INSTALLATION MANUAL

(ENGLISH) (ORIGINAL VERSION)

SBGuidance Auto

Deutz-Fahr AgroSky

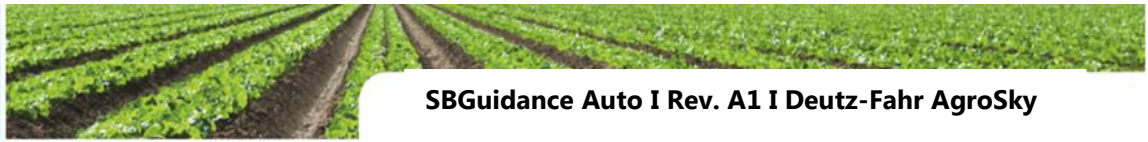016-8000-087EN Rev. A1

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Contents

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Preface

This installation manual is intended for persons responsible for installing a SBGuidance Deutz-Fahr AgroSky set. The manual contains important instructions that should be complied with when commissioning, operating and servicing the SBGuidance system.

This manual has been compiled with the utmost care. SBG Precision Farming assumes no responsibility for any errors or omissions in this document.

Any comments or questions can be sent to service-eu@ravenind.com.

SBG Precision Farming or any of its suppliers will accept no liability for physical or material damage caused whilst using the SBGuidance system.

The installed SBG system produces less than 70dB (A) noise.

This user guide uses a number of concepts for extra attention to a few things:

Tip!:
Provides recommendations on how certain activities can be performed much easier.

Please note!:
Indicates certain problems that the user should take note of.

Caution!:
Indicates that the machine can be damaged.

Warning!:
Indicates a risk of injury.

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Disclaimer

Warning!:
Always switch off the tractor before installing or repairing hydraulic and electrical components of the SBGuidance system.

Warning!:
The safety instructions contained in the manuals of the tractor or implements must be complied with at all times.

Warning!:
It is strictly prohibited to use the SBGuidance system on public roads.

Warning!:
It is strictly prohibited to leave a driving vehicle unattended when the SBGuidance system is switched on. The driver is always responsible for the direction and course of the vehicle.

Warning!:
To prevent injury or fire, replace defective fuses only with fuses of the same type and amperage.

Warning!:
The SBGuidance the operating system is not able to detect and avoid obstacles. If there is an obstacle in your path, you will always need to take action for it to be avoided.

Warning!:
Only allow authorized/qualified persons to operate the system. Authorized/qualified persons are defined as: persons who have read and understood the manual, have been given instructions by a product specialist, and who are both physically and mentally fit and able to operate the system.

Warning!
In case of system failure or breakdown switch of the tractor and disconnect the electrical power source to avoid further damage. Contact your dealer for further instructions on how to repair your system.

Warning!
The system contains moving parts! Make sure the immediate environment is clear of people before operating the system.

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Warning!

Always wear personal protective equipment when operating/adjusting/repairing the system outside of the tractor cab.

Caution!:

In order to prevent power surges from occurring, always start the machine first, before initiating the SBGuidance control system.

Caution!:

Only touch the touch-screen with your finger or by using a special touch-screen stylus/pen. Operating the touch-screen with sharp objects may cause permanent damage to the screen.

Caution!:

Always consult your supplier as to which products are best suited first before cleaning the touch-screen with chemicals or alcohol.

Please note!

If the terminal is not used for a long period, better remove the terminal from the tractor and store in a heated environment. This will extend the life span of the electronic components.

Please note!

To prevent theft, it is better to not let the terminal and GPS-antenna unattended in the tractor on the field.

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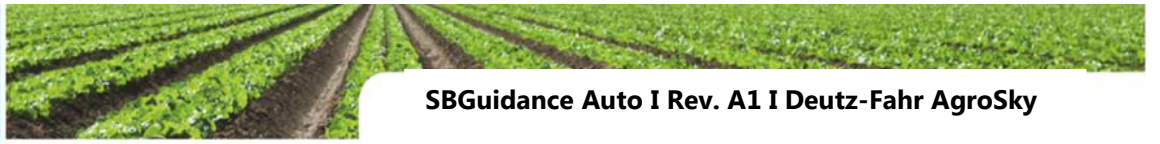
1. Instructions for installing the SBGuidance Auto on tractors

This manual is a guide for the Deutz-Fahr AgroSky tractors. This chapter provides overviews of the components that can be supplied with this tractor sets.

All necessary parts are supplied, including this manual. Verify that all items listed on the packing list are actually present.

