

Installation and operating instructions

TANK-Control III



Version: V4.20191001



30252080-02-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

Document	Installation and operating instructions Product: TANK-Control III Document number: 30252080-02-EN As of software version: 01.02.01.00 Original instructions Original language: German
Copyright ©	Müller-Elektronik GmbH Franz-Kleine-Straße 18 33154 Salzkotten Germany Phone: ++49 (0) 5258 / 9834 - 0 Fax: ++49 (0) 5258 / 9834 - 90 Email: info@mueller-elektronik.de Homepage: http://www.mueller-elektronik.de

Table of contents

1	For your safety	5
1.1	Basic safety instructions	5
1.2	Intended use	5
1.3	Layout and meaning of warnings	5
1.4	Disposal	6
1.5	EU declaration of conformity	6
2	Product description	7
2.1	Functions of the on-board integrated display/controller	7
2.2	System overview	7
2.3	Information on the rating plate	9
3	About these Operating Instructions	10
3.1	Who should use the Operating Instructions?	10
3.2	Screenshots in these Operating Instructions	10
3.3	Layout of operating instructions	10
3.4	Layout of references	11
4	Mounting and installation	12
4.1	Safety during installation	12
4.2	Instructions for installation	12
4.3	Installing the sensor	12
4.3.1	Step 1: Drill holes into the tank	14
4.3.2	Step 2: Install the tube socket	15
4.3.3	Step 3: Prepare the sensor tube	15
4.3.4	Step 4: Installing the sensor tube	16
4.4	Installing the on-board integrated display/controller	17
5	Basic control principles	18
5.1	Initial start-up	18
5.2	Buttons on the casing	18
5.3	Changing parameters	19
6	Configuring the basic settings of the on-board integrated display/controller	20
6.1	Entering the system settings	20
6.2	Configuring the formats and units	21
6.3	Performing diagnostics	21
6.3.1	Performing a standard diagnostic	21
6.3.2	Performing a diagnostic for connected devices	22
6.4	Defining the on-board integrated display/controller identification	23
7	Operating the system on the field	25
7.1	Calculating the volume of spray required	25

7.2	Tank filling	25
7.3	Displaying the workable area	26
7.4	Configuring the units	27
7.4.1	“Number of Decimals” parameter	27
7.4.2	“Decimal (fixed)” parameter	27
8	Configuring the system for work	28
8.1	Carry out 100 litre calibration	28
8.2	Carry out basic initialisation	28
8.3	Carrying out calibration	29
8.3.1	Selecting the pre-set tank	29
8.3.2	Planning calibration	29
8.3.3	Carrying out automatic calibration	31
8.3.4	Enter calibration values manually	32
8.4	Changing the number of sensors	32
9	Technical specifications	34
9.1	On-board integrated display/controller	34
9.1.1	Technical specifications	34
9.1.2	Connector pin assignment	35
9.2	Job computer	35
9.2.1	Technical specifications	35
9.2.2	Connector pin assignment	36
10	Spare parts	37

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.
- 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
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.

1.5
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.

SMART430®

Harmonised standards applied:

EN ISO 14982:2009

(EMC Directive 2014/30/EU)

2 Product description

2.1 Functions of the on-board integrated display/controller

TANK-Control III is a system that consists of a computer and a sensor:

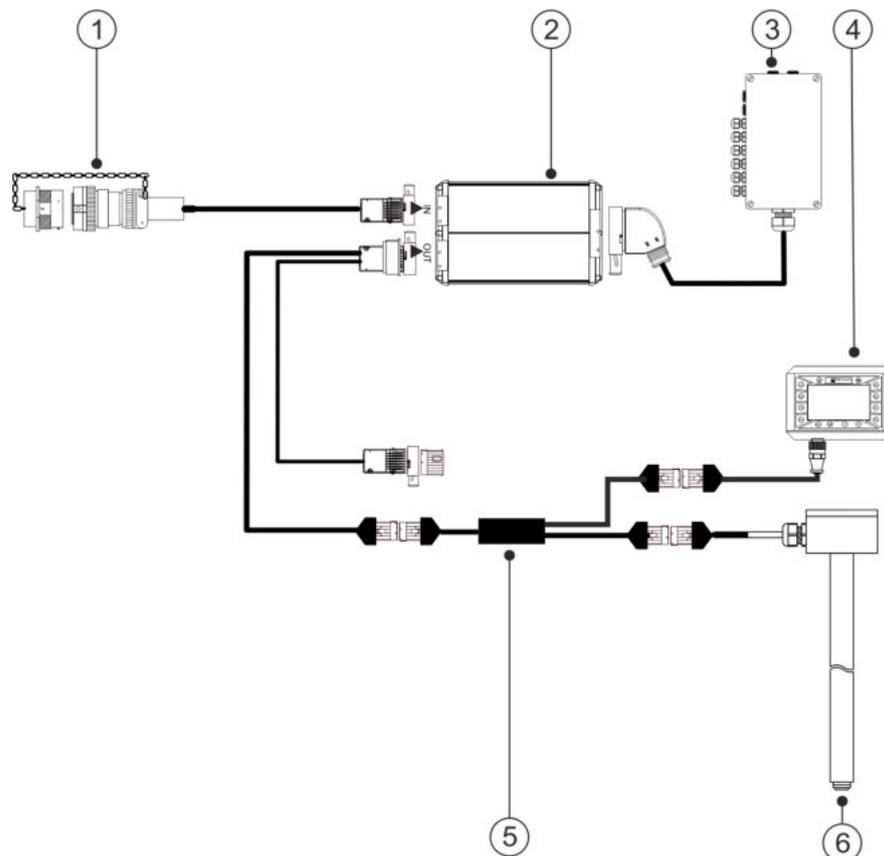
- The on-board integrated display/controller controls various system functions.
- The sensor measures the actual fill level in the tank.

