INSTALLATION MANUAL

SBGuidance Auto

Valtra AutoGuide

016-8000-089EN Rev. A

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Preface

This installation manual is intended for persons responsible for installing a Valtra AutoGuide 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:

Hint!:
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.

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!:

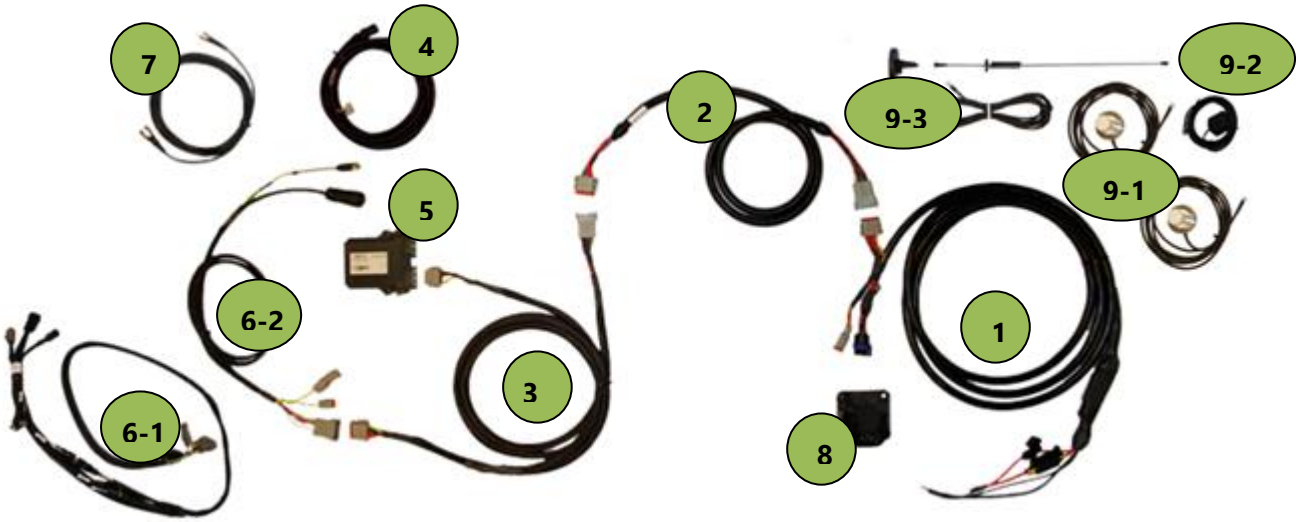
Always consult your supplier as to which products are best suited first before cleaning the touch-screen with chemicals or alcohol.

1. Instructions for installing the SBGuidance Auto on tractors

This manual is a guide for the Valtra AutoGuide tractors. This chapter provides overviews of the components that can be supplied with this tractor sets.

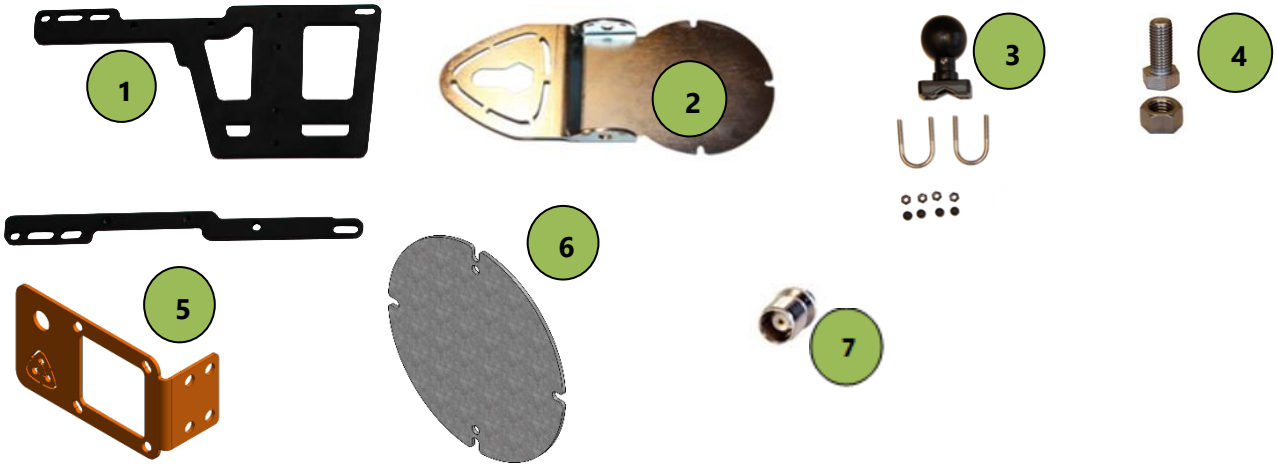
All necessary parts are supplied, including this manual. Verify that all items listed on the packing list are actually present.