1.1. Overview of standard electronic components
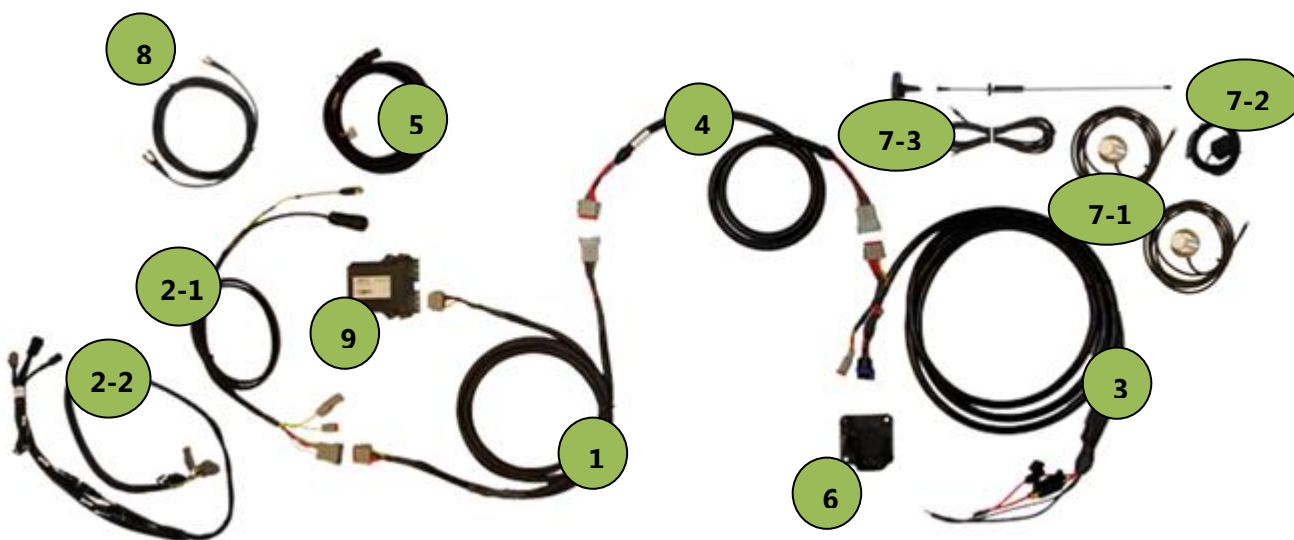
#	Part Number:	Description:
1	11158000228	Harness in-cab (DynamIQ)
2-1	11158000129	Harness in-cab (Geostar)
2-2	11158000008	Harness in-cab (Viper)
3	11158000065	Power harness - Basic
3	11158000060	Power harness - Implement Ready (IR)
4	11158000214	Extention Harness 2,0M
5	11158000093	Harness Deutz-Fahr AgroSky
6	14084002131	Implement socket (IBBC)
7-1	11218000003	GSM antenna LAIRD - 3,5M
7-2	10638000015	Field hub GPS patch antenna 4,5M
7-3		Radio antenna with magnetic base
8	1115800011(0/1/2)	GPS antenna cable (3,0 / 4,5 / 6,0M)
9	10638000053	DynamIQ ISO

1.2. Overview of standard mechanical components

#	Part Number:	Description:
1	11078000125	DynamIQ bracket universal V4
2	11078000081	GPS/Radio bracket universal
3	11030001040	RAM-D mount
4	11178000311	UNC Bolt + nut
5	11078000006	IBBC bracket (only with CAN IR harness)
6	11078000131	Radio/GSM mounting plate
7	14074001024	TNC Dummy
-	11178000341	Mounting kit tractor

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2. Tractor kit assembly

It is recommended to accomplish the installation of the tractor in the following order (Figure 1):

1. Mount the entire wire harness from the battery.
2. Mount harness to the Deutz-Fahr AgroSky CAN-BUS.
3. Mount GPS antenna and radio/gsm-antenna(s) + cables.
4. Mount DynamIQ ISO in cabin.
5. Mount terminal.

Figure 1 Overview Deutz-Fahr AgroSky components.

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3. Mounting harness

Two options can be chosen; a CAN Basic harness or an Implement Ready (IR) harness.

3.1. CAN Basic harness

The Basic harness can only be used for tractor steering. If the tractor is mounted with this harness there is no possibility to use the tractor for implement steering (TWIN, plough).

3.2. CAN Implement Ready (IR) harness

The Implement Ready harness ensures that the tractor can be used for tractor and implement steering. Mounting the implement is possible through the IBBC-connector. The harness is mounted from the battery to the IBBC-connector at the back side of the tractor (Figure 2).

Figure 2 IBBC connector of the IR harness.

3.3. Mount harness

The CAN basic harness and the CAN Implement Ready harness are divided in the following harnesses (ranked in order from the battery):

1. Power harness: this harness comes from the battery and goes to the rear axle along the chassis, wrapped in a hard casing. A Basic harness goes from the battery directly to the chassis harness (and not to the rear axle of the tractor). Mount the relays and fuses well nearby the battery. Find a place where they can be fastened firmly and vibration free (Figure 3).

Figure 3 Mounted relays and fuses.

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2. Extension harness: extends the power harness to the In-Cab harness. This harness is wrapped in a hard casing. This harness goes inside the cabin. A good place to go inside the cabin is at the right side nearby the right door. Remove the floor mat and the protection cover (Figure 4) and find a place to enter the cabin (red circle in Figure 5).

Figure 4 Protection cover.

Figure 5 Location to enter the cabin (red circle).

3. In-Cab harness (DynamIQ ISO): this harness comes from the extension harness and goes to the terminal harness, wrapped in a braided sleeve casing. A branch is made to the DynamIQ ISO. If the DynamIQ ISO is mounted on the left front side of the cabin (Figure 20), an example of the route to the DynamIQ ISO is shown as the red curved line in Figure 5.

Figure 6 Extension harness = left, terminal harness = right top, Deutz-Fahr AgroSky harness = right bottom.

4. Harness In-Cab Terminal: this harness connects the In-Cab harness (DynamIQ ISO) and the terminal. This harness is also connected with the Deutz-Fahr AgroSky harness (Figure 6). First disconnect the CAN terminator (Figure 7) to be able to connect the Deutz-Fahr AgroSky harness.
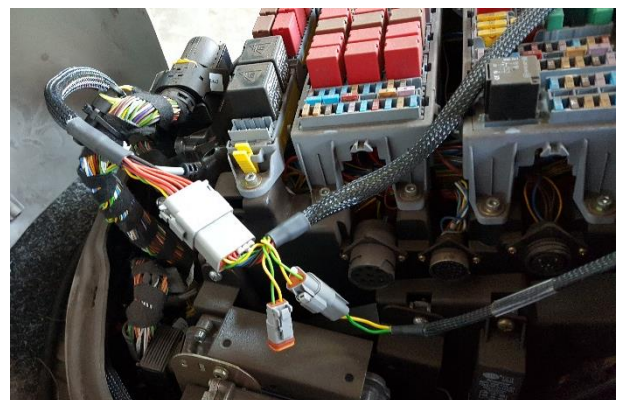

Figure 7 Disconnected terminator.

