INSTALLATION MANUAL
VERSION 2.0

SBGuidance 3.7.0

Agrifac Condor (Mini I/O equipped)

Preface

This setup manual is intended for persons responsible for the setup of a SBG system on an Agrifac Condor. This manual contains important instructions that should be used when putting the machine into service or conducting maintenance.

SBG paid utmost attention to the composition of this manual. SBG Precision Farming accepts no responsibility for errors or omissions in this document.

Any comments or questions can be sent to info@sbg.nl.

SBG Precision Farming or any of its suppliers cannot be held responsible for any physical or material damage caused while using the SBGuidance system.

Disclaimer

Warning!:
Turn off the machine at any time during installation and repair of hydraulic and electrical components of the SBGuidance system.

Warning!:
You must always follow the safety instructions from the manual of the machine under any circumstances.

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

Warning!:
It is strictly forbidden to leave the machine with SBGuidance enabled during operation of the system. The driver remains responsible at all times for the 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 operating system is not able to detect or avoid obstacles. If there is an obstacle in your path, you need to avoid the obstacle yourself.

Warning!:
Only competent persons may operate the system. Competent means:
The operator must have read and understood the operating manual and must have had an explanation of a product specialist. The operator must be in good physical and mental state to operate the system.

Caution!:
Always first start the machine to avoid surges in the SBGuidance electrical system.

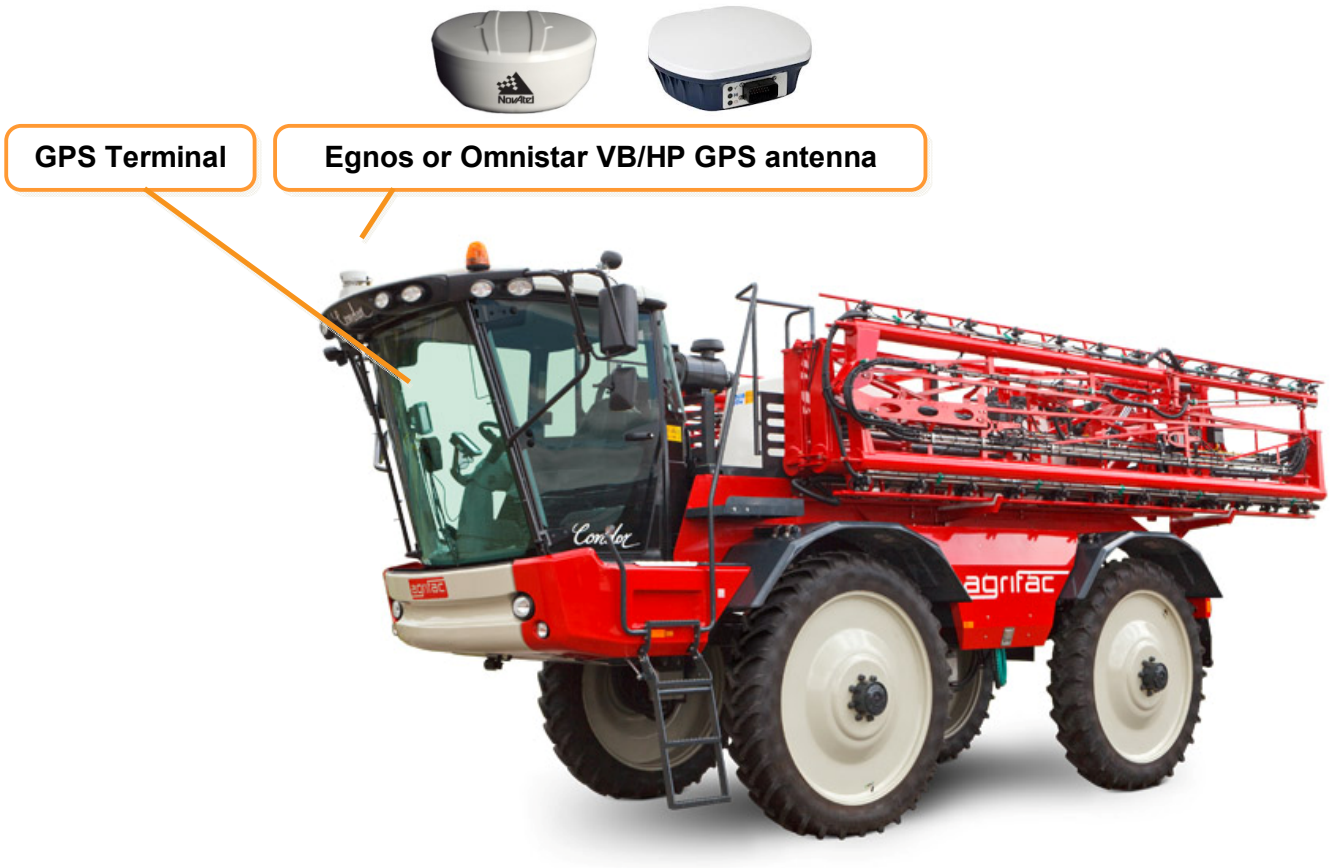
Caution!:
Touch the touch screen only with your finger or a special touch screen pen. Operating with sharp objects may damage the touch screen permanently.

Caution!:
Before cleaning the touch screen with chemicals or alcohol consult your supplier which products are suitable.

Table of contents

1. Overview GPS Installation options on a Agrifac Condor

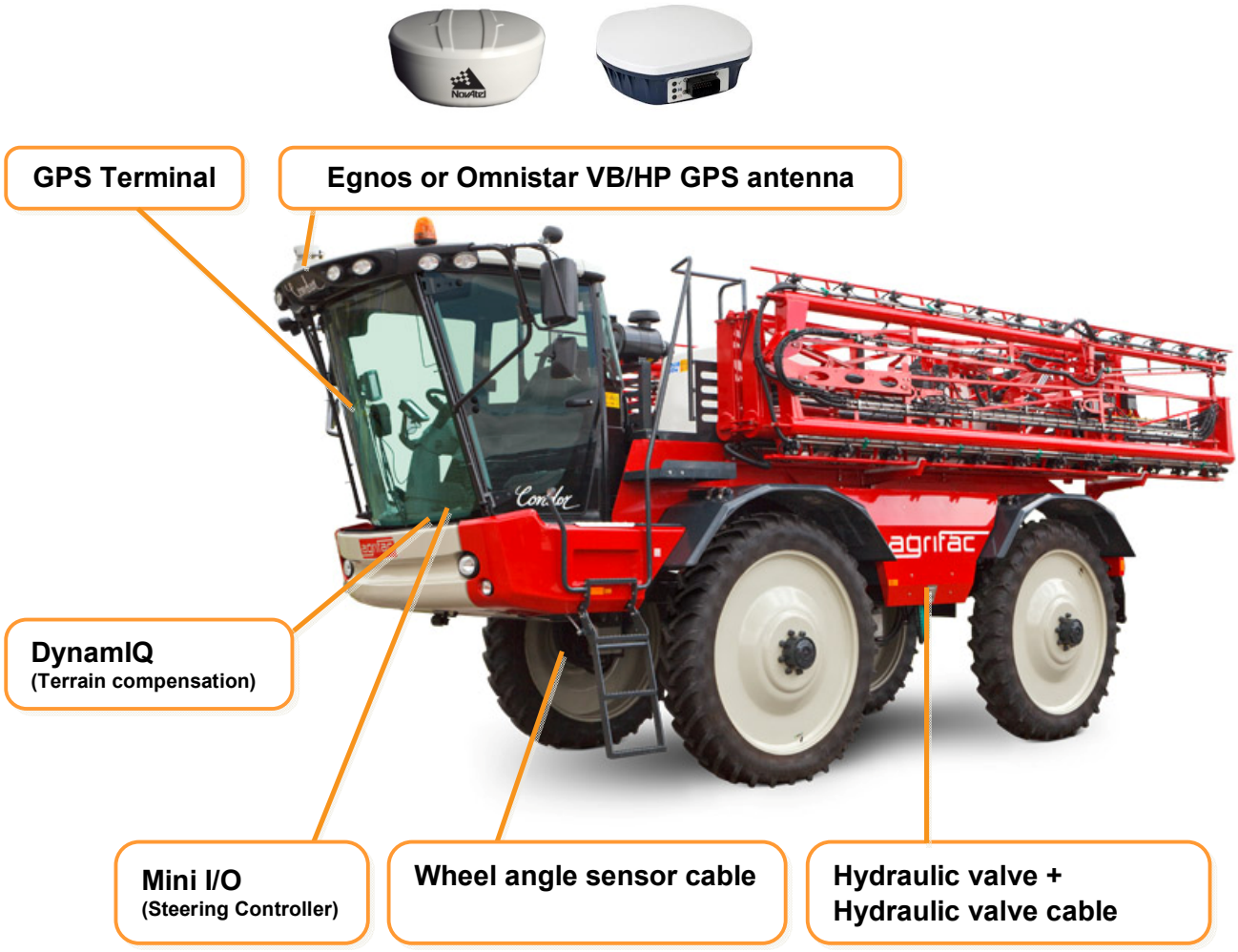
1.1. Option 1: SectionControl on Egnos or Omnistar VB/HP (no autosteer)



Parts list:

- SBG Egnos or Omnistar kit → see chapter 2.3.1 or 2.3.2

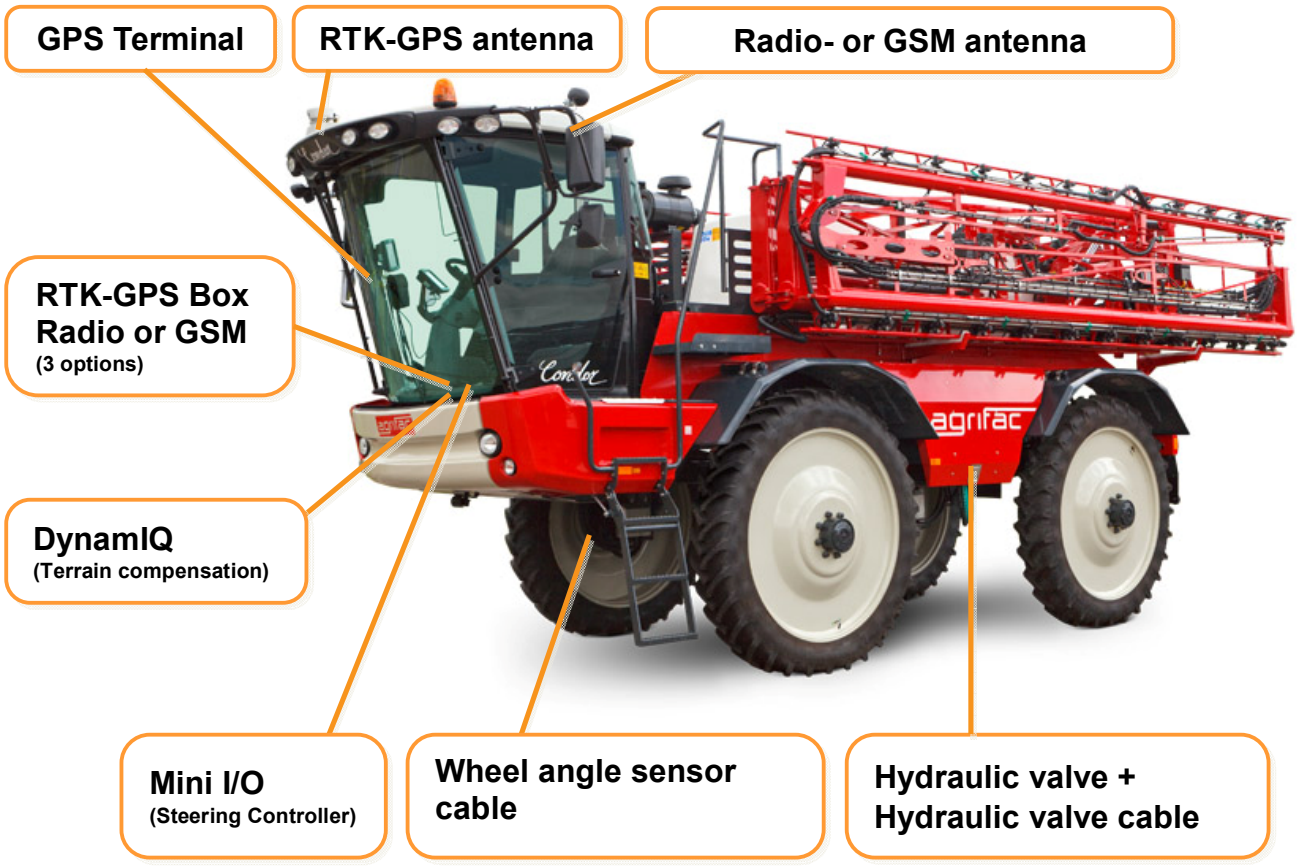
1.2. Option 2: SectionControl + autosteer on Egnos or Omnistar VB/HP