1.1. Overview of standard electronic components



#	Type Number:	Description:
1	11158000141	HRNS, POWER, BASIC
1	11158000060	HRNS, POWER, IMPLEMENT READY
2	11158000214	HRNS, CHASSIS, EXTENSION, 2M
3	11158000228	HRNS, IN-CAB, DYNAMIQ
4	11158000257	Harness Valtra AutoGuide
5	10630173862	DynamIQ ISO - Tractor
6-1	11158000064	HRNS, IN-CAB, TERMINAL, VIPER4
6-2	11158000129	HRNS, IN-CAB, TERMINAL, GEOSTR
7	1115800011(0/1/2)	CBL, ANT. 3 / 4.5 / 6M, TNC-N
8	14084002131	Implement socket (IBBC)
9-1	11218000003	ANTENNA, 4G/3G UMTS LAIRD 3.5M
9-2	10638000015	ANTENNA, PATCH, 4.5M
9-3	11178000313	KIT, RADIO ANTENNA TRC, MAGNET

1.2. Overview of mechanical components



#	Type Number:	Description:
1	11078000125	BRACKET, DYNAMIQ, V4
2	11078000081	BRACKET, GPS/RADIO ANT GENERIC
3	11030001040	MOUNT, 1" RAIL, RAM D
4	11178000311	KIT, BOLT AND NUT UNC, ANTENNA
5	11078000006	BRACKET, IBBC, IR
6	11078000131	MOUNTINGPLATE, ANTENNA, ROOF
7	14074001024	TNC dummy
-	11178000341	KIT, MOUNTING, TRACTOR

2. Tractor kit build up

It is recommended to carry out the build up of the tractor in the following order:

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

Figure 1 Overview components Valtra AutoGuide

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 (Figure 2) at the back side of the tractor.

3.3. Mount harness

The CAN basic harness and the CAN Implement 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 well fastened and vibration free. (Figure 3)

2. Extension harness: extends the power harness to the In-Cab harness. This harness is wrapped in a hard casing.

3. In-Cab harness (DynamIQ ISO): This harness comes from the chassis harness and goes inside the cabin, wrapped in a braided sleeve

Figure 2 IBBC connector

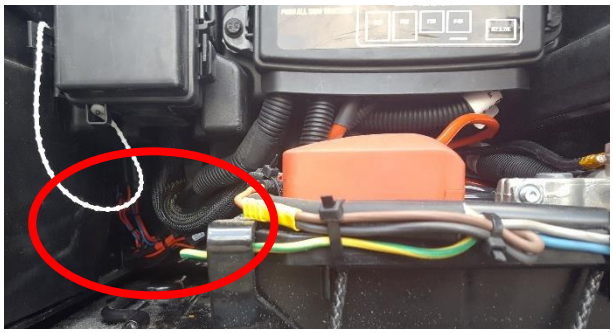


Figure 3 mounted relays and fuses

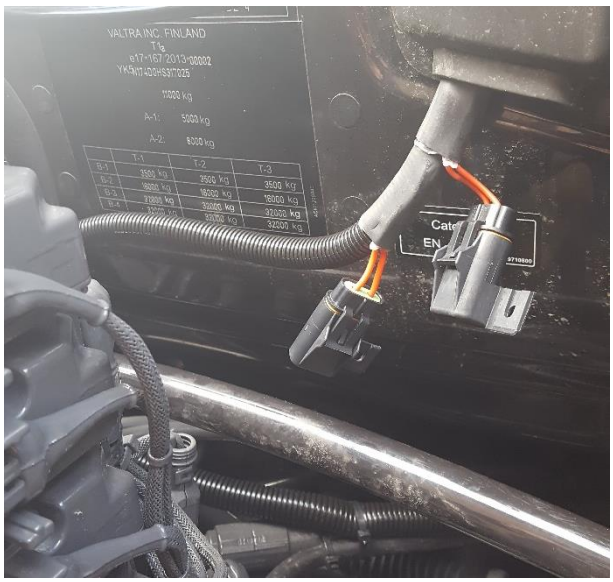


Figure 4 location to go inside the cabin

casing. (Figure 4 & Figure 5) A branch is made to the DynamIQ ISO.

