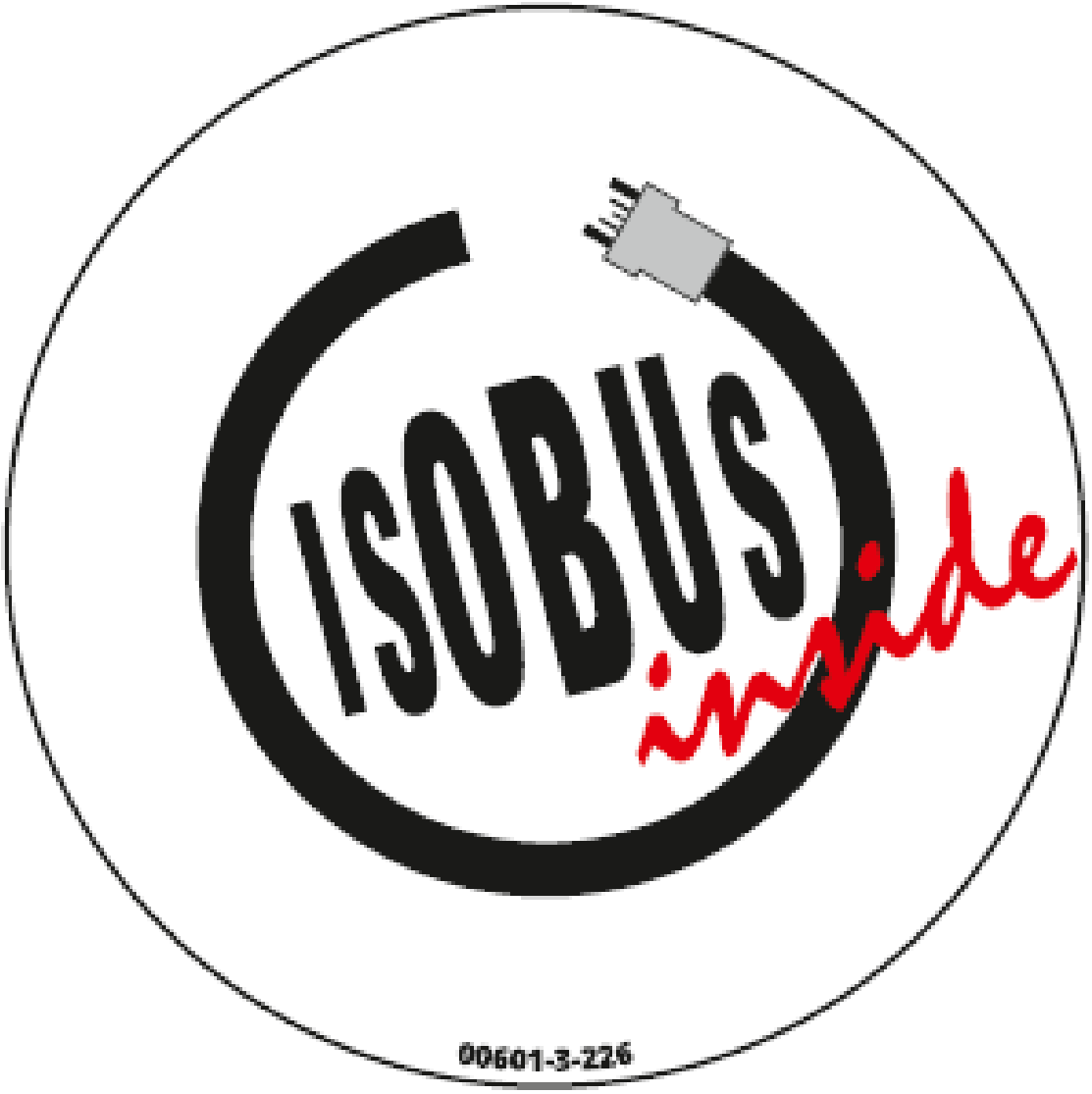
ISOBUS M2

OPERATOR MANUAL



PLEASE READ CAREFULLY BEFORE COMMISSIONING!

Translation of the original operating manual

Version: 2.2 EN; item number: 00602-3-810

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1 IDENTIFICATION OF THE IMPLEMENT

The control box can be clearly identified by the following information on the type plate:
1: Item number
2: Serial number
3: Software version
4: Hardware version

Position of the type plate
The type plate is located on the control box.
To be able to read it, the controller cover must first be removed.



Figure 1

NOTE!
In cases of inquiries or warranty claims, please always tell us the serial number and software version of your control box.

2 SERVICE

Please contact our service address in the following cases:

- If you still have questions regarding the handling of this implement despite the information provided in this operating manual
- For questions regarding spare parts
- To order maintenance and servicing work

Service address:

APV - Technische Produkte GmbH
ZENTRALE
Dallein 62
A-3753 Hötzelsdorf
AUSTRIA

Telephone: +43 2913 8001-5500
Fax: +43 2913 8002
E-mail: service@apv.at
Web: www.apv.at

3 WARRANTY

Please check the control box/device for any transport damage immediately upon receipt. Later claims regarding transport damage can no longer be considered.
Based on the invoice, we grant a six-month factory warranty starting on the date of initial operation. This warranty is applicable for cases of material or construction faults and does not include parts that are damaged by normal or excessive wear.

The warranty expires

- if damage is caused by external forces (e.g. opening of the control box).
- if the prescribed requirements are not met.
- if the implement is modified, expanded or equipped with third-party spare parts without our permission.

4 SCOPE OF DELIVERY

NOTE!
The items included can vary depending on the implement and its configuration!

4.1 CONTROL BOX ISOBUS M2



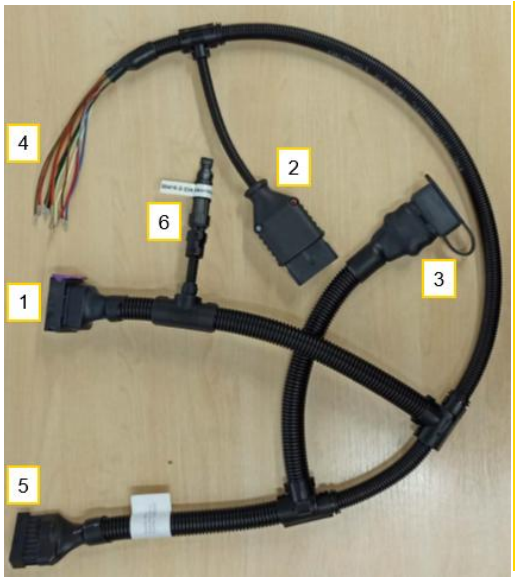
1	Type plate (see Point 1)
2	24-pin plug, connection for wiring harness

Figure 2

4.2 WIRING HARNESS

The wiring harness is mounted directly on the device and connects the ECU to all of the actuators, sensors and the connection cable to the ISOBUS socket on the tractor.

4.2.1 PNEUMATIC SEEDER PS 120 – PS 500 AND PS 300 D TWIN



1	24-pin plug, connection to control box ECU
2	12-pin plug, connection to external sensors • Speed sensors • Working position sensors
3	2-pin plug, supply to motor module
4	Open wire ends, terminals on the seeder for: • Seeding shaft motor • Motor module (only for electric fan) • Fill level sensor • Calibration button • Fan speed sensor • Seeding shaft speed sensors
5	16-pin plug, connection cable for ISOBUS socket
6	Terminating resistor

Figure 3

Order number:
00410-2-300

4.2.2 PNEUMATIC SEEDERS PS 800, PS 1600 AND LF 600

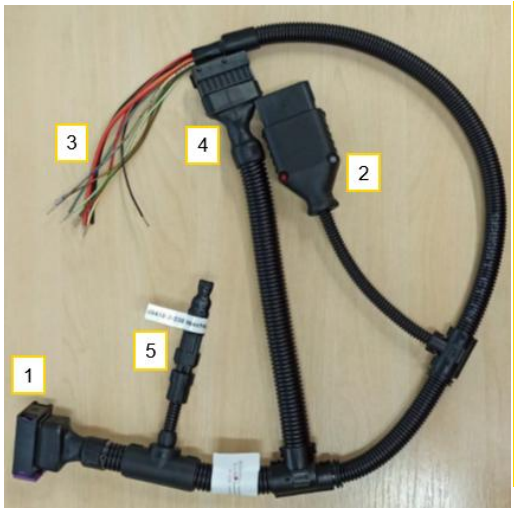


Figure 4

1	24-pin plug, connection to control box ECU
2	12-pin plug, connection to external sensors • Speed sensors • Working position sensors
3	Open wire ends, terminals on the seeder for: • Seeding shaft motor • Fill level sensor • Calibration button • Fan speed sensor • Seeding shaft speed sensors
4	16-pin plug, connection cable for ISOBUS socket
5	Terminating resistor

Order number:
00410-2-301

4.2.3 MDC AND MDG MULTI-METERING SYSTEM

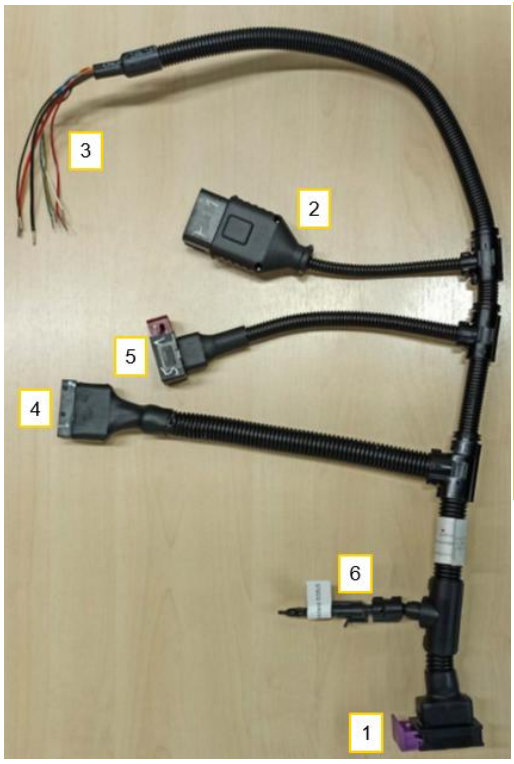


Figure 5

1	24-pin plug, connection to control box ECU
2	12-pin plug, connection to external sensors • Speed sensors • Working position sensors
3	Open wire ends, terminals on the seeder for: • Seeding shaft motor • Fill level sensor • Calibration button • Seeding shaft speed sensors
4	16-pin plug, connection cable for ISOBUS socket
5	10-pin plug, extension cable to the second implement
6	Terminating resistor

Order number:
00410-2-240

4.2.3.1 EXTENSION CABLE FOR PARALLEL OPERATION

The extension cable is used for parallel operation of another MDC or MDG Multi-Metering System.

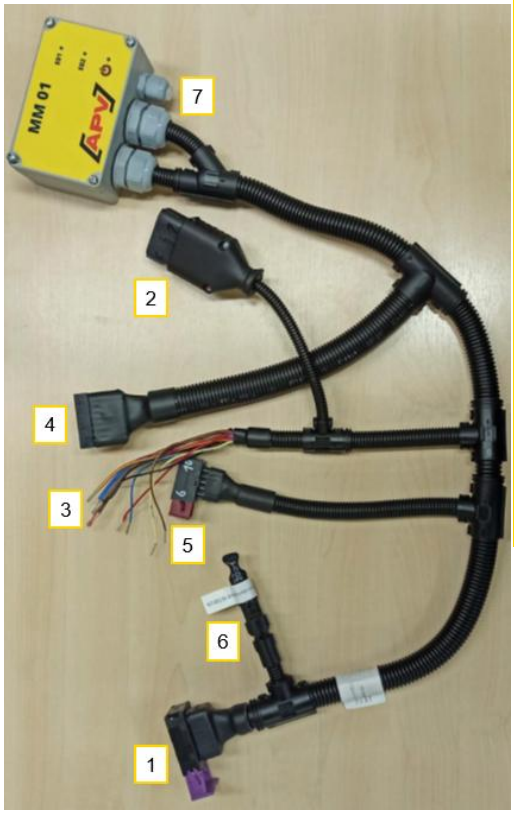


1	10-pin plug, connection to the first implement
2	Open wire ends, terminals on the seeder for: • Seeding shaft motor • Fill level sensor • Calibration button • Seeding shaft speed sensors

Order number:
00410-2-241

Figure 6

4.2.4 MDP MULTI-METERING SYSTEM



1	24-pin plug, connection to control box ECU
2	12-pin plug, connection to external sensors • Speed sensors • Working position sensors
3	Open wire ends, terminals on the seeder for: • Seeding shaft motor • Fill level sensor • Calibration button • Seeding shaft speed sensors
4	16-pin plug, connection cable for ISOBUS socket
5	10-pin plug, extension cable to the second implement
6	Terminating resistor
7	Motor module

Order number:
00410-2-244

Figure 7

4.2.4.1 EXTENSION CABLE FOR PARALLEL OPERATION

The extension cable is used for parallel operation of another MDP Multi-Metering System.



1	10-pin plug, connection to the first implement
2	Open wire ends, terminals on the seeder for: • Seeding shaft motor • Fan • Fill level sensor • Calibration button • Seeding shaft speed sensors

Order number:
00410-2-245

Figure 8

4.3 ISOBUS CONNECTION CABLE

The connection cable connects the implement wiring harness to the ISOBUS socket of the tractor.



1	Connection with 16-pin plug (number 5 in Figure 3)
2	Connection with the ISOBUS socket on the tractor

Order number:
00410-2-170

Figure 9

CAUTION!
Before disconnecting the ISOBUS connection cable from the tractor, it is mandatory to turn off the tractor ignition. Otherwise, the saved values could be lost!

4.4 INSTALLATION MATERIAL AND OTHER ACCESSORIES

Depending on the implement configuration, the corresponding installation material, covers and other parts will be supplied.
Details about the different versions can be found in the enclosed conversion instructions.

5 INITIAL OPERATION

5.1 GENERAL INFORMATION ON THE CONTROL BOX

5.1.1 UPLOADING THE OBJECT POOL (IOP)

The first terminal onto which the object pool (IOP) is uploaded is stored as the preferred terminal. If the implement is connected once again, the control box will be immediately displayed. If the implement is connected to a different towing vehicle / terminal, it takes approx. 20 seconds to 4 minutes until the control box is displayed on the terminal.

5.1.2 STATUS BAR

The status bar is located in the upper area of the display, which is shown in every menu:

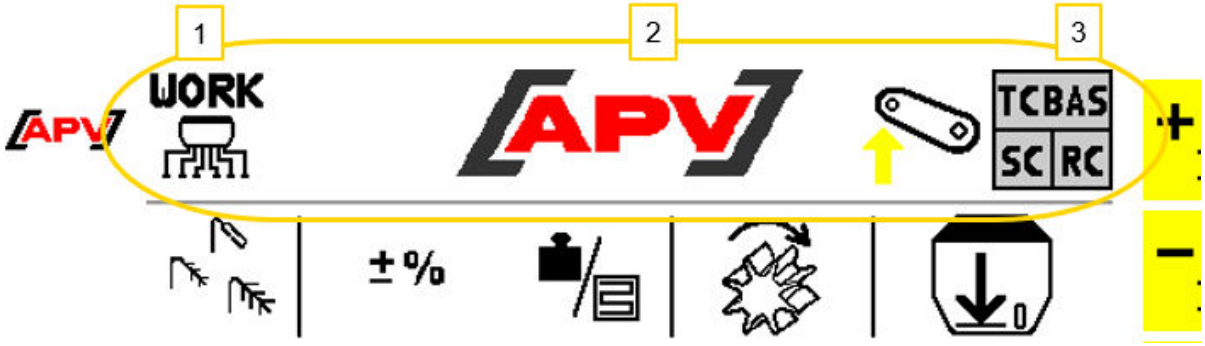


Figure 10

Description of the display elements

1 On the left in the status bar, the current menu is shown. In this case, it is the Work menu.

2 In the middle of the status bar, there is the APV logo. In case of errors, the logo is replaced by the corresponding error or warning message.

3 On the right side of the status bar, there is the symbol for the current working position or the current position of the mounted implement. The Task Controller status display is beside it. It provides information on which Task Controller function is currently activated.



The mounted implement is in working position.



The mounted implement is not in working position.



The Task Controller status display provides information about which task function is currently activated on the ISOBUS. This field has different colours, depending on the activated function.



TC-BAS:
With this function, jobs can be simply documented. The values that are relevant for this are provided to the tractor.



TC-SC:
With this function, part-width sections can be automatically switched.

TC-RC:
With this function, variable spread rates can be used for operation.
When working with 2 part-width sections (e.g.: PS Twin, 2x MDP, 2x MDG or 2x MDC) or with 2 seed types (e.g.: PS Twin), the RC display turns green as soon as a part-width section is working with variable spread rates.

Grey:
- The Task Controller is not connected.
- The towing vehicle does not support this ISOBUS function.
- This ISOBUS function is not activated on the towing vehicle.

Yellow:
- The Task Controller is connected, but it is not activated.

Green:
- The respective function is active.

Section 6.3.4 describes how the position or the utilised signal of the working position is changed.
Section 6.3.6 describes how to enter settings for the Task Controller.

5.1.3 STOP BUTTON

The STOP button can be found in every menu. This button executes a general STOP of all motors.



Figure 11

Description of the button functions



Grey: no actuators are switched on.



Red: motors are switched on and can be stopped with this button.

5.2 BASIC SETTINGS MENU

For initial operation or when pressing and holding the Set button in the Start menu for five seconds (see also Point 6.1), the basic settings for the utilised seeder must be entered (e.g. settings for the implement and fan type, seeding shaft motor, etc.).

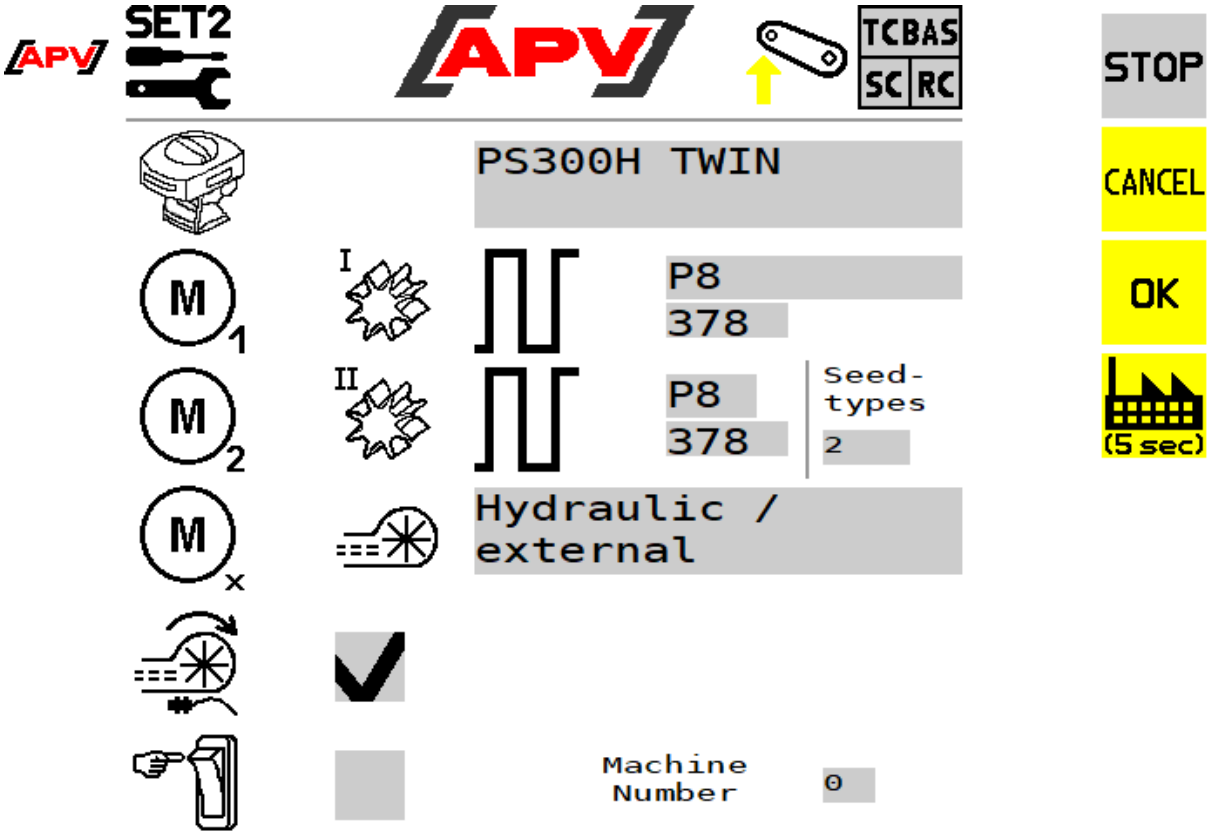
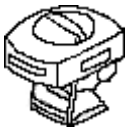


Figure 12

Description of the button functions

CANCEL	The Basic settings menu is exited without saving the modified settings.
OK	The Basic settings menu is exited and the modified settings are saved. When the settings have been changed, the control box is restarted.
(5 sec)	By pressing and holding this button for 5 seconds, a factory reset is performed, i.e. all of the settings are reset and the Basic settings menu is called up again. The corresponding implement must then be set there again.

