MÜLLER ELEKTRONIK
A TRIMBLE COMPANY

Installation and Operating Instructions

DGPS/GLONASS Receiver SMART-6L

Version: V9.20191001

3030247606-02-EN

Read and follow these instructions. Keep these instructions in a safe place for later reference. Please note that there might be a more recent version of these instructions on the homepage.

Company details

Document Installation and Operating Instructions
Product: DGPS/GLONASS Receiver SMART-6L
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Table of contents

1 For your safety

1.1 Basic safety instructions

Please read the following safety instructions carefully before using the product for the first time.

- Do not make any unauthorized modifications to the product. Unauthorized modifications or use may impair safety and reduce the service life or operability of the unit. Modifications are considered unauthorized if they are not described in the product documentation.
- Comply with road traffic rules. Stop the vehicle before operating the receiver or connected components.

Systems with modem

If you use the GPS receiver with a modem, note that the modem emits radio waves when switched on. These can interfere with other devices or be harmful to human health.

You should therefore follow the following instructions when using the GPS receiver with a modem:

- If you wear a medical device, ask your doctor or the device manufacturer about how to prevent hazards. Medical devices such as pacemakers or hearing aids can be affected by the radio transmissions of modems.
- If you wear a pacemaker, keep the modem away from the pacemaker.
- Switch off the modem as soon as you are close to petrol stations, chemical plants, biogas plants or other locations where combustible gases or fumes can occur. These gases can be ignited by a spark and explode.
- Maintain a minimum distance of 20 cm (8 inches) between the antenna of the modem and your body.
- Never switch on the modem in an aircraft. Ensure that it is not accidentally switched on during flight.

1.2 Intended use

The product is intended for accurate positioning of agricultural vehicles.

The product is only intended for use in the agricultural sector. The manufacturer shall not be held responsible for any other use of the system.

The operating instructions form part of the product. The product may only be used in accordance with these operating instructions.

The manufacturer cannot be held liable for any personal injury or property damage resulting from such non-compliance. All risk arising from improper use lies with the user.

1.3 Layout and meaning of warnings

All safety instructions found in these Operating Instructions are composed in accordance with the following pattern:

⚠ WARNING

This signal word identifies medium-risk hazards, which could potentially cause death or serious physical injury, if not avoided.

⚠ CAUTION

This signal word identifies hazards that could potentially cause minor or moderate physical injury or damage to property, if not avoided.

NOTICE

This signal word identifies hazards that could potentially cause damage to property, if not avoided.

There are some actions that need to be performed in several steps. If there is a risk involved in carrying out any of these steps, a safety warning appears in the instructions themselves.

Safety instructions always directly precede the step involving risk and can be identified by their bold font type and a signal word.

Example

1. **NOTICE! This is a notice. It warns that there is a risk involved in the next step.**
2. Step involving risk.

1.4 Disposal

When it has reached the end of its service life, please dispose of this product as electronic scrap in accordance with all applicable waste management laws.

1.5 Cleaning

Do **not** clean the product with a high pressure cleaner to prevent moisture from entering the connector.

1.6 EU declaration of conformity

Herewith we declare that the product designated below, on the basis of its design and construction in the form brought onto the market by us, is in accordance with the relevant safety and health requirements of the EU Directives 2014/53/EU and 2011/65/EU. If alterations are made to the product without prior consultations with us, this declaration becomes invalid.

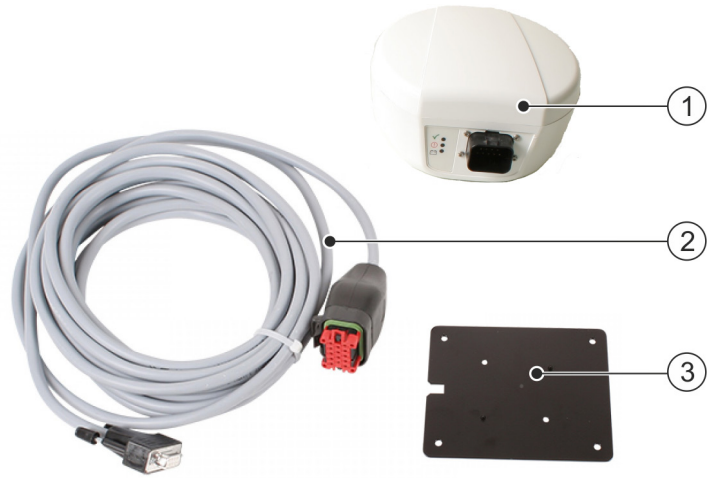
Harmonised standards applied:	EN 60950:2006 EN 301 489:2017 EN 303 413:2017 UNECU Addendum 9 EN 50581:2012