4. Harness In-Cab Terminal: this harness comes from the In-Cab harness (DynamIQ ISO) and is connected with the terminal. This harness is also connected with harness Valtra AutoGuide.

5. Harness Valtra AutoGuide: this is the connection between the SBG system and the CANBUS of the Valtra tractor. The Valtra connection is located on the roof. (Figure 6)

Hint!: *A schematic overview of the SBG CAN-harness on a* Valtra AutoGuide *tractor is shown in* Figure 28.

Furthermore there are some general instructions for mounting a Raven harness:

- Mount the harness, if there is no battery switch installed, always directly on the battery. That means the positive (red) and the negative (black).
- If a battery switch is used, the harness has to be mounted after the battery switch.
- Mount the terminal harness together with the GPS- and radio/GSM-cable in one jamb.
- Use tie-wraps to mount all the cables vibration and scrape free.

Warning!: *Important to mount the harness at all times at last on the battery after mounting all the cables and controllers!*

Warning!: *Be sure the cables won't damage during the installation!*

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

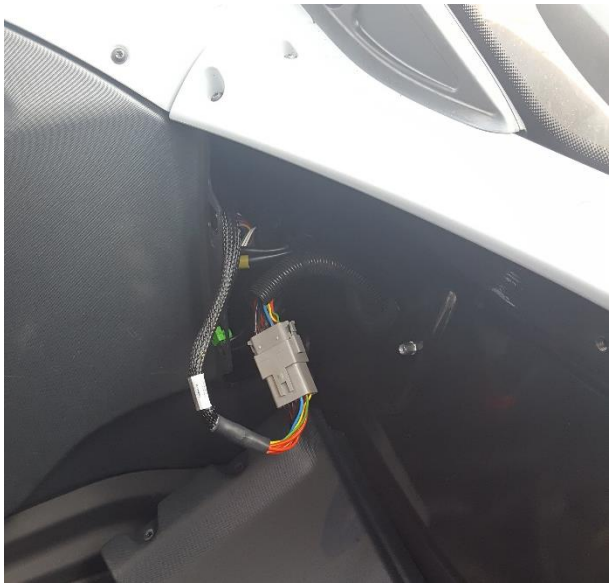


Figure 5 connection to In-Cab harness

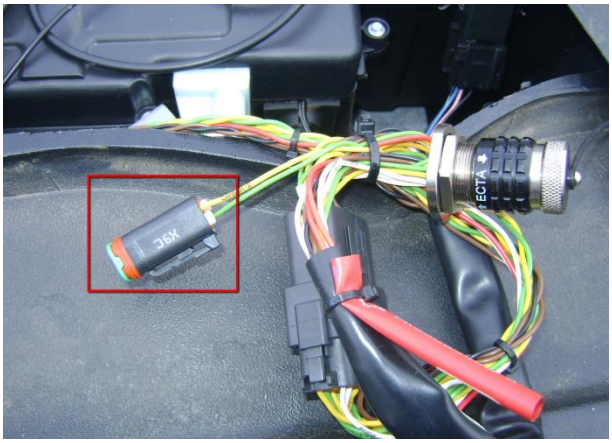


Figure 6 CAN connection on the roof

4. Mounting GPS- and radio/gsm- antenna

A standard GPS bracket can be mounted on a Valtra AutoGuide tractor.

4.1. Mounting the standard GPS antenna bracket

Figure 7 shows an example of a standard GPS-antenna (with a Radio antenna in this case) mounted on a standard GPS-antenna bracket. A GPS-dummy and a UNC bolt + nut are also mounted. The standard GPS-antenna bracked can be mounted with double sided tape on the cabinroof.

Figure 7 Standard GPS-antenna bracket + UNC bolt and nut mounted on a roof

For mounting a GPS-antenna a few general instructions are applicable:

- 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 7).
- 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 lead 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'.

4.2. Mounting Raven 600S antenna

Nowadays, it is also possible to use SBGuidance Auto in combination with a Raven 600S antenna (Figure 8).

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 8). The GPS antenna bracket has to be mounted on the front of the cabin roof.