Parts list:

- SBG Hydraulic kit → see chapter 2.1
- SBG Wiring kit → see chapter 2.2
- SBG Egnos or Omnistar kit → see chapter 2.3.1 or 2.3.2

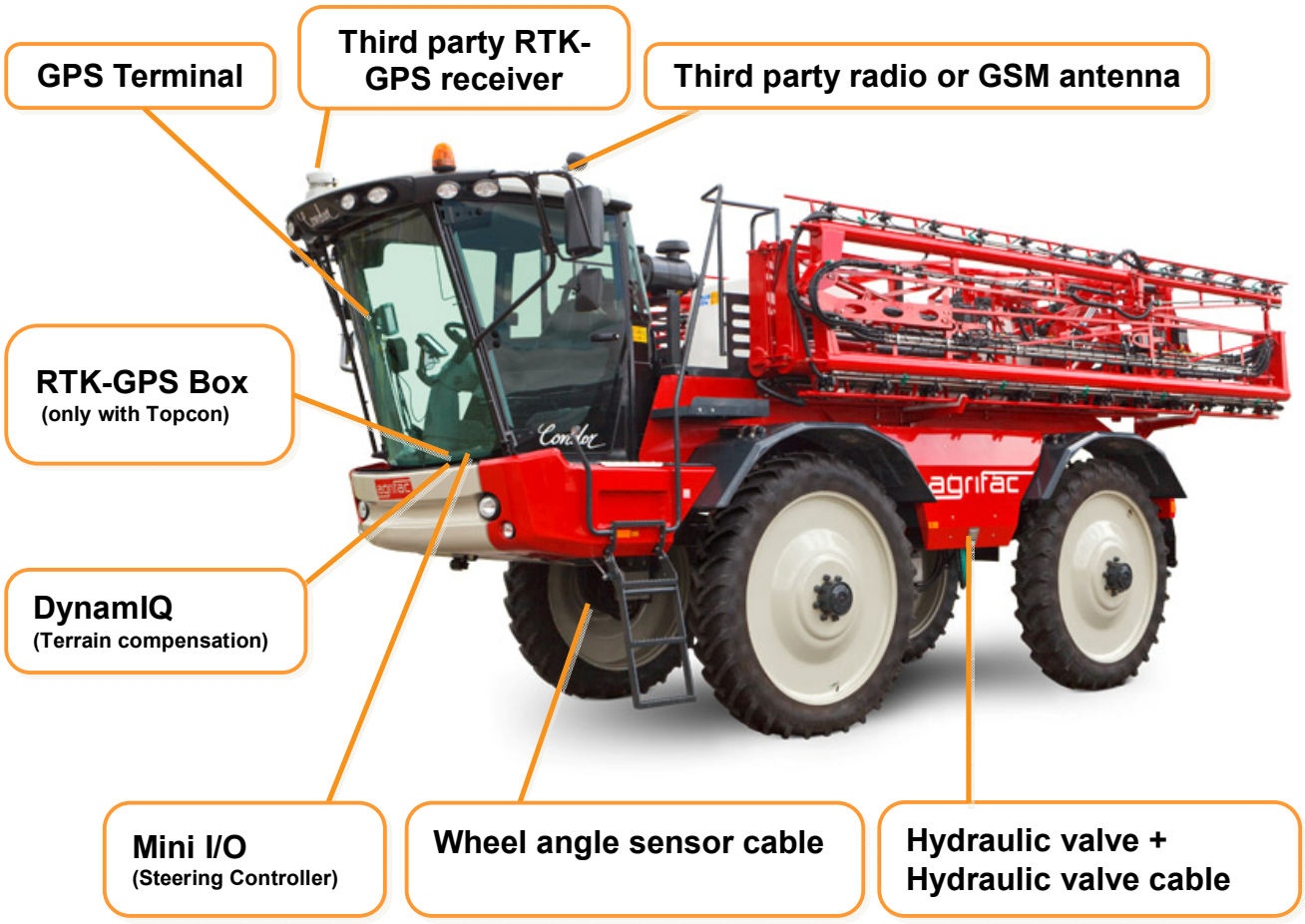
1.3. Option 3: SectionControl + autosteer on SBG RTK-GPS



Parts list:

- SBG Hydraulic kit → see chapter 2.1
- SBG Wiring kit → see chapter 2.2
- SBG RTK-GPS kit → see chapter 2.3.3 or 2.3.4 or 0

1.4. Option 4: SectionControl + autosteer with third party RTK-GPS receiver



Parts list:

- SBG Hydraulic kit → see chapter 2.1
- SBG Wiring kit → see chapter 2.2
- Third party RTK-GPS receiver → see chapter 2.4
- Cable harness for third party GPS receivers → see chapter 2.4.1 or 2.4.2

2. GPS Component overview

This manual is specially designed for equipping an Agrifac Condor with RTK GPS auto steer and section control.

2.1. Hydraulic kit for SBG RTK-GPS autosteer

Agrifac order nr.	Description
1	Proportional valve 4/3 - 15L (Argo-Hytos)
2	Proportional valve 4/3 - L3 (ATOS)
3	Check valve + seal plate
4	serens Argo-Hytos valve
5	Hose + nipple set

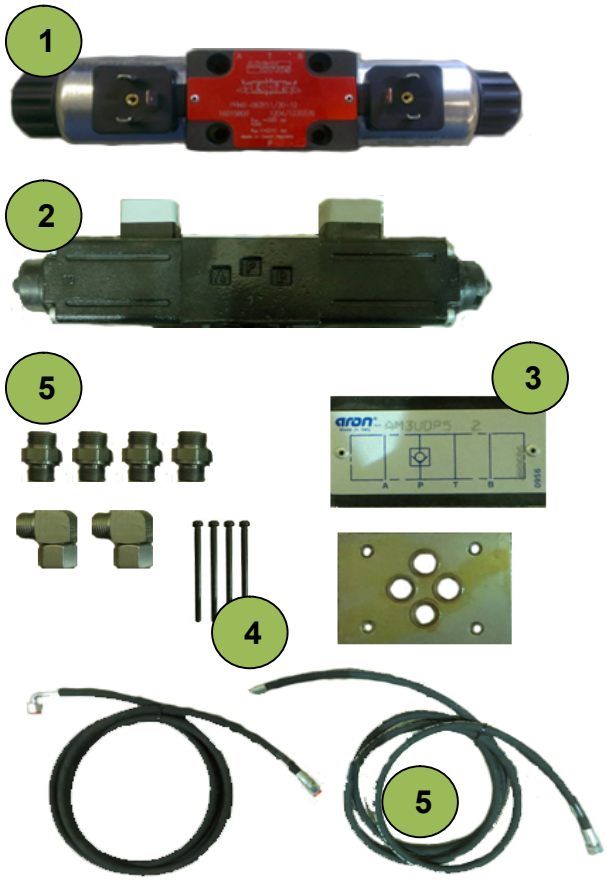


Figure 1 GPS Component overview

2.2. Wiring kit for SBG RTK-GPS autosteer

	Agrifac order nr.	Description
1		DynamIQ: 3D level
2		Mini I/O Generic V1.04
3		Steering controller cable Agrifac
4		Valve cable 10M
5	90004445.1	Wheel sensor spy cable
6		Deutsch DTM female contacts
7		GPS Mounting bracket

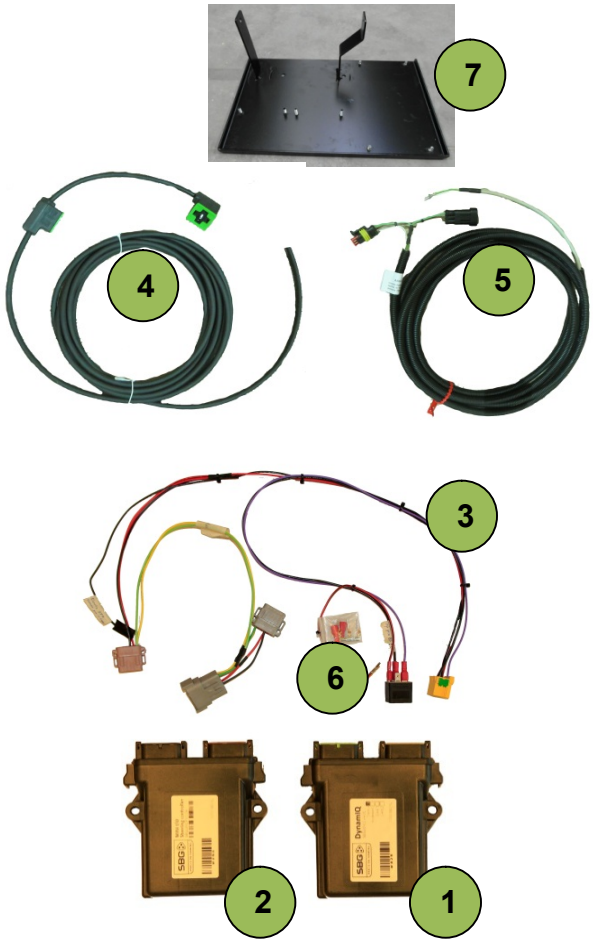


Figure 2 Wiring kit RTK-GPS Autosteer

2.3. SBG - GPS kits

2.3.1. SBG GPS kit A: Egnos

Agrifac order nr.	Description
	Novatel Smart-AG (Egnos)

Figure 3 Novatel Smart-AG

2.3.2. SBG GPS kit B: Omnistar VB/HP

Agrifac order nr.	Description
	Novatel Smart-AG MR-10 (Omnistar VB/HP)

Figure 4 Novatel Smart-MR10

2.3.3. SBG GPS kit C: RTK-GPS with Internal Radio

Agrifac order nr.	Description
4-1	GPS Box (Internal Radio)
4-2	RTK-GPS antenna
4-3	Antenna cable 5m
4-4	Antenna MU4CX/L magnet
4-5	UNC Bolt
4-6	Radio Bracket

Figure 5 RTK-GPS Kit C internal radio

2.3.4. SBG GPS kit D: RTK-GPS with third party external radio

Agrifac order nr.	Description
5-1	GPS Box (External Radio)
5-2	GPS antenna Multi Frequency
5-3	Antenna cable 5m
5-4	UNC Bolt
5-5	Radio Bracket

Notice that external radio and correction signal are arranged by third party.