Description of the display elements



Selection of the implement type. The following selections are available:
PS120E, PS120H, PS200E, PS200H, PS300E, PS300H, PS300E TWIN, PS300H TWIN, PS500E, PS500H, PS800H, PS1600H, LF600, MDP40, MDP100, MDG40, MDG100, MDC40, 2xMDP, 2xMDG and 2xMDC
Here, "E" stands for electric fan and "H" for hydraulic fan. If "2x" is written in front of an implement designation, two implements are controlled.
Note: When the correct implement is selected, nothing may be changed in the settings for the "Seeding shaft motor", "Number of pulses per revolution", "Fan" and "Fan speed sensor".

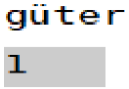


Selection of the seeding shaft motor or pumps (installed in LF600) and its number of pulses per revolution. For the PS TWIN implement type, a second motor can be selected.

Note: when selecting the implement type and the seeding shaft motor, the default values are automatically displayed.
The following default values are stored:

- P8 motor (installed in PS120 – PS500, PS TWIN): 378
- P17 motor (installed in PS800 – PS1600): 1024
- Pump EF5500 (installed in LF600): 400
- Pump EF7000 (installed in LF600): 400

CAUTION!
The default values (pulses per revolution) for the motors may not be changed!



Selection of the number of seed types to be spread with the PS TWIN, 2x MDP and 2x MDC implement types:

- one seed type (with part-width section function)
- two seed types (across the same working width)



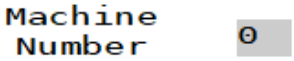
Selection of the existing PS fan. The following selections are available: electric fan, electric fan PLUS, hydraulic/external fan or no fan (OFF).



When using a hydraulic fan, you must select whether a sensor is installed on the PS for fan monitoring (speed sensor).



Setting whether a calibration button is installed on the implement (available as an accessory).



Implement number: If two APV implements are operated in parallel on the ISOBUS, the APV implements must be assigned with numbers. You can find more information under Point 5.3 and in the corresponding conversion instructions.

TIP!
Depending on the selected settings, not all of the points will be requested. The settings can be changed retroactively, as described under Point 5.2.

NOTE!
When opening the Basic settings menu, all actuators are switched off.

5.3 TWO APV IMPLEMENTS ON THE ISOBUS

To be able to operate two APV implements in parallel on the ISOBUS, you need the item Accessories Kit ISOBUS M2 splitter APV-APV 04000-2-931.

CAUTION!
Before beginning the conversion work, the control box must be switched off and the implement cable must be disconnected from the control box!

CAUTION!
Observe the maximum current rating of the ISOBUS.

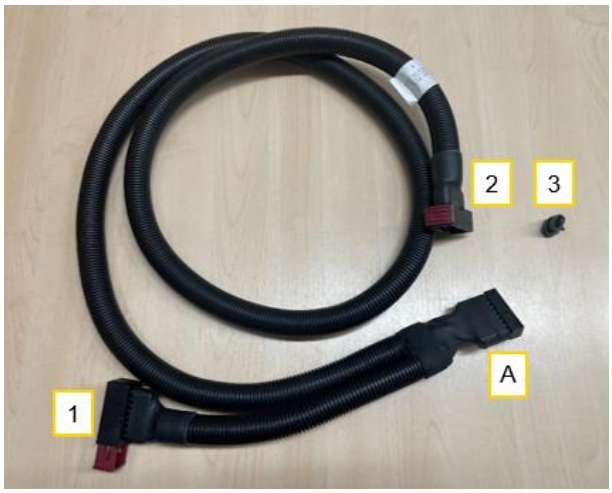


Figure 13

1. Connect the splitter cable (see Figure 13) at end "A" with the "ISOBUS implement cable" mounting kit.
2. Connect APV implement no. 1 at end "1". Do not use an extension cable for this.
3. Connect the "ISOBUS implement cable" mounting kit to the tractor.
4. Start the tractor.
5. The terminal connects to APV implement no. 1. This takes about 4 minutes.
6. When the implement is connected to the terminal, enter the SET2 menu by pressing the SET button for 5 seconds.
7. Set the implement number to "1".
8. The implement is then restarted and is immediately displayed on the terminal again.
9. There must be a "1" in the status bar. See Figure 14
10. Switch off the tractor.
11. Disconnect the ISOBUS implement cable from the tractor.
12. Connect end "2" of the splitter cable to APV implement no. 2.
13. Remove the terminating resistor on APV implement no. 1 and replace with a blind cap (3) (see splitter cable scope of delivery).
14. Connect the ISOBUS implement cable to the tractor.
15. Start the tractor.
16. APV implement no. 1 is immediately displayed.
17. APV implement no. 2 will be displayed approx. 4 minutes later.
18. Change the implement number to "2" for APV implement no. 2.
19. APV implement no. 2 is restarted and is immediately displayed.
20. Both APV implements are displayed on the ISOBUS and can be operated.



Figure 14

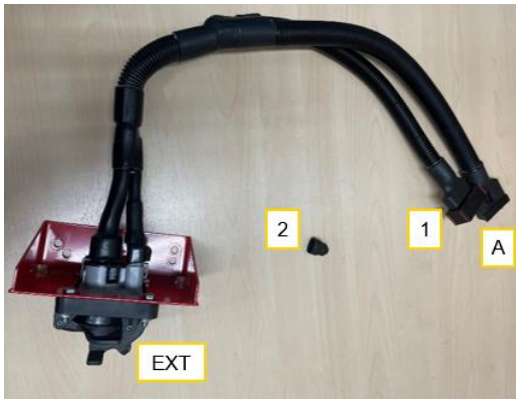
NOTE!
As soon as APV implement no. 2 is not needed and is disconnected, the terminating resistor must be connected for APV implement no. 1.

5.4 ONE APV IMPLEMENT AND ONE EXTERNAL IMPLEMENT ON THE ISOBUS

To be able to operate one APV implement and one external implement in parallel on the ISOBUS, you need the item Accessories kit ISOBUS M2 splitter APV-EXTERNAL 04000-2-930.

CAUTION!
Before beginning the conversion work, switch off the control box and disconnect the implement cable from the control box.

CAUTION!
Observe the maximum current rating of the ISOBUS.



1. Connect the splitter cable (see Figure 15) at end "A" with the "ISOBUS implement cable" mounting kit.
2. Connect the APV implement to end "1".
3. Remove the terminating resistor there and replace with the blind cap (2) (see splitter cable scope of delivery).
4. Connect "EXT" external ISOBUS implement.
5. Connect the "ISOBUS implement cable" mounting kit to the tractor.

Figure 15

6 MENU STRUCTURE

6.1 START MENU

This screen appears after the control box has started up. From here, the different menus can be called up.



Figure 16

Description of the button functions:



In the Work menu, all of the important information for field operation is displayed. Here, the motors can be switched on or off and information such as the forward speed, working position, and seeding shaft speed is displayed. The Work menu is described in more detail under Point 6.2.



The implement settings are entered in the Set menu. Here, a calibration test is performed, the seed is selected or the forward speed is calibrated. The Set menu is described in more detail under Point 6.3.

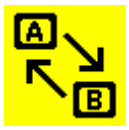
If the button is pressed and held for 5 seconds, the Basic settings menu is called up. Here, basic settings can be entered (e.g. motor type or fan type). The Basic settings menu is described in more detail under Point 5.2.



In the Info menu, the area and hour counters are displayed. The Info menu is described in more detail under Point 6.4.



In the Diagnostic menu, the switching states of the sensors, the supply voltage and the power consumption of the motors are shown. The Diagnostic menu is described in more detail under Point 6.5.



This button is only shown if there are multiple terminals on the ISOBUS and they are detected by the ECU. Pressing this button switches to the next terminal. The object pool must then be uploaded on the next terminal. This takes up to 30 seconds. The terminal on which the control box is located is saved as the preferred terminal.

6.2 WORK MENU

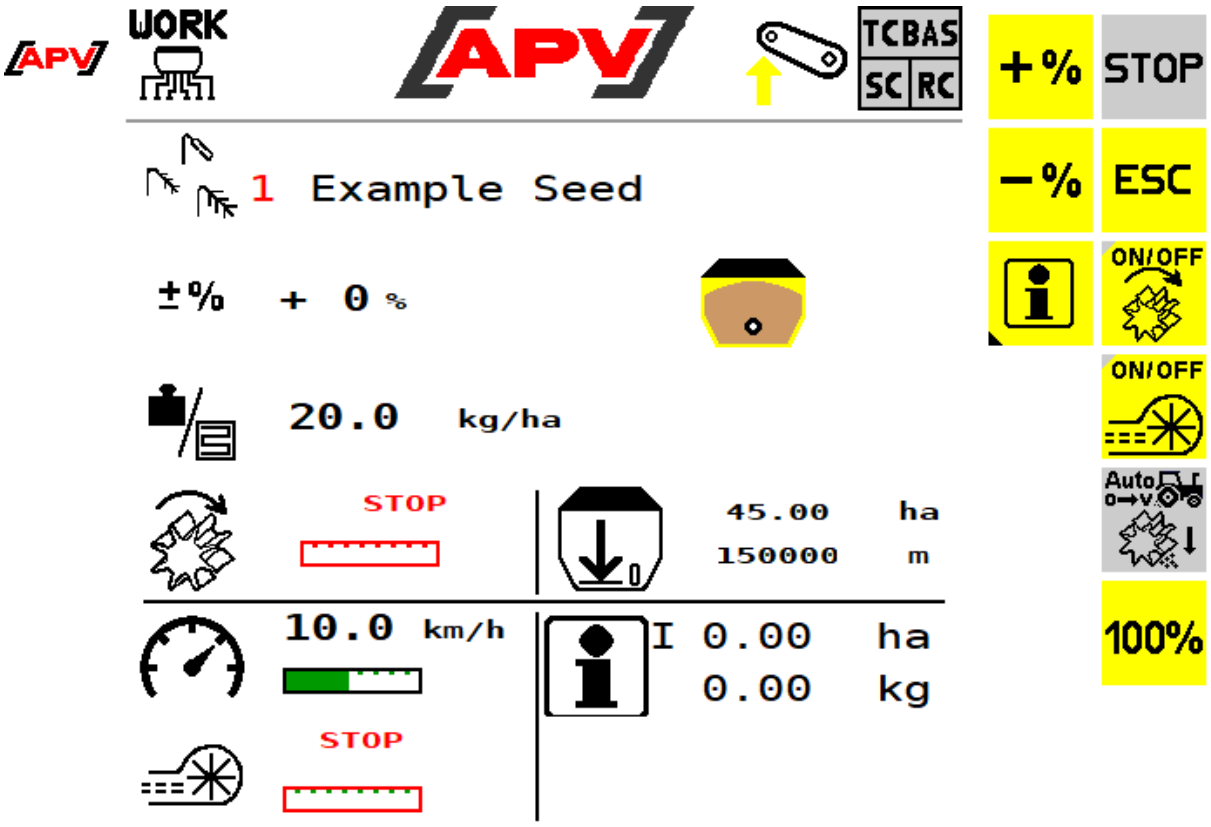


Figure 17

Description of the button functions



With the +% button, the spread rate can be increased during operation in 5% increments, up to a maximum of 95%.



With the -% button, the spread rate can be reduced during operation in 5% increments, down to a minimum of 85%.



With the ESC button, you go back one menu level, in this case, to the Start menu.



With the Info button, the Seed info menu for the currently selected seed is shown. The Seed info menu is described in more detail under Point 6.3.1.2.



With this button, the seeding shaft can be switched on or off.
If an electric fan is installed, it will start running automatically. Only then does the seeding shaft start rotating.



When the seeding shaft is activated, it is coloured green.



With this button, the electric fan can be switched on or off. If an electric fan is not installed, this button is hidden.



When the fan is activated, it is coloured green.



With this button, the pre-metering can be started.
Press and hold the button and the seeding shaft will rotate at the forward speed set in the pre-metering menu. When the button is released, the current forward speed is used again to regulate the seeding shaft.
This allows you to avoid gaps in the seeded area at the beginning of the field or when standing still on the field.



With the 100 % button, the spread rate can be set back to the value determined during the calibration test.

If the implement type PS TWIN is selected in the basic settings (see Point 5.2), an extended Work menu is available. It is described under Point 7.

Description of the display elements



Display of the currently selected seed, including the number in the seed library.



Display of the currently set change to the spread rate.

NOTE!
The spread rate can be both increased and reduced by 95%. Due to the non-linearity between an increase in the speed and the spread rate, it can no longer be guaranteed that the spread rates will be correct afterwards.
<u>Recommendation:</u> Change the spread rate by a maximum of approx. 50% if it needs to be precisely maintained.
Different spread rates for the same seed type can be saved in the seed library.



Yellow-brown: according to the fill level sensor, the hopper is full.



Red: according to the fill level sensor, the hopper is empty.
Settings for the fill level sensor are described under Point 6.3.2.



Display of the currently set spread rate.

NOTE: a valid calibration test must have been performed beforehand to be able to display a value.



Display of the current seeding shaft speed in %.
If the seeding shaft is switched off, STOP is displayed and the frame is coloured red. If the required seeding shaft speed cannot be reached, the bar is coloured yellow and an alarm is issued (see Point 7 for error messages).
If the seeding shaft is blocked (implement is lifted or forward speed is 0), the frame is coloured orange.



Display of the calculated still possible remaining area/remaining distance.
For the calculation, the fill quantity of the hopper must be entered in the Set menu (see Point 6.3.2).



Display of the current forward speed.
The black mark shows the forward speed set during the calibration test. If the forward speed becomes too high or too low, so that the required speed for the seeding shaft can no longer be maintained, the bar is coloured red and an alarm is issued (see Point 7 for controller messages).



Display of the seeded area and the spread quantity for each seed type.



Display of the current fan speed.
The black mark shows the set speed.
When using an electric fan, the speed is displayed in %. When using a hydraulic fan, the speed is displayed in rpm.
If the set speed limits are exceeded or undercut, the bar turns red and an alarm is issued (see Point 7 for controller messages).
Detailed information for setting the fan speed or the speed limits is provided under Point 6.3.8.

6.3 SET MENU



Figure 18

Description of the button functions



Pre-metering menu: here, in addition to setting the pre-metering speed, you can also set whether and for how long automatic pre-metering should be performed. The Pre-metering menu is described in more detail under Point 6.3.5.



Task Controller menu: here, all settings for the Task Controller such as mounting the implement, axle and seeding rail distances as well as switch-on/-off times can be entered. The Task Controller menu is described in more detail under Point 6.3.6.



With the ESC button, you go back one menu level, in this case, to the Start menu.



Empty hopper menu: here, the hopper(s) can be emptied.
The Empty hopper menu is described in more detail under Point 6.3.7.



Seed library: here, a seed type already saved can be selected or a new seed type can be created.
The seed library is described in more detail under Point 6.3.1.



Fan menu: here the rotational speed of the electric fan can be set. When using a hydraulic fan with speed sensor, the alarm limits can be set here.
The Fan menu is described in more detail under Point 6.3.8.



Fill menu: the fill quantity can be entered here. This can be used to calculated the possible remaining distance/area for display in the Work menu.
The Filling menu is described in more detail under Point 6.3.2.



Calibration menu: in the Calibration menu, in addition to the desired spread rate, the forward speed, the working width, the utilised seeding shaft and the desired calibration time are set. Afterwards, the correct seeding shaft speed is determined. The calibration test is always performed for the currently set seed type.
The Calibration menu is described in more detail under Point 6.3.3.



Tractor settings menu: here, the source for the forward speed and the working position can be selected and calibrated. Moreover, a signal when changing the working position can be selected and deselected.
The Tractor settings menu is described in more detail under Point 6.3.4.

6.3.1 SEED LIBRARY

In this menu, all of the saved seed types are listed. Seed types can be created and saved by means of a calibration test (see Point 6.3.3.2).

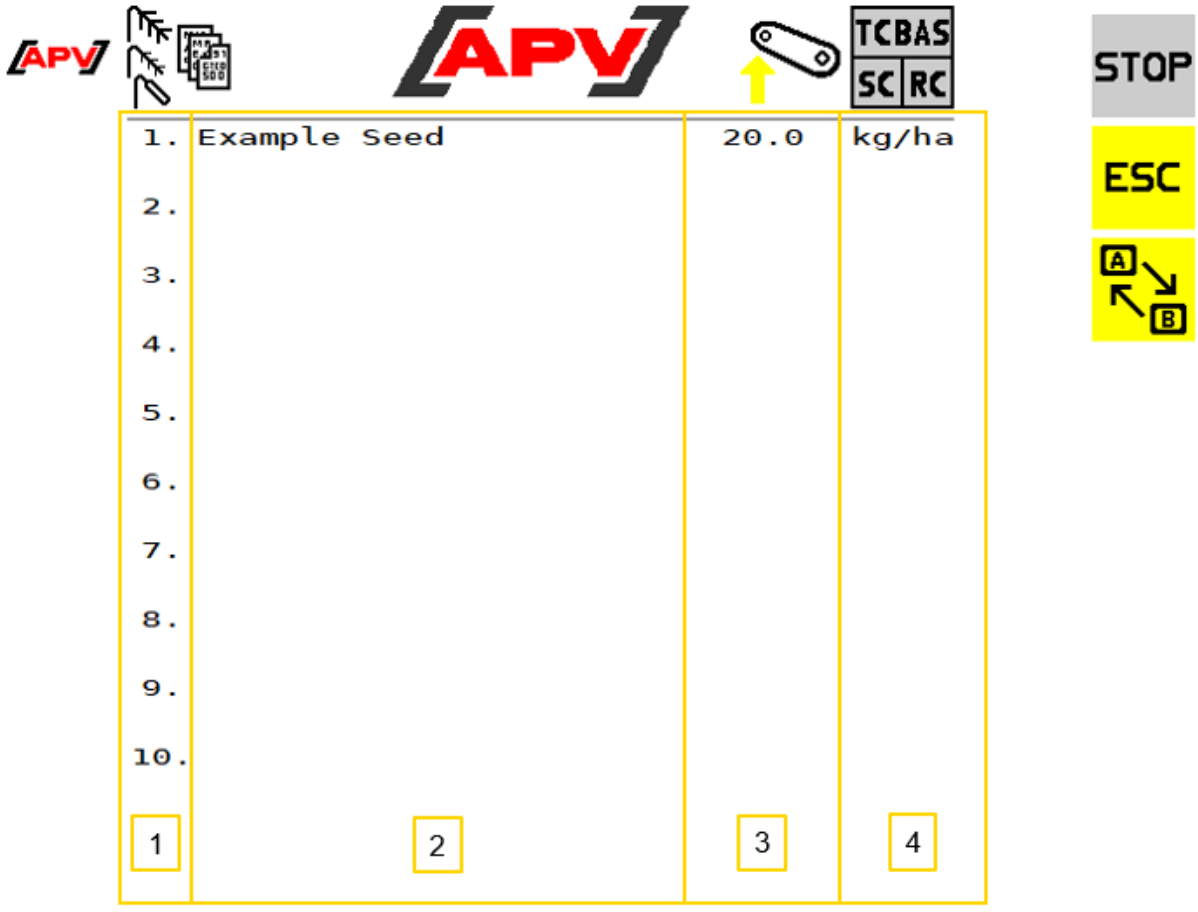
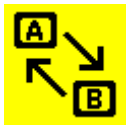


Figure 19

Description of the button functions



With the ESC button, you go back one menu level. In this case, to the Set menu.