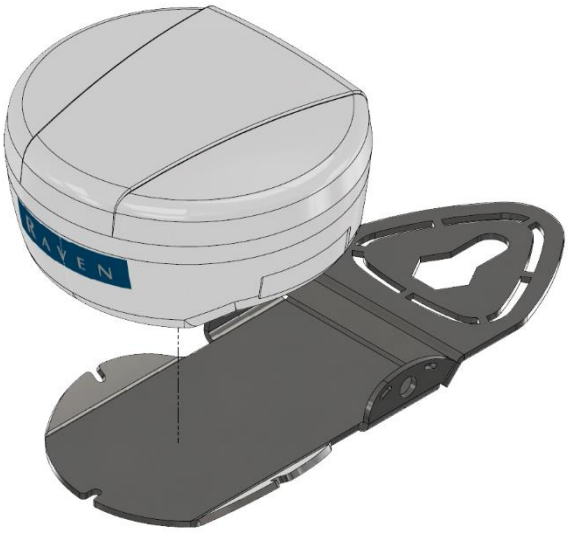


Figure 8 Raven 600S antenne.

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.

Figure 9 Raven 600S antenna on a cabin.

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 10). With these protective caps no dust and water can enter the connectors.

Figure 10 Cables to the Raven 600S antenna.

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

- Mount the GPS-antenna with the connectors backwards (Figure 9).
- Mount the GPS-antenna at least 60 centimetres in front of the rear axle.

4.3. Mounting the radio antenna

Figure 11 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	Antenna lead
3	Connector to terminal
4	Magnetic base

Figure 11 Radio antenna components.

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

- The TNC-dummy should preferably be mounted to the GPS antenna bracket (Figure 11).
- Do not place the radio antenna next to a steel construction but above it.
- Place magnet 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).

4.4. Mounting the GPRS/UMTS antenna

The GPRS/UMTS antenna should preferably be mounted to the GPS antenna bracket. Mount the two GSM (Laird) antennas preferably minimum 1,0 meter from each other. The base of the GPS-antennas are magnetic and can be placed in longitudinal (front/rear on the cabin) or transversal direction (left/right on the cabin). The SlingShot GPS patch antenna is also magnetic. The position of the SlingShot GPS patch is not important as long as the antenna is mounted on the roof and with a clear view.

Figure 12 GPS antenna bracket with a Laird UMTS antenna.

On a universal GPS-antenna bracket, one of the GSM-antennas can be mounted behind the GPS-antenna. (Figure 12) Preferably mount the SlingShot GPS patch antenna also on the universal GPS-antenna bracket next to the GSM-antenna. In this way the two GSM antennas has to be mounted also minimum 1.0 meter between each other. For mounting the second GSM-antenna an extra metal plate is supplied in a SlingShot tractorkit. (see chapter 1.2)

Figure 13 Brand specific bracket with GPS-antenna, GPS patch antenna and two GPRS/UMTS antennas.

It is important to meet the following conditions at all times:

- Place the two GSM antenna's at least 1.0 meter from each other.
- The GPRS/UMTS-antenna's and the SlingShot GPS patch antenna are equipped with a magnetic base and has to be mounted on top of the cabin roof.
- Antennas must have a clear view all around.
- Use a metal plate with double sided tape if the GPS-antenna's and GPRS/UMTS antenna will be mounted separately.

Figure 14 GPRS/UMTS-antenna and GPS patch antenna on a metal bracket.

4.1. Mounting GPS Patch antenna

When using a SlingShot modem also a GPS Patch antenna should be mounted (Figure 14). 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 15).

Figure 15 Antenna cables with labels and SMA-grip set.

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 left side of the seat. Use the standard DynamIQ ISO mounting plate (Figure 16).
- 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.
- 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 16). Any other orientation should be set in the software!

Figure 16 DynamIQ ISO on a mounting plate

6. Installing the terminal

The terminal can be mounted with a supplied RAM-D/RAM-C pipe bracket on a Valtra AutoGuide tractor. (Figure 17)

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.