2 Product description

2.1 About the GPS receiver

The GPS receiver can be used worldwide. In Europe and North America, it works with the GPS system and the WAAS and EGNOS correction systems. In locations where WAAS and EGNOS cannot be used, the GPS receiver can use the GPS system together with GLONASS satellites. The correction signal is then calculated internally (using GLIDE technology).

The GPS receiver can also function with other correction signals. In order to do this, the GPS receiver must be connected with a GPS modem or an RTK radio modem.



1	DGPS/GLONASS receiver SMART-6L	3	Magnetic plate
2	Terminal connector cable		

GLONASS

GLONASS is a Russian satellite system which can be used in addition to the American GPS system.

WAAS and EGNOS

WAAS and EGNOS are satellite-based correction services which can be used in Europe and North America.

GLIDE

GLIDE technology can be used in parallel to other methods. This thus increases path-to-path accuracy.

RTK

Systems which work with RTK consist of a fixed base station and a mobile receiver. The base station transmits correction signals to the mobile receiver by means of a modem. This enables levels of accuracy in the centimeter range.

Accuracies

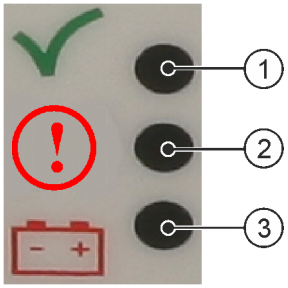
The accuracy of the GPS receiver is dependent on the site in which you are located.

Accuracy is also described using the following values:

- Path-to-path accuracy describes the maximum displacement of the GPS position during field work. A path-to-path accuracy of 2.5 cm means that the overlap or defect during parallel movements is a maximum of 2.5 cm.
- Absolute accuracy is the accuracy with which a movement can be repeated after days, months or years. An absolute accuracy of 2.5 cm means that the deviation of a movement after one year is a maximum of 2.5 cm. This maximum deviation also applies if, after one year has passed, you use the field limits, guidance lines, obstacles, etc. in the TRACK-Leader application from the previous year.

2.2 Meaning of the LED lights

The GPS receiver has three LED lights, which display the current state of the GPS receiver.



1	Green LED light	3	Red LED light
2	Yellow LED light		

- Green: The GPS receiver is receiving GPS signals.
- Yellow: The GPS receiver is not receiving GPS signals. There is an error (e.g. an expired or faulty RTK or L band license).
- Red: The GPS receiver is in operation. Voltage is connected.

3 Assembly instructions

3.1 Mounting the GPS receiver

GPS receiver on the roof of a tractor

NOTICE

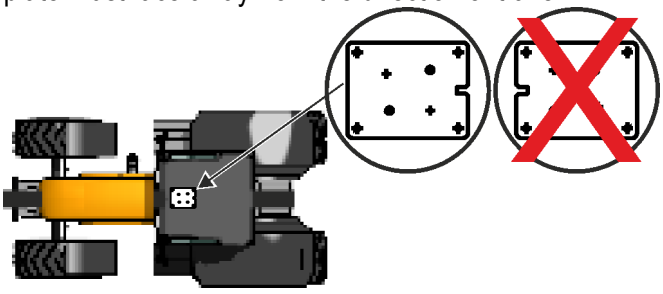
The receiver needs an open view of the sky.

- Mount the receiver on the roof of the vehicle cab.
- Avoid shadowing the receiver's view of the sky.

Procedure

To mount the GPS receiver:

1. Identify a suitable location on the roof