Figure 6 RTK-GPS Kit D (External radio)

2.3.5. SBG GPS kit E: RTK-GPS with GSM (UMTS / GPRS)

	Agrifac order nr.	Description
6-1		GPS Box (GSM)
6-2		GPS antenna Multi Frequency
6-3		Antenna cable 5m
6-4		3G Antenna LAIRD – 4,0M
6-5		GSM Bracket

Figure 7 SBG-RTK-GPS Kit E with GSM

2.4. Third party GPS

	Name
1	Trimble AgGPS 262
2	Trimble FmX
3	Topcon HiPer-M
4	John Deere ITC
5	John Deere SF3000

Figure 8 Trimble FmX/AgGPS 262

2.4.1. Cable harness for third party GPS receivers

	Agrifac order nr.	Description
1		Trimble AgGPS 262
2		Trimble FmX
3		Topcon HiPer-M
4		John Deere ITC
5		John Deere SF3000

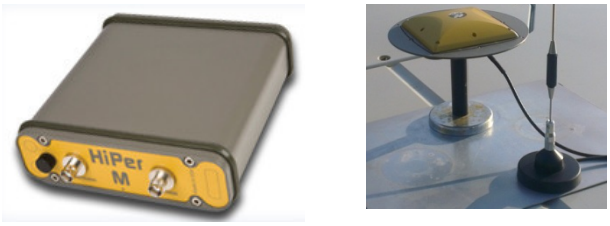


Figure 9 Topcon HiPer-M

2.4.2. Mounting brackets for third party GPS receivers

	Agrifac order nr.	Description
1		Trimble AgGPS 262
2		Trimble Fmx
3		Topcon HiPer-M
4		John Deere ITC
5		John Deere SF3000

Figure 10 John Deere ITC/SF3000

3. Installation of RTK-GPS autosteer system

We advise to install the autosteer system in the following order:

1. Installation of the hydraulic components: proportional valve + check valve
2. Installation of wiring outside the cabin
    a. Hydraulic harness
    b. Wheel angle sensor harness
3. Installation of DynamIQ and Mini I/O
4. Installation of SBG RTK-GPS CAN bus harness inside the cabin

3.1. Installation of the hydraulics

3.1.1. Mounting the valve

On the left side of the machine there is an array of valves placed. For auto steer is it necessary to mount a proportional valve (Agro-Hytos 4/3-15L-12V) on a check-valve. Also a sealing-plate should be mounted between the manifold and the check-valve (see Figure 11).

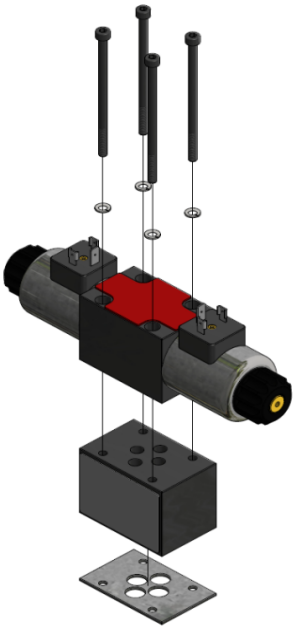


Figure 11 Manifold build up

To mount the hydraulics it is necessary to remove the clean water tank- and soap holder (see Figure 12).

Figure 12 Remove water tank and soap holder

Remove the connectors and the dummy connector plate from the manifold (see Figure 13).

These connectors will not be used for autosteer, a new cable with DIN connectors will be installed.

The sealing-plate that was mounted underneath the dummy connector plate should be reused for mounting the check-valve and proportional valve.

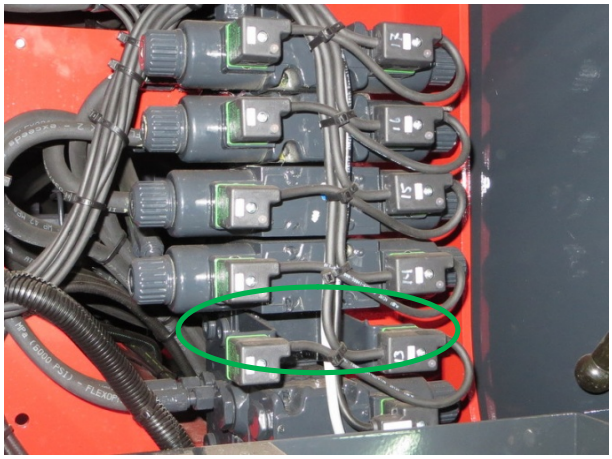


Figure 13 Location of the DIN Connectors

Check if these hoses for the auto steer are mounted (see Figure 14). If not, do this first, see chapter 5.1.2.

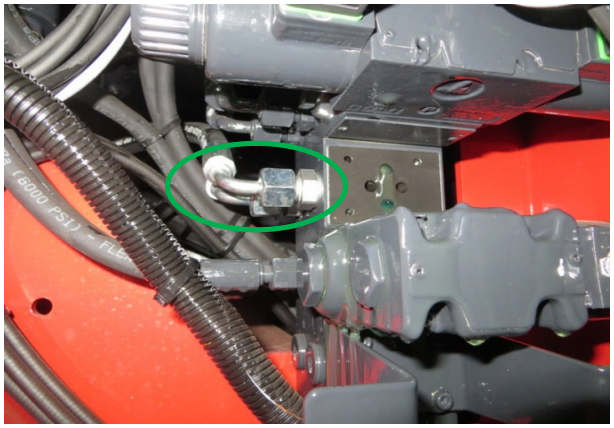


Figure 14 Hoses for autosteer

Mount the sealing-plate, check-valve and proportional valve on the manifold (see Figure 15).

Mount the valve cable and lead it along the other hoses to the electronic box in the cabin. The cable should reach the Mini I/O.

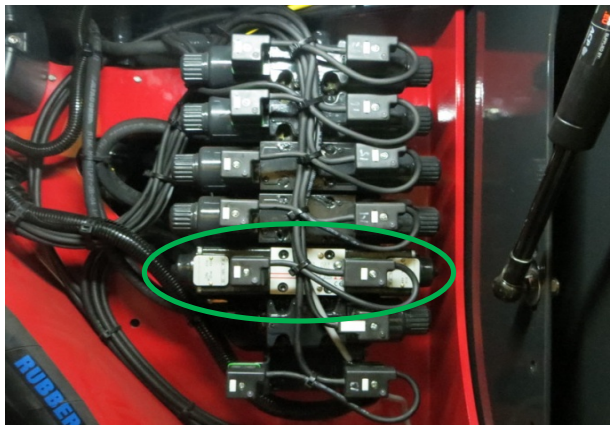


Figure 15 Valve build up

Make sure the cables are tied up with tie-rips.

Make sure that the valves are placed at the correct place.

Figure 16 Valve Cable

3.1.2. Mounting the hoses

Normally the hydraulic hoses for auto steer are already mounted on the machine. When not, fit two hoses from the valve array to the steering cylinders.

Remove the plugs from the manifold and mount the hoses with the angled end on the manifold (see Figure 17).

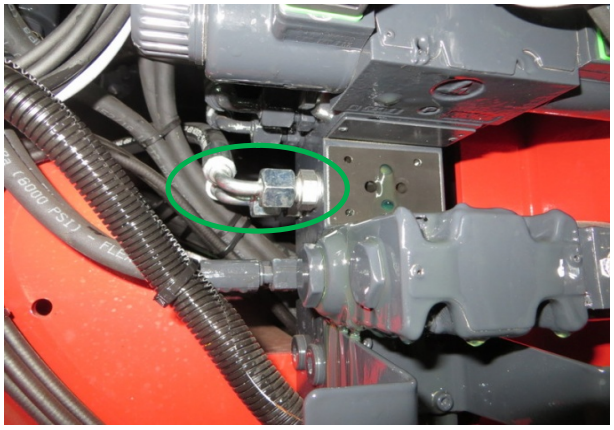


Figure 17 Hydraulic hoses mounted for autosteer

3.1.3. Deutz Engine

Lead the hoses along the other hoses to the split-manifold. With an Deutz engine this is at the front of the engine.

Figure 18 Split Manifold at the front of the engine (Only Deutz engines)

Remove the two plugs on the top of the split-manifold (see Figure 19), and mount the two hoses with the angled adapters (see Figure 20).

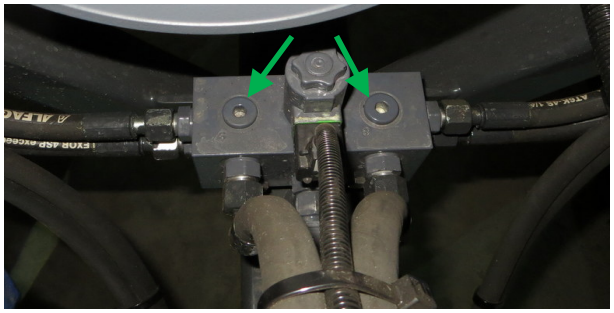


Figure 19 Split manifold with two plugs

Make sure the hoses are tied up with tie-rips.

Figure 20 Split manifold with hoses

3.1.4. Iveco Engine

Lead the hoses along the other hoses to the split-manifold. With an Iveco engine this is under the cabin (see Figure 21).

Figure 21 Location of the split manifold on an Iveco engine

Remove the two plugs on the side of the split-manifold (see Figure 22), and mount the two hoses with the angled adapters (see Figure 23).

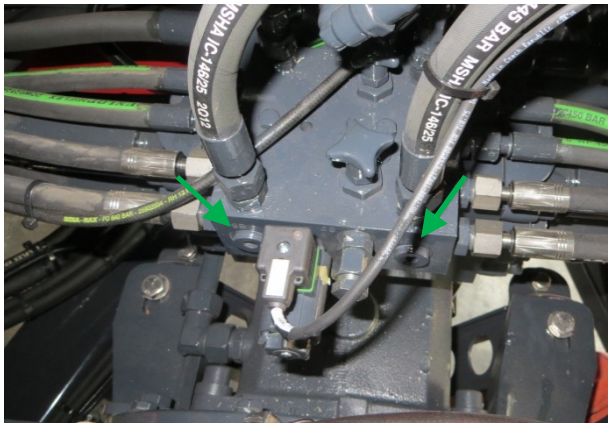


Figure 22 Location of the two plugs

Make sure the hoses are tied up with tie-rips.

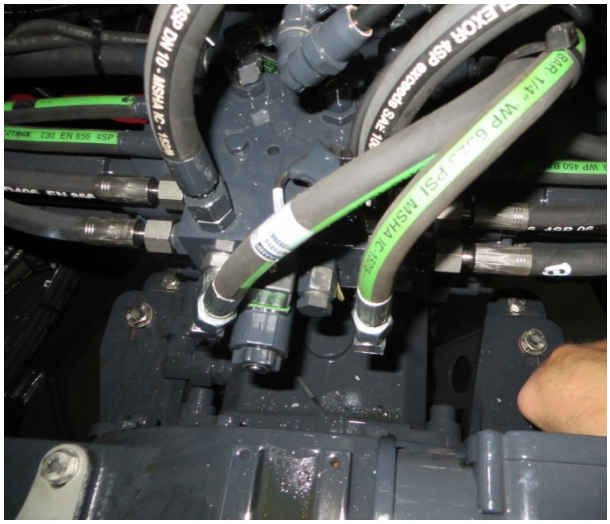


Figure 23 Split Manifold with hoses

3.1.5. Installation of the wheel-angle-sensor-cable

The already mounted wheel angle sensor on the right front wheel will be used for auto steer (see Figure 24).

