terminals, it is possible that the TASK-Controller is not capable of controlling soil tillage implements. In this case, you must change the basic configuration so that you can work normally with the ECU.

1. Switch to the “SECTION-Control” screen:

   The “SECTION-Control” screen appears.

2.  - Select whether you want to configure the hoeing machine as a  soil tillage implement (standard) or as a  sprayer.

   The selection on the screen changes.

3.  - Exit the screen.

4. Restart the ECU when you are prompted to do so.

Parameter	Description
Target Rate	This parameter can be shown and hidden using the icon. If you are regulating based on the target rate, you can enter the desired value here.
Current working depth	This parameter can be shown and hidden using the icon. If you are regulating based on the current working depth, you can enter the desired value here.

Assigning the Joystick Buttons

If you are using the AUX2 auxiliary protocol, you can assign the buttons on the joystick yourself.

The buttons on the joystick can be assigned in the *Service* application of the terminal. You can read how to do this in the operating instructions for the terminal.

The functions that can be assigned to the individual buttons can also be seen in the *Service* application of the terminal. You can always recognize the respective function by the function icon.

The meaning of the respective function icons can be found in the different sections of these instructions.

Configuring the Tine Sensors

You can calibrate different parameters for the tines.

1. Switch to the “Tines” screen:

 > 

2. Calibrate the desired components. The following calibrations are possible:
3.  - Tines pressure sensor calibration
4.  - Tines angle sensor calibration

Performing the Tines Pressure Sensor Calibration

In order to get the right values visible in the working screen, you need to calibrate different parameters.

1. Switch to the “Sensor calibration” screen:

 >  > 

2.  - Reduce the pressure until the minimum value is reached.

   The current/voltage determined for the minimum pressure is shown in the “Measured current/voltage” parameter.
3.  - Save the determined minimum pressure.
4.  - Increase the pressure until the maximum value is reached.

   The current/voltage determined for the maximum pressure is shown in the “Measured current/voltage” parameter.
5.  - Save the determined maximum pressure.

   You have calibrated the sensor.

Performing the Tines Angle Sensor Calibration

In order to get the right values visible in the working screen, you need to calibrate different parameters.

1. Switch to the “Sensor calibration” screen:
2.  >  > 
3.  - Reduce the angle until the minimum value is reached.

The current/voltage determined for the minimum angle is shown in the “Measured current/voltage” parameter.

4. 

- Save the determined minimum angle.

5.  - Increase the angle until the maximum value is reached.

   The current/voltage determined for the maximum angle is shown in the “Measured current/voltage” parameter.

6. 

- Save the determined maximum angle.

   You have calibrated the sensor.

8

Technical Specifications

- Technical Specifications of the ECU-MIDI 3.0
- Checking the Software Version
- Available Languages
- 42-Pin Connector
- 16-Pin Connector

Technical Specifications of the ECU-MIDI 3.0

Specification	Value
1. processor:	32-bit ARM Cortex™-M4 CPU 168 MHz, 2048 KB flash; 256 KB RAM
2. 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 The connectors can be locked and equipped with single conductor insulations.
Interfaces:	up to 3xCAN*
Power supply:	12 V electrical system (9-16 V), maximum current consumption 30 A
Current consumption (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 °C
Housing:	Anodized aluminum continuous cast casing, plastic lid with seal and pressure compensation element, stainless steel screws
Protection rating:	IP6K6K (with installed connectors)
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 Electromagnetic compatibility according to DIN EN ISO 14982: 2009-12
Dimensions:	Approx. 262 mm x 148 mm x 62 mm (L x W x H, without connector)
Weight:	ca. 1 kg

** Other interfaces upon request*

Checking the Software Version

To find out the software version:

1. Switch to the “Parameters” screen:

   The software version will be shown.

Available Languages

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

Bulgarian, Croatian, Czech, Danish, Dutch, English, Estonian, Finnish, French, German, Greek, Hungarian, Italian, Latvian, Lithuanian, Norwegian, Portuguese, Polish, Romanian, Russian, Serbian, Slovak, Slovenian, Spanish, Swedish, Turkish


PTx
Trimble