This button is used to change to the second page of the seed library.

Description of the display elements

1	Memory location
2	Seed name
3	Spread rate
4	Unit (kg/ha, grains/m^2, l/ha)

6.3.1.1 SEED MENU

In this menu, all set parameters that were saved at last use of the seed type are displayed.

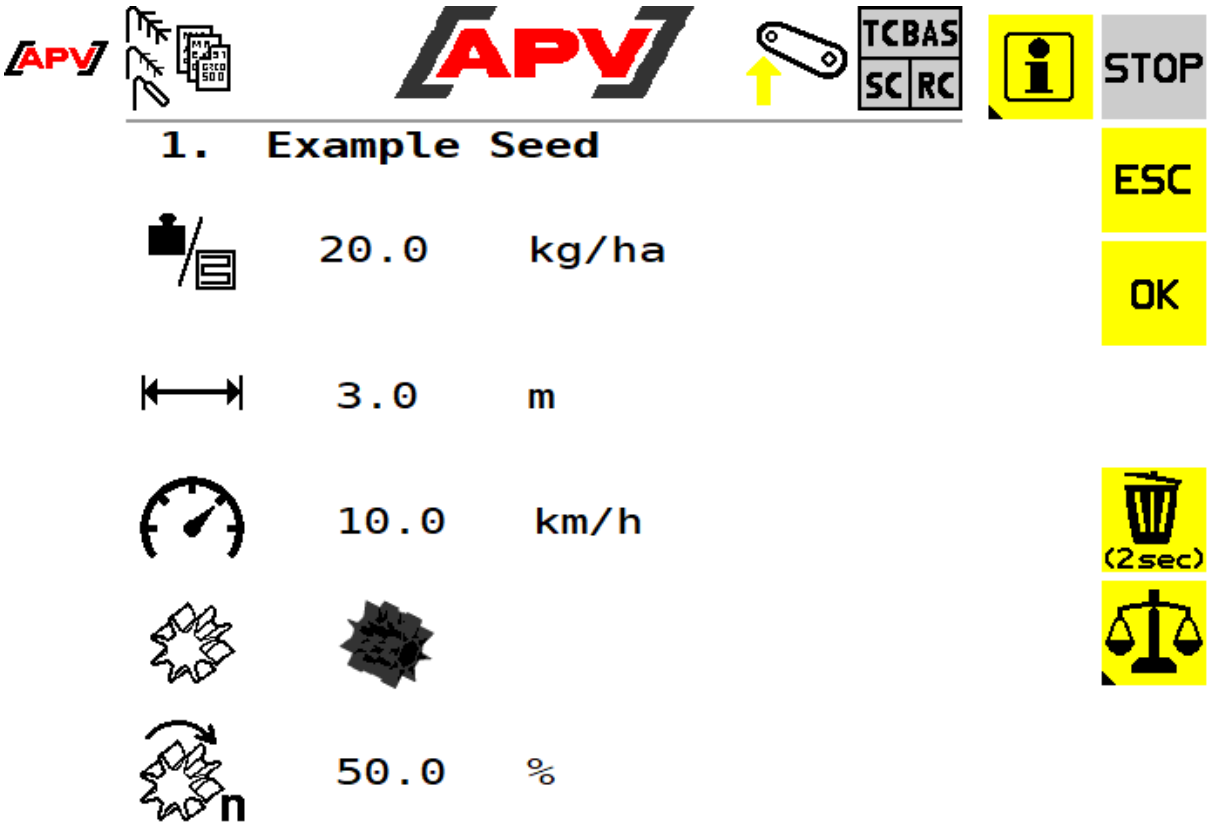


Figure 20

Description of the button functions



This button takes you to the Seed info menu. There, the seeded area, hours, spread quantity, and area output is displayed.
The Seed info menu is described in more detail under Point 6.3.1.2.



With the ESC button, you go back one menu level, in this case, to the seed library.



With the OK button, the seed type is applied and you go to the Work menu.
The Work menu is described in more detail under Point 6.2.



By pressing and holding this button for two seconds, the seed type is deleted and you switch to the seed library.
The seed library is described in more detail under Point 6.3.1.



With this button you go to the Calibration menu. There, the parameters can be changed and a new calibration test can be performed.
The Calibration menu is described in more detail under Point 6.3.3.

Description of the display elements



Display of the number and the seed name.



Display of the spread rate in kg/ha or grains/m².



Display of the working width of the implement.



Display of the working speed.



Display of the utilised seeding shaft.



Display of the calculated seeding shaft speed in %.

6.3.1.2 SEED INFO MENU

This menu shows seed type-specific trip counters and total counters.

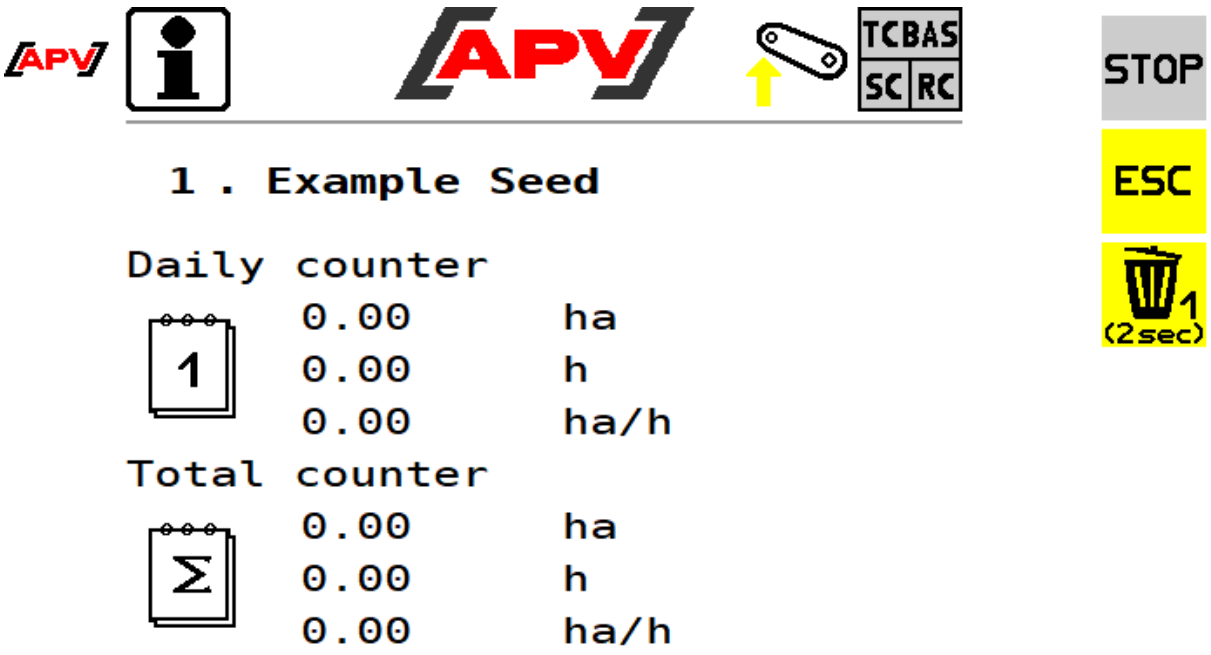


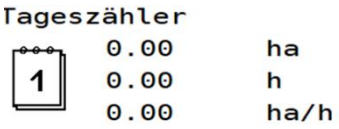
Figure 21

Description of the button functions

ESC — With the ESC button, you go back one menu level, in this case, to the Seed menu.

(2sec) — With the Delete button, the trip counter is reset to 0.

Description of the display elements



Display of the trip counter.
The trip counter can be reset by pressing and holding the Delete button (for 2 seconds).



Display of the total counter.
The total counter can only be set to 0 by deleting the seed type.

6.3.2 FILL MENU

Here, the current hopper fill level can be entered. This forms the basis for the calculated possible remaining distance/quantity that is displayed in the Work menu (see Point 6.2).

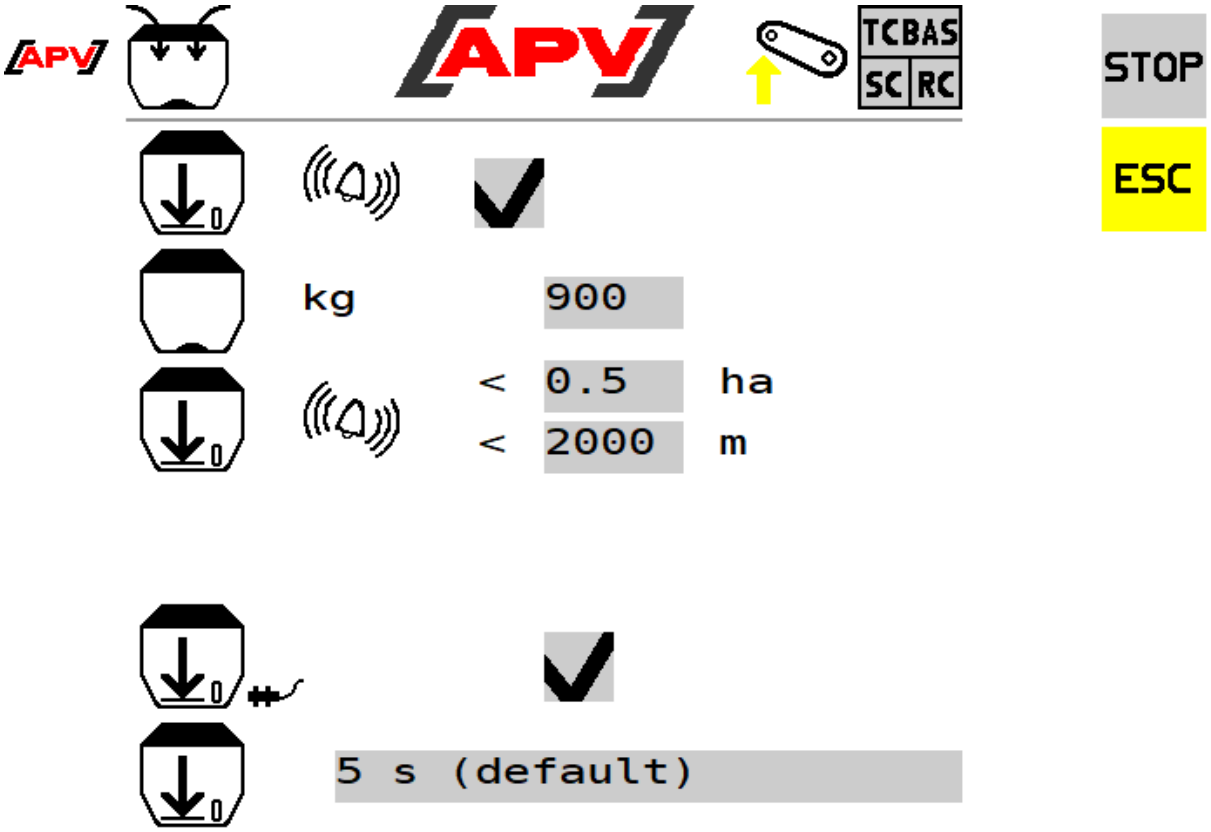


Figure 22

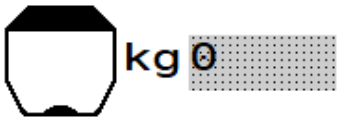
Description of the button functions

ESC With the ESC button, you go back one menu level. In this case, to the Set menu.

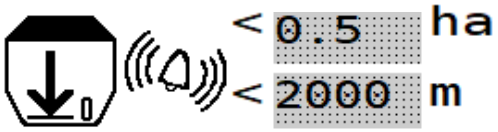
Description of the display elements



Here, the calculation of the remaining area/distance can be switched on and off.



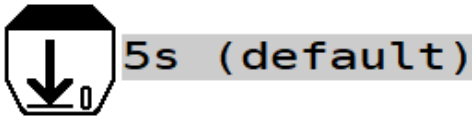
Here, the current fill quantity of the hopper can be entered or displayed.



Here, you can set the calculated still possible remaining area/distance at which the fill level message should appear.



Here, the output of the warning message for the fill level sensor can be activated or deactivated.



Here, the delay for the fill level sensor message after the sensor is no longer covered with seed can be set.

6.3.3 CALIBRATION MENU

In this menu, the parameters required for the calibration test are entered.

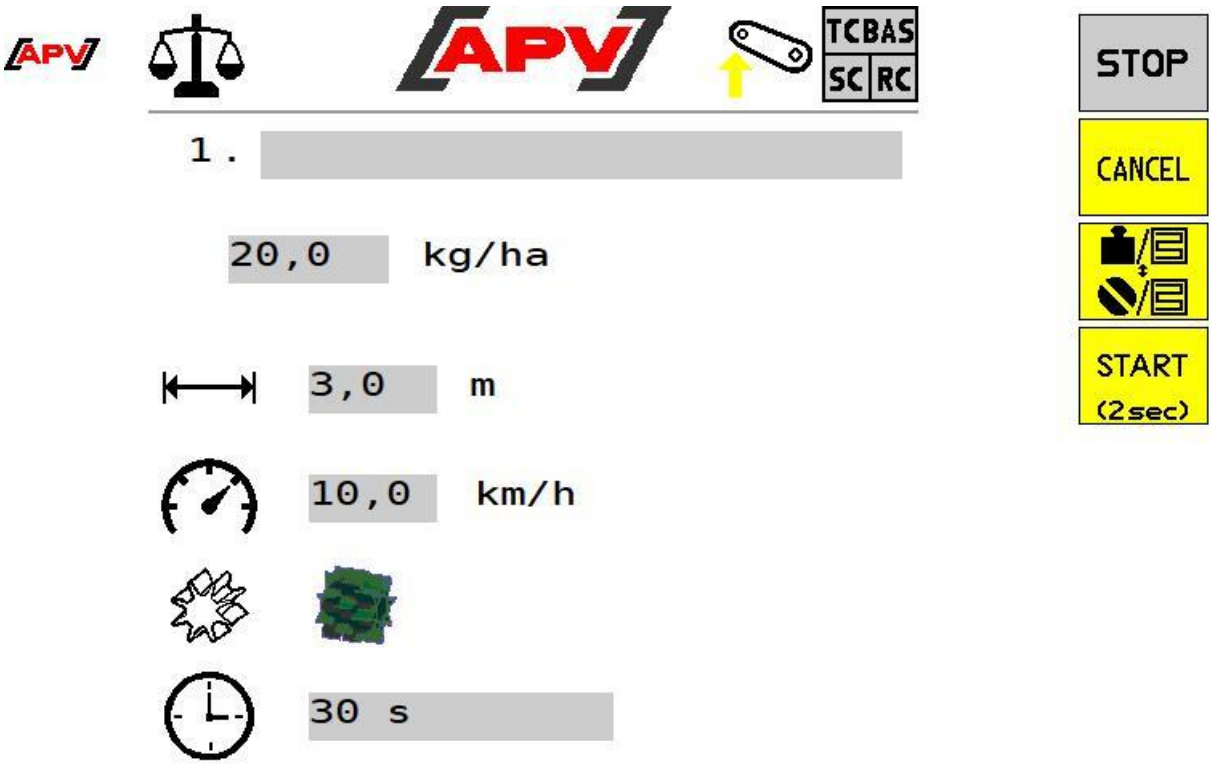


Figure 23

Description of the button functions

CANCEL

With this button, you go back one menu level. Either to the Set menu, the seed library or the Seed menu, depending on where you entered the Calibration menu from.

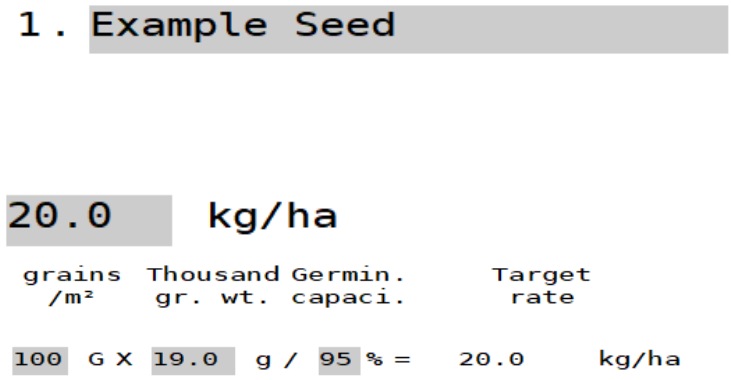


Here, you can select whether the calibration test is performed in kg/ha or grains/m².

START (2sec)

By pressing and holding the Start button (for 2 seconds), the calibration test is started.

Description of the display elements



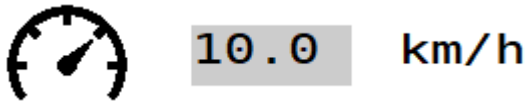
Here, the current number in the seed library as well as the name of the seed type are shown. If a name has not yet been assigned, the seed type can be named or renamed here.

Here, the desired spread rate in kg/ha is set.

If you want to perform the calibration test in seeds/m², you must set the desired number of grains per square meter, the thousand grain weight and the germination capacity.



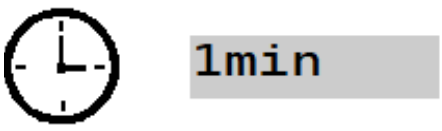
Here, the working width of the mounted implement is set.
Note: deduct any overlaps from the working width!



Here, the forward speed is set. If you are working with a speed sensor, the average working speed is entered.



Here, the utilised seeding shaft is set. This is saved in the seed library along with the seed type.
When calling up the seed type again, it must be ensured that the stored seeding shaft is used again; otherwise, the calibration test must be repeated.



Here, the desired calibration time (0.5 min, 1 min or 2 min) or area (1/40 ha, 1/20 ha, 1/10 ha) can be set. When selecting an area, the calibration time will be automatically calculated and displayed.

When using a calibration button (available as an accessory), this point is hidden.

CAUTION!
If values are changed in the Calibration menu, a new calibration test must be performed.

TIP!
For small seed types (e.g. canola, phacelia, poppy, etc.), a calibration time of 2 minutes is recommended. For larger seed types (e.g. wheat, barley, peas etc.), a calibration time of 0.5 minutes is enough.

If the implement type PS TWIN is selected in the basic settings menu (see Point 5.2), the additional information given in Point 7.2.1 must also be observed.

If the implement type LF600 is selected in the basic settings (see Point 5.2), a calibration test is not required. Here, proceed according to Point 8.