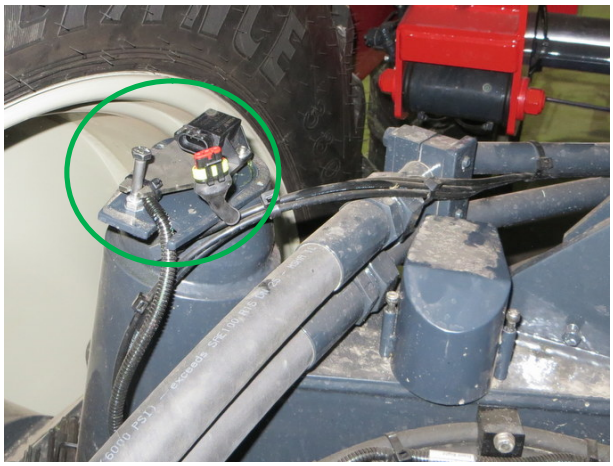


Figure 24 Location of the wheelsensor

Therefore a split wheel angle sensor cable needs to be mounted (see Figure 25).

Check if the right angel sensor is delivered. See Schematic in Chapter 4.1.6 to check the wiring. Both connectors should have three wires connected!

Figure 25 Wheel angle sensor cable

Remove the cover from the wheel angle sensor.

Mount the wheel-angle-sensor-cable and lead the cable along the other cables and hose to the electronics box inside the cabin. The cable should reach the Mini I/O (see Figure 26).

Place the cover back on the sensor.

Make sure the cables are tied up with tie-rips.

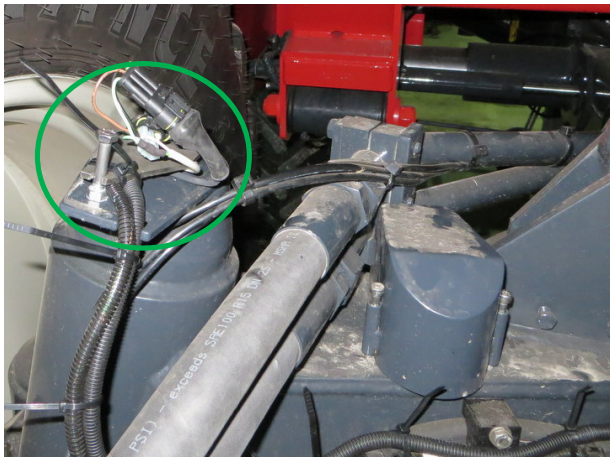


Figure 26 Wheel sensor with the SPY Cable installed

3.2. Mounting the GPS antenna

3.2.1. Mounting the GPS antenna cable harness

Agrifac sprayers can be delivered with many different GPS antennas. Every antenna needs a different cable harness to connect the GPS antenna to the GPS terminal.

Figure 27 Agrifac roof opened

Before mounting the GPS antenna check if the right cable harness is connected. If not, or a wrong cable harness is mounted the roof needs to be opened.

To open the roof remove some torx screws on the top front of the cabin. Open the roof a little bit and reach to the cables inside (see Figure 27).

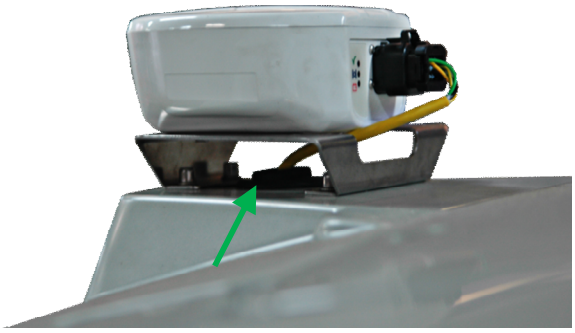


Figure 28 Location of the rubber gasket

In the front of the roof there are two cables. One cable has a grey 6 pin Deutsch DTM connector and another black cable has a TNC connector.
The cable with the grey 6 pin Deutsch DTM connector is for mounting a GPS cable that goes outside the rubber gasket on the top of the cabin (see Figure 28).

Figure 29 TNC Connector

The TNC connector is for connecting a RTK-GPS antenna from SBG and has to be put through the rubber gasket on the top of the roof if needed. The grey 6 pin Deutsch connector is not used when using the TNC cable (see Figure 29).

3.2.2. Mounting the Novatel Smart-AG Egnos

Before mounting the Smart-AG Egnos antenna check if a Smart-AG cable harness comes from the roof.
If no or a wrong cable harness mounted see chapter 3.2.1 how to open the cabin roof and mount the right harness.

Mount the Smart-AG Egnos antenna with 4 inox M4 bolts from the mounting kit.
Connect the Smart-AG cable to the antenna.

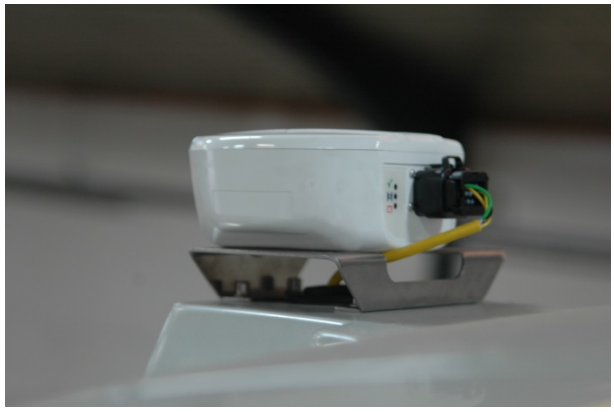


Figure 30 Novatel Smart-AG Egnos mounted on Condor roof

3.2.3. Mounting the Novatel Smart-MR10 Omnistar VB/HP

Before mounting the Smart-MR10 Omnistar antenna check if there is a Smart-MR10 Omnistar harness coming from the roof.
If there is none or a wrong cable harness has been mounted see chapter 3.2.1 how to open the cabin roof and mount the right cable Harness.

Mount the Smart-AG Egnos antenna with 4 inox M4 bolds from the mounting kit.
Connect the Smart-AG cable harness to the antenna.

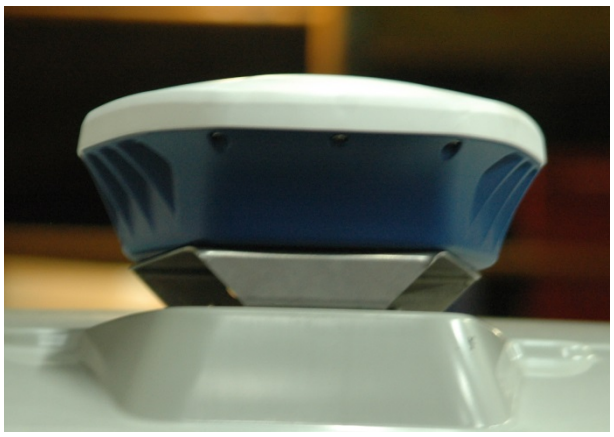


Figure 31 Novatel Smart-MR10 Omnistar mounted on Condor roof

3.2.4. Mounting the RTK-GPS Antenna

Before mounting the RTK GPS-antenna check if the TNC-coax cable is coming from the roof. If this is not the case see chapter 3.2.1.

The RTK-GPS antenna has to be mounted on the front of the cabin-roof. First mount the inox UNC bolt (inox UNC 5/8x1,5) and nut on the bracket that is already on the roof. Then mount the RTK-GPS antenna. The cable with the TNC plug is already placed in the cabin roof.

Figure 32 RTK GPS Antenna mounted on top of the Condor roof

3.2.5. Mounting a third party RTK-GPS Antenna

When using a third party RTK-GPS antenna choose the right mounting bracket and cable harness from chapter 2.4. To set up the third party GPS antenna see the information in the GPS Setup manual. For other questions about the setup ask your third party GPS supplier for advice. In some cases, for instance John Deere antennas, the GPS antenna needs to configured before it can be installed. With John Deere antennas the configuration can be done in a John Deere tractor.

3.3. Mounting the radio or GSM-antenna for RTK

When an Agrifac Condor is using a RTK-GPS box it is necessary to mount a radio or GSM antenna. The radio or GSM is placed at the back of the cabin for the best signal strength.

To mount the magnetic base of the radio or GSM antennas it is necessary to stick a metal plate on the roof. Before placing the plate clean the surface of the roof with a degreaser or brake cleaner.

To mount the cable from the antenna to the RTK-box inside the cabin remove the sunscreen at the back of the cabin, the cover on the top of the rear window, the cup holder and the cover of the C-style of the right window.

From the outside of the cabin at the back side drill a hole (for radio 15mm and for GSM 10mm) and lead the cable through a rubber gasket through this hole. Lead the cable through the roof to the C-style, down to the RTK-GPS box. Make sure the cable is outside and makes a loop downwards to avoid water entering the cabin (see Figure 34).

Dual GSM antenna

When using a dual GeoConnect setup with two GSM antennas place the two GSM antennas with at least one meter distance from each other on the roof.

Figure 33 Radio antenna mounted on Condor roof

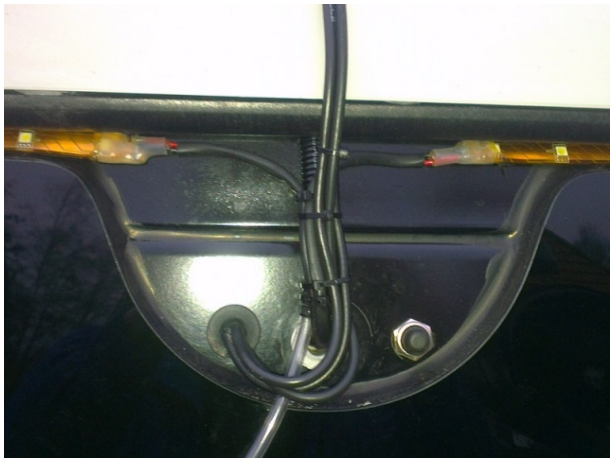


Figure 34 Radio cable at the back of the cabin (Outside)

3.4. Mounting the DynamIQ, Mini I/O and RTK-GPS box

3.4.1. Mounting the DynamIQ (terrain compensation module)

The DynamIQ is mounted on a GPS mounting bracket (see Figure 35). This mounting bracket has to be mounted underneath the two mounting points of the hinge U-bracket of the big circuit board.

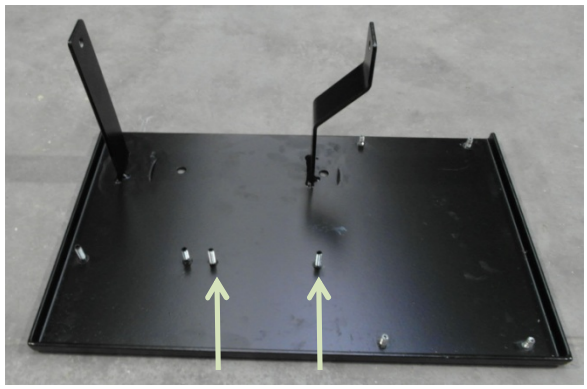


Figure 35 GPS mounting Bracket

Remove the two bolts of the U-bracket, carefully shift the DynamIQ mounting bracket underneath the U-bracket and place the two bolts back again.

Mount the DynamIQ always with the connector pointing to the back of the sprayer.

Mount the DynamIQ always with sticker facing up!