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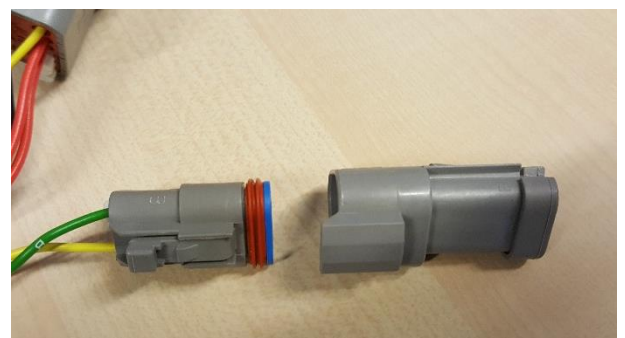
5. Harness Deutz-Fahr AgroSky: connects the SBG system with the Deutz-Fahr CAN-Bus. The CAN-Bus connectors for steering are located in the B-pillar at the right side of the tractor. Remove the cover to find these connectors (Figure 8). One of these connectors is located somewhere behind the radio.

Figure 8 Connection with Deutz-Fahr CAN-Bus.

- Connect the connector of the cable with label AUX (green/yellow) to a connector of the cable with label AUTOG (blue/orange).
- Connect the connector of Harness Deutz-Fahr AgroSky to another connector of the cable with label AUTOG (blue/orange).
- The connectors standard have a CAN terminator on it, disconnect these first.

i **Tip!:**

A schematic overview of the SBG CAN-harness on a Deutz-Fahr AgroSky tractor is shown in Figure 32.

Furthermore there are some general instructions for mounting an SBG harness:

- Mount the relays fixed and in a dry, clean and accessible spot (Figure 3).
- The red wire is + (12V). The black wire is (ground). Make sure that the first part of the red wire (part in between battery and fuses) cannot damage during operation.
- If necessary the positive and negative wires, in between the battery and the fuses, can be shortened. Be sure to use cable sockets with the correct size for proper connection.
- If a ground switch is used, connect the wiring harness behind the ground switch (not at the battery side of the ground switch!).
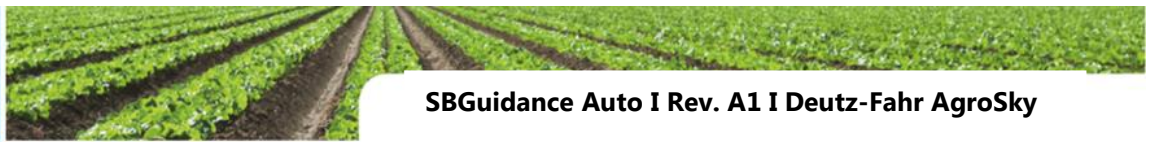
- If a main (12V) switch is used in the red wire, connect the wiring harness behind the main switch (not at the battery side of the main switch!).
- If no main switch is used, always connect the wiring harness directly to the battery.
- If the system is connected to a 24 Volt machine, always use a 24V to 12V converter. Never connect between the two batteries of a 24V machine!
- Lead the terminal harness along with the GPS and radio/GSM antenna cables through one pillar of the cab.
- Tie-wrap the wires so they are attached free from vibration and friction.

! **Warning!:**
It is Important to ensure that the wiring harness is always connected to the battery AFTER installing all wires and controllers!

! **Warning!:**
Be sure the cables do not damage during the installation!

i **Please note!:**
Push all connectors until they snap to be sure the connectors are properly connected!

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4. Mounting GPS- and radio/gsm- antenna

A standard GPS bracket can be mounted on a Deutz-Fahr AgroSky tractor.

4.1. Mounting the standard GPS antenna bracket

Figure 9 shows an example of a standard GPS-antenna (with a patch antenna in this case) mounted on a standard GPS-antenna bracket. A GPS-dummy and an UNC bolt + nut are also mounted. The standard GPS-antenna bracket can be mounted with double sided tape on the cabin roof. In case of Figure 9 the standard GPS antenna bracket is a bit shortened, otherwise the window could not be opened anymore. For mounting a GPS-antenna a few general instructions are applicable:

Figure 9 Standard GPS-antenna bracket + UNC bolt mounted on a Deutz-Fahr AgroSky roof.

- Mount the GPS-antenna at least 60 cm in front of the rear axle.
- Mount the GPS-antenna in the middle of the tractor.
- Mount the GPS-antenna on the supplied UNC bolt.
- Mount the TNC-dummy on the GPS-antenna bracket (Figure 9).
- Wire the antenna cable connector with the largest connector through to the inside of the cabin.
- Fasten the antenna cable so that it cannot become pinched anywhere and conceal inside the cabin upholstery, together with the GPS patch antenna cable, radio antenna cable or UMTS antenna cable.
- Mount the GPS antenna cables in a way water cannot flow down into the cabin.
- Mount the antenna cable in such a way that no water is allowed to flow along the cable into the cabin.
- Label the antenna cable inside the cabin with label 'GPS1'.

Figure 10 Location where antenna cables can be lead into the cabin.

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4.2. Mounting Raven 600S antenna

Nowadays, it is also possible to use SBGuidance Auto in combination with a Raven 600S antenna (Figure 11).

In this manual the installation of the 600S antenna is explained. For the configuration of this antenna see the English configuration manual: '016-8000-025EN-A - Configuration manual – 600S smart antenna'.

On the bottom side of the 600S antenna, two magnets are built-in for attaching the antenna to steel surfaces. The new version of the GPS antenna bracket has a slope on both sides, so that the 600S antenna is well centred on the GPS antenna bracket (Figure 11). The GPS antenna bracket has to be mounted on the front of the cabin roof.

An adapter/split cable is supplied with this antenna. The antenna is connected through this adapter cable and the '600S to Viper 4' cable to the terminal harness. The adapter cable should remain to the GPS antenna when it is removed from the tractor.

If also a Slingshot modem is used for RTK corrections, a 'modem to receiver' cable has to be connected. Make sure that the connectors on the roof are provided with protective caps (Figure 13). With these protective caps no dust and water can enter the connectors.