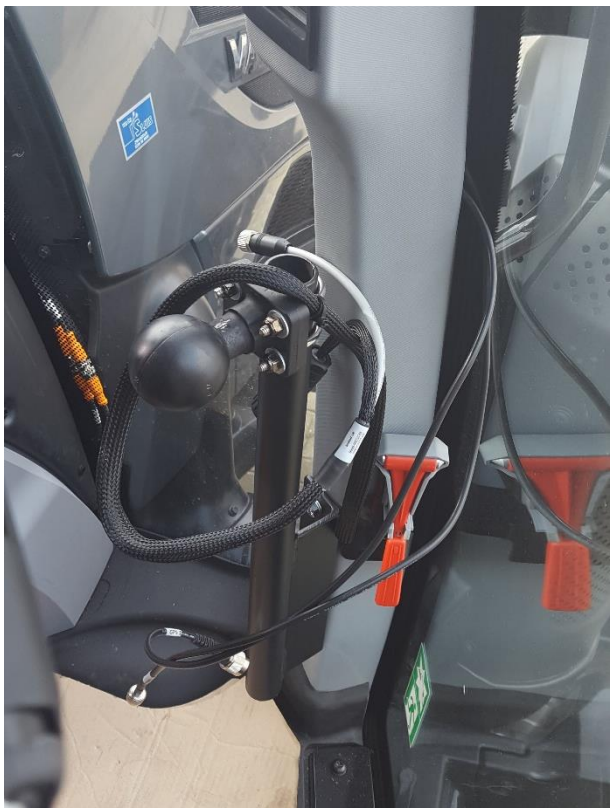


Figure 17 location for the terminal

Hint:
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.

7. Configurating tractor

For configurating a Valtra AutoGuide see general Configurating Manual – SBGuidance Auto – CAN – EN (016-8000-100). However, some things are different. The different parts of configurating a Valtra AutoGuide are described in this chapter.

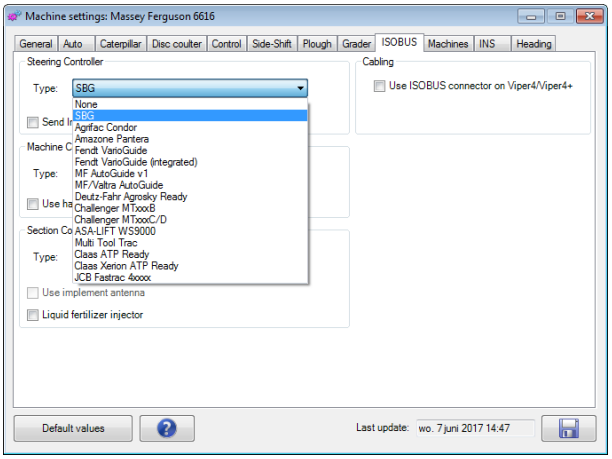


Figure 18: select type in machine settings

7.1. Starting automatic steering

starting the SBGuidance software the automatic steering on the Valtra AutoGuide 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 a few seconds (red circle in Figure 19). When activated, the button will light up.

Figure 19 Engage automatic steering.

7.2. Configurating settings

Select MF/Valtra AutoGuide in page ISOBUS of the machine settings in the Configurator (Figure 18)

7.1. 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 20).

Make sure there is communication with the CANbus (received frames is running and Busload > 0%); see red rectangles in Figure 20.

Open the tab 'Modules' (green circle in Figure 20) and select the Sauer-Danfoss PVED-CL module to get to the programming tool.

Press 'Connect' to establish communication with the hydraulic valve (Figure 21).

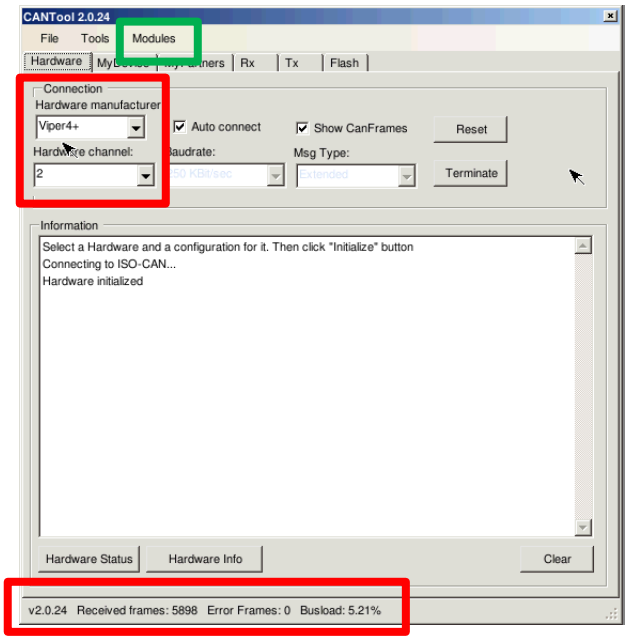


Figure 20 CANTool

If there is communication, information about the valve will show up in the module (Figure 21).