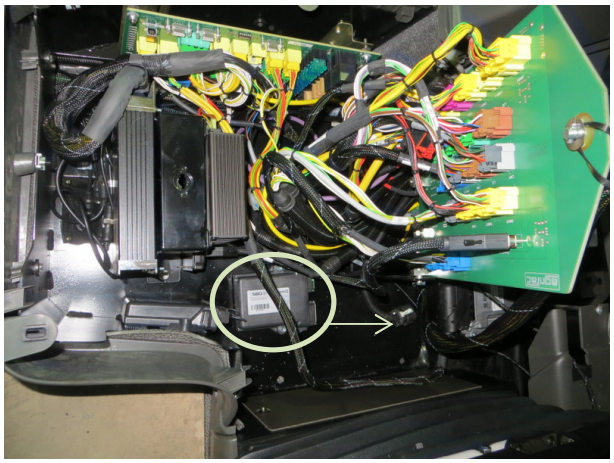


Figure 36 DynamIQ mounted in the electronics box right of the driver seat

If the DynamIQ mounting plate is not available then there is also the possibility to drill and tap two M6 mounting points in de bottom of the electronics box. Make sure the DynamIQ has its orientation exactly with its connectors to the back of the sprayer. Clean out the waste of the drilling before mounting the DynamIQ.

3.4.2. Mounting the Mini I/O (steering controller)

Mount the Mini I/O Steering controller with the velcro to the side of the box in the cabin (see Figure 37).
The DynamIQ and steering controller are mounted apart from each other. Therefore the high currents of the steering controller do not influence the sensitive sensors in the DynamIQ.

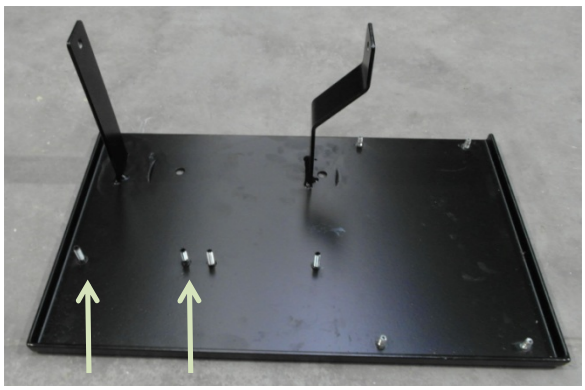


Figure 37 Mini I/O mounted in the electronics box right of the driver seat

3.4.3. Mounting the RTK-Box

Place the RTK-Box also in the electronics box. The connecters of the RTK-Box should face towards the front windscreen so you can see the 3 led burning.

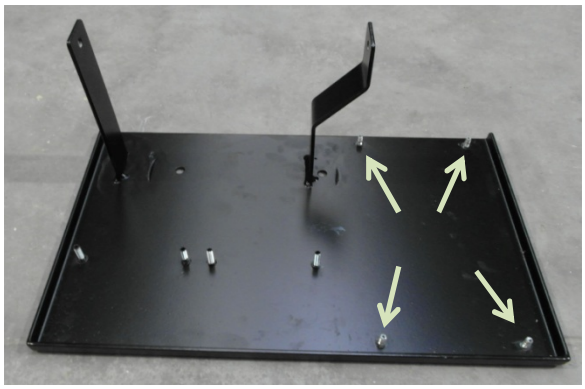


Figure 38 RTK-Box mounted with the connectors to the front so you can see the lights and connectors.

3.5. Installation of the RTK-GPS CAN bus harness

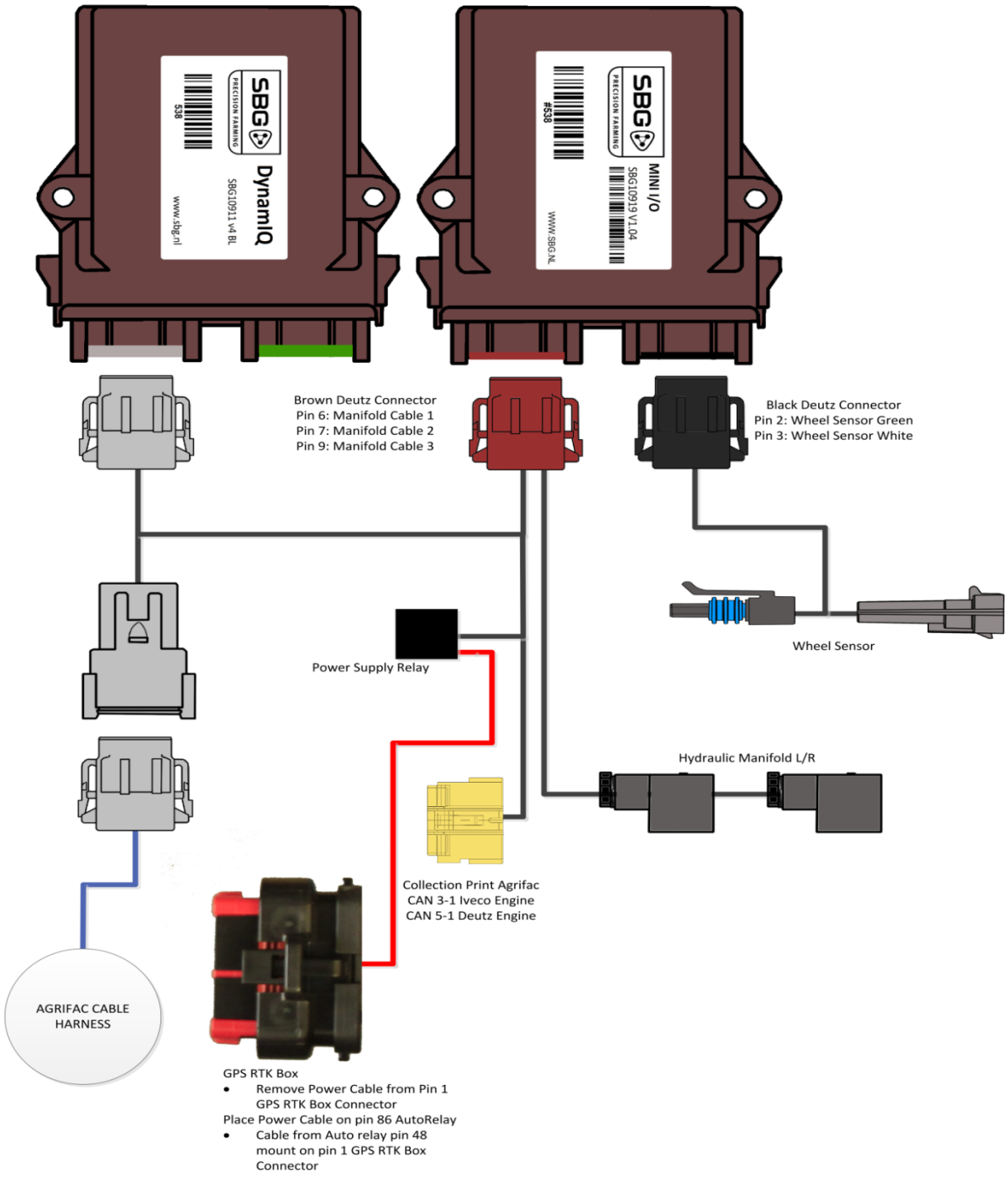
SBG delivers a power cable harness which has not all the cables connected. The following parts need to be connected:

- Deutsch connectors
  - Wheel sensor
  - Hydraulic manifold L/R
- AMP
  - Power supply

Where to connect the wires is shown on the next page.

Make sure that every pin is well connected in the sockets of the connector.

Make sure that the resistance over the CAN bus is 60 Ohm.



See for the drawing of the cable harness chapter 4.4.

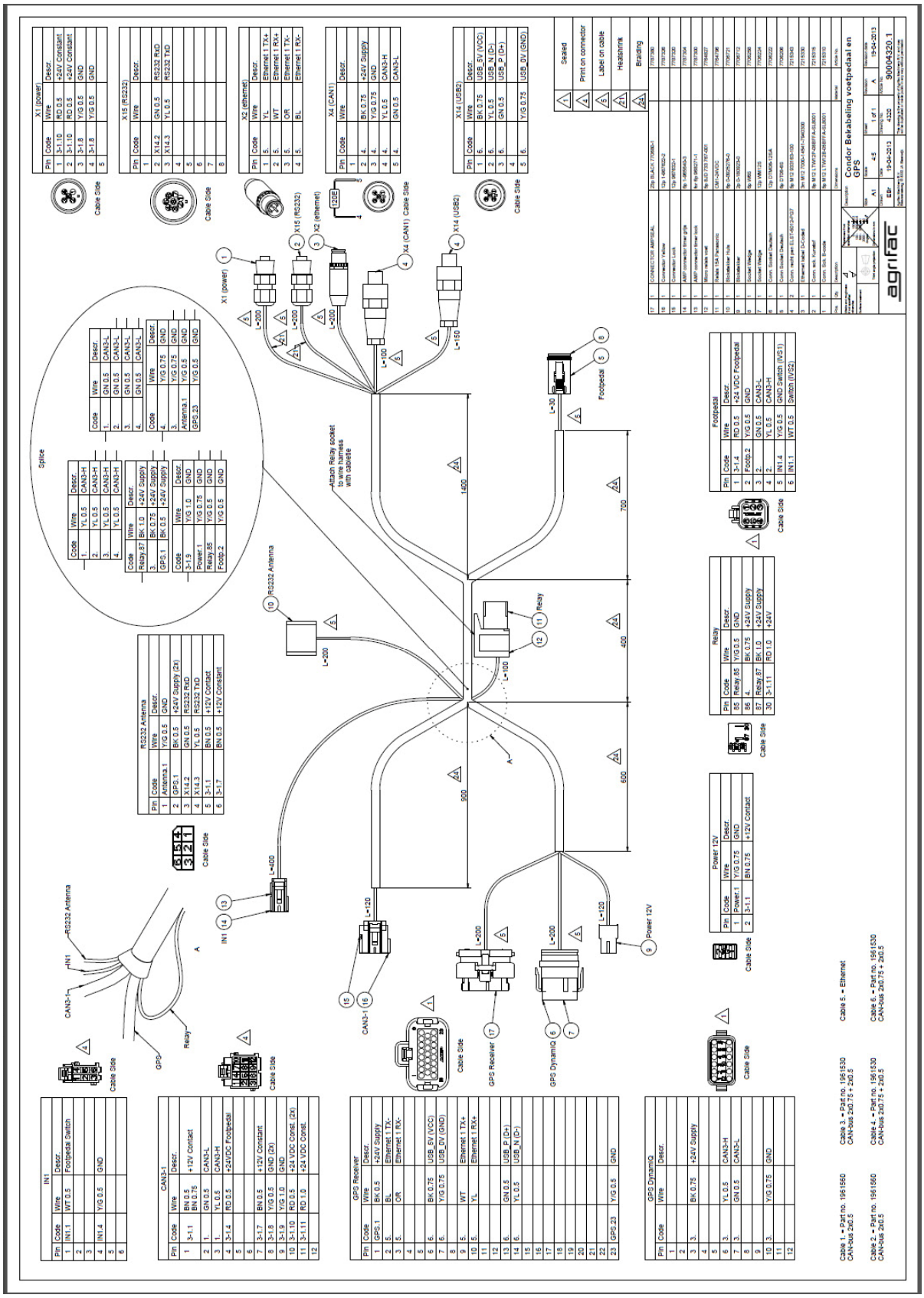
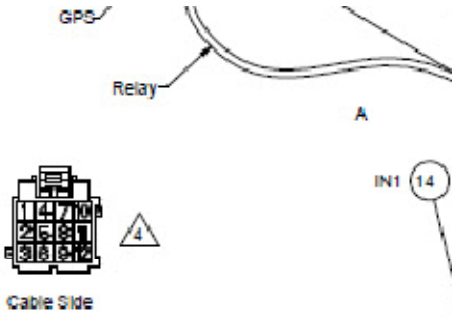


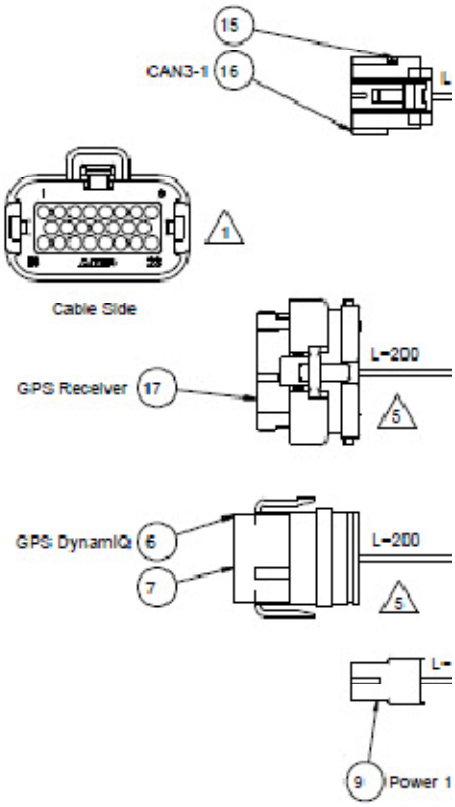
Figure 39 Conder bekabeling Voetpedaal en GPS.