Furthermore, the following guidelines must be observed when installing the GPS antenna:

- Mount the GPS-antenna with the connectors backwards (Figure 12).
- Mount the GPS-antenna at least 60 centimetres in front of the rear axle.
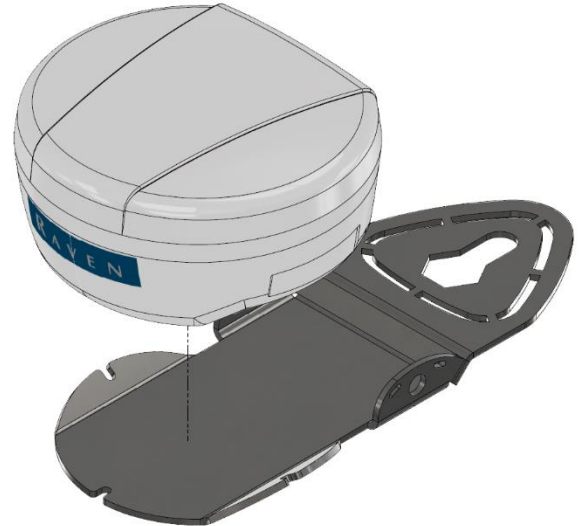
Figure 11 Raven 600S antenne.

Figure 12 Raven 600S antenna on a cabin.

Figure 13 Cables to the Raven 600S antenna.

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4.3. Mounting the radio antenna

Figure 14 shows the standard radio antenna with magnetic base. Preferably, this standard antenna should be used. The components of this standard antenna are shown in Table 1.

Table 1 Standard parts for radio antenna.

Symbol	Description
1	Radio antenna
2	Radio antenna cable
3	Connector to terminal
4	Magnetic base

A number of specific conditions should be met before installing and mounting the radio antenna:

- Preferably mount the radio antenna with the magnetic base on the standard GPS antenna bracket.
- Do not mount the radio antenna next to a steel construction, but above it.
- Mount magnetic base on a sufficiently large steel surface (at least the size of the standard GPS antenna bracket). A larger steel base surface can improve signal strength and prevent problems, especially at greater distances (> 9 km).
- Label the antenna cable inside the cabin with label 'Radio'.

4.4. Mounting the GPRS/UMTS antenna

The a SlingShot modem is used, in addition to the GPS-antenna, two GPRS / UMTS antennas and a GPS patch should be mounted.

The GPRS / UMTS-antennas should be mounted at least 100 cm of each other (like the CNH antenna-bracket in Figure 15). If a standard GPS-antenna bracket is mounted, one of the GPRS / UMTS-antennas should be mounted on this bracket (Figure 14). The second GPRS / UMTS-antenna should be mounted on a metal bracket on the cabin (Figure 16).

It is important that the following conditions are met at all times:

- The GPRS/UMTS antenna is equipped with a magnetic base and must be placed on top of the cabin.
- The antennas should have a clear reception all round.
- Label the antenna cables inside the cabin with labels 'Cellular' and 'Diversity' (Figure 17).
- Mount a grey SMA grip on both connectors (Figure 17).

Figure 14 GPS antenna bracket with a Laird UMTS antenna.

**Figure 15 Brand specific bracket with GPS-antenna, GPS patch antenna and two GPRS/UMTS antennas.**

Figure 16 GPRS/UMTS-antenna and GPS patch antenna on a metal bracket.

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4.5. Mounting GPS Patch antenna

When using a SlingShot modem also a GPS Patch antenna should be mounted (Figure 16). The GPS Patch antenna is magnetic. Mount the GPS Patch antenna always on the roof of the cabin. Be careful with mounting the GPS patch antenna; the GPS patch antenna cable is quite thin and fragile. Label the GPS Patch antenna cable inside the cabin with label 'GPS' and mount a blue SMA grip to the connector (Figure 17).

Figure 17 Antenna cables with labels and SMA-grip set.

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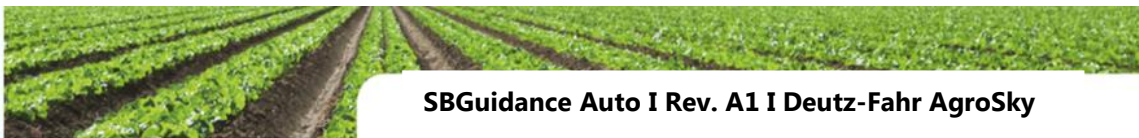
5. Mounting DynamIQ ISO

The following guidelines have been established for mounting the DynamIQ ISO:

- Preferably, place the DynamIQ ISO next to and at the right side of the seat. Use the standard DynamIQ ISO mounting plate (Figure 18).
- If it is not possible to attach the DynamIQ ISO to the seat bolts, the DynamIQ ISO should be attached in an appropriate place in the cabin that is free from vibrations. Here are two examples: one option is to mount the DynamIQ ISO just in front of the seat at the right side (Figure 19). Another alternative is mounting the DynamIQ ISO on the left front side of the cabin (Figure 20). In that case, mount the DynamIQ ISO as far as possible to the front, so the driver don't stand on it when entering the tractor. In this case also remove some of the floor mat to make some space for the DynamIQ ISO (Figure 20).
- A DynamIQ ISO may only be mounted in a horizontal position (with the sticker side up). The connectors may be orientated in four directions (0, 90, 180, 270 degrees).
- By default, the orientation of the DynamIQ ISO is set to: horizontal position with connectors pointing towards the rear (as shown in Figure 18). Any other orientation should be set in the software!