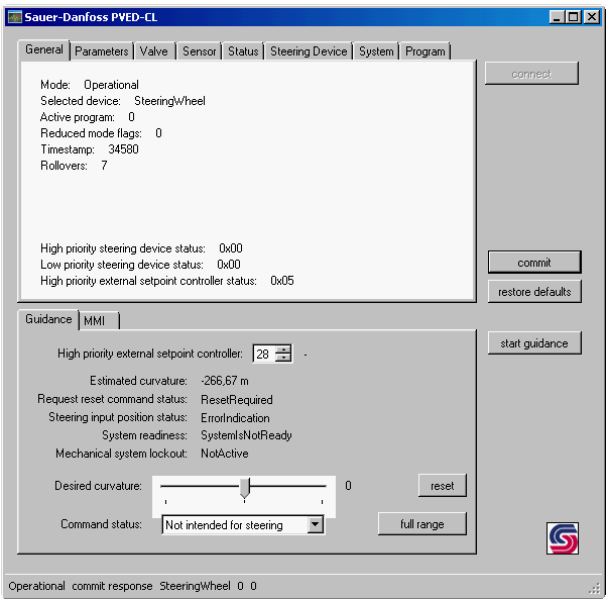


Figure 21 Information about the valve.

7.1.1. **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 22).

Left value = AD1_1000_Left

Centre value = AD1_1000_Neutral

Right value = AD1_1000_Right

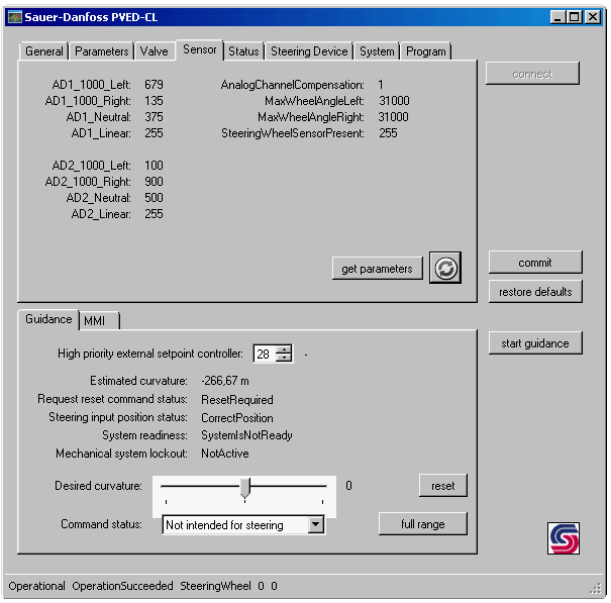


Figure 22 Values steer sensor.

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 23).

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

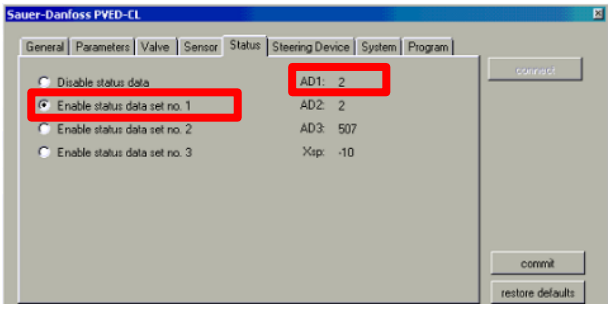


Figure 23 Steering sensor value.

If the value is not correct, open the tab 'Parameters' (Figure 24) to change the value. Search the value, double-click on it and it will be shown in the bar (see red rectangle in Figure 24). 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'.

Please note!:
If any value has changed, press 'Commit' before proceeding the procedure.

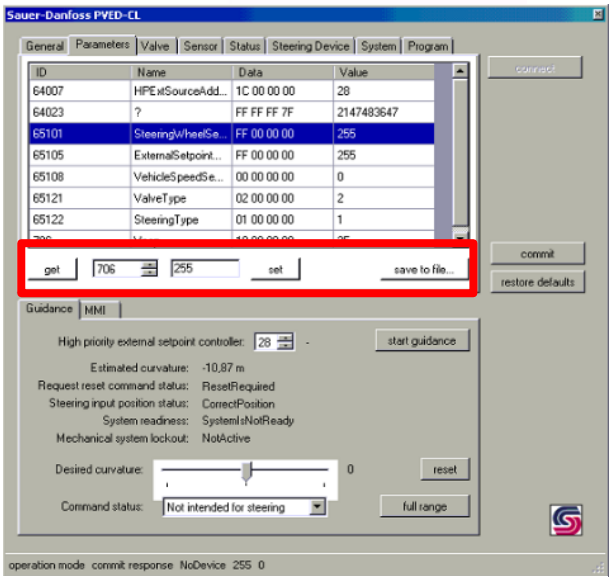


Figure 24 Tab parameters.