6.3.3.1 CALIBRATION TEST RESULTS PAGE

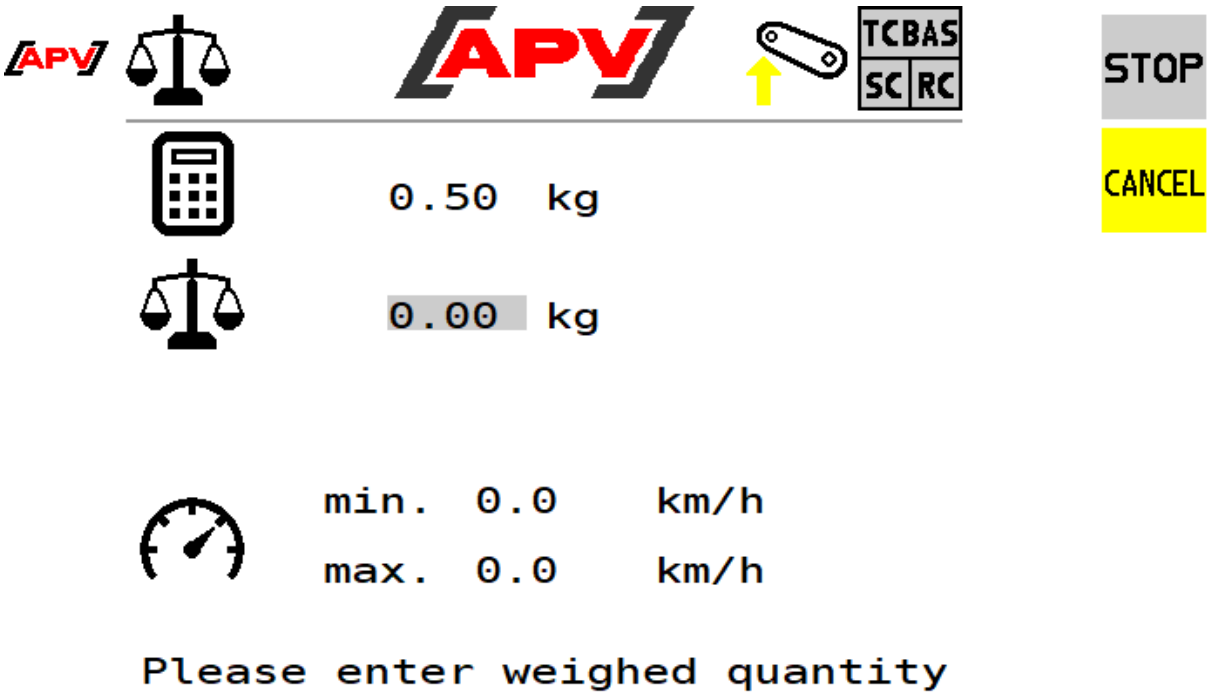


Figure 24

Description of the display elements



Here, the calculated spread rate is shown.



Here, the weight determined for the calibrated seed is entered.



Here, the minimum and maximum calculated working speed will be shown.

6.3.3.2 PERFORM A CALIBRATION TEST

During the calibration test, the suitable seeding shaft speed is determined for the selected settings (see Point 6.3.3).

NOTE!
A proper calibration test is important, as it is the only way to ensure that your desired spread rate is achieved.

The calibration test must be performed as follows:

1. The calibration button (see Figure 25) is pressed. The button can be found directly in the Set menu or in the Seed menu when selecting a seed type.
2. The settings described under Point 6.3.3 are entered.
3. The hopper is filled with sufficient seed.



Figure 25: calibration button

CAUTION!
It must be ensured that there is enough seed in the hopper of the seeder for the calibration test. The results would be falsified if the hopper runs out of seed during the calibration test.

4. The calibration lid of the seeder is removed and a calibration bag or a suitable container is placed on the seeder (here, the operating manual for the seeder must be observed).
5. The start button (see Point 6.3.3) is pressed and held for 2 seconds – the calibration test results page (see Point 6.3.3.1) will be shown automatically.
6. **Without calibration button:** the seeding shaft starts turning, the calculated spread rate (see Point 6.3.3.1) starts counting up.
   With calibration button:
   - The control box waits until the calibration button is actuated. The message "Actuate calibration button!" appears on the screen.
   - The calibration button is actuated at least until the calculated quantity is greater than 0.2 kg. If this weight is not reached, the following message appears: "Low calibration quantity. Longer calibration time recommended!" more reliably. In this case, the calibration test can be resumed by pressing the calibration button again.
   - When the calibration button is pressed, the seeding shaft starts turning, and the calculated spread rate (see Point 6.3.3.1) starts counting up.
7. Calculation of the spread rate is automatically stopped as soon as the set calibration time has expired or when the calibration button is released.
8. The calibrated seed is weighed and the determined weight is entered in the input box highlighted in grey on the calibration test results page (see Point 6.3.3.1).

CAUTION!
The weight of the calibration bag or calibration box must be deducted!

9. After the entry, the information "Calibration successful, confirm calibration test with "OK"", which is confirmed with the OK button.

   The seeding shaft will be then be calibrated to the entered value. The Control Box now calculates the seeding shaft speed resulting from the settings and the entered weight as well as the minimum and maximum working speed.
   If the calculated seeding shaft speed is within the possible motor speeds, the calibration test was successful.
   If the calculated seeding shaft speed is outside of the possible motor speeds, the following message is displayed, depending on the range.
   - "A finer seeding shaft is required! Repeat recommended!"
   - "A coarser seeding shaft is required! Repeat recommended!"

Change the seeding shaft accordingly and repeat the calibration test.
If you do not have a suitable seeding shaft, contact Customer Service.

If the message "Repeat calibration test" is shown, the deviation between the calculated spread rate and the weight of the calibrated seed is greater than 20 %.
In this case, the calibration test must be repeated to ensure the correct spread rate.
To do so, the displayed calibration test button is pressed, the calibration test must be repeated according to Point 6.3.3.2. The Control Box then automatically readjusts the seeding shaft speed to correct the deviation.

If the calibration test should not be successful even after multiple attempts, the cause of error can be found under Point 9.

10. After pressing the OK button, the seed details are shown (see Figure 26, the display elements are explained in Point 6.3.1.1). If the calibration test was successful, all of the settings are already saved at this time.

11. To switch to the Work menu, confirm with the OK button. If you want to go to the seed library, press the ESC button.

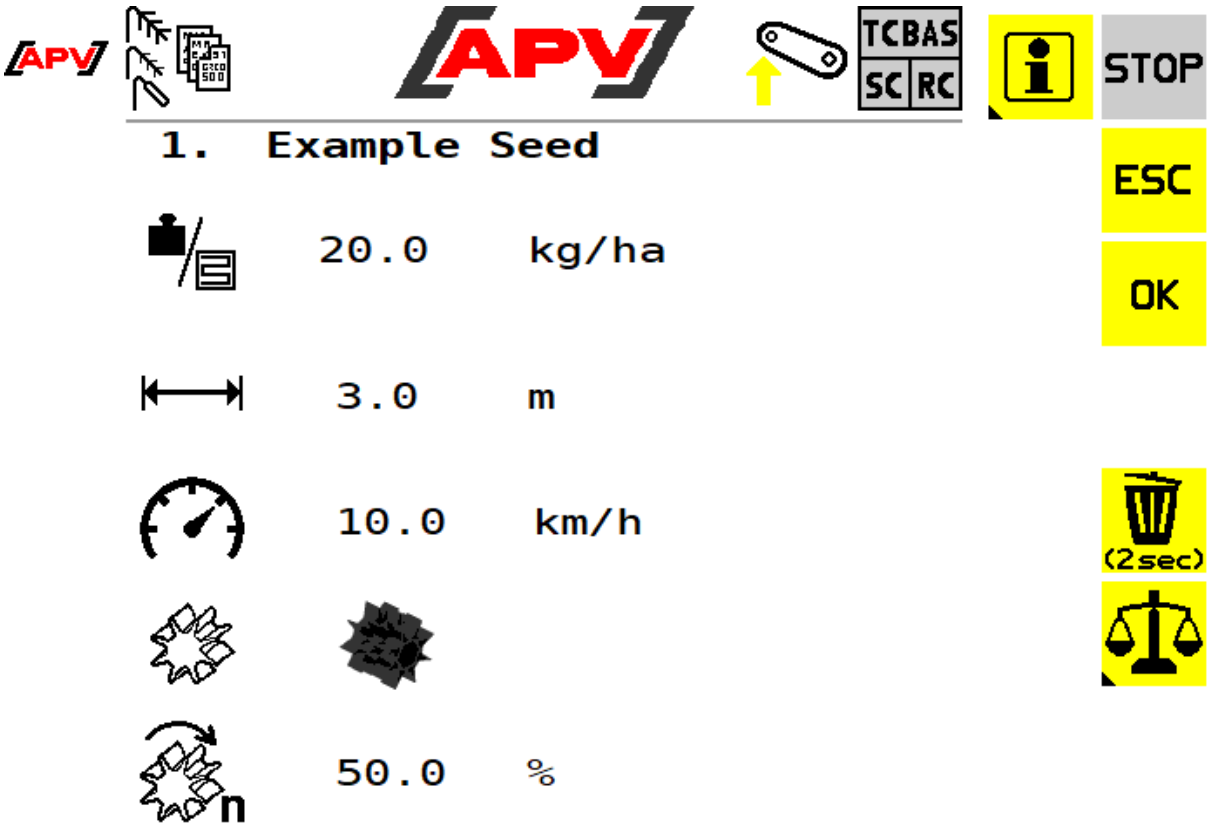


Figure 26

CAUTION!
After the calibration test, the seeding shaft speed should be at least 10% and at most 100%. The seeding shaft can be regulated down to 7.5%, however, there can be uneven seed distribution at these low speeds (checkerboard pattern). To achieve a higher seeding shaft speed, the corresponding seed wheels must be used.

NOTE!
Any change to the saved calibration parameters requires repetition of the calibration test.

6.3.4 TRACTOR SETTINGS MENU

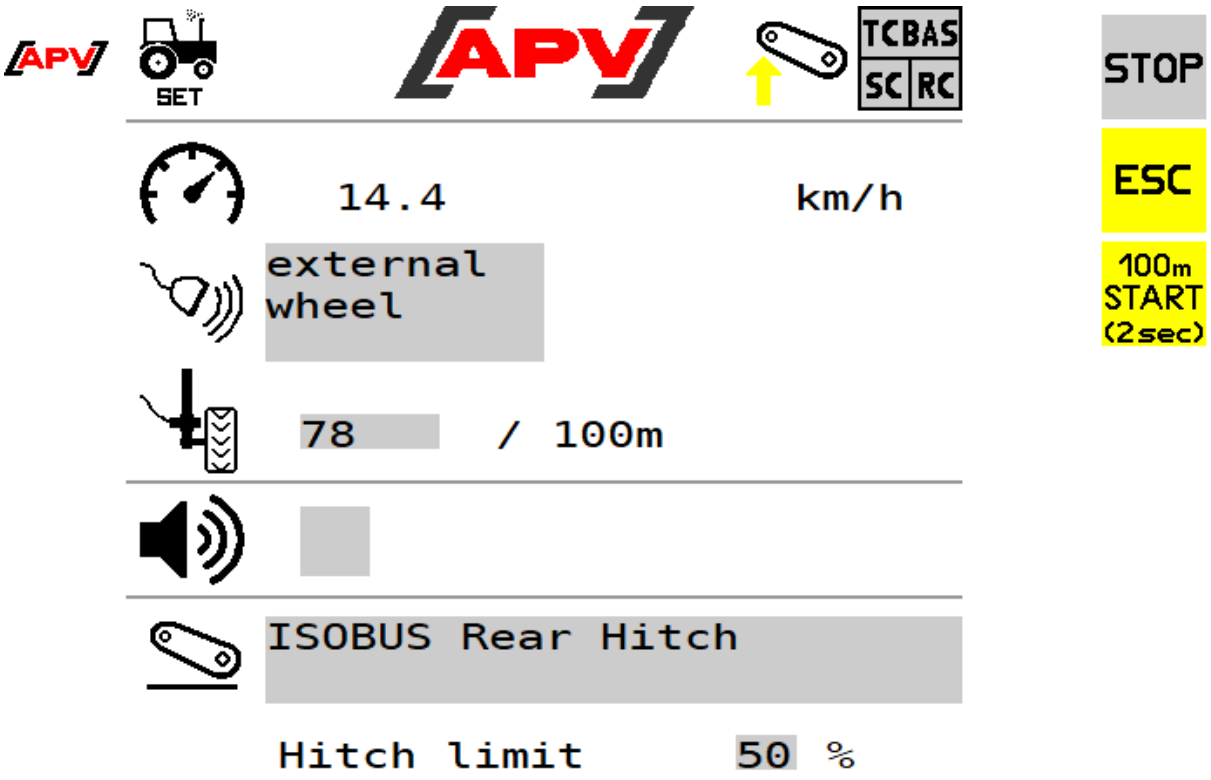


Figure 27

In this menu, the source for the forward speed and the working position signal can be set. Likewise, external speed sensors (wheel, radar, GPS sensor) can be calibrated. When using a speed sensor, it is necessary to calibrate the forward speed (except with the GPS sensor), since the seeding shaft speed is regulated based on the forward speed.

CAUTION!
It must be noted that not all tractors provide all speed or linkage signals on the ISOBUS!

Description of the button functions



With the ESC button, you go back one menu level. In this case, to the Set menu.



By pressing and holding this button (for 2 seconds), the 100-meter calibration test is started. The following INFO appears: "Drive for 100 m, then press 100 m STOP". This button only appears when the speed source is set to external radar/GPS or external wheel.



The 100 m Stop button appears as soon as the calibration test was started.
By pressing this button (for 2 seconds), the 100-metre calibration test is terminated and the value is saved. If the value is admissible, the message "Calibration successful, value accepted" appears, otherwise, the message "Calibration invalid, original value restored" appears.

Description of the display elements



Displays the currently measured forward speed.
If "N/A" is displayed, the selected speed signal is not available.



Displays the currently set speed source. The following parameters can be set:

ISOBUS Machine Selected: the speed is adopted from the tractor. Here, the signals are queried in the following sequence and the most accurate available signal will automatically be selected (the sequence corresponds to the signal accuracy): ISOBUS Ground Based, ISOBUS Wheel Based and ISOBUS GNSS Based.

- ISOBUS Ground Based: the speed is adopted from the tractor. The actual speed is used for this, usually from a radar sensor.
- ISOBUS Wheel Based: the speed is adopted from the tractor. The theoretical speed from the gearbox is used for this.
- NMEA2000: the speed is adopted from the tractor. The speed determined from a GNSS signal is used for this.
- External radar/GPS: the speed is taken from a radar or GPS sensor for this, which is installed on the implement.
- External wheel: the speed is taken from a wheel sensor for this, which is installed on the implement.
- Simulated: the speed is adopted from the speed set in the calibration test.
- J1939: the speed from an external GPS system or steering system is used.



Displays the current calibration value for the wheel, radar or GPS sensor. This symbol only appears when the speed source is set to external radar/GPS or external wheel.



Shows whether an acoustic signal is activated or not when the working position is changed.



Shows the current working position source. The following parameters can be set:

- ISOBUS rear linkage: The tractor sends a signal with the current lifting height of the linkage. With the "Linkage limit", you can set the height above which the mounted implement is in working position.
- ISOBUS rear linkage TECU: Binary rear linkage signal – in this case, the towing vehicle decides whether the implement is in working position or not.
- ISOBUS front linkage: The tractor sends a signal with the current lifting height of the linkage. With the "Linkage limit", you can set the height above which the mounted implement is in working position.
- ISOBUS front linkage TECU: Binary front linkage signal – in this case, the towing vehicle decides whether the implement is in working position or not.
- External: The working position signal is taken from a working position sensor that is installed on the implement.
- External inverted: The working position signal is taken from a working position sensor that is installed on the implement. In doing so, the input is inverted.
- External PNP: the working position signal is taken from a working position sensor that is installed on the implement.
- External PNP inverted: the working position signal is taken from a working position sensor that is installed on the implement. In doing so, the input is inverted.
- Not available / OFF: a working position signal is not available. The working position is always assumed to be "In operation".

Hitch limit 50 %

Here, you can set the linkage position above which the mounted implement is switched to "Working position" or "Lifted".
This display only appears if the working position source is set to "ISOBUS rear linkage" or "ISOBUS front linkage".

6.3.4.1 PERFORMING THE CALIBRATION TEST

There are two methods for calibrating the speed signal of the sensors:

- Manual calibration.
- Automatic calibration over a travelled distance of 100 metres.

Manual calibration

If the pulses per 100 metres for the respective sensor are known, this value can be directly entered under the calibration value symbol.



Figure 28: calibration value

Automatic calibration

With automatic calibration, the calibration value is determined automatically while driving a distance of 100 metres.

The procedure is as follows:

1. A straight distance of 100 metres is measured. The beginning and end of this distance are marked.
2. The tractor is positioned precisely at the beginning mark, e.g. front axle exactly over the mark.
3. The Tractor settings menu is selected.
4. The 100 m Start button is pressed and held for 2 seconds.
5. As soon as the message "Drive 100 m, then press 100 m STOP" appears, start driving. The control box now counts the pulses coming from the sensor.
6. Drive the tractor to the end mark, e.g. once more precisely with the front axle over the mark.
7. As soon as the tractor comes to a stop, the 100 m Stop button is pressed and held for 2 seconds.
   If the calibration was successful, the message "Calibration successful, value accepted" will be displayed. The calibration value is now saved.
   If the calibration was not successful, the message "Calibration invalid, original value restored" is shown and the original value is set (see Point 7 for possible causes of error).
8. The calibration must be tested by driving the tractor over a distance and comparing the speed displayed on the Control Box with that of the tractor.
   If the speeds do not match, the calibration test must be repeated.



Figure 29: Tractor settings menu



Figure 30: 100 m Start button



Figure 31: 100 m stop button

6.3.5 PRE-METERING MENU

In this menu, you can enter the settings for pre-metering. For pre-metering, as soon as a speed of 0.1 km/h or faster is driven, the set speed is used to regulate the seeding shaft. This allows you to avoid gaps in the seeded area (e.g. at the beginning of the field or when standing still on the field).

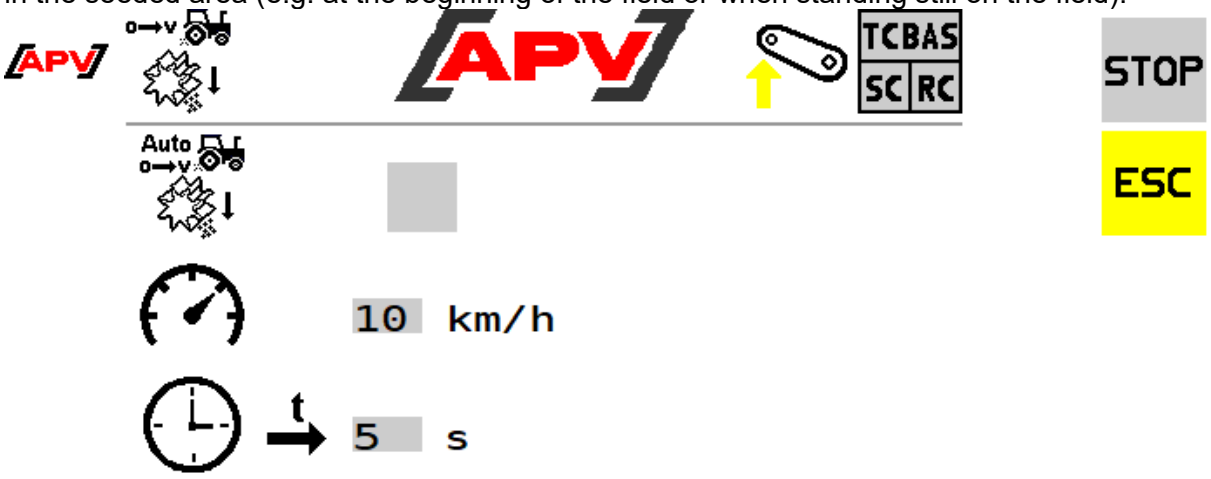


Figure 32

Description of the button functions

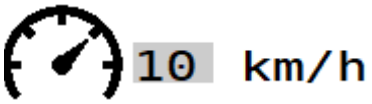


With the ESC button, the entries are confirmed and you go back one menu level; in this case, to the Set menu.