Figure 18 DynamIQ ISO on a standard mounting plate.
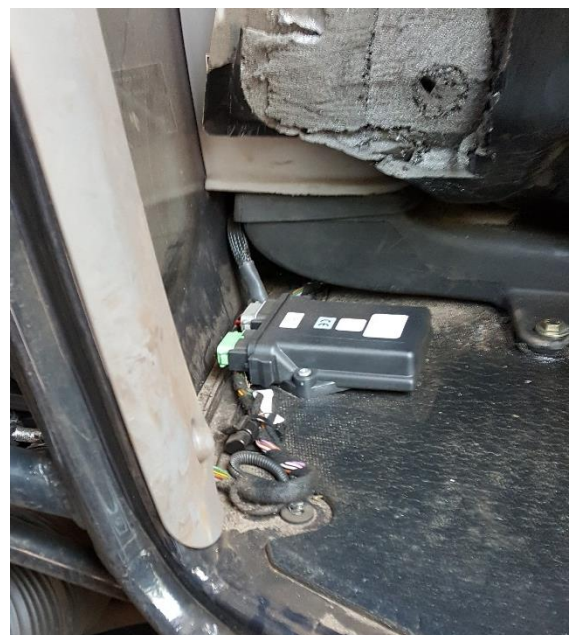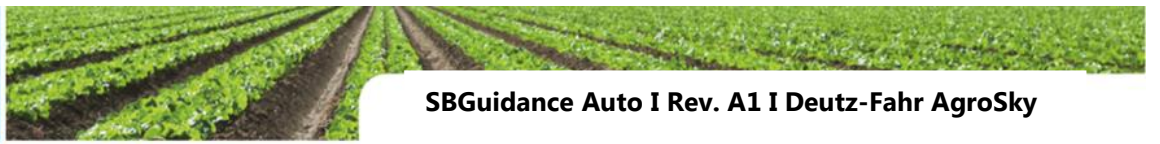

Figure 19 DynamIQ ISO mounted at the right side

Figure 20 DynamIQ ISO mounted at the left front side of the cabin.

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6. Mounting the terminal

The terminal can be mounted with a supplied RAM-D/RAM-C pipe bracket on a Deutz-Fahr AgroSky tractor (Figure 21).

The following orders are presented for mounting the Terminal:

- Always contact the customer about the terminal position in the cabin.
- Always use a RAM-D or RAM-C ball attachment.
- Mount the terminal free of vibrations with a solid bracket. A variety of mounting brackets are available for this purpose.
- Conceal all cables in one pillar (e.g. A-pillar or B-pillar).
- Mount in such a way that the display is directed straight towards the driver.
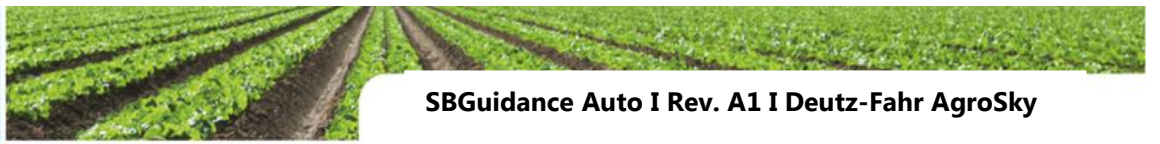- Mount in such a way that driver has a clear view all around.

Figure 21 Viper 4 terminal mounted.

Tip*:*

Mount the terminal in such a way that it does not obstruct the view of the driver over the top of the right-hand fender, but also so that the inside of the front wheel on the ground is still clearly visible.

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7. Configuring tractor

For configuring a Deutz-Fahr AgroSky see general configuring Manual – SBGuidance Auto – CAN – EN (016-8000-100). However, some settings are different. The different parts of configuring a Deutz-Fahr AgroSky are described in this chapter.

Figure 22 Engage automatic steering.

7.1. Starting automatic steering

After starting the SBGuidance software the automatic steering on the Deutz-Fahr tractor should be switched on before the automatic steering can be activated. To do this press and hold the button with the steering wheel for six seconds (red circle in Figure 22). When activated, the button will light up.

It is also possible to use the activation button of Deutz-Fahr (label auto in Figure 22), this works in the same way as the GO button in the software of the terminal.

Figure 23 Select steering controller type in machine settings.

7.2. Configurating settings

In the SBGuidance Configurator go to the machine settings. Select Deutz-Fahr AgroSky Ready in page ISOBUS of the machine settings in the Configurator (Figure 23).

7.3. CANTool

Open the CANtool (use CANtool 2.0.24 or newer).

Depending on the cabling and the terminal, choose the Hardware manufacturer and Hardware channel. Press 'Initialize' to get communication with the CANbus (Figure 24).
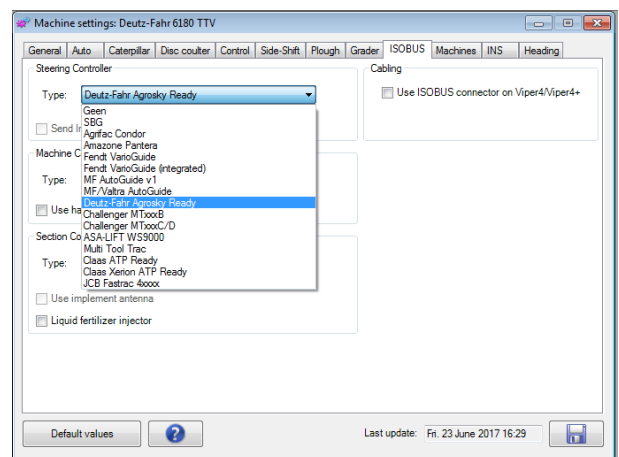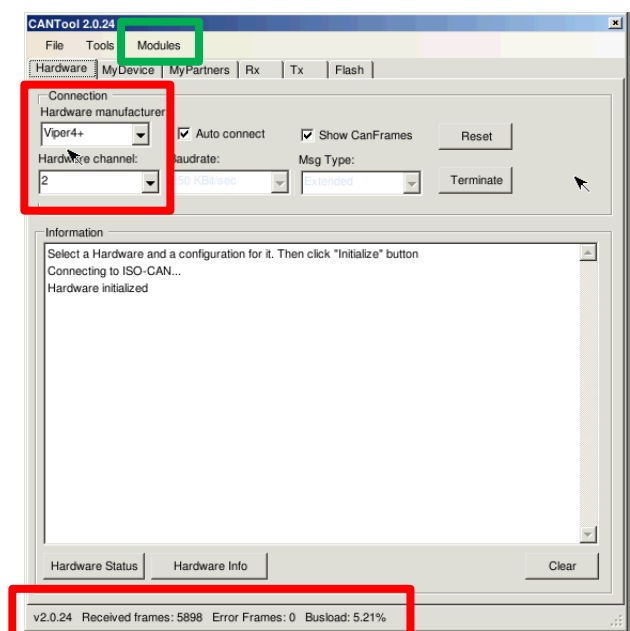

Figure 24 CANTool.