See Google Drive for PDF Version.

CAN3-1			
Pin	Code	Wire	Descr.
1	3-1.1	BN 0.5 BN 0.75	+12V Contact
2	1.	GN 0.5	CAN3-L
3	1.	YL 0.5	CAN3-H
4	3-1.4	RD 0.5	+24VDC Footpedal
5			
6			
7	3-1.7	BN 0.5	+12V Constant
8	3-1.8	Y/G 0.5	GND (2x)
9	3-1.9	Y/G 1.0	GND
10	3-1.10	RD 0.5	+24 VDC Const. (2x)
11	3-1.11	RD 1.0	+24 VDC Const.
12			



GPS Receiver			
Pin	Code	Wire	Descr.
1	GPS.1	BK 0.5	+24V Supply
2	5.	BL	Ethernet 1 TX-
3	5.	OR	Ethernet 1 RX-
4			
5			
6	6.	BK 0.75	USB_5V (VCC)
7	6.	Y/G 0.75	USB_0V (GND)
8			
9	5.	WT	Ethernet 1 TX+
10	5.	YL	Ethernet 1 RX+
11			
12			
13	6.	GN 0.5	USB_P (D+)
14	6.	YL 0.5	USB_N (D-)
15			
16			
17			
18			
19			
20			
21			
22			
23	GPS.23	Y/G 0.5	GND



GPS DynamIQ			
Pin	Code	Wire	Descr.
1			
2			
3	3.	BK 0.75	+24V Supply
4			
5			
6	3.	YL 0.5	CAN3-H
7	3.	GN 0.5	CAN3-L
8			
9			
10	3.	Y/G 0.75	GND
11			
12			

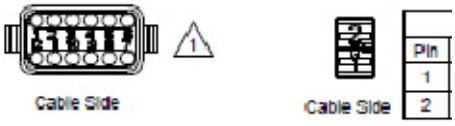


Figure 40 Part of Schematic Conder bekabeling Voetpedaal en GPS. See Google Drive for PDF Version.

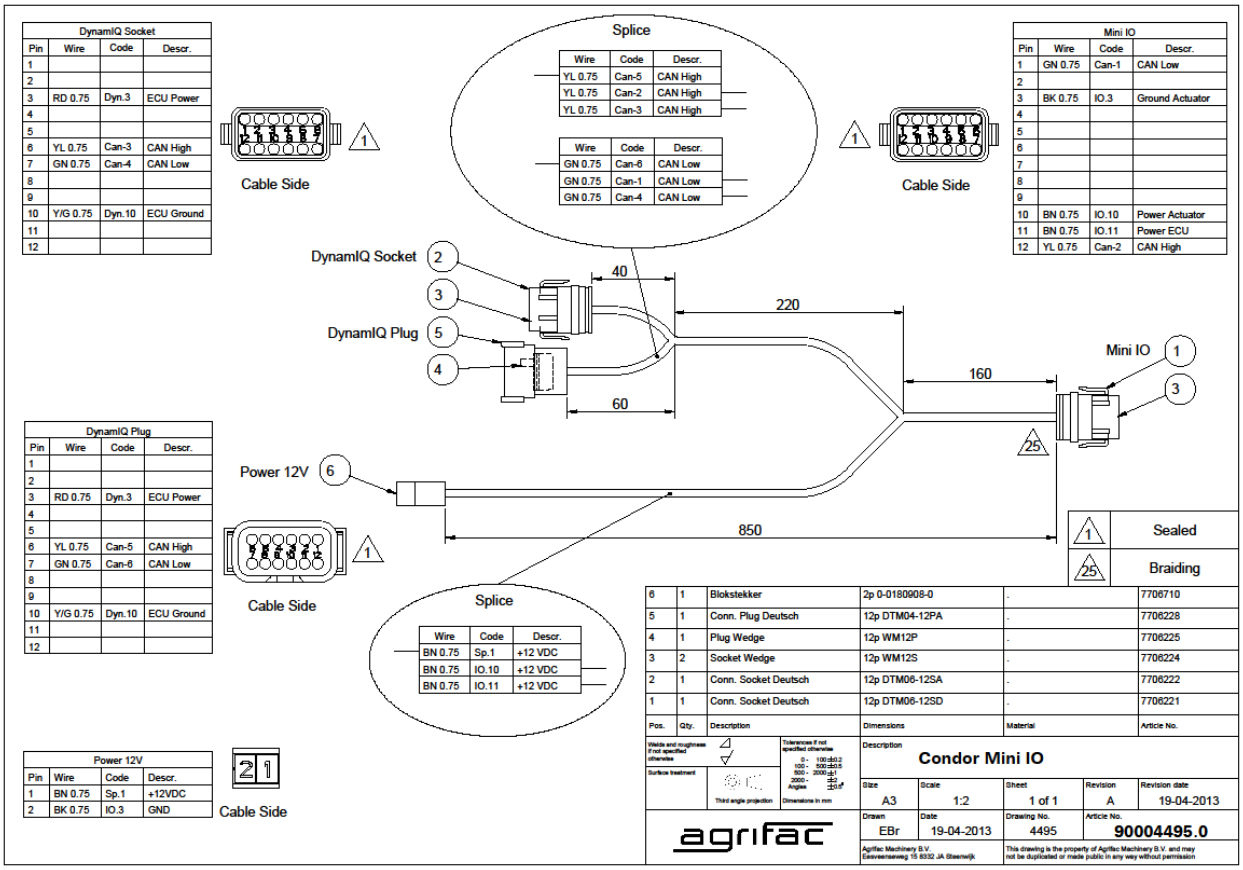


Figure 41 Cabling Condor MiniIO.

See Google Drive for PDF Version.

4. Appendix

4.1. GPS adapter cables

For mounting a third party GPS receiver there are several GPS adapter cables.
In Table 1 a cabin interface cable is described. Open the big box on the right of the cabin and find the white connector marked “RS232”. Normally an extension-cable to the roof will be connected to this connector.
In Table 2 the roof interface cables are displayed. Open the roof on the front to mount.