Description of the display elements



Here, the automatic pre-metering can be activated.
When it is activated, every time the implement is lowered at the beginning of the field (during the transition of the implement into working position), pre-metering is started with the set speed for the set duration.



Here, the speed at which the pre-metering should be performed is set. This speed is also used for manual pre-metering.



Here, the time during which the automatic pre-metering should run is set.

6.3.6 TASK CONTROLLER MENU

The settings required for the Task Controller differ depending on the set Connector Type.

CAUTION!
It is mandatory to observe the tractor settings! All settings for the Task Controller can also be changed with different terminals or towing vehicles. Therefore, the set values might possibly be overwritten.

NOTE!
If there is no valid calibration test, TC mode cannot be used.

6.3.6.1 TASK CONTROLLER MENU FOR MOUNTED IMPLEMENTS

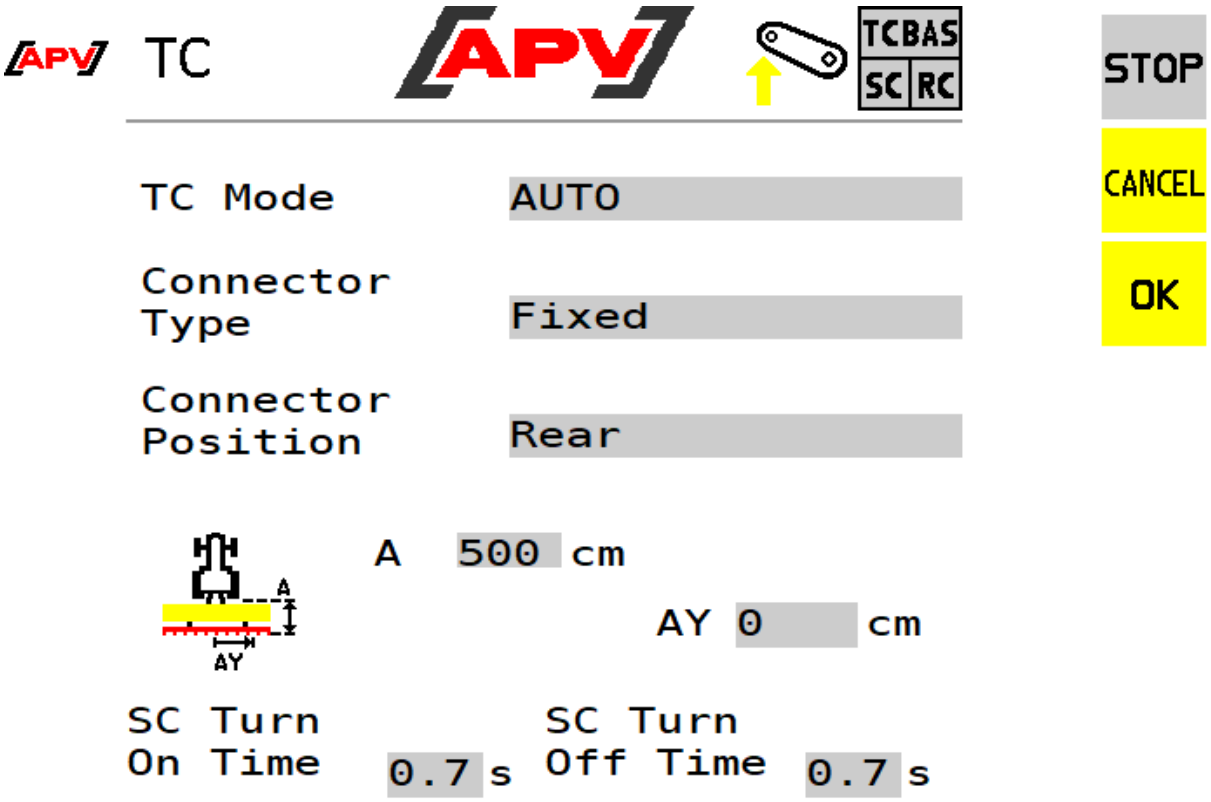


Figure 33

Description of the button functions

CANCEL

With the CANCEL button, the values are not adopted and you go back one menu level; in this case, to the Set menu.

OK

The set value is applied with the OK button.

Description of the display elements

TC Mode

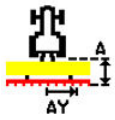
Here, the desired mode can be set. There is a choice between OFF, TC-BAS, AUTO, or ON. With OFF, the Task Controller is completely deactivated. With TC-BAS, the Task Controller is connected and activates the recording. With AUTO and ON, the Section and Rate Control functions are also activated. With AUTO, they are only used when they are also sent by the tractor/terminal, with ON, they must be sent.

Connector Type

Here, the connection of the implement to the tractor can be set. It can be switched between "mounted" and "trailed". Mounted implements refer to implements that are mounted on the tractor's linkage and do not have an axle. Trailed implement have an installed axle.
Depending on what is set here, the distances to be entered differ.

Anhänge
Position

If the implement is "mounted", a selection can still be made as to whether it is mounted at the rear "Rear" or at the front "Front".



A 500 cm

AY 0 cm

Settings when the connector type is set to "mounted":
Here, the distance (A) from the reference point of the tractor to the seeding rail is entered.
The reference point for a rigid mounted implement is the centre point of the lower link hooks.
The distance (AY) is used to move the seeding rail in the transverse direction. If 0 cm is entered here, the seeding rail is positioned precisely at the centre of the towing vehicle. With a positive entry, the seeding rail is moved to the right (in the direction of the arrow). With a negative entry, the seeding rail is moved to the left (opposite to the direction of the arrow).

SC Turn
On Time

Here, the time is entered that the seed requires to reach the soil after the seeding shaft is switched on. As a result, the implement can be switched on precisely at the field boundaries.

SC Turn
Off Time

Here, the time is entered that the remaining seed requires to reach the soil after the seeding shaft is switched off. As a result, the implement can be switched off precisely at the field boundaries.

If the implement type PS TWIN is selected in the basic settings (see Point 5.2), an extended Task Controller menu is available. It is described under Point 7.1.2.

6.3.6.2 TASK CONTROLLER MENU FOR TOWED IMPLEMENTS

APV TC APV TCBAS SC RC

STOP

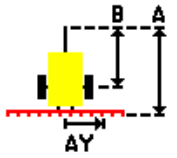
CANCEL

OK

TC Mode AUTO

Connector Type Trailed

Connector Position Rear



A 500 cm B 300 cm

AY 0 cm

SC Turn On Time 0.7 s

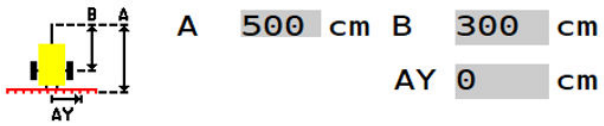
SC Turn Off Time 0.7 s

Figure 34

Description of the button functions

The functions correspond to the button functions for mounted implements (see Point 6.3.6.1).

Description of the display elements



Settings when the connector type is set to "trailed": Here, the distance (A) from the reference point of the tractor to the seeding rail and the distance (B) from the reference point of the tractor to the trailer axle are entered.

The reference point for a trailed implement is the centre point of the clevis pin for a clevis hitch and the centre point of the ball head or the lower link for a ball-head attachment. The distance (AY) is used to move the seeding rail in the transverse direction. If 0 cm is entered here, the seeding rail is positioned precisely at the centre of the towing vehicle. With a positive entry, the seeding rail is moved to the right (in the direction of the arrow). With a negative entry, the seeding rail is moved to the left (opposite to the direction of the arrow).

All other elements correspond to the display elements for mounted implements (see 6.3.6.1).
If the implement type PS TWIN is selected in the basic settings (see Point 5.2), an extended Task Controller menu is available. It is described under Point 7.1.2.

6.3.7 EMPTY HOPPER

In this menu, the residual seed can be emptied out of the hopper.

CAUTION!
CAUTION: before emptying, the calibration lid must be removed and the calibration bag must be attached (see operating manual for the seeder). Otherwise, the hoses can get blocked!



Figure 35

Description of the button functions



With the STOP button, emptying is terminated and you remain on the same screen.



With the ESC button, the emptying is terminated and you automatically go back one menu level; in this case, to the Set menu.



If this button is pressed and held for 2 seconds, the emptying procedure is started and the seeding shaft rotates at 100%.

If the implement type PS TWIN is selected in the basic settings (see Point 5.2), an extended Empty hopper menu is available. It is described under Point 6.3.7.

Description of the display elements

Emptying runs !

Indicates that the emptying procedure has been started.



If your implement is also equipped with a calibration button, the message "Actuate calibration button!" appears. When the calibration button is then actuated, the seeding shaft rotates at full speed.

6.3.8 FAN MENU

6.3.8.1 ELECTRIC FAN / ELECTRIC FAN PLUS

In this menu, the rotational speed of the electric fan can be set.

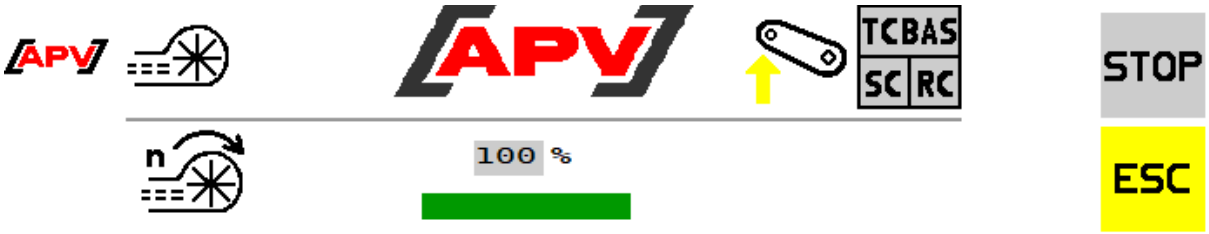


Figure 36

Description of the button functions



With the ESC button, you go back one menu level. In this case, to the Set menu.

Description of the display elements



Here, the desired speed for the electric fan can be set.
The fan speed must be selected according to the seeder operating manual. The setting range is between 20% and 100%.

6.3.8.2 HYDRAULIC FAN

In this menu, various settings can be entered for the hydraulic fan. The number of pulses from the speed sensor and the speed limits for the hydraulic fan can be set.

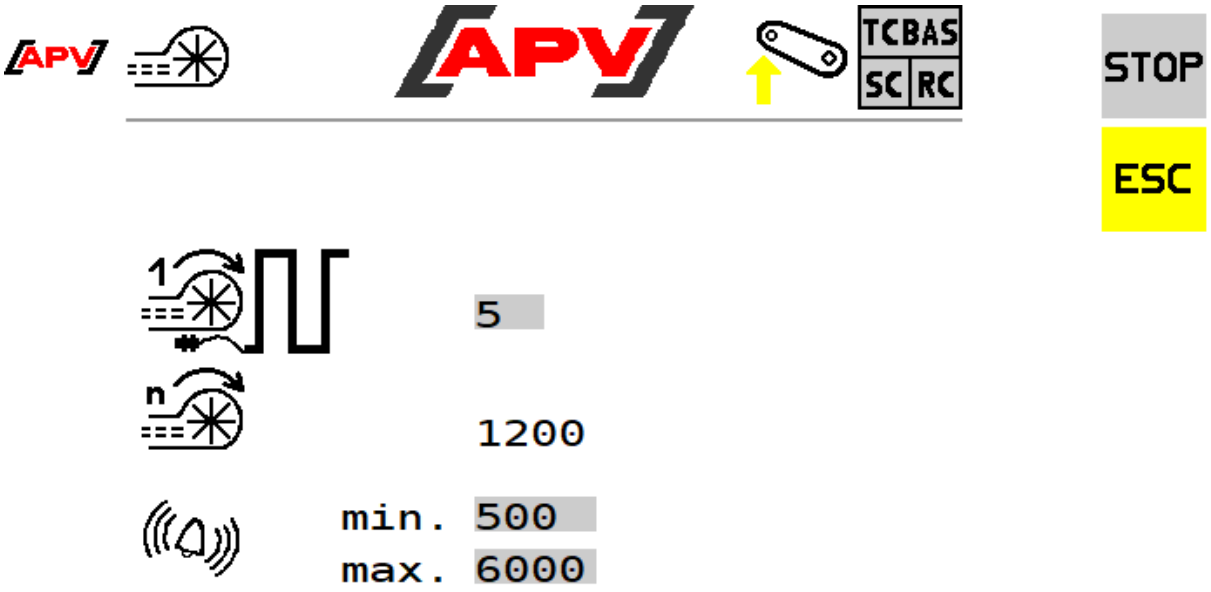


Figure 37

Description of the button functions

ESC — With the ESC button, you go back one menu level. In this case, to the Set menu.

Description of the display elements

Here, the number of pulses sent by the fan speed sensor per revolution can be set. The number of pulses must be selected according to the conversion instructions for the sensor.

The default value is 5 pulses per revolution. More detailed information on this can be found in the operating manual / conversion instructions for the respective seeder.

Display of the current fan speed.

min. 500
max. 6000

Here, the speed and the alarm limits for the hydraulic fan can be set. If you enter 0 revolutions per minute for "min.", the error message "Fan speed too low!" will be deactivated.

NOTE: the speed itself can only be adjusted through the oil quantity, directly on the tractor or on the hydraulic block of the seeder! Here, you must proceed as described in the seeder operating manual.

6.4 INFO MENU

In this menu, 3 different trip counters and a total counter are displayed. The trip counters can be reset individually.

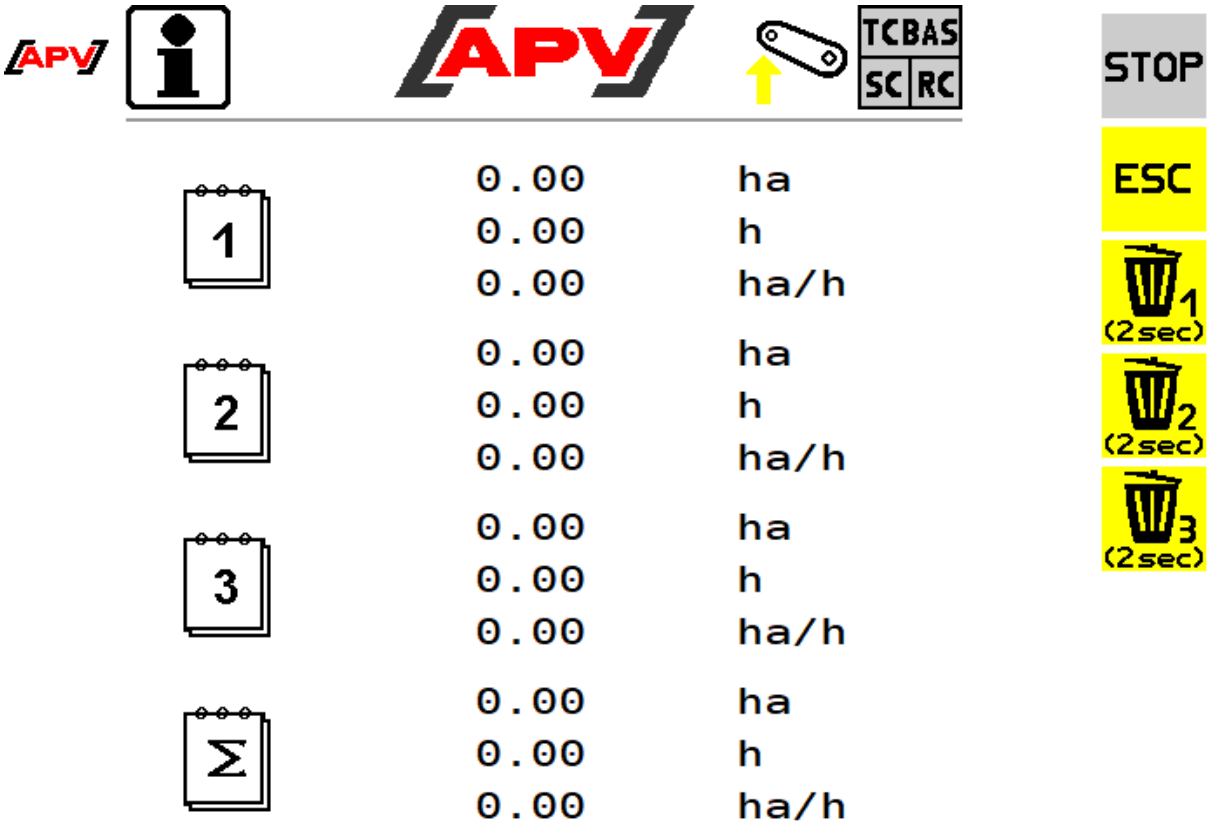


Figure 38

Description of the button functions

ESC — With the ESC button, you go back one menu level; in this case, to the Start menu.

1 (2sec) — By pressing and holding the Delete button for 2 seconds, the respective day counter is reset to 0.

Description of the display elements

1 — The trip counters show the worked area, the operating hours, and the area output since the last reset.

Σ — The total counter shows the total worked area, the total operating hours, and the average area output of the control box.

TIP!
The trip counters can be used e.g. for the respective field or day or the respective year.

6.5 DIAGNOSTIC MENU

In this menu, all of the important information for customer service is displayed. This includes the switching states of the sensors, the supply voltage, and the power consumption of the motors.

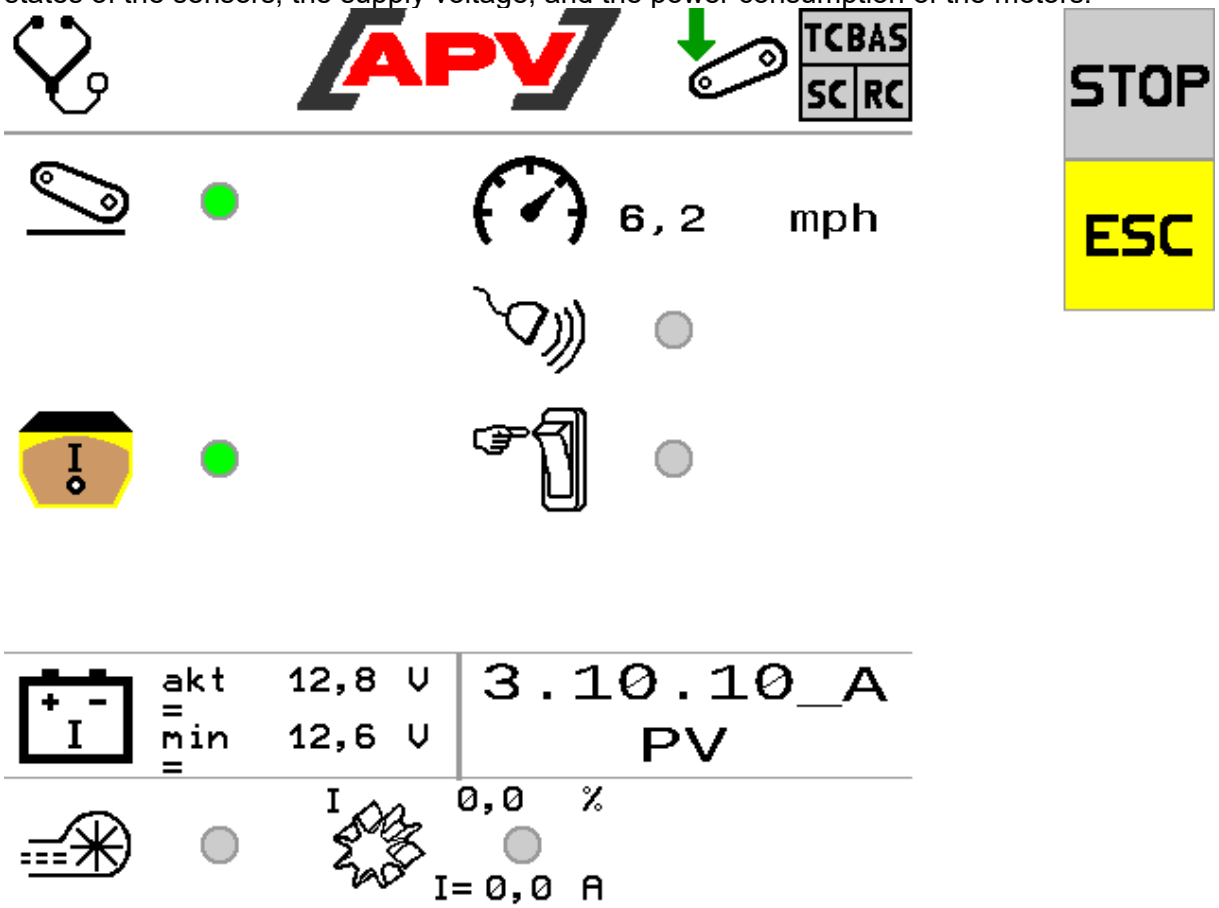


Figure 39

Description of the button functions

ESC — With the ESC button, you go back one menu level; in this case, to the Start menu.