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Make sure there is communication with the CANbus (received frames is running and Busload >0%) see Figure 24.

Open the tab 'Modules' (green circle in Figure 24) and select the Sauer-Danfoss PVED-CL module to get to the programming tool. Press 'Connect' to establish communication with the hydraulic valve.

If there is communication, information about the valve will show up in the module (Figure 25).

Figure 25 Valve information.

7.3.1. Steer sensor

To make the system work properly the values of the steering angle sensor has to be checked and possibly changed. Three steering values are necessary; position completely left, right and centre. Open the tab 'Sensor'. Press 'Get parameters', wait 5 seconds and press 'refresh'. After pressing these buttons, all parameters are shown in the tab (Figure 26).

Left value =   AD1_1000_Left

Centre value =   AD1_1000_Neutral

Right value =   AD1_1000_Right

Figure 26 Values steer sensor.

To check these values, open the tab 'Status' and press 'Enable status set no. 1'.

The value which is visible behind 'AD1:' is the value of the steer sensor (see Figure 27).

Turn the wheels completely to the left and read the value. Compare this value with the value in the tab 'Sensor' (AD1_1000_Left).
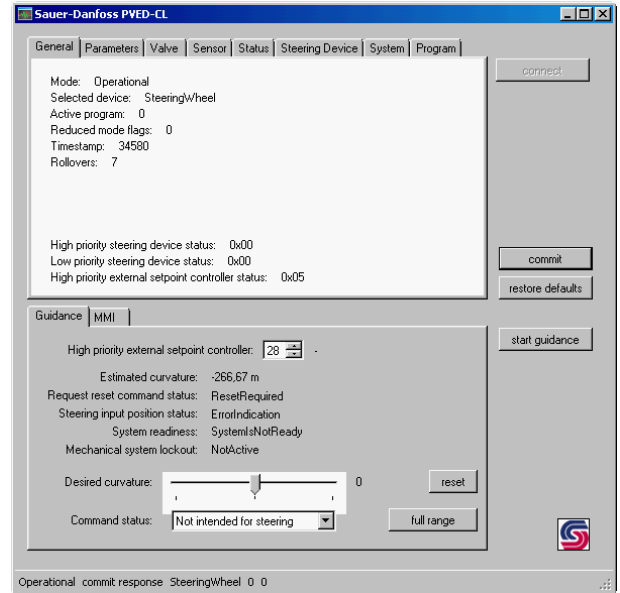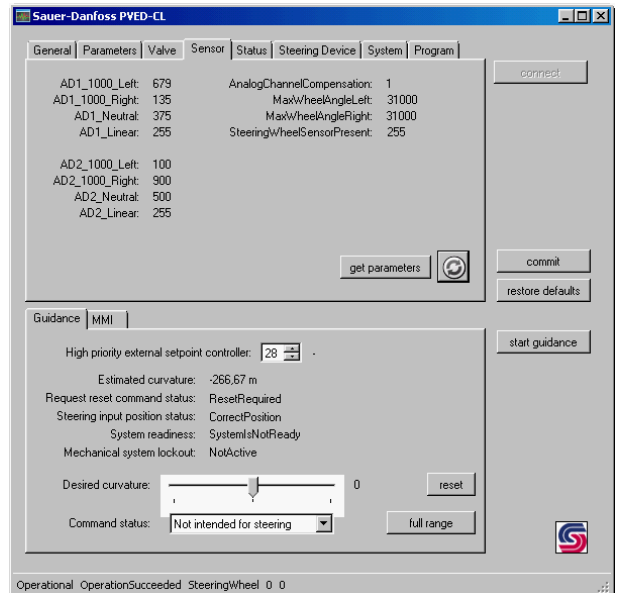

Figure 27 Steering sensor value

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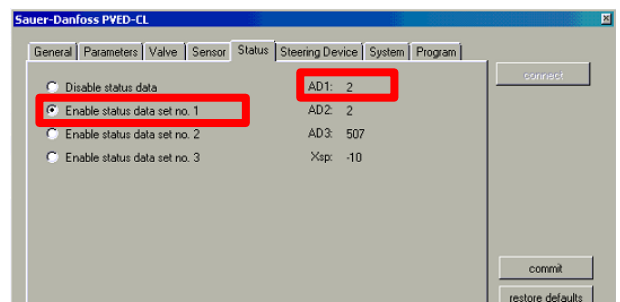
If the value is not correct, open the tab 'Parameters' (Figure 28) to change the value. Search the value, double-click on it and it will be shown in the bar (see red rectangle in Figure 28). Overwrite the old value with the correct value and press 'Set'.

Do the same for the centre- and right value. After changing any of these values press 'Commit'.

> ℹ️ **Please note!:**
> *If any value has changed, press 'Commit' before proceed further.*
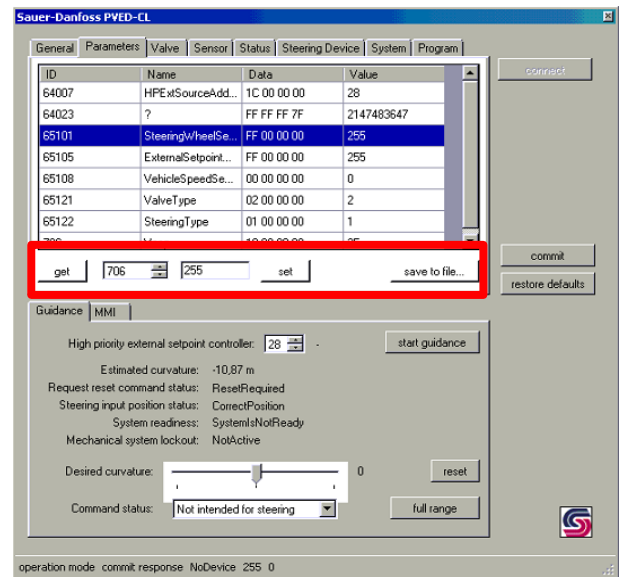

Figure 28 Tab parameters.