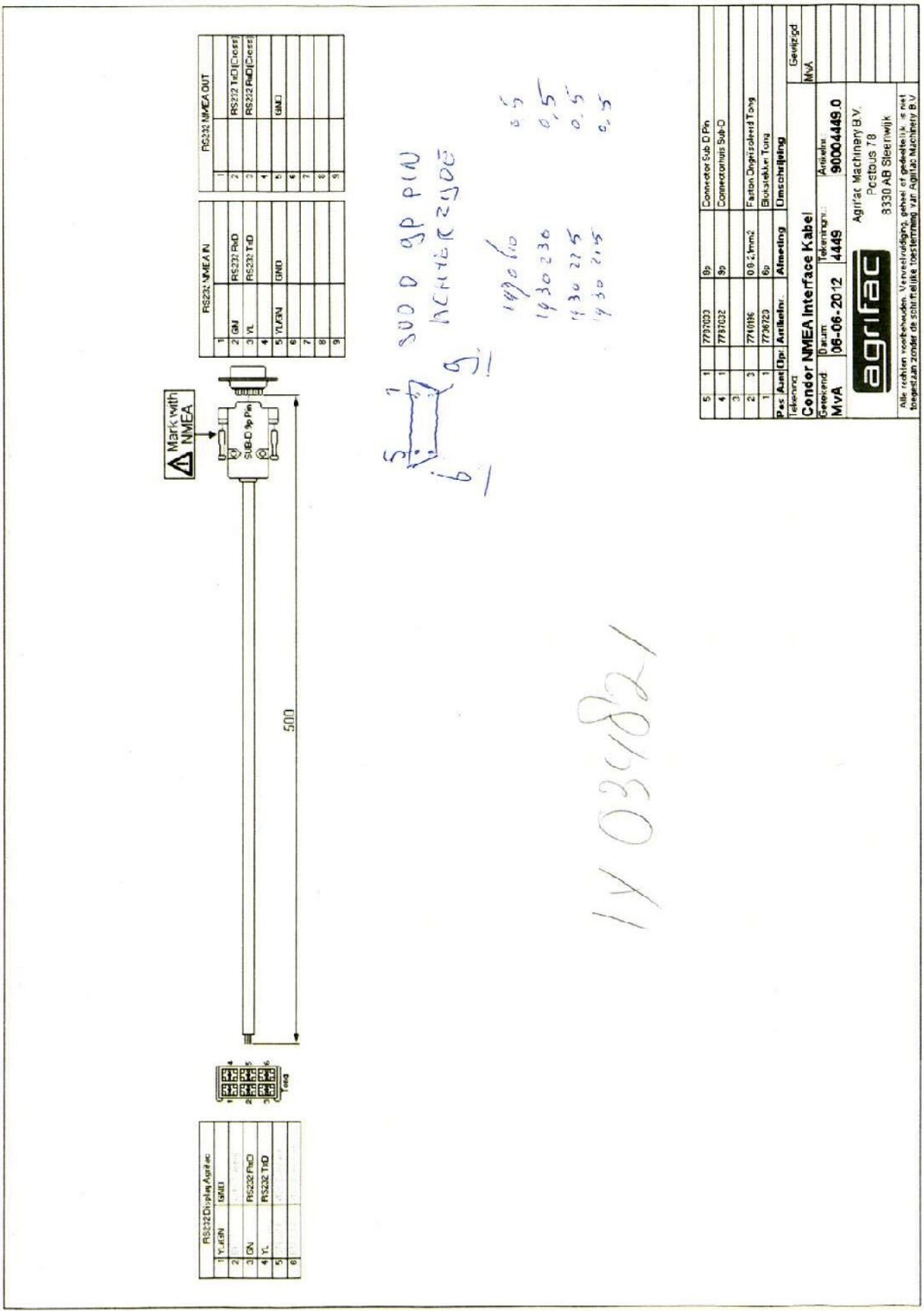
Table 1: Cabin interface cables

Description	Agrifac drawing nr.	Appendix
Condor NMEA Interface cable	4449	4.1.5

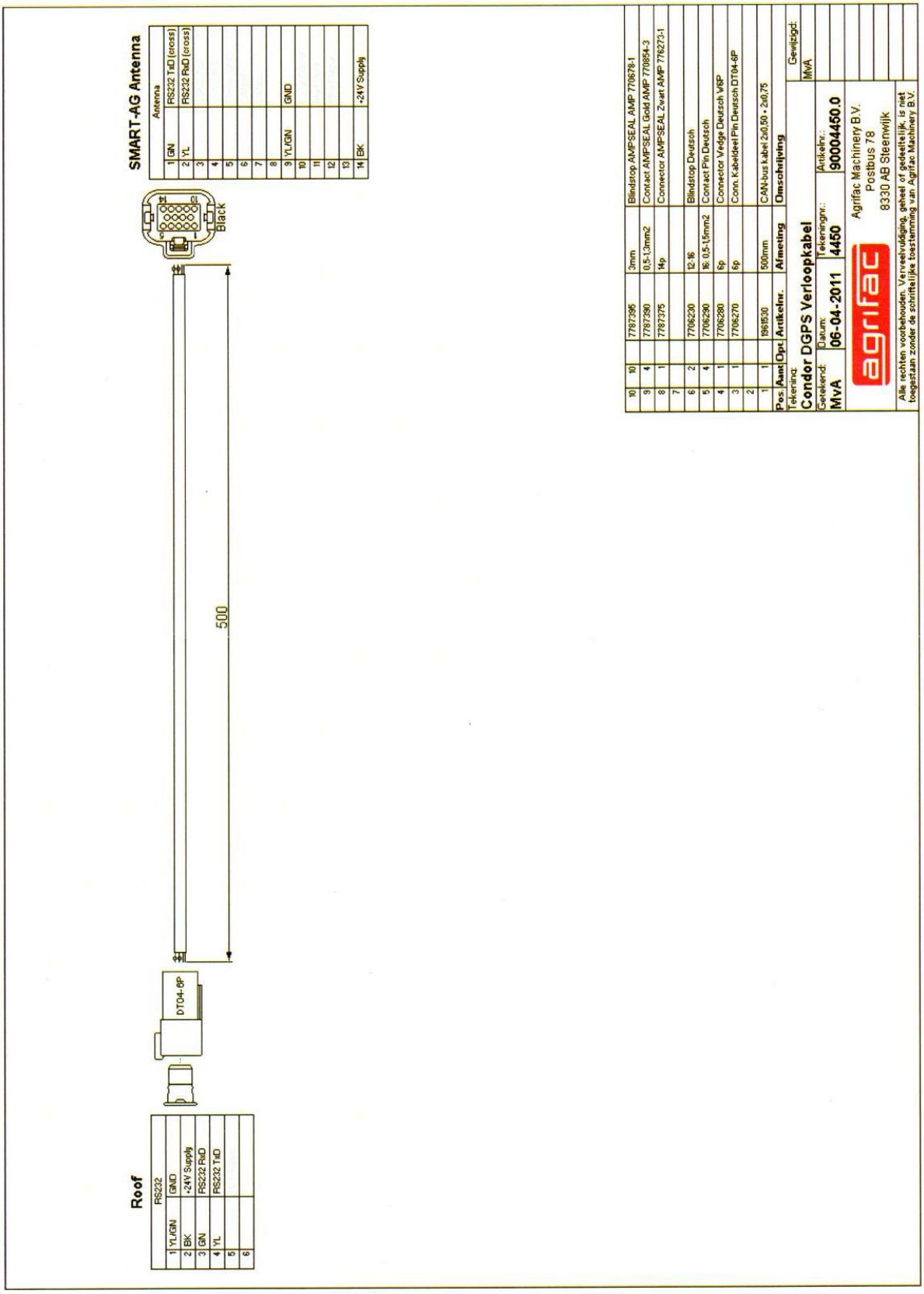
Table 2: Roof interface cables

Description	Agrifac drawing nr.	Appendix
Condor EGNOS DGPS interface cable	4450	4.1.1
Condor Omnistar DGPS interface cable	4451	4.1.2
Condor John Deere GPS interface cable	4455	4.1.3
Condor Trimble GPS interface cable	4456	4.1.4

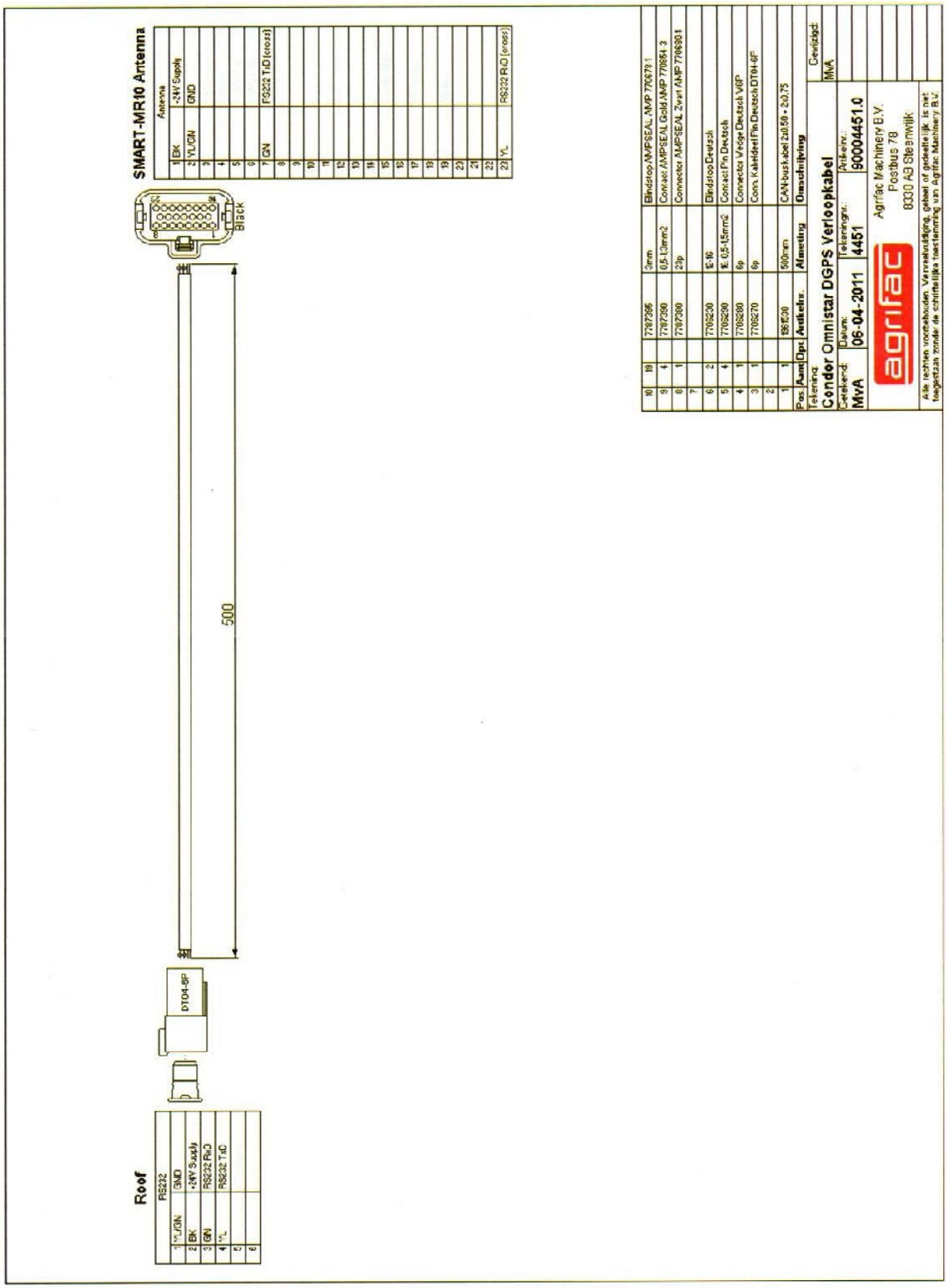
4.1.1. Condor NMEA interface cable



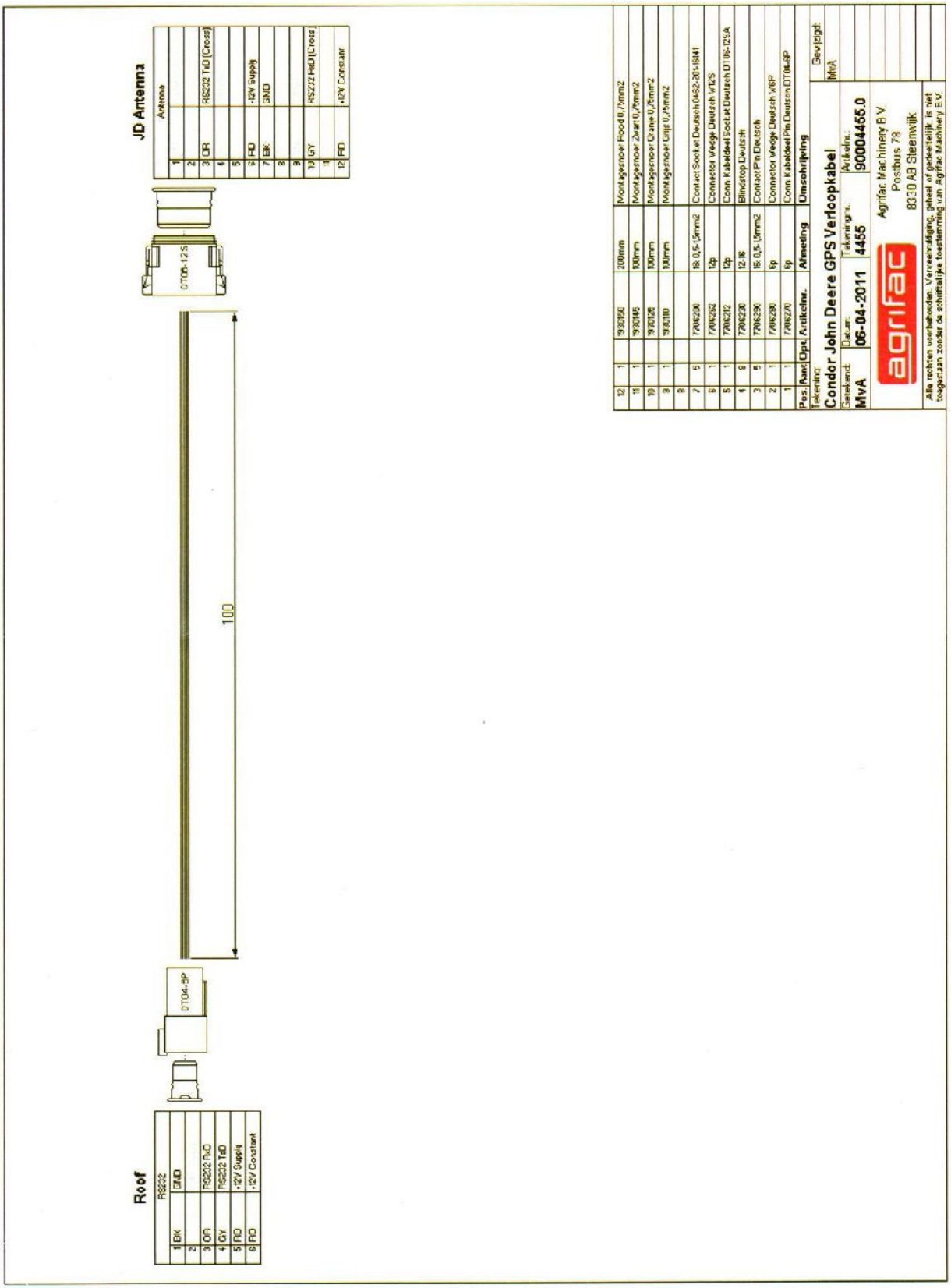
4.1.2. Condor EGNOS DGPS interface cable