Description of the display elements

Switching states of the individual sensors:

Linkage sensor input

Fan speed sensor input

Fill level sensor input



Calibration button input

Information on the speed sensors:

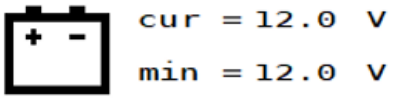


Current forward speed.
If "N/A" is displayed, the selected speed signal is not available.

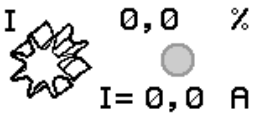


If a wheel, radar or GPS sensor input is used to determine the forward speed, this point is coloured green.

Measured voltage and the currents:



Here, the supply voltage measured on the Control Box and the minimum supply voltage since the start are displayed.



Here, the current of the seeding shaft motor measured by the Control Box is displayed. For the PS TWIN implement type, two displays are shown here.

7 SPECIAL FEATURES FOR PS300 TWIN, 2XMDG, 2XMDC AND 2XMDP

If a PS300 TWIN, 2xMDG, 2xMDC or 2xMDP is configured, it is possible to either spread one seed type with two sections beside each other or spread two seed types with the same working width behind each other. This is set in the Basic settings menu with the "Number of seed types to be spread" display element (see Point 5.2).
Per default, spreading with two seed types is stored for the PS300 TWIN and for 2xMDP. For 2xMDG and 2xMDC, spreading with one seed type is stored per default.

CAUTION!
For operation with only one seed type with the PS 300 TWIN, seeding shaft 1 must always spread on the left side in the direction of travel. For 2xMDG, 2xMDC and 2xMDP implements, Implement 1 (with the ISOBUS M2 Control Box) must always be attached on the left side in the direction of travel.

7.1 SPREADING OF TWO SEED TYPES

If "2" is selected for the "Number of seed types to be spread" display element in the Basic settings menu, two seed types can be configured in the Work menu.

It must be ensured that the same working width is entered for both seed types. If this is not the case, the message "Working widths inconsistent!" will be shown.
If the settings are still not changed, the larger entered working width will be automatically adopted for both seed types and used for spreading the seed. If the difference is large, it can cause the metering unit to operate outside of the normal operating range!
For this reason, it is always recommended to set the same working width for two seed types that are spread together.

7.1.1 WORK MENU

The Work menu is already described under Point 6.2. For the PS TWIN implement type, this menu was extended. Under this point, only the changed or new buttons and their functions are described.

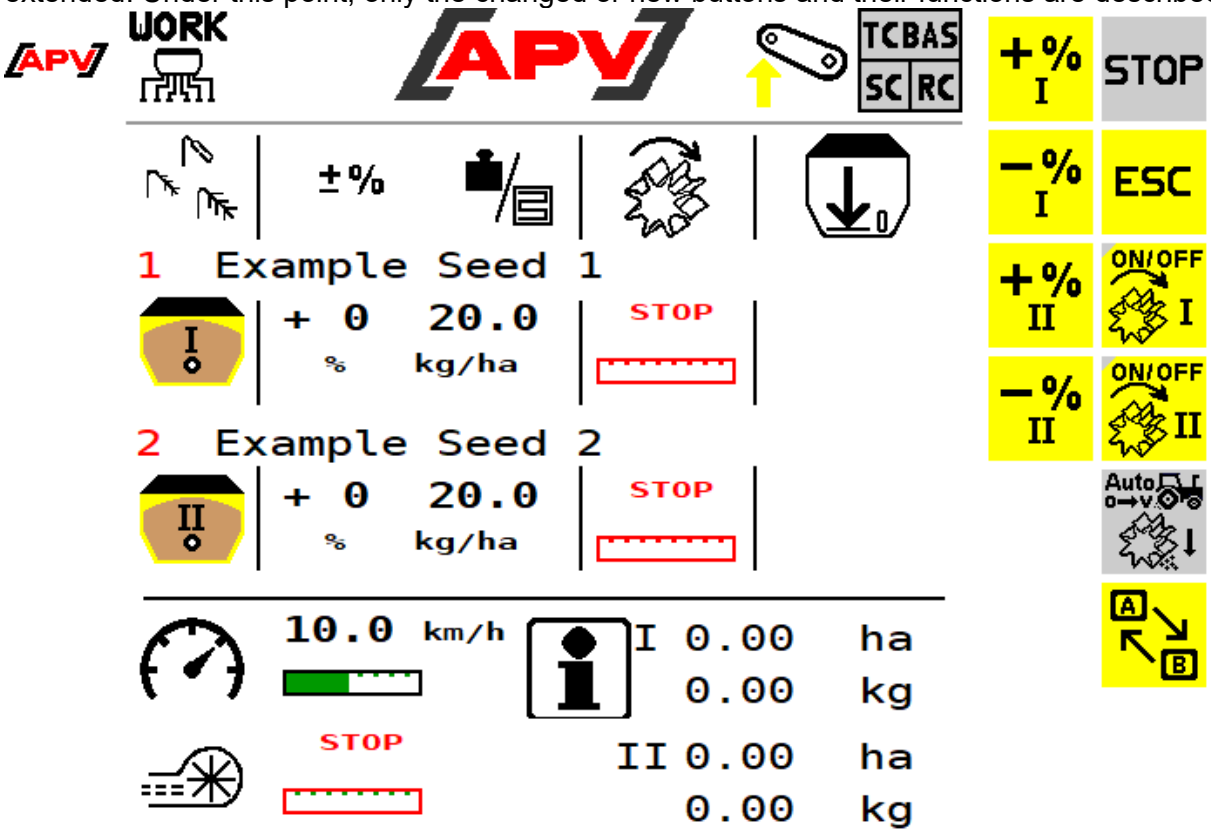
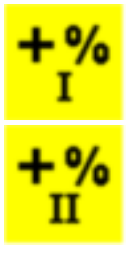
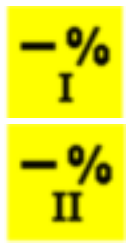


Figure 40

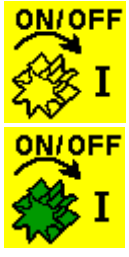
Description of the button functions



With the +% button, the spread rate for the respective seeding shaft can be increased during operation in 5% increments, up to a maximum of 95%.

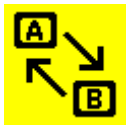


With the -% button, the spread rate for the respective seeding shaft can be reduced during operation in 5% increments, down to a minimum of 85%.



With this button, the respective seeding shaft can be switched on or off.
If an electric fan is installed, it will start running automatically. Only then does the respective seeding shaft start rotating.

When the respective seeding shaft is activated, it is coloured green.



With this button, the information, fan, and 100% buttons are shown. When it is pressed again, the display goes back to the screen shown in Figure 40.



With the 100 % button, the spread rates for both seeding shafts can be set back to the value determined during the calibration test. (If both seed types have the same working width)

7.1.2 TASK CONTROLLER MENU

CAUTION!
It is mandatory to observe the tractor settings! All settings for the Task Controller can also be changed with different terminals or towing vehicles. Therefore, the set values might possibly be overwritten.

The Task Controller menu is described under Point 6.3.6. For the PS TWIN implement type, this menu was extended. Under this point, only the changed buttons and their functions are described.
In this case with two different seeding rails, the Task Controller calculates which ones can also spread at different distances behind one another.

7.1.2.1 TASK CONTROLLER MENU FOR MOUNTED IMPLEMENTS

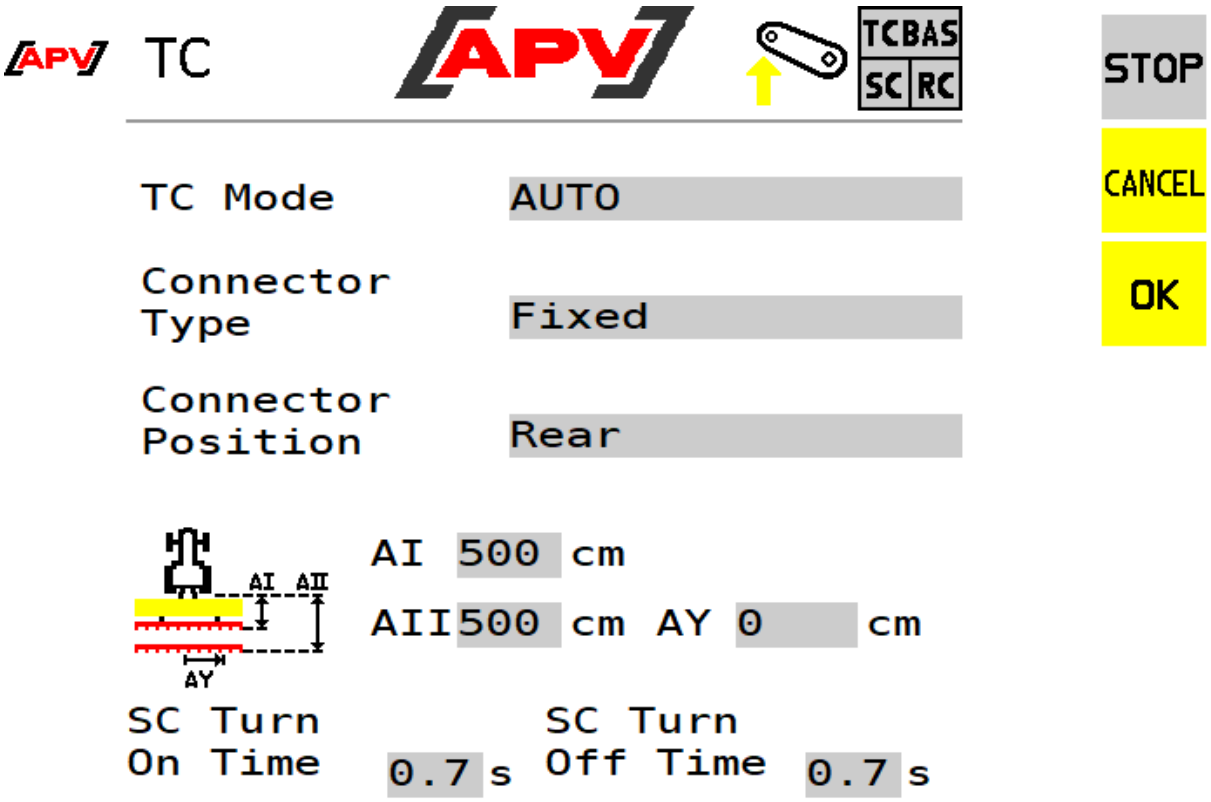
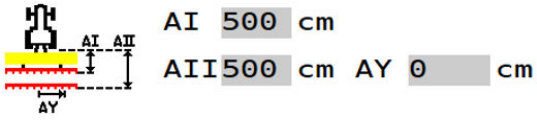


Figure 41

Description of the display elements



Settings when the connector type is set to "mounted":
Here, the distances (AI and AII) from the reference point of the tractor to the two seeding rails are entered. The reference point for a rigid mounted implement is the centre point of the lower link hooks.
The distance (AY) is used to move the seeding rail in the transverse direction. If 0 cm is entered here, the seeding rail is positioned precisely at the centre of the towing vehicle. With a positive entry, the seeding rail is moved to the right (in the direction of the arrow). With a negative entry, the seeding rail is moved to the left (opposite to the direction of the arrow).

7.1.2.2 TASK CONTROLLER MENU FOR TOWED IMPLEMENTS

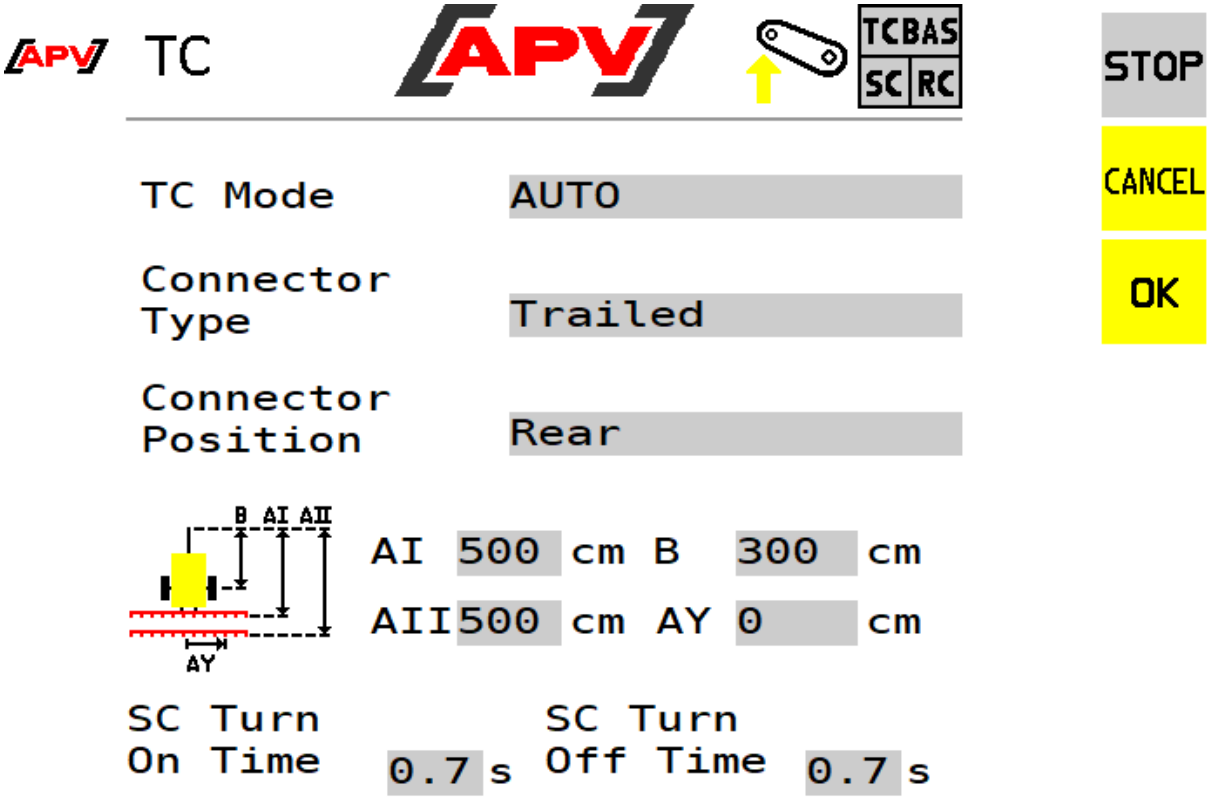
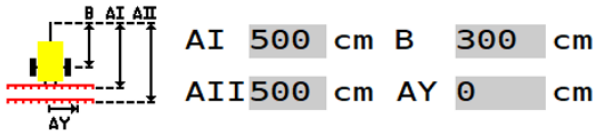


Figure 42

Description of the display elements



Settings when the connector type is set to "trailed": Here, the distances (AI and AII) from the reference point of the tractor to the two seeding rails and the distance (B) from the reference point of the tractor to the trailer axle are entered. The reference point for a trailed implement is the centre point of the clevis pin for a clevis hitch and the centre point of the ball head or the lower link for a ball-head attachment.
The distance (AY) is used to move the seeding rail in the transverse direction. If 0 cm is entered here, the seeding rail is positioned precisely at the centre of the towing vehicle. With a positive entry, the seeding rail is moved to the right (in the direction of the arrow). With a negative entry, the seeding rail is moved to the left (opposite to the direction of the arrow).

7.2 SPREADING OF ONE SEED TYPE

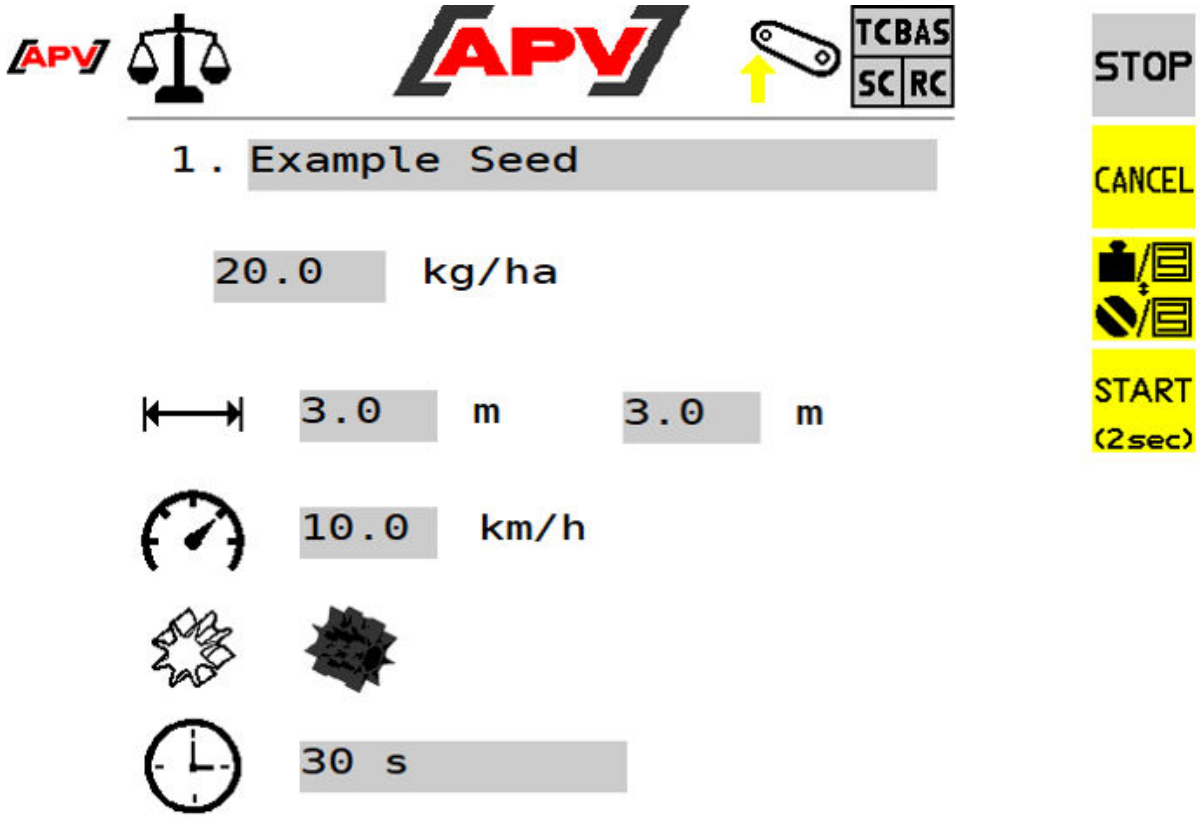
If "1" is selected for the "Number of seed types to be spread" display element in the Basic settings menu, only one seed type can be configured in the Work menu. Both seeding shafts are shown, which can be switched on and off separately.
Likewise, both sections can be individually switched on and off via the Section Control (SC) Task Controller function. In this case, the Task Controller calculates with one seeding rail that is divided into two sections.