Summary of the TANK-Control III features:

- Display of the current fill level.
- Calculation of the spray volume required.
- Calculation of the workable area.
- Function with different liquids.
- Data display on the on-board integrated display/controller and on the terminal in the tractor cab.
- Control of various components:
 - Filling pumps and ball valves for filling
 - Agitators used during spraying work.
- Can be operated with two sensors.

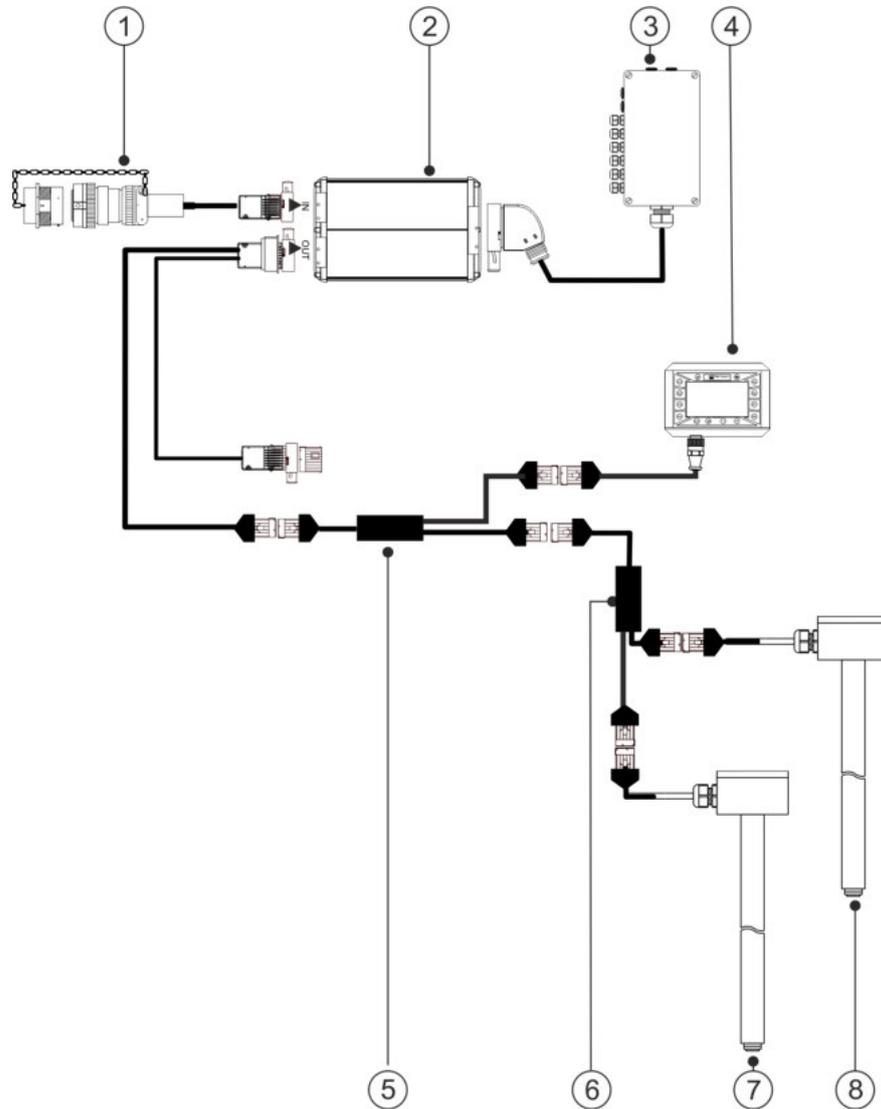
2.2 System overview

The system differs depending on whether you are using TANK-Control III with one or two sensors.



TANK-Control III with one sensor

①	ISOBUS connection	④	TANK-Control III on-board integrated display/controller
②	Job computer	⑤	Adapter cable box
③	Junction boxes	⑥	TANK-Control III sensor



TANK-Control III with two sensors

①	ISOBUS connection	⑤	Adapter cable box 1
②	Job computer	⑥	Adapter cable box 2
③	Junction boxes	⑦	TANK-Control III sensor 1
④	TANK-Control III on-board integrated display/controller	⑧	TANK-Control III sensor 2

2.3

Information on the 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 should use the Operating Instructions?

These Operating Instructions are intended for:

- People who use the field sprayer.
- People who install the sensor.
- People who install and use the on-board integrated display/controller.

3.2 Screenshots in these Operating Instructions

The screen shots of the software interface are presented for reference purposes. They help you to find your way around the software screens.

The information shown on the screen depends on the following factors:

- the type of field sprayer
- the configuration
- the status

For this reason, the pictures in these operating instructions may show different information than the display on the terminal or on-board integrated display/controller.

3.3 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.

3.4

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 Safety during installation



This section is intended for specialists and agricultural machinery manufacturers who install the sensor and on-board integrated display/controller.

- Please read these installation instructions carefully and follow all the instructions.
- Do not install the product unless you know how to install it on agricultural machines.
- Only install the sensor when the tank is new.
- Take safety measures to ensure that you do not fall if you climb onto the tank while installing the sensor.
- If you climb into the tank, ensure that a second person is watching you and can help you in an emergency.

4.2 Instructions for installation



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

- 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.
- Do not use the system if some of its parts are damaged. Damaged parts can cause malfunctions and lead to injuries. Replace damaged components or repair them if possible.
- Only use original components.