7.1.2. **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 25) and press the button 'enter calibration mode'. To get in the calibration mode, the valve needs to be powered off- and on again. To do this follow the steps to get in the Calibration mode. In the lower left corner, the mode is shown (Figure 25).

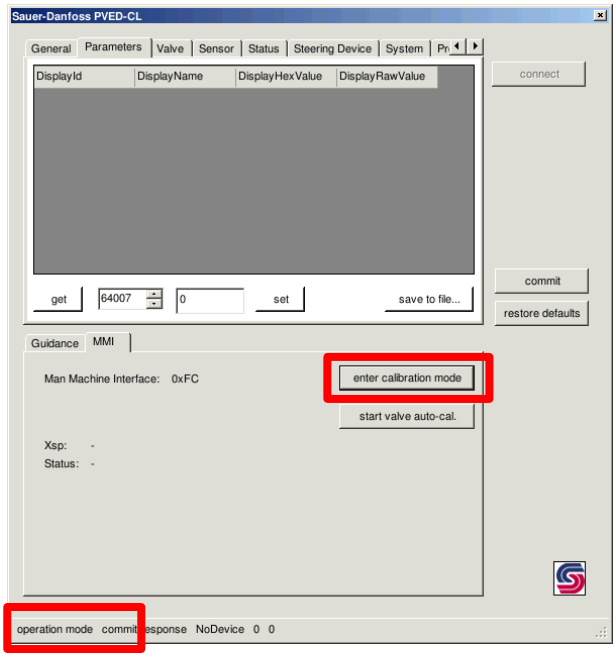


Figure 25 Calibration mode.

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

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

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

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

7.1.3. **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 26.

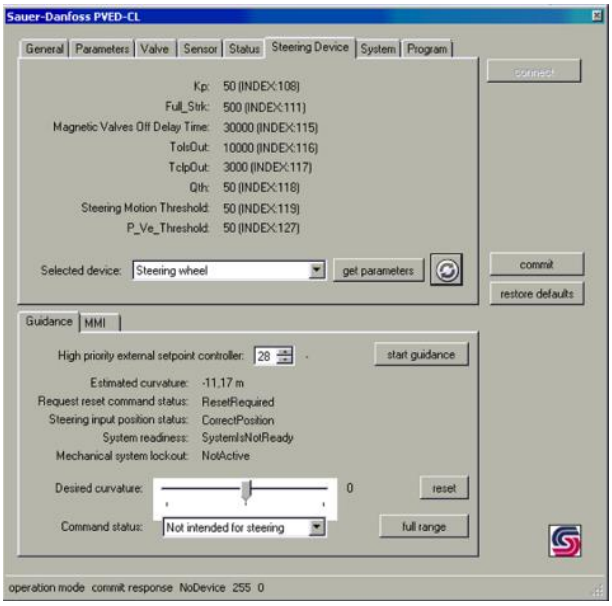


Figure 26 Get the Kp value.

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 27). Overwrite the old value and press 'Set'. The new value will be shown after the value.

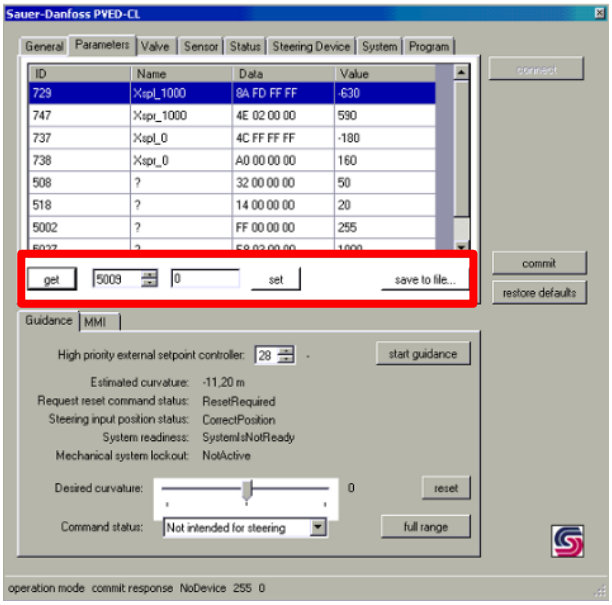


Figure 27 Change a value.

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.