CAUTION!
It is always assumed that seeding shaft 1 is always spreading on the left side in the direction of travel. For this reason, the implement with the ECU must always be attached to the left side in the direction of travel with the 2xMDG, 2xMDC and 2xMDP implements.
All other settings are the same as the normal PS application and can be found in the Task Controller menu under Point 6.3.6.

7.2.1 CALIBRATION MENU

For the calibration test, two working widths must be entered, i.e. one working width for each section. Adding these two part-width sections then result in the total working width.

NOTE!
If the calibration tests were already performed for 2 seed types, a new calibration test still needs to be performed again!



7.3 EMPTY HOPPER

The Empty hopper menu is described under Point 6.3.7. For the PS TWIN implement type, this menu was extended. Under this point, only the changed buttons and their functions are described.

CAUTION!
Before emptying, the calibration lid must be removed and the calibration bag must be attached (see PS TWIN operating manual).



Figure 43

Description of the button functions



If one of these buttons is pressed and held for 2 seconds, the emptying procedure is started for the respective seeding shaft and it rotates at 100%.

8 SPECIAL FEATURES OF THE LF600

The LF600 has a flow sensor, so that a calibration test is not required.
On the seed details page, the pump capacity is shown in addition to the set spread rate. The calculated minimum and maximum speed for the current settings is also shown.

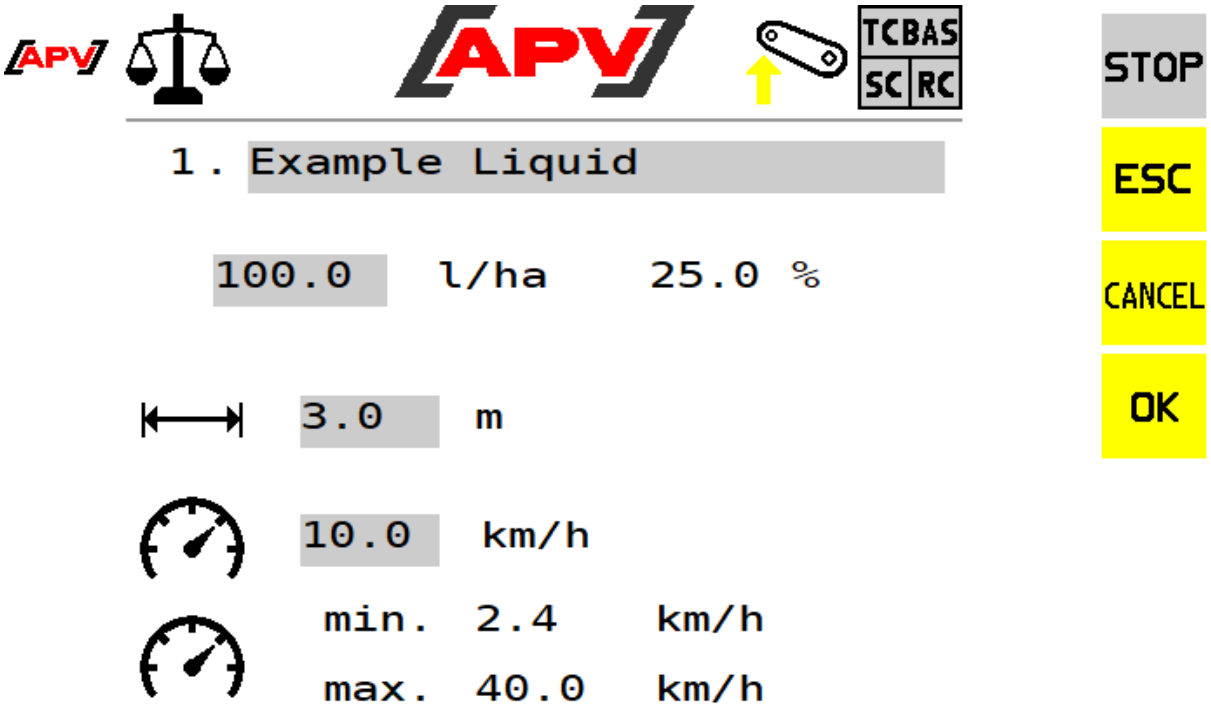


Figure 44

9 CONTROLLER MESSAGES

9.1 SUPPRESSING / ACKNOWLEDGING MESSAGES

An acknowledgement button appears simultaneously with a message, which can be used to suppress messages for a specific period of time:



By pressing the OK button, messages are acknowledged/deleted as soon as the error has been rectified.



By pressing the Snooze button, the messages are suppressed. But they are still shown in the status bar.
The Snooze button is not available for all messages, because a STOP of all actuators is performed in case of critical errors.

9.2 WARNINGS

Display	Cause	Solution
Battery voltage too low!	The supply voltage is below 10 V.	• Minimise consumers (e.g. work floodlights). • Check the battery. • Check the cabling. • Check the plugs. • Check the alternator.
Battery voltage too high!	The supply voltage is too high.	• Check the alternator.
Hopper I/II almost empty!	Is displayed as soon as the fill level sensor is not covered with seed for longer than the time set under Point 6.3.2.	• Refill seed. • Adjust the sensor (position further down). • Increase the delay time for the message.
Metering drive out of control range!	The specified/required seeding shaft speed cannot be maintained.	• Use larger/coarser seed wheels to reduce the speed. • Use smaller/finer seed wheels to increase the speed. • Adjust the speed • Reduce the spread rate
	LF 600: • A warning can be displayed during the start-up process. • Excessive system pressure. The pump switches off repeatedly for short periods.	• Adjust the speed • Reduce the spread rate • Leave the pump switched on until the system is filled • Reduce pressure in the system: larger nozzles, install more outlets

Display	Cause	Solution
Tractor speed too high!	The forward speed is too high and the seeding shaft can no longer readjust.	• Reduce the forward speed. • Use larger/coarser seed wheels. • Use more seed wheels on each outlet. • Reduce the spread rate.
Tractor speed too low!	The forward speed is too low and the seeding shaft can no longer readjust.	• Increase the forward speed. • Use finer seed wheels. • Use fewer seed wheels on each outlet. • Increase the spread rate.
Fan speed too high!	The speed of the hydraulic fan is higher than the upper limit set in Point 6.3.8.	• Reduction of the speed of the hydraulic fan. • The pulses per revolution parameter is set incorrectly, see Point 6.3.8.
ISOBUS working position signal not available!	The tractor is not providing a valid working position signal on the ISOBUS.	• Check whether the signal is deactivated in the tractor settings. • Use a different working position signal. • Consult with the tractor manufacturer customer service.

9.3 WARNINGS - TC "AUTO" MODE

Warnings when the implement is in the Task Controller AUTO mode:

Display	Cause	Solution
TC units inconsistent!	The units for the specified values from the Task Controller do not match the expected units.	• TC units must be verified.
TC specifications no longer available!	The TC specification is no longer available on the tractor side.	• Check the Task Controller.
TC specifications will be used!	The TC specification will be used, it only serves as information.	

9.4 ERRORS

Display	Cause	Solution
Operating voltage not OK!	• The supply voltage is below 8 V. • Excessive voltage fluctuations.	• Minimise consumers (e.g. switch off the work floodlights). • Check the battery. • Check the cabling. • Check the plugs. • Check the alternator.
Motor is overloaded (seeding shaft I)! Motor is overloaded (seeding shaft II)!	• A seed shaft is not able to rotate. • The motor has been strained too long at its limits!	• Switch off the control box! • Remove any foreign objects or similar from the seeding shaft or the agitator. • Switch off the agitator (with well-flowing seed). • Remove 1-3 spacing discs from the seeding shaft. • Check the set motor type. • Check the idling motor for proper function. • Refer to the seeder operating manual
Motor overloaded (pump)!	• Short circuit on the pump	• Check the connections
Error (fan)!	Only with electric fan: Is displayed when the implement cable is not connected or the cabling is faulty.	• Check the cabling. • Check the plug on the motor module. • Read the error message on the motor module (motor overloaded or motor not connected) and fix the error according to the seeder operating manual.
Fan speed too low!	Only with hydraulic/external fan: • Seeding shaft I AND/OR II active. • The fan speed is below the minimum speed.	• Switch on the hydraulic fan. • Increase the fan speed. • The pulses per revolution parameter is set incorrectly, see Point 6.3.8.2. • The fan speed limit was incorrectly set, see Point 6.3.8.2.
Motor not connected (seeding shaft I)! Motor not connected (seeding shaft II)!	Is displayed when the implement cable is not connected or the cabling is faulty.	• Check the cabling.

Display	Cause	Solution
Motor not connected (pump)!	• The pump's safety switch is being triggered by overpressure in the system.	• Reduce pressure in the system: larger nozzles, install more outlets. • Check for blockage and eliminate if necessary
No motor speed (seeding shaft)!	Power consumption at the motor, but no feedback that it is rotating.	• Check the terminal connections on the seeder (especially the ENC encoder). • Contact Customer Service.

9.5 ERROR - TC "ON" MODE

If the TC mode is switched on, the following messages are issued as errors. As a result, all actuators will be switched off for these warnings.

Display	Cause	Solution
TC units inconsistent! Boom I TC units inconsistent! Boom II	The units for the specified values from the Task Controller do not match the expected units.	• Check the TC unit of the utilised terminal or towing vehicle.
TC specification no longer available I TC specification no longer available II	The Task Controller must be used (TC mode: ON), but it is no longer available on the tractor side.	• Check the Task Controller of the utilised terminal or towing vehicle.

10 PROBLEM SOLVING

Problem	Cause	Solution
The seeding shaft rotates when the implement is lifted!	• Wrong linkage signal. • Linkage signal is not available on the ISOBUS.	• Invert the linkage signal on the control box, see Point 6.3.4. • Reposition the linkage sensor.
The seeding shaft does not rotate when the implement is in working position!	• Seeding shaft is not switched on. • Forward speed is 0. • No linkage signal.	• Switch on the seeding shaft, the seeding shaft must be switched on by pressing the button one time at the beginning. • Check the settings for the speed sensor – see Point 6.3.4. • Check the speed sensor. • Check the linkage sensor.

Problem	Cause	Solution
A fill level sensor is installed, but does not transmit!	• No signal from the fill level sensor. • The fill level sensor is deactivated, see Point 6.3.2.	• Adjust the sensitivity of the fill level sensor (bolt on the rear side of the sensor). • Reposition the fill level sensor. • Check the terminal strip and cable.
Fill level sensor is constantly transmitting!	• Poor sensor setting. • Poor sensor position.	• Adjust the sensitivity of the fill level sensor (bolt on the rear side). • Reposition the fill level sensor. • Deactivate the fill level sensor, see Point 6.3.2.
No speed signal!	• Speed signal is not available on the ISOBUS. • Wrong speed signal was selected.	• Select a different speed signal • Check the settings for the speed sensor – see Point 6.3.4.
No linkage signal!	• Linkage sensor was not detected. • There is no linkage signal issued on the ISOBUS.	• Check the signal source and change if necessary. • If external linkage sensors are equipped, check them. • Magnet sensor: the sensor and magnet must be precisely opposite to each other when in working position or in lifted position.
A forward speed of 0.0 km/h is displayed or it keeps jumping back to 0.0 km/h!	• Wrong or non-existing speed signal was selected.	• Check the speed settings (Point 6.3.4).
Spread rate in kg/ha or grains/m² is not being displayed!	• A valid calibration test was not performed. • Values were retroactively changed in the Calibration test menu.	• Perform a calibration test. • Load the seed type again from the library.
Spread rate is too high or too low!	• Wrong speed. • Linkage sensor switches during operation. • Seed properties have changed.	• Check the hectare counter on the control box! • Check the speed! • Calibrate the speed sensor (not required for GPS sensor). • Check the linkage sensor. • Perform a calibration test. • Reduce the fan speed for the hydraulic fan.

11 SOFTWARE UPDATE

For a software update, please contact Service at APV, the contact data can be found under Point 2.

12 ACCESSORIES

12.1 EXTENSION CABLE

This cable serves as an extension cable between the APV implement and the "ISOBUS connection cable" (see Point 4.2.2 - Scope of delivery of an ISOBUS-PS).

The extension cable is available in two lengths: 2 m and 5 m.

Order number: 00410-2-221 (2 m), 00410-2-220 (5 m)



Figure 45: Symbolic image

NOTE!
If extension cables are used, the electrical power of the fan and the seeding shaft drive can be reduced!
For this reason, extension cables should always be avoided!

12.2 SPLITTER CABLE

12.2.1 CURRENT LIMITS

The following limits must be observed according to the standards:
ECU supply: 15 A
Power supply: 50 A
The sum of the ISOBUS power supply is actually limited to 55 A according to the standards. The power supply is provided exclusively by the power supply device.

APV implement	PWR power consumption	
	Typical [A]	Maximum [A]
PS 120-500 electric fan	32	49
PS 120-500 electric fan PLUS	39	49
PS 120-500 hydraulic fan	7	9
PS 300 TWIN electric fan	39	58
PS 300 TWIN electric fan PLUS	46	58
PS 300 TWIN hydraulic fan	14	18
PS 800-1600	10	15
LF 600	14	18
1x MDC / MDG	7	9
2x MDC / MDG	14	18
1x MDP	23	29
2x MDP	46	58

NOTE!
The currents can vary widely depending on the layout, hose length, seed type and spread rate.

12.2.2 SPLITTER CABLE APV/EXTERNAL

With this cable, an APV implement and an external implement can be operated via the ISOBUS.
To do so, the ISOBUS socket is installed on the APV implement. The two AMP connectors are connected between the APV implement and the "ISOBUS connection cable" (see Point 4.3 - included with the delivery of an ISOBUS-PS).



Figure 46

NOTE!
The short connection must be connected directly to the APV implement. An extension cable may not be used in between!

Cable length: 0.75 m

Order number: 04000-2-930

12.2.3 SPLITTER CABLE APV/APV

With this cable, two APV implements can be operated via the ISOBUS.
The cable is connected between an APV implement and the "ISOBUS connection cable" (see Point 4.3 - included with the delivery of an ISOBUS-PS). The longer end of the cable is then connected to the second APV implement.



Figure 47

NOTE!
An extension cable may not be used in between!

Availability upon request and only as of software version 3.4.1!

Cable length: 2 m

Order number: 04000-2-931

12.3 CALIBRATION BUTTON FOR PS

The calibration button is integrated directly in the terminal strip of the PS and is installed on the implement with the integrated magnets. As a result, the calibration test and emptying of the hopper can be performed directly on the implement.



Figure 48

Connection: terminal strip

Order number: 00410-2-185

12.4 FILL LEVEL SENSOR FOR PS

The fill level sensor triggers an alarm on the ISOBUS terminal when there is not enough
seed in the hopper.



Figure 49

Connection: terminal strip

Order number: 04000-2-269

12.5 LINKAGE SENSOR CHASSIS

Through this sensor, the seeding shaft of the PS can start and stop rotating automatically when lifting and lowering the implement.

Connection: 12-pin plug on the side of the PS (under the cover)

Order number: 00410-2-173



Figure 50

12.6 LINKAGE SENSOR TOP LINK

Through this sensor, the seeding shaft of the PS can start and stop rotating automatically when lifting and lowering the implement.

Connection: 12-pin plug on the side of the PS (under the cover)

Order number: 00410-2-169



Figure 51

12.7 LINKAGE SENSOR PULL SWITCH

Through this sensor, the seeding shaft of the PS can start and stop rotating automatically when lifting and lowering the implement.

Connection: 12-pin plug on the side of the PS (under the cover)

Order number: 00410-2-174



Figure 52

12.8 LINKAGE SENSOR HYDRAULIC SYSTEM

The sensor can be installed in an existing hydraulic system on an implement (e.g. chassis cylinder). Function: actuation by a change in pressure in the hydraulic system. The rotation of seeding shaft is then automatically started or stopped.

Connection: 12-pin plug on the side of the PS (under the cover)

Order number: 00410-2-176



Figure 53

12.9 INDUCTIVE LIFTING UNIT SENSOR

For installation on moving parts on the headlands; Function: Contactless, can detect metal. The rotation of seeding shaft is then automatically started or stopped (invertible).

Connection: 12-pin plug on the side of the PS (under the cover)

Order number: 00410-2-263 3 m cable
00410-2-175 12 m cable



Figure 54

12.10ACCESSORIES KIT FOR GPSa SENSOR MX

The GPSa sensor transmits the current vehicle speed to the ISOBUS M2 control box.

Connection: 12-pin plug on the side of the PS (under the cover)

Order number: 00410-2-180



Figure 55

NOTE!
The sensor does not function if there is complete GPS shadowing.

12.11 ACCESSORIES KIT FOR RADAR SENSOR MX 35

The radar sensor transmits the current vehicle speed to the ISOBUS M2 control box. The radar sensor works on almost any substrate (e.g. soil, sand, pavement, etc.).

Connection: 12-pin plug on the side of the PS (under the cover)

Order number: 00410-2-179



Figure 56

12.12 ACCESSORIES KIT FOR INDUCTIVE WHEEL SENSOR MX

The wheel sensor transmits pulses to the ISOBUS M2 control box, which then calculates the speed. The wheel sensor must be installed on a feeler wheel.

Connection: 12-pin plug on the side of the PS (under the cover)

Order number: 00410-2-181



Figure 57

12.13 MX SPLITTER SENSOR

Is required if you want to work with 2 sensors (e.g. the wheel sensor and the linkage sensor).