4.3 Installing the sensor

To install the sensor, you will need carry out the following steps independently of one another:

Step 1: Drill holes into the tank

Step 2: Install the tube socket

Step 3: Prepare the sensor tube

Step 4: Installing the sensor tube

Before installation

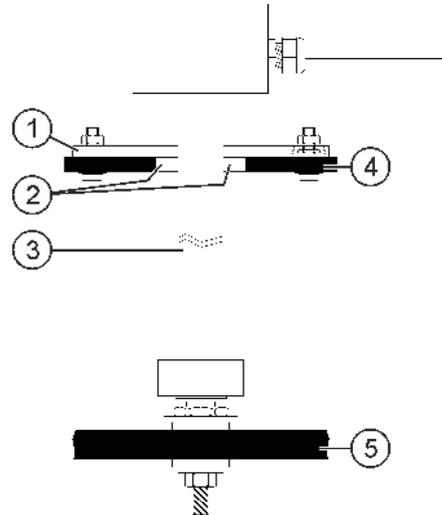
Check that you have all the parts:

	Number	Part
	1	Float
	1	Flange 140

	Number	Part
	1	Viton gasket 140
	4	Viton gasket 25x8x3
	4	Hexagonal screw M8x35
	4	Nut M8
	4	Nut M8 flat
	8	Spring washer B8
	8	Washer A8.4 (large)
	4	Washer A8.4
	1	Tube socket
	2	Viton gasket 25x6
	1	Nut M6 (self-locking)
	1	Washer 24.2x12.2
	1	Washer A6.4
	1	Locking ring

4.3.1

Step 1: Drill holes into the tank



Drill holes into the tank

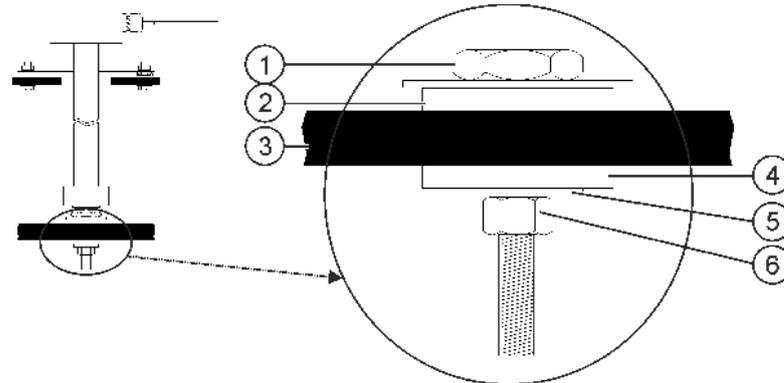
①	Flange 140	④	Top of tank
②	Opening	⑤	Base of tank
③	Sensor tube		

Procedure

- The field sprayer must be standing on level ground.
- 1. Drill a hole (55 mm diameter) in the top of the tank for the sensor tube opening.
- 2. Mark the drilling positions. To do this, push the sensor tube and flange through the hole. Using the flange 140 as a drilling template, mark the screw positions on the tank.
- 3. Drill 4 holes (8.5 mm diameter) at the positions marked; they will be used to attach the flange.
- 4. Pull the sensor tube out of the tank.
- 5. Use a plumb-line to identify a point directly below the hole on the base of the tank.
- 6. Mark the position for the hole.
- 7. Drill a hole (6.2 mm diameter) at the point you have marked so that you can install the tube socket.
- 8. You can now install the tube socket.

4.3.2

Step 2: Install the tube socket



Install the tube socket

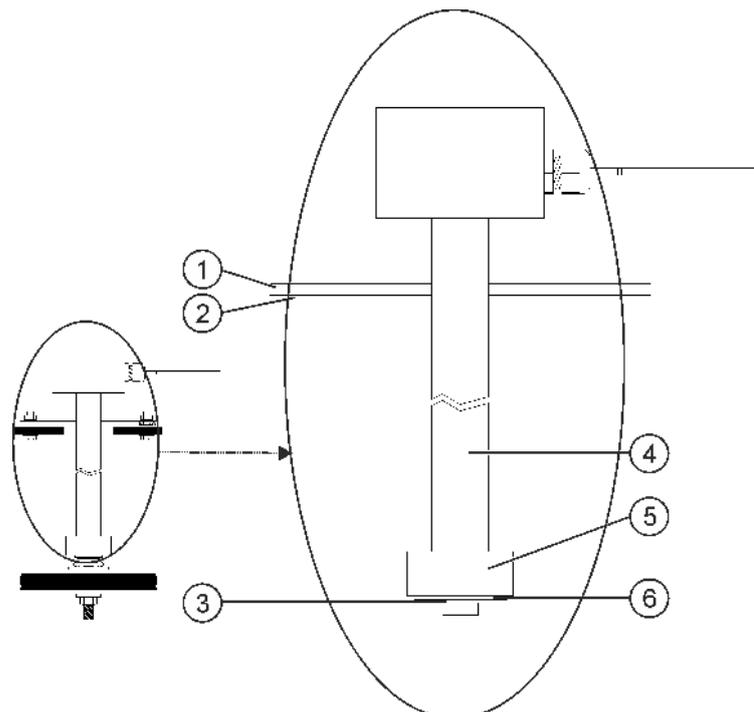
①	Tube socket	④	Viton gasket 25x6
②	Viton gasket 25x6	⑤	Washer A6.4
③	Base of tank	⑥	Nut M6

Procedure

1. Push a Viton gasket 25x6 onto the tube socket.
2. Push the tube socket through the hole in the tank base from above.
3. Push the second Viton gasket 25x6 onto the tube socket from below.
4. Push the washer A6.4 onto the tube socket.
5. Fix the tube socket in place using nut M6.
6. You can now prepare the sensor tube.