7.3.2. Calibration mode

The hydraulic valve has two modes, the Operation mode and the Calibration mode. In calibration mode it is possible to calibrate these values. Open the tab 'MMI' (Figure 29) and press the button 'enter calibration mode'. To get in the calibration mode, the valve needs to be powered off- and on again. Follow the steps to get in the Calibration mode. In the lower left corner, the mode is shown (Figure 29).

When the valve is in Calibration mode, press 'Start valve auto-cal.'. Don't touch the steering wheel while calibrating!

When the calibration is successful, press 'set' and 'Commit'.

> ℹ️ **Please note!:**
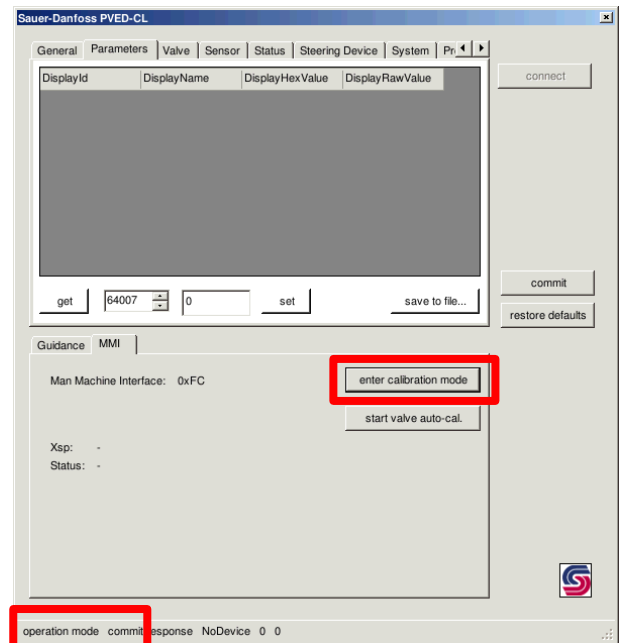> *If any value has changed, press 'Commit' before proceed further.*

Power off- and on again to get back in the Operation mode.

Figure 29 Calibration mode.

7.3.3. Proportional gain

There are two values in the PVED-CL which are equal to the Proportional Gain when using the SBG system. These are the Kp and the Vcap, in which the Kp value will be the one with the most result. Increasing this values will result in more accurate steering, decreasing this value will result in a less aggressive (less 'nervous') steering system.

To change the Kp, open the tab 'Steering device'. Press 'Get parameters', wait 5 seconds and press 'refresh' (sometimes it's needed to press these buttons multiple times). After pressing these buttons, all parameters are shown in the tab; see Figure 30.

After the parameters are visualized in this tab, go to the tab 'Parameters'. Double-click on the value and it will be shown in the bar (Figure 31). Overwrite the old value and press 'Set'. The new value will be shown after the value.
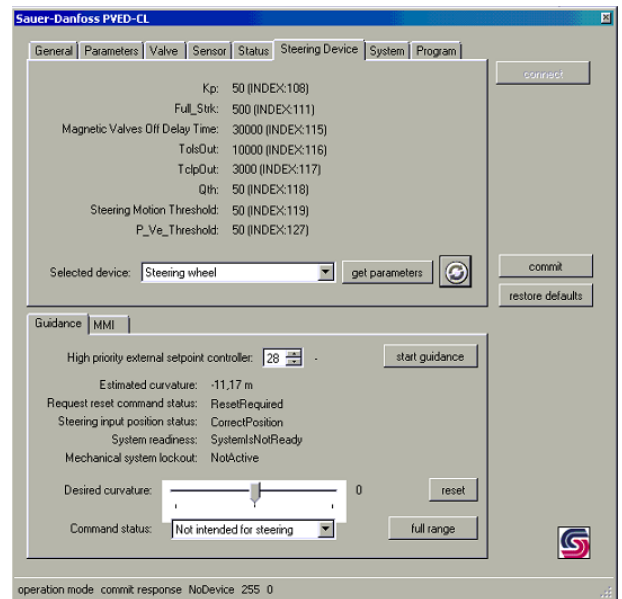

Figure 30 Get Kp value.

> **i** **Please note!:**
> *If any value has changed, press 'Commit' before proceed further.*

If changing the Kp value does not result in an accurate steering system, the Vcap value can also be adjusted.

To change the Vcap, open the tab 'Valve'. Press 'Get parameters', wait 5 seconds and press 'refresh' (sometimes it's needed to press these buttons multiple times). After pressing these buttons, all parameters are shown in the tab. Go to the tab 'Parameters' and the Vcap should also be shown here. Double click the parameter and it's possible to change the value.
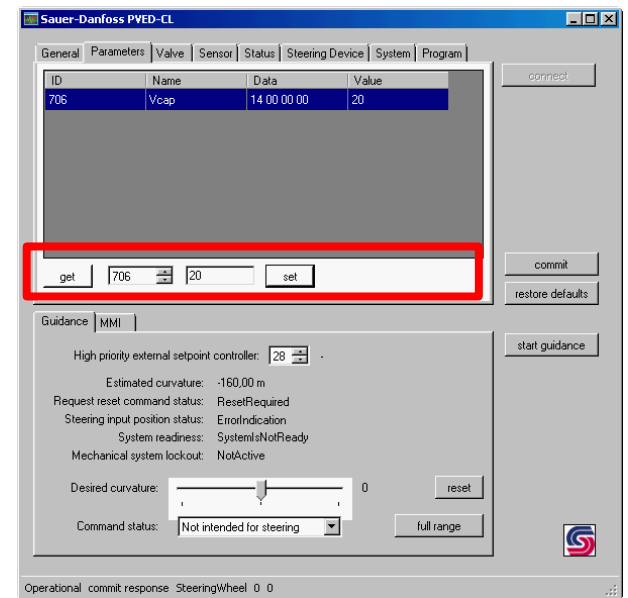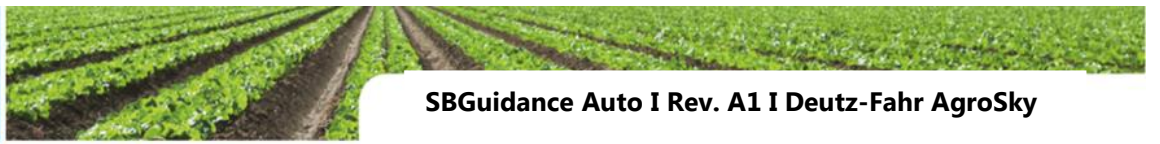