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

7.1.4. **Parameters**

For Massey Ferguson AutoGuide tractors we have experience with some settings which are needed; see Table 1. 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.

Table 1 Overview parameters

Parameter ID:	Name:	Value:
64007	HPExtSourceAddress	28
65101	SteeringWheelSensorPresent	255
706	Vcap	20
518	KP	10
64023	StwActivationTimeout	600000
65105	EsternalSetpointControllerPresent	255
65108	VehicleSpeedSensorPresent	0
65121	ValveType	2
65122	SteeringType	1

8. Annexes

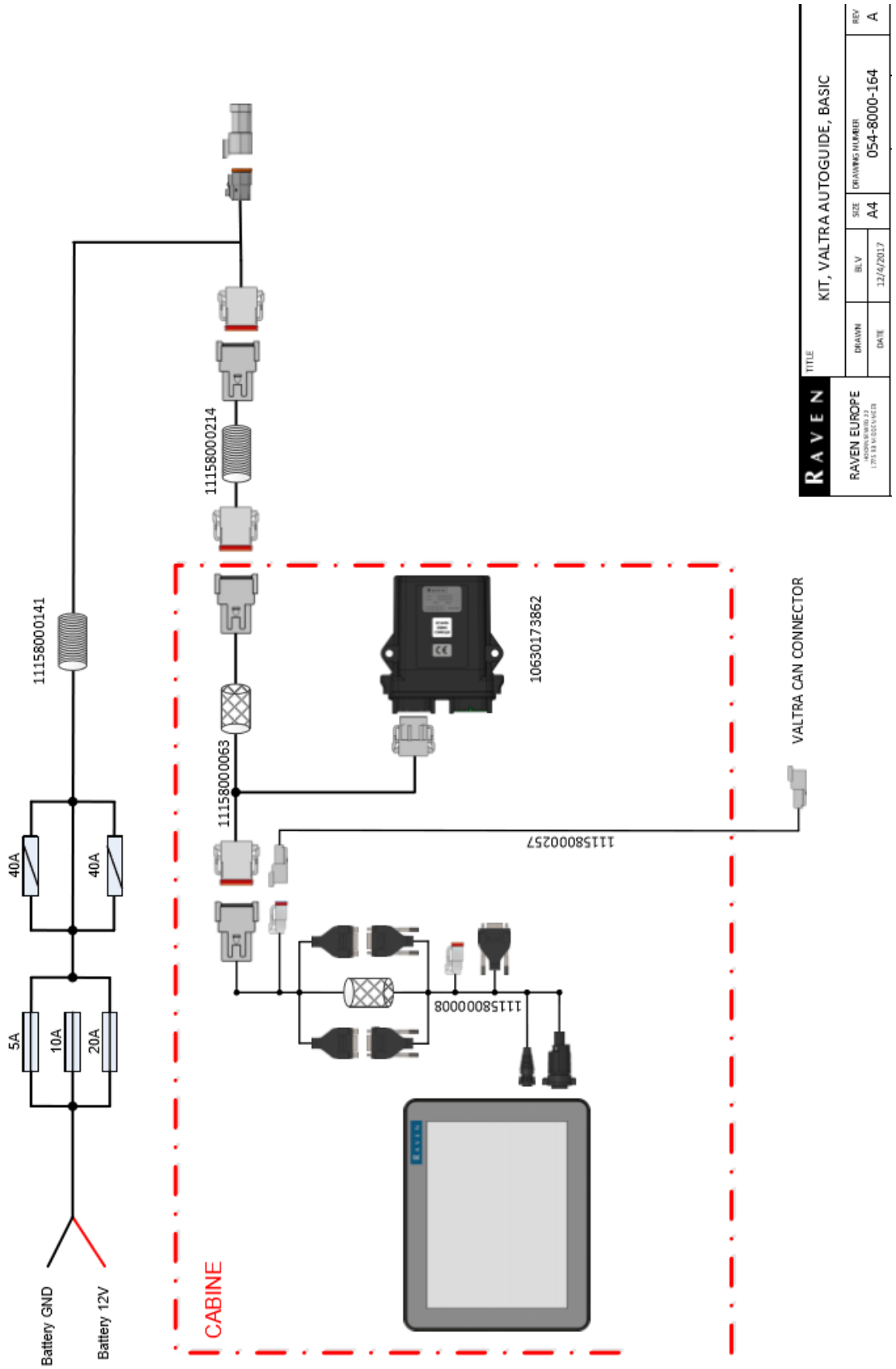


Figure 28 Schematic overview