4.3.3

Step 3: Prepare the sensor tube



Prepare the sensor tube

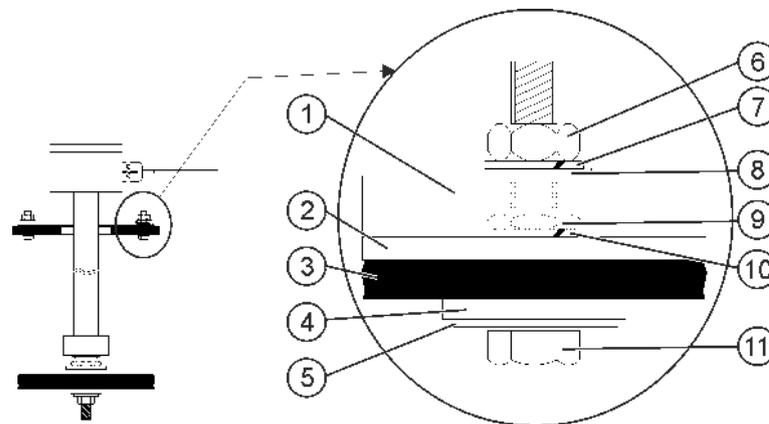
①	Flange 140	④	Sensor tube
②	Viton gasket 140	⑤	Float
③	Locking ring	⑥	Washer 24.2x12.2

Procedure

1. Push the flange 140 onto the sensor tube from below.
2. Push the Viton gasket 140 onto the sensor tube from below.
3. Push the float onto the sensor tube. The “0” marking on the float must point upwards.
4. Push washer 24.2x12.2 onto the sensor tube.
5. Secure washer 24,2x12,2 using the locking ring.
6. Carefully loosen the locking ring so that you can turn it over the thread.
7. You can now install the sensor tube.

4.3.4

Step 4: Installing the sensor tube



Installing the sensor tube

①	Flange 140	⑥	Nut M8
②	Viton gasket 140	⑦	Spring washer B8
③	Top of tank	⑧	Washer A8.4
④	Viton gasket 25x8x3	⑨	Nut M8 flat
⑤	Washer A8.4, large	⑩	Spring washer B8
		⑪	Hexagonal screw M8

Procedure

1. Push the prepared sensor tube through the opening at the top of the tank.
2. Screw the sensor tube into the tube socket on the tank base. Because you have to turn the sensor tube, ensure that the cable for the sensor tube does not get twisted.
3. Push a washer A8.4 (large) and a Viton gasket 25x8x3 onto each of the 4 hexagonal screws M8.
4. Push the screws upwards through the tank cover.
5. Push a spring washer B8 onto the screws from above.
6. Secure the screws using the nuts M8 flat.
7. Push the Viton gasket 140 and the flange 140 downwards.
8. Push a washer A8.4 and a spring washer B8 onto the screws.

9. Secure the screws using the nuts M8.
10. You have completed the installation.

4.4

Installing the on-board integrated display/controller

When installing the on-board integrated display/controller, you must observe the following:

- Install the on-board integrated display/controller so that the “TANK-Control II” lettering is read horizontally.
- Leave enough room for the cables.
- Wire the on-board integrated display/controller to the sensor, the job computer for the field sprayer and the terminal in the tractor cab. [→ 7].

5 Basic control principles

5.1 Initial start-up

For the initial start-up, you must switch on and configure the on-board integrated display/controller.

Procedure

You have connected the on-board integrated display/controller as shown in the system overview [→ 7].

1.  - Press the ON button and hold for two seconds.
⇒ The job computer boots up.
2.  - Press this key several times until the following screen appears:



- ⇒ You have started up the on-board integrated display/controller.
- ⇒ You can now configure [→ 20] the basic settings for the on-board integrated display/controller.

5.2 Buttons on the casing

	ON button	Switching on: Press the button for 1 second. Switching off: Press the button for 2 seconds.
	Switching among the apps	A different application is displayed each time the button is pressed.
	Plus key	Moves the cursor up; Increases the value of a parameter.
	Minus key	Moves the cursor down; Reduces the value of a parameter.
	Enter key	Opens an input box; Confirms the input; Acknowledges alarms.
	Cancel key	Send a cancel signal to the job computer. Cancels the input of a value. The input box is exited and the previous valid value is restored. Acknowledges alarms.

	<p>Function keys (softkeys)</p>	<p>Serve to execute the functions displayed on the screen.</p>
---	---------------------------------	--

5.3

Changing parameters

Procedure

1. Call up a screen with adjustable parameters. For example:



2.  - Move the dashed cursor to mark the parameter that you want to change.
3.  - Select the parameter to be changed.
 - ⇒ You now have three ways to change the value:
 - a) For numbers, a numerical keyboard appears.
 - b) For text entries, a text keyboard appears.
 - c) For lists, the line of the cursor becomes continuous. You can then use the  and  keys to set the desired value.
4.  - Adopt the value.

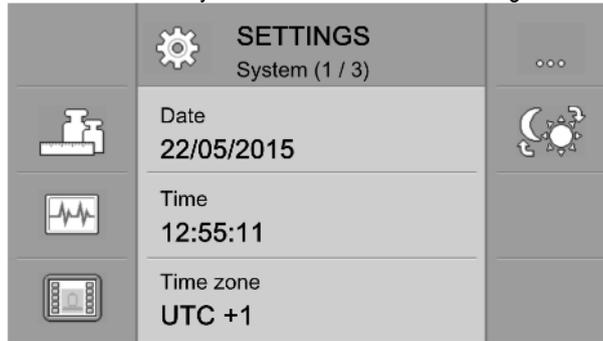
6 Configuring the basic settings of the on-board integrated display/controller

6.1 Entering the system settings

On the screens of the “System” group, you can enter several basic system settings.