Figure 31 Change Vcap value.

> **i** **Please note!:**
> *If any value has changed, press 'Commit' before proceed further.*

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7.3.4. Parameters

For Deutz-Fahr AgroSky tractors we have experience with some settings which are needed; see Table 2. To set these settings, go to the tab 'Parameters', fill in the parameter ID (in the text box behind the button 'Get') and press 'Get'. Change the value and press 'Set' and 'Commit' to save the new set value. Follow this procedure for all the settings in Table 2.

Table 2 Overview parameters.

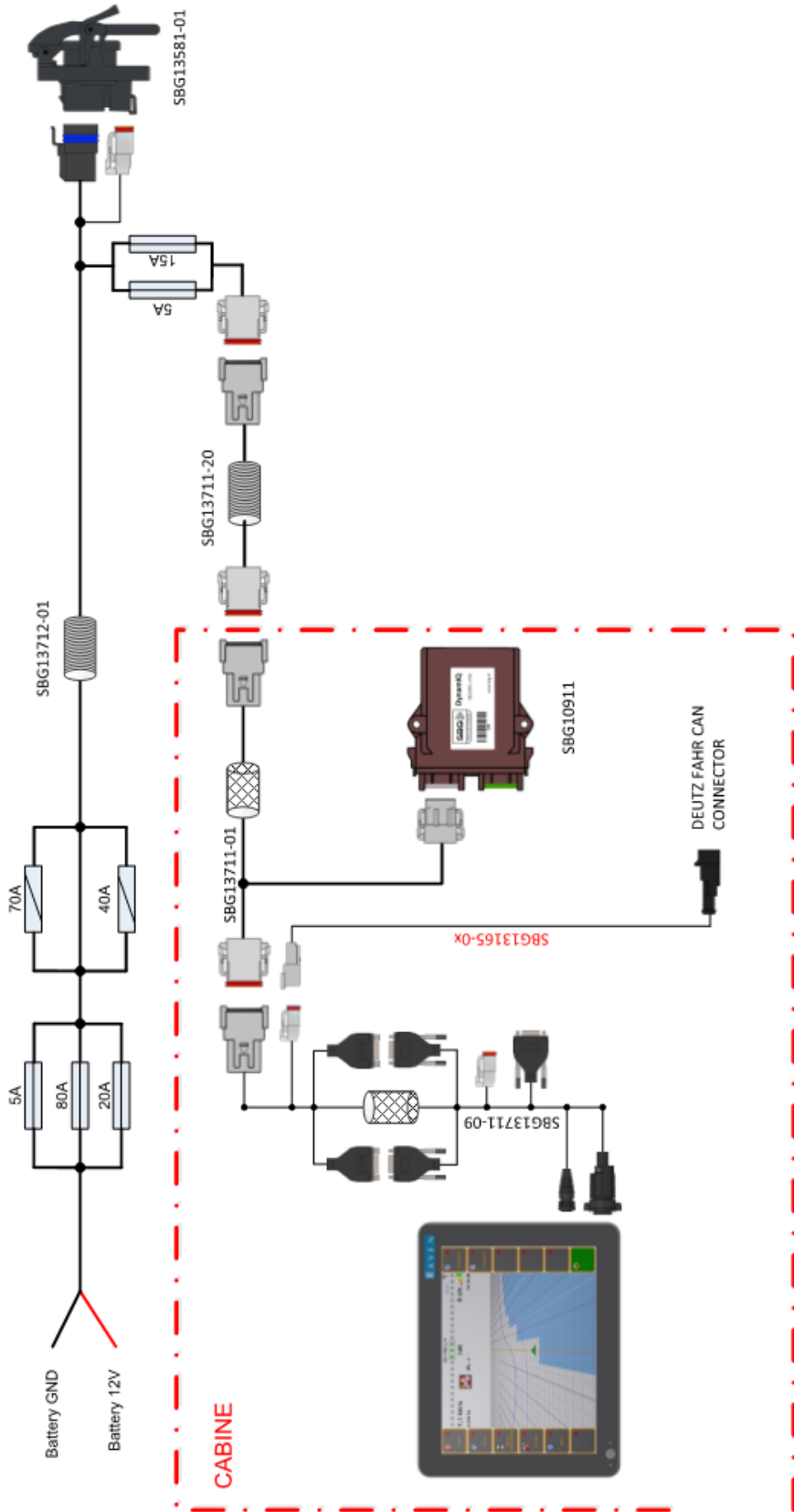| Parameter	Name	Value
64007	HPExtSourceAddress	28
65101	SteeringWheelSensorPresent	255
706	Vcap	30
508	KP	50-70
64023	StwActivationTimeout	2147483647
65105	EsternalSetpointControllerPresent	255
65108	VehicleSpeedSensorPresent	255
65121	ValveType	2
65122	SteeringType	1

Intentionally left blank.

Performing perfection.

8. Annexes

Figure 32 Schematic overview Deutz-Fahr AgroSky.