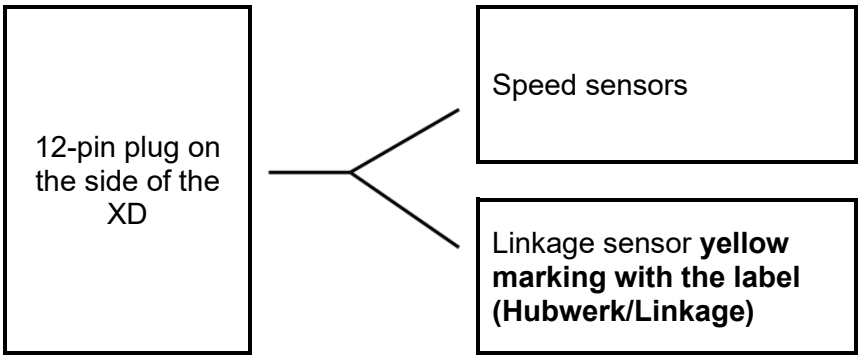
Connection: 12-pin plug on the side of the PS (under the cover)

Order number: 00410-2-153



Figure 58

Connection diagram:



13 CONNECTION DIAGRAMS

13.1 PS 120 – PS 500

Electric fan:

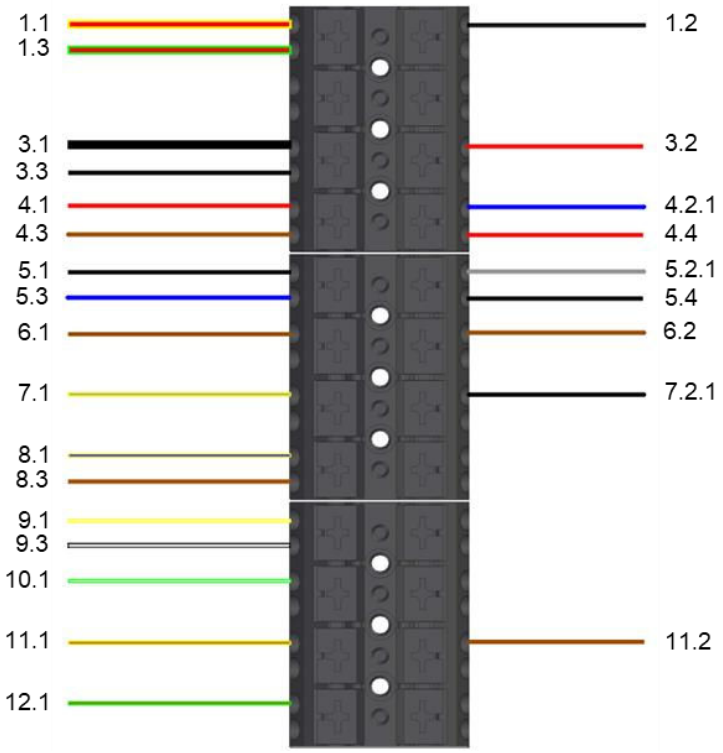


Figure 59

Hydraulic fan:

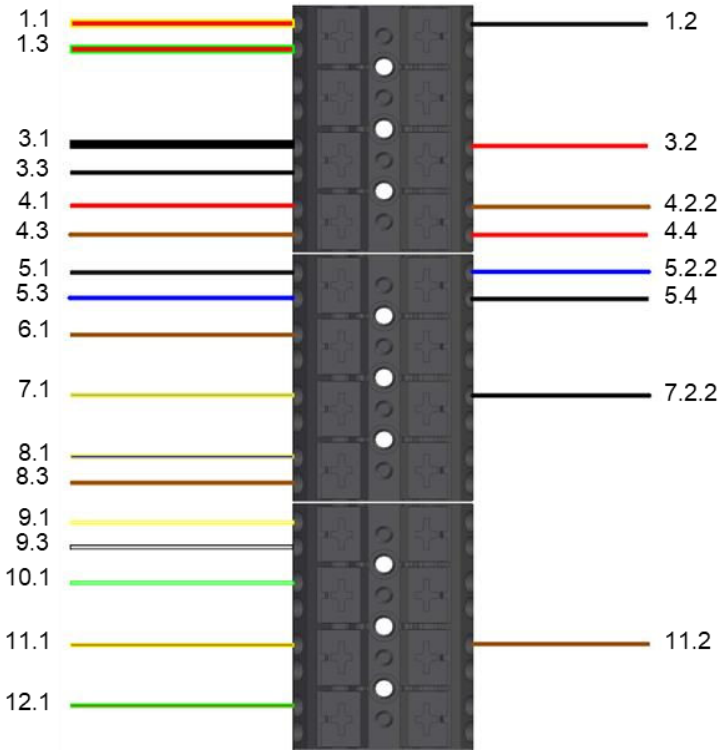


Figure 60

Number	Description	Colour	Cross-section (mm^2)	Function
1.1	Implement cable	Red-yellow	2.5	Seeding shaft PWM
1.2	Seeding shaft motor	Black	1.5	
1.3	Implement cable	Red-green	2.5	
3.1	Implement cable	Black	2.5	Ground
3.2	Seeding shaft motor	Red	1.5	
3.3	Calibration button	Black	0.75	
4.1	Implement cable	Red	0.75	+12 V sensor supply
4.2.1	Motor module	Blue	0.5	
4.2.2	Fan speed sensor	Brown	0.34	
4.3	Fill level sensor	Brown	0.34	
4.4	Encoder	Red	0.34	
5.1	Implement cable	Black	0.75	Sensor ground
5.2.1	Motor module	Grey	0.5	
5.2.2	Fan speed sensor	Blue	0.34	
5.3	Fill level sensor	Blue	0.34	
5.4	Encoder	Black	0.34	
6.1	Implement cable	Brown	0.75	PWM elec. fan
6.2	Motor module	Brown	0.5	
7.1	Implement cable	Grey-yellow	0.75	Fan status input
7.2.1	Motor module	Black	0.5	
7.2.2	Fan speed sensor	Black	0.34	
8.1	Implement cable	Blue-yellow	0.75	Calibration button input
8.3	Calibration button	Brown	0.75	
9.1	Implement cable	White-yellow	0.75	Fill level sensor input
9.3	Fill level sensor I	White	0.34	
10.1	Implement cable	White-green	0.75	Spare
11.1	Implement cable	Brown-yellow	0.75	Seeding shaft speed input
11.2	Encoder	Brown	0.34	
12.1	Implement cable	Brown-green	0.75	Spare

Stripping length: 10 mm

13.2 PS 300 TWIN

Electric fan:

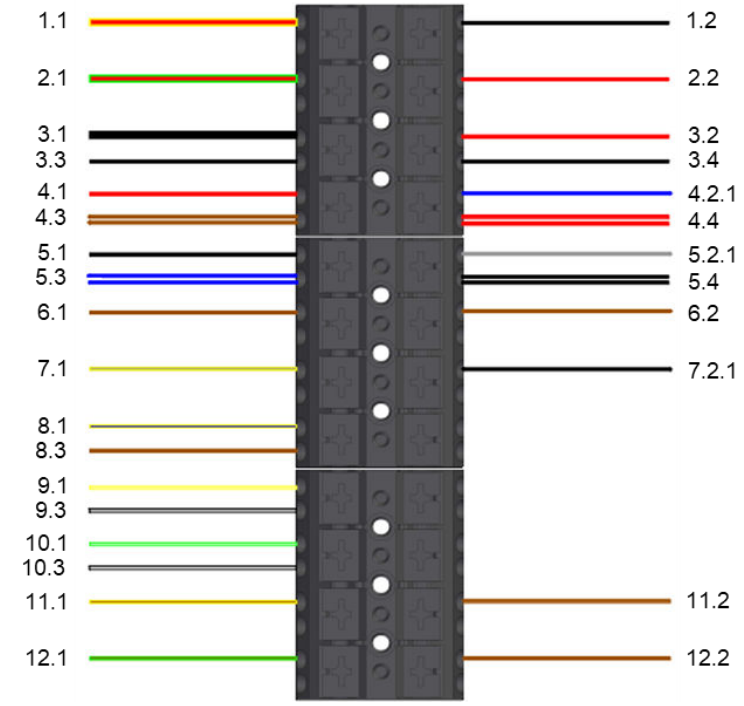


Figure 61

Hydraulic fan:

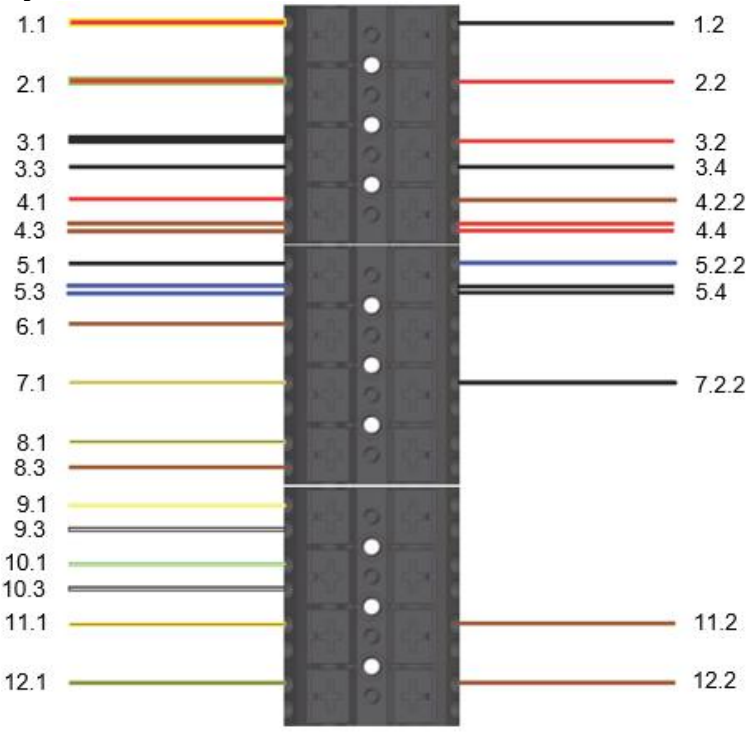


Figure 62

Number	Description	Colour	Cross-section (mm^2)	Function
1.1	Implement cable	Red-yellow	2.5	Seeding shaft I PWM
1.2	Seeding shaft motor I	Black	1.5	
2.1	Implement cable	Red-green	2.5	Seeding shaft II PWM
2.2	Seeding shaft motor II	Red	1.5	
3.1	Implement cable	Black	2.5	Ground
3.2	Seeding shaft motor I	Red	1.5	
3.3	Calibration button	Black	0.75	
3.4	Seeding shaft motor II	Black	1.5	
4.1	Implement cable	Red	0.75	+12 V sensor supply
4.2.1	Motor module	Blue	0.5	
4.2.2	Fan speed sensor	Brown	0.34	
4.3	Fill level sensor I & fill level sensor II	Brown	0.34	
4.4	Encoder I & encoder II	Red	0.34	
5.1	Implement cable	Black	0.75	Sensor ground
5.2.1	Motor module	Grey	0.5	
5.2.2	Fan speed sensor	Blue	0.34	
5.3	Fill level sensor I & fill level sensor II	Blue	0.34	
5.4	Encoder I & encoder II	Black	0.34	
6.1	Implement cable	Brown	0.75	PWM elec. fan
6.2	Motor module	Brown	0.5	
7.1	Implement cable	Grey-yellow	0.75	Fan status input
7.2.1	Motor module	Black	0.5	
7.2.2	Fan speed sensor	Black	0.34	
8.1	Implement cable	Blue-yellow	0.75	Calibration button input
8.3	Calibration button	Brown	0.75	
9.1	Implement cable	White-yellow	0.75	Fill level sensor I input
9.3	Fill level sensor I	White	0.34	
10.1	Implement cable	White-green	0.75	Fill level sensor II input
10.3	Fill level sensor II	White	0.34	
11.1	Implement cable	Brown-yellow	0.75	Seeding shaft speed I input
11.2	Encoder I	Brown	0.34	
12.1	Implement cable	Brown-green	0.75	Seeding shaft speed II input
12.2	Encoder II	Brown	0.34	

Stripping length: 10 mm

13.3 PS 800 – PS 1600

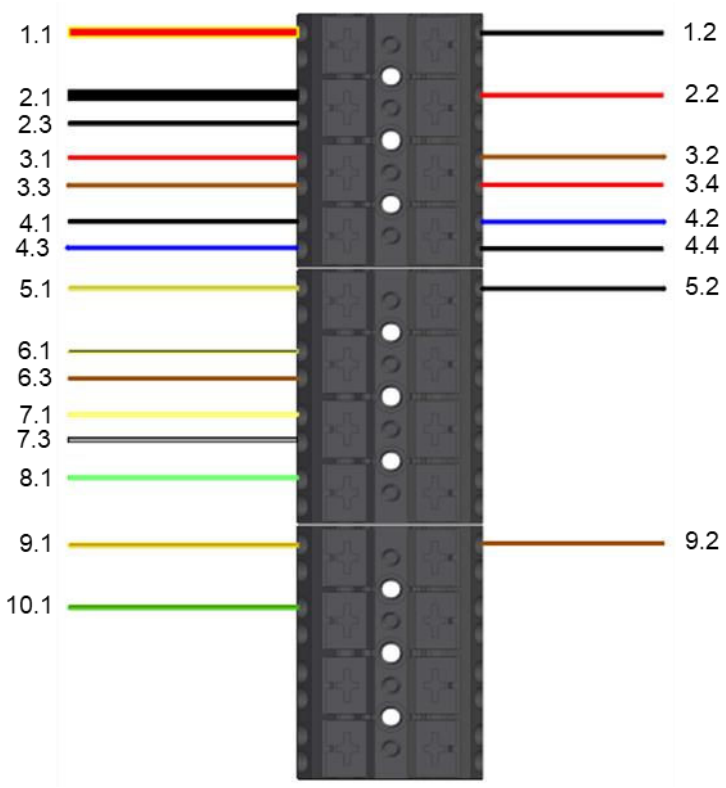


Figure 63

Number	Description	Colour	Cross-section (mm^2)	Function
1.1	Implement cable	Red-yellow	4	Seeding shaft PWM
1.2	Seeding shaft motor	Black	2.5	
2.1	Implement cable	Black	4	Ground
2.2	Seeding shaft motor	Red	2.5	
2.3	Calibration button	Black	0.75	
3.1	Implement cable	Red	0.75	+12 V sensor supply
3.2	Fan speed sensor	Brown	0.34	
3.3	Fill level sensor	Brown	0.34	
3.4	Encoder	Red	0.34	
4.1	Implement cable	Black	0.75	Sensor ground
4.2	Fan speed sensor	Blue	0.34	
4.3	Fill level sensor	Blue	0.34	
4.4	Encoder	Black	0.34	
5.1	Implement cable	Grey-yellow	0.75	Fan status input
5.2	Fan speed sensor	Black	0.34	
6.1	Implement cable	Blue-yellow	0.75	Calibration button input
6.3	Calibration button	Brown	0.75	

Number	Description	Colour	Cross-section (mm^2)	Function
7.1	Implement cable	White-yellow	0.75	Fill level sensor input
7.3	Fill level sensor	White	0.34	
8.1	Implement cable	White-green	0.75	Spare
9.1	Implement cable	Brown-yellow	0.75	Seeding shaft speed input
9.2	Encoder	Brown	0.34	
10.1	Implement cable	Brown-green	0.75	Spare

Stripping length: 10 mm

13.4 MDP – MDC/MDG

MDP

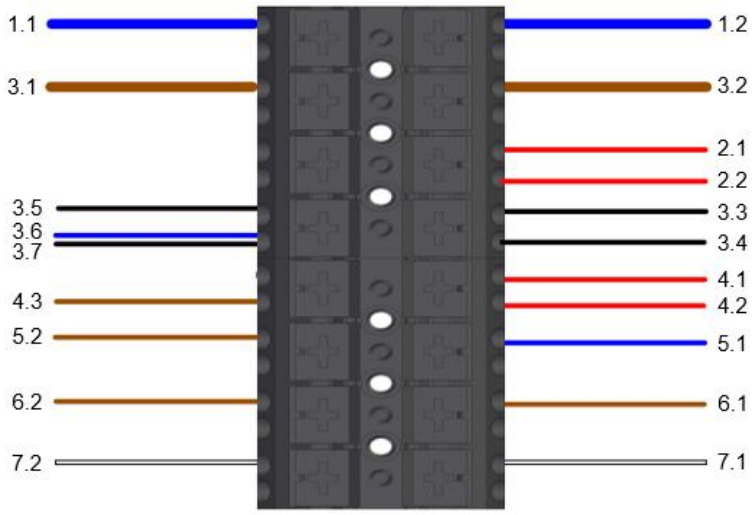


Figure 64

MDC/MDG

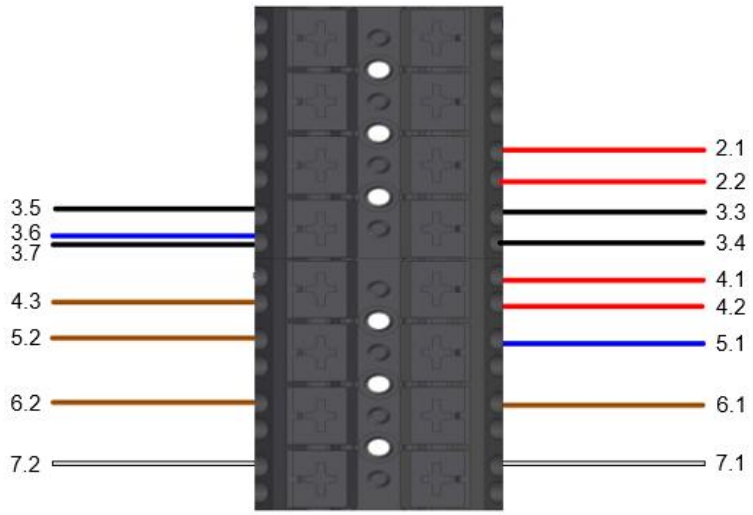


Figure 65

Number	Description	Colour	Cross-section (mm^2)	Function
1.1	Implement cable	Blue	4	PWM elec. fan
1.2	Fan	Blue	4	
2.1	Implement cable	Red	2.5	Seeding shaft PWM
2.2	Seeding shaft motor	Red	2.5	
3.1	Implement cable	Brown	4	Ground
3.2	Fan	Brown	4	
3.3	Implement cable	Black	2.5	Ground
3.4	Seeding shaft motor	Black	2.5	
3.5	Encoder	Black	0.75	
3.6	Fill level sensor	Blue	0.34	
3.7	Calibration switch	Black	0.75	
4.1	Implement cable	Red	0.75	+12 V sensor supply
4.2	Encoder	Red	0.75	
4.3	Fill level sensor	Brown	0.34	
5.1	Implement cable	Blue	0.75	Calibration button input
5.2	Calibration switch	Brown	0.75	
6.1	Implement cable	Brown	0.75	Seeding shaft speed input
6.2	Encoder	Brown	0.75	
7.1	Implement cable	White	0.75	Fill level sensor input
7.2	Fill level sensor	White	0.34	

Stripping length: 10 mm

13.5 LF

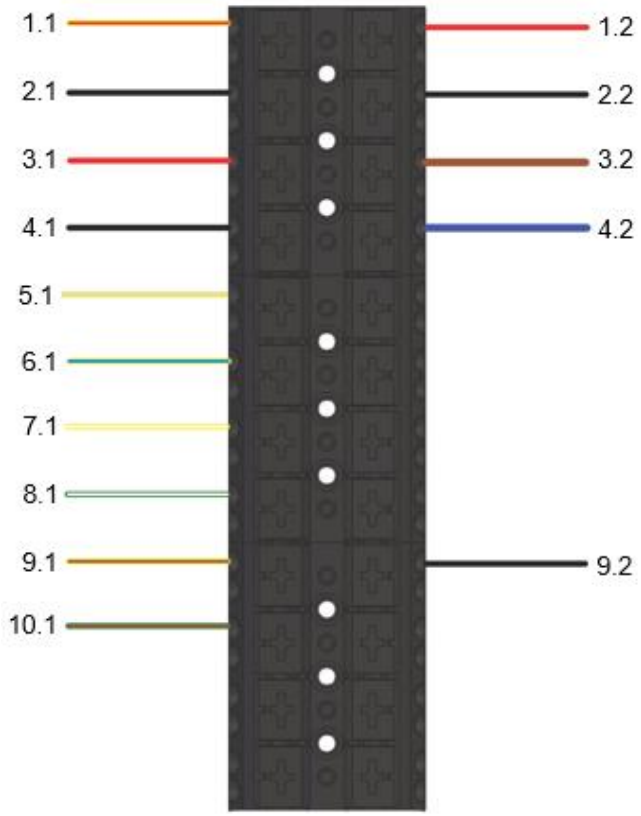


Figure 66

Number	Description	Colour	Cross-section (mm^2)	Function
1.1	Implement cable	Red-yellow	4	+12 V pump
1.2	Pump	Red	2.5	
2.1	Implement cable	Black	4	Pump ground
2.2	Pump	Black	2.5	
3.1	Implement cable	Red	0.75	Sensor supply
3.2	Flow sensor	Brown	0.34	
4.1	Implement cable	Black	0.75	Sensor ground
4.2	Flow sensor	Blue	0.34	
5.1	Implement cable	Grey-yellow	0.75	Spare
6.1	Implement cable	Blue-yellow	0.75	
7.1	Implement cable	White-yellow	0.75	
8.1	Implement cable	White-green	0.75	
9.1	Implement cable	Brown-yellow	0.75	FS signals
9.2	Flow sensor	Black	0.34	
10.1	Implement cable	Brown-green	0.75	Spare

Stripping length: 10 mm

NOTES

NOTES

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