Procedure

1.  - Press this key several times until the following screen appears:



2. Enter the settings required.

Function icons

Function icon	Meaning
	Switches to the next screen in the screen group.
	Configuring the formats and units [→ 21]
	Performing diagnostics [→ 21]
	Defining the on-board integrated display/controller identification [→ 23]
	Switches the brightness between bright and dark.

Parameter

Parameter	Meaning
Date	Current date.
Time	Current time.
Time zone	Current time zone.
Brightness Day	Screen brightness for the on-board integrated display/controller during the day.
Brightness Night	Screen brightness for the on-board integrated display/controller at night.
User language	List of all of the languages that are supported by the connected job computer or on-board integrated display/controller. If the on-board integrated display/controller supports the language selected

Parameter	Meaning
	here, it will be activated in this language. Otherwise, the on-board integrated display/controller will be activated in the language defined as the "System language".
System language	Alternative language for the on-board integrated display/controller.
Volume	Volume of the on-board integrated display/controller.

6.2 Configuring the formats and units

On the screens of the "Formats" group, you can define the units used by the on-board integrated display/controller and the connected devices.

Path On the "SETTINGS / System" screen, press:



Function icons

Function icon	Meaning
	Switches back to the previous screen.
	Switches to the next screen in the screen group.

Parameter

Parameter	Meaning
Hour format	Time of day format for the display.
Date format	Date format for the display.
Decimal symbol	Decimal symbol for the display.
System of units	metric – The units are shown in the metric system. imperial – The units are shown in the imperial system. US – The units are shown in the US American system. Custom – The units can be configured individually.

6.3 Performing diagnostics

On the different diagnostic screens, you can see details about your on-board integrated display/controller.

Moreover, you can find screens here with detailed information on the devices connected to the bus.

6.3.1 Performing a standard diagnostic

On the screens of the "Diagnostic" group, you can find detailed information about your on-board integrated display/controller.

Path On the “**SETTINGS / System**” screen, press:



Function icons

Function icon	Meaning
	Switches back to the previous screen.
	Switches to the next screen in the screen group.
	Switches to the screen with the connected devices.
	Deletes all object pools for devices that are currently not connected.

Parameter

The greyed-out values cannot be changed. They only serve as a reference.

Parameter	Meaning
Version	Installed software version.
Operating voltage	Current operating voltage.
Operating temperature	Current processor temperature.
Hardware item number	Item number of the on-board integrated display/controller.
Software item number	Item number of the on-board integrated display/controller software.
Serial number	Serial number of the on-board integrated display/controller.
Service hours	Hours in a switched-on state.
Date of manufacture	Date of manufacture.
Available memory	Available memory.

6.3.2

Performing a diagnostic for connected devices

On the screens of the “**Devices**” group, you can find detailed information on all of the devices connected to the bus.

Path On the “**SETTINGS / system**” screen, press:



Function icons

Function icon	Meaning
	Switches back to the previous screen.
	Scrolls to the next device.

Function icon	Meaning
	Scrolls to the previous device.
	Deletes the object pool of the displayed device. The device must also be connected.
	Only appears for object pools that cannot be deleted.

Parameter

The greyed-out values cannot be changed. They only serve as a reference.

Parameter	Meaning
ISO name	ISO name of the connected device.
Manufacturer	Manufacturer of the connected device.
CAN Bus address	CAN bus address of the connected device.

6.4

Defining the on-board integrated display/controller identification

On the “**Terminal**” screen, you can find detailed information about your on-board integrated display/controller.

Path

On the “**SETTINGS / System**” screen, press:



Function icons

Function icon	Meaning
	Switches back to the previous screen.

Parameter

The greyed-out values cannot be changed. They only serve as a reference.

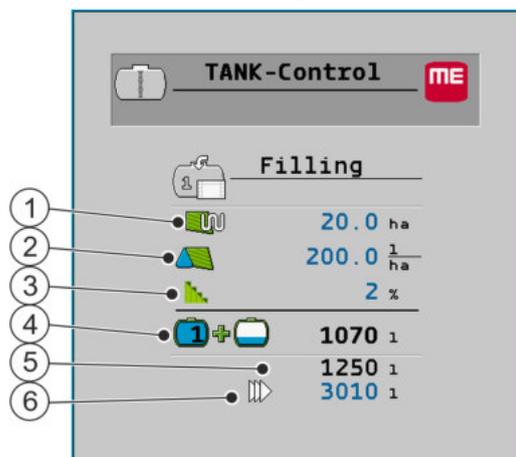
Parameter	Meaning
Function ISO VT	Activates and deactivates communication through the ISOBUS interface.
VT number	If there are multiple clients on the ISOBUS, each client can be assigned with an instance number. The instance number serves to assign job computers to the clients.
Navig. Buttons Number	<p>If you notice that the connected job computer is not displaying all of the function keys, change the value for this parameter to 2.</p> <p>If this is supported by the job computer, you then have the option of using the F4 and F8 keys to display function keys that are not shown otherwise.</p> <p>1 - 7 job computer keys and one navigation key are displayed.</p> <p>2 - 6 job computer keys and one navigation key are displayed. This setting improves the display when the keys for moving left and right in the job computer application should also be displayed on the left and right side of the screen.</p>

7 Operating the system on the field

You can operate the system directly on the on-board integrated display/controller. Alternatively, you can also operate the system using the your terminal in the vehicle cab.