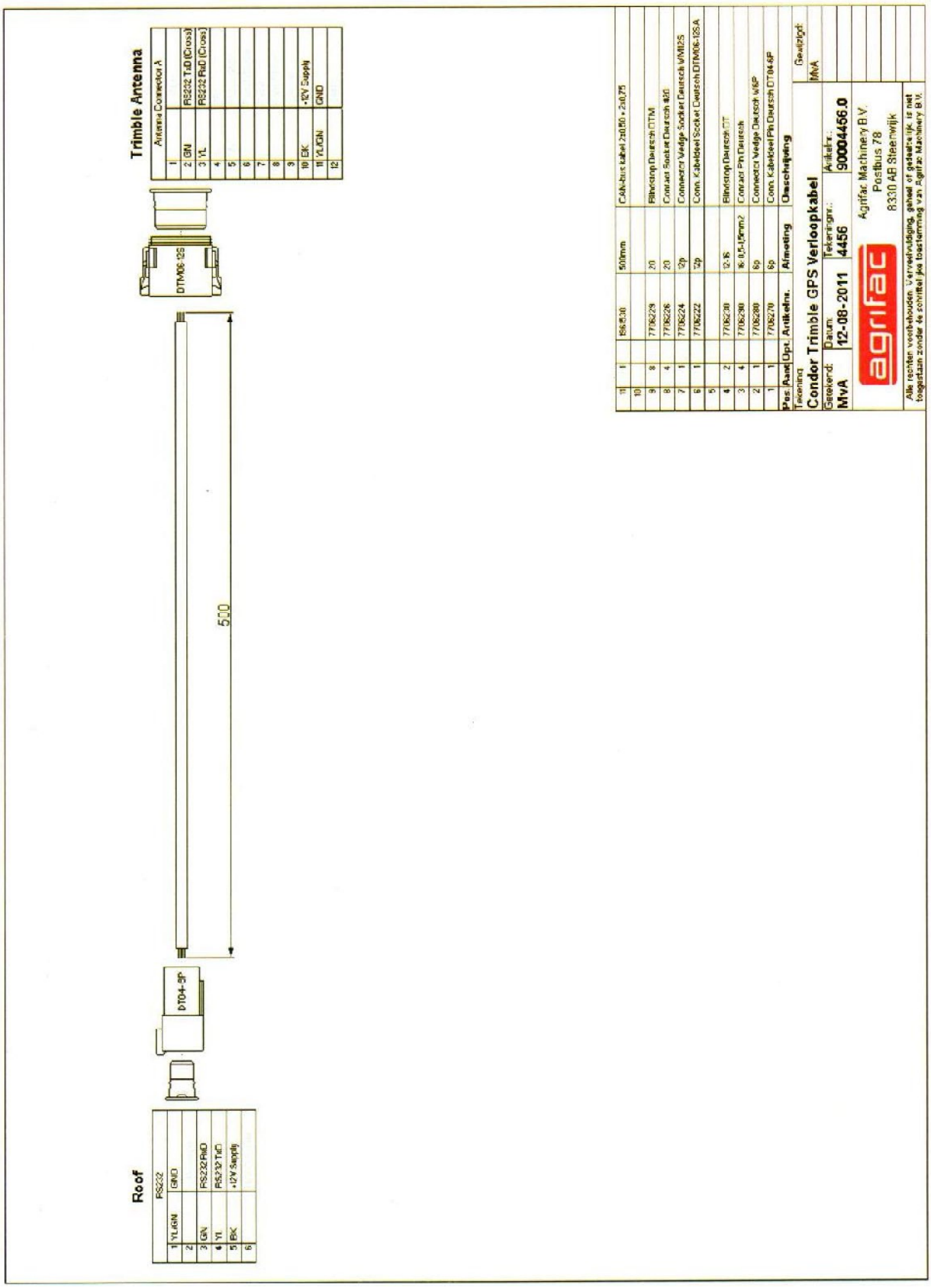
4.1.3. Condor Omnistar DGPS interface cable



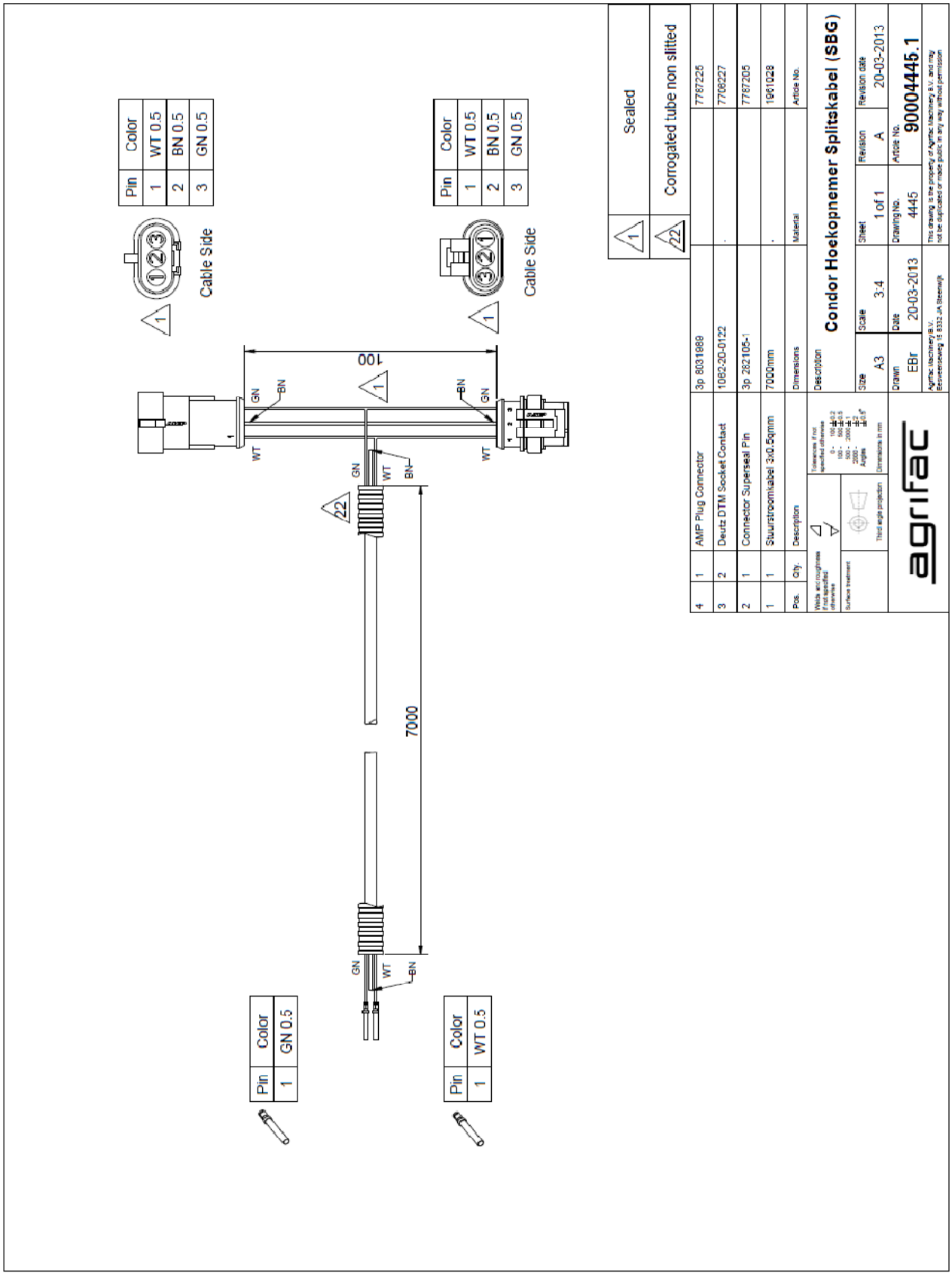
4.1.4. Condor John Deere GPS interface cable



4.1.5. Condor Trimble GPS interface cable



4.1.6. Wheel angle split cable



4.2. Appendix: Mini I/O Jumper settings

Table 1 Jumper settings Agrifac

Configuratie	jumper	positie
0..5 volt (wheel sensor)	X303	No jumper
0..5 volt (pressure sensor 1)	X306	No jumper
0..5 volt (pressure sensor 2)	X309	No jumper
0..5 volt (input not used)	X312	No jumper
Power supply IN2 “power supply”	X307	1-2
Power supply 12 volt (wheel sensor)	X302	1-2
Power supply 5 volt (pressure sensor 1)	X305	2-3
Power supply 5 volt (pressure sensor 2)	X308	2-3
Power supply 5 volt (not used)	X311	2-3
CAN bus passive terminator	X4	No jumper

After changing the jumper settings secure the jumpers by adding none conducting silicon kit.

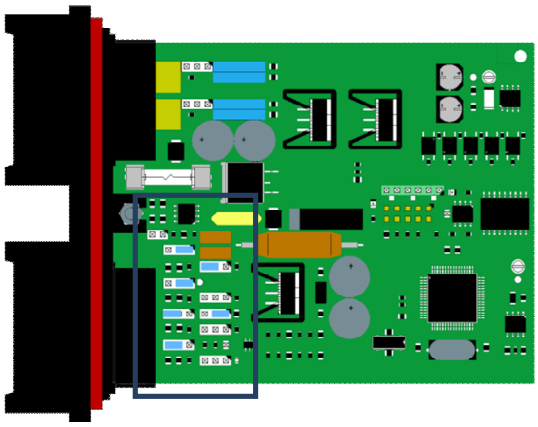


Figure 42 Mini IO Overview

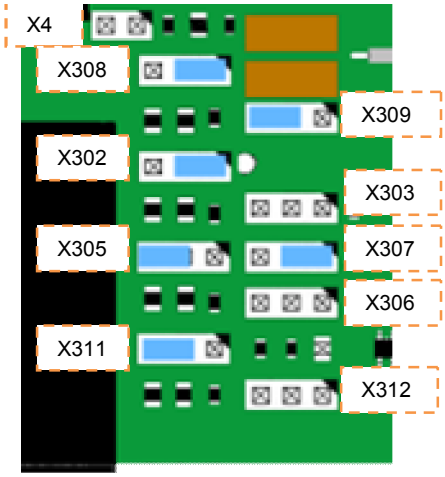


Figure 43 Jumper settings Mini I/O Agrifac

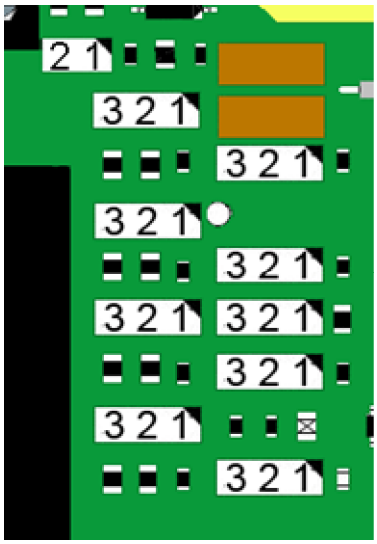


Figure 44 Pinning Mini IO

4.3. Pin-out Mini I/O

Table 2 Mini I/O B-connector (Black)

Pin	Description
1	Wheel sensor (+12V)
2	Wheel sensor signal
3	Wheel sensor GND
4	
5	
6	
7	
8	
9	Wheel sensor (+5V)
10	
11	Pressure sensor s
12	Pressure sensor +

Table 3 Mini I/O C-connector (Pink)

Pin	Description
1	CAN Low
2	Ground ECU
3	Ground Actuator
4	Ground Output
5	Output 4
6	PWM Steer right
7	PWM Steer left
8	Output 2
9	Ground Output
10	Power Actuator
11	Power ECU
12	CAN High

4.4. Harness Agrifac Condor Mini I/O