7.1 Calculating the volume of spray required

With the on-board integrated display/controller, you can calculate how much spray liquid you need to spray the field and how often you will need to fill the tank.



①	Area to be sprayed	④	Required volume of spray liquid
②	Planned application rate	⑤	Current fill level
③	Realistic overlap	⑥	Tank size

Procedure

1. On the work screen, press:



⇒ The "Filling" screen appears.

2. Change the desired values.

⇒ The lower area of the screen shows how many full tanks and how much additional spray liquid you will need.

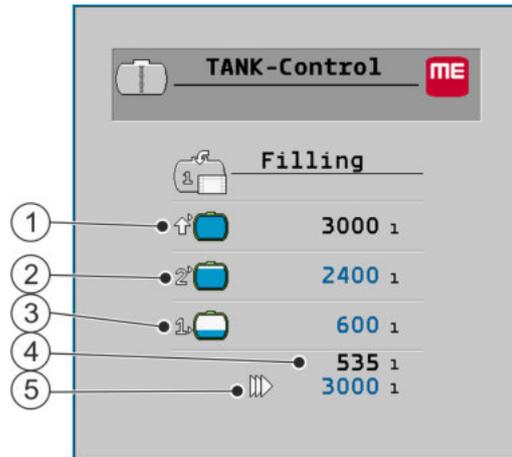
7.2 Tank filling

You can fill a tank manually or with the help of external devices. If you intend to use external devices, they must be connected to the system. The on-board integrated display/controller can stop the filling automatically if it is controlled by external devices.

Before filling the tank, you can define two fill limits:

- One fill limit if you are adding one product to the tank.
- Two fill limits if you are adding two products to the tank.

Note that the value for fill limit 2 must always be higher than the value for fill limit 1.



①	Maximum tank filling	④	Current tank content
②	Refilling limit 2	⑤	Currently set filling quantity
③	Refilling limit 1		

Procedure

1. On the work screen, press:



⇒ The "Filling" screen appears.

2. Change the values for Refilling limits 1 and 2 as required

3. Press the function key with the fill limit to which you want to fill the tank. If you want to set the partial tank volume required for the remaining area as a fill limit, you need to switch to the calculation [→ 25] screen.

⇒ The volume to be added to the tank, shown in the lower area of the screen, changes.



4. - Start filling.

⇒ The lower area of the screen shows whether external devices are activated.

5. Fill the tank up to the fill limit selected.



6. - Option to stop or interrupt the filling procedure.

⇒ The screen shows the area that you can spray with the current fill level.

⇒ You have filled the tank to the selected fill limit.

7.3

Displaying the workable area

If you are using one tank and one sensor, the workable area is displayed by default on the work screen.

If you are using two tanks and two sensors, you can display the workable area as follows:

Icon	Meaning
	Area that you can spray with the fill level in tank 1. For example, if you only apply the spray liquid from tank 1.
	Area that you can spray with the fill level in tank 2. For example, if you only apply the spray liquid from tank 2.

Icon	Meaning
	Total area that you can spray. For example, if you apply the same spray liquid from both tanks.

Procedure

The work screen is opened.

1.  - Switch between the three display options.

⇒ The workable area display changes depending on what you select.

7.4 Configuring the units

You can configure all of the units that are displayed on the on-board integrated display/controller. You can select between various metric and imperial units.

Procedure

1. On the work screen, press:



⇒ On the screen, you will see which categories and subcategories can be configured.

2. Enter the settings required.

3. You have the option of configuring the parameters **“Number of decimals”** and **“Decimal (fixed)”** for each category and subcategory.

⇒ All of the displayed values will be converted and displayed in the configured units.

7.4.1 “Number of Decimals” parameter

Enter how many decimal places should be displayed.

7.4.2 “Decimal (fixed)” parameter

Activate this parameter if the decimal point should not be automatically shifted. The decimal places then also remain even with larger numbers.

8 Configuring the system for work

You can configure the system directly on the on-board integrated display/controller. Alternatively, you can also configure the system using your terminal in the vehicle cab.

8.1 Carry out 100 litre calibration



WARNING

Danger of poisoning from spray liquid residues

When configuring the tank:

- Always use clean water.

NOTICE

Inaccurate calibration due to incorrect fill volume

If the configuration is wrong the fill level cannot be measured accurately. This makes all calculations imprecise.

When calibrating the tank:

- Use a flow meter or a weighbridge.

The purpose of the 100 litre calibration is:

- To equalise manufacturing tolerances
- To correct changes in accuracy over time.

Procedure

1. On the work screen, press:



2. For the “Calibrat. volume” parameter, enter “100 l”. Alternatively, you can also calibrate using a different volume.



3.  - Press to call up the “Calibration” screen.

4. Empty the tank completely.

5. Fill exactly 100 litres or the required volume in the tank.



6.  - Start the 100-litre calibration.

7. Wait until the process is completed.

8. You have successfully completed the 100-litre calibration.

8.2 Carry out basic initialisation

During basic initialisation, the on-board integrated display/controller uses a signal to activate the sensor one time to ensure that all the connections are OK.

Procedure

1. On the work screen, press:



⇒ Basic initialisation will be performed.

2. Moreover, you can set the sensor sensitivity with the “Filter” parameter. Reduce the value if the sensor reacts too sensitively to water movement.
 - ⇒ If the sensitivity is high, the fill levels displayed are updated faster. If the sensitivity is low, the fill levels displayed are updated more slowly.
 - ⇒ You have initialised the sensor.

8.3 Carrying out calibration

The calibration process measures the height of the sensor float. The float height rises as the fill level increases.

During calibration, the tank is filled with water in several steps. The exact position of the float is measured at each step. The computer then knows the position of the float at every fill level.

These values are stored in the memory.

The following types of calibration are available:

- Automatic calibration.
- Manual input.

8.3.1 Selecting the pre-set tank

If you install the on-board integrated display/controller on a field sprayer model for which the tank characteristics are already stored in the software, you can skip the calibration and simply select the number for the tank.

1. On the work screen, press:

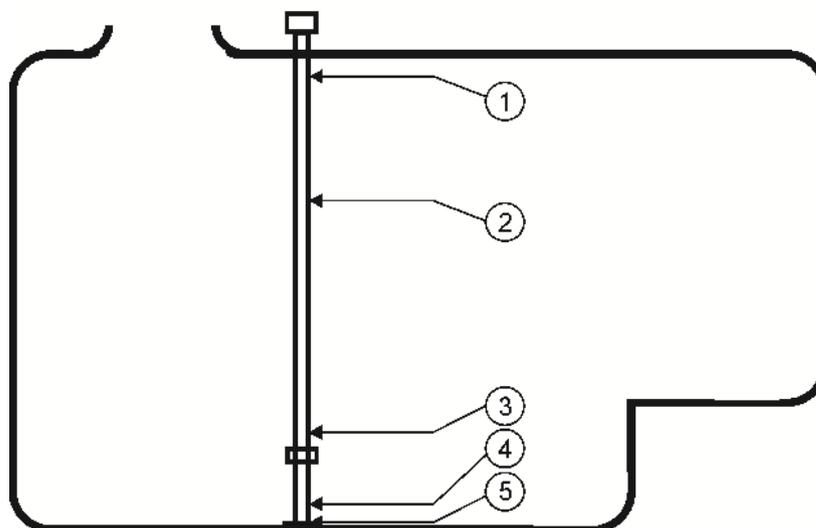


2. Enter the number of the tank in the “Tank-ID” parameter.

⇒ The sensor is calibrated for the corresponding tank.

8.3.2 Planning calibration

Before you start calibration, you must plan the float heights at which you want to enter the fill level.



Possible tank shape with calibration points

①	Maximum fill level Calibration point 29	④	Calibration point 01
②	e.g.: Calibration point 21	⑤	Calibration point 00
③	Calibration point 02		

The table below shows an example of what a planned calibration may look like. The values may be different for every tank. You cannot plan the fill levels at given float heights. The fill levels depend on the size and shape of the tank. In the example, the tank has a capacity of 7200 litres.

Calibration point	Float height	Possible fill level	Calibration point	Float height	Possible fill level
0	15 mm	0 l (tank must be empty)	15	750 mm	3000 l
1	25 mm	30 l (first float movement is registered)	16	800 mm	3200 l
2	100 mm	400 l	17	850 mm	3400 l
3	150 mm	600 l	18	900 mm	3600 l
4	200 mm	800 l	19	950 mm	3800 l
5	250 mm	1000 l	20	1000 mm	4000 l
6	300 mm	1200 l	21	1050 mm	4200 l
7	350 mm	1400 l	22	1100 mm	4400 l
8	400 mm	1600 l	23	1200 mm	4800 l
9	450 mm	1800 l	24	1300 mm	5200 l
10	500 mm	2000 l	25	1400 mm	5600 l
11	550 mm	2200 l	26	1500 mm	6000 l
12	600 mm	2400 l	27	1600 mm	6400 l
13	650 mm	2600 l	28	1700 mm	6800 l
14	700 mm	2800 l	29	1800 mm	7200 l (maximum fill level is reached)

This is how to plan the calibration:

1. Check whether your tank has any bulges as they can affect the float height.
2. Note that the tank must be completely empty at calibration point 0. You cannot select the float height yourself.

3. Note that the fill level at which the float registers the first movement must be entered at calibration point 1. You cannot select the float height yourself.
 4. Note that the tank must be filled to the maximum fill level at the last calibration point. The maximum fill level is specified by the tank manufacturer. You cannot select the float height yourself.
 5. Decide how many calibration points you want to use. You can use a maximum of 30 calibration points.
 6. Decide on the float heights at which you want to enter the fill level. If possible, use evenly spaced intervals, e.g. every 50 mm.
- ⇒ You can now start calibration.

8.3.3

Carrying out automatic calibration

NOTICE

Inaccurate calibration due to incorrect fill volume

If the configuration is wrong the fill level cannot be measured accurately. This makes all calculations imprecise.

When calibrating the tank:

- Use a flow meter or a weighbridge.



WARNING

Danger of poisoning from spray liquid residues

When configuring the tank:

- Always use clean water.

Procedure

- You have completed the 100-litre calibration.
 - You have planned the float heights at which you want to enter the fill level.
 - You have pen and paper at hand to write down the fill levels.
1. On the work screen, press:
 - > >
 2. Enter the value "0" in the "Tank-ID" parameter.
 3. Enter the maximum fill level for the tank in the "Tank Max" parameter.
 4.  - Call up the "Calibration" screen.
 5. Empty the tank completely.
 - ⇒ In the bottom area of the screen, you can see the current calibration point 0 and the current floater height.
 6.  - Start the automatic calibration.
 7. Fill the tank with water until the sensor registers the first movement.
 - ⇒ You have reached calibration point 1.
 8. Enter the current tank fill level.

9. Write down the current fill level. You will then have a record of the values so you will not have to repeat the entire calibration process if an error occurs, and can calibrate an identical tank manually in the future.



10. - Proceed with the automatic calibration.

11. Fill the tank to the next planned float height. The planned level in the example is 100 mm.
⇒ A signal tone is issued.

12. You have reached calibration point 2.

13. Enter the current tank fill level. In the example, we assume a fill level of exactly 400 litres.

14. Write down the current fill level.

15. Repeat the procedure for a maximum of 30 calibration points in total



16. - Finish and save the automatic calibration.

⇒ You have completed automatic calibration.

8.3.4

Enter calibration values manually

You can input calibration values manually if you have already carried out automatic calibration on an identical tank and know the fill level at each float height.

To save time, you can enter the individual values without filling the tank.

Procedure

- You have calibrated an identical tank and have the individual values to hand.

1. On the work screen, press:



2. >
3. Enter the value "0" in the "Tank-ID" parameter.
4. Enter the maximum fill level for the tank in the "Tank Max" parameter.



5. - Call up the "Calibration" screen.



6. - Select the fill level or float height that you want to change.

7. Enter the settings required. Use the values from the identical tank.

8. Repeat the procedure for all the values you want to change.



9. - Finish and save the entry.

8.4

Changing the number of sensors

If you use two tanks on your field sprayer, you can also use the on-board integrated display/controller with two sensors.

Procedure

1. On the work screen, press:



2. Enter the value “2” in the “**Number of sensors**” parameter.
 - ⇒ New function icons now appear everywhere where you can switch between the two sensors and tanks.
 - ⇒ You can now configure the second tank. Proceed exactly like for the first sensor. You just have to select the sensor you want to configure.

9 Technical specifications

9.1 On-board integrated display/controller

9.1.1 Technical specifications

Operating voltage	9 - 32 V
Current consumption (operation)	approx. 150mA at 13V
Power input	ca. 2W
Ambient temperature	-20°C - +70°C
Storage temperature	-30°C to +85°C
Dimensions (W x H x D)	174mm x 121mm x 49mm
Weight	370 g
Protection class	IP66
EMC	EN ISO 14982:2009
ESD protection	4kV according to ISO 15003:2006E
Environmental testing	Change of temperature and temperature shock according to ISO15003:2006E
Processor	STM32F429, 180MHz
Storage	16Mbyte flash (SPI-Flash) SD-RAM: 8Mbyte EEPROM: 64kbit
Operating system	RTX
Display	4.3" 480x272 pixels WQVGAs
Housing	Casing material: PC-ABS / UL-VO
Inputs / outputs	See Pin assignment

9.1.2

Connector pin assignment

8-pin CAN bus connector

Pin	Function	Notes
1	+U _B	Supply +12V In
2	CAN_1_H_out	CAN-Bus 1 In
3	+U _{ON}	Supply +12VE, switched for the job computer
4	CAN_1_L_out	CAN-Bus 1 In
5	CAN_1_L_in	CAN-Bus 1 Out
6	GND	GND In
7	CAN_1_H_in	CAN-Bus 1 Out
8	IGN	Ignition signal In

9.2

Job computer

9.2.1

Technical specifications

ECU-MIDI 3.0 job computer

1st processor:	32-bit ARM Cortex™-M4 CPU 168 MHz, 2048 KB flash; 256 KB RAM
2nd processor:	32-bit ARM Cortex™-M4 CPU 168 MHz, 2048 KB flash; 256 KB RAM
External memory:	SPI-Flash 16 MB; SDRAM 16 MB; FRAM 16 kByte
Connections:	<ul style="list-style-type: none"> ▪ 42-pin connector for connecting actuators/sensors ▪ 2x 16-pin connector for power supply and CAN <p>The connectors can be locked and equipped with single conductor insulations.</p>
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 aluminium 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

Additional information:

Minimum input frequency required for control:	5 Hz
---	------

9.2.2

Connector pin assignment

42-pin connector

Outputs	<ul style="list-style-type: none"> ▪ 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:	<p>up to 23 universal inputs in total, configurable as</p> <ul style="list-style-type: none"> ▪ 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:	Upon request: CAN, LIN

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

10 Spare parts

TANK-Control III

Designation	Item number
TANK-Control III	30252080
ISOBUS job computer MIDI 3.0 TANK-Control III	3025209001
Connector cable, main to expansion job computer, 0.3 m	30322355
Connector cable, main to expansion job computer, 1.5 m	30322359
Connector cable, main to expansion job computer, 3.2 m	30322358
Connector cable, main to expansion job computer, 6.5 m	30322357
Connector cable, main to expansion job computer, 10 m	30322356
Universal junction box for ECU-MIDI 3.0 , 0.6 m cable	30322470
Universal junction box for ECU-MIDI 3.0 , 1.5 m cable	30322475
Universal junction box for ECU-MIDI 3.0 , 2 m cable	30322471
Universal junction box for ECU-MIDI 3.0 , 4 m cable	30322472
Universal junction box for ECU-MIDI 3.0 , 6 m cable	30322473
Universal junction box for ECU-MIDI 3.0 , 9 m cable	30322474
FlexWire connector cable for TANK-Control III	3025208020
FlexWire Y cable with 3x 6-pin AMP connector	3025208010
FlexWire extension cable 3.5 m with 6-pin AMP connector	3025208035
FlexWire extension cable 7.5m with 6-pin AMP connector	3025208036
FlexWire Y cable on MIDI 3.0	3025208030
TANK-Control III with level sensor 800/980	30252061
TANK-Control III with level sensor 1440/1620	30252062
TANK-Control III with level sensor 1600/1780	30252064
TANK-Control III with level sensor 1840/2020	30252066
TANK-Control III with level sensor 2080/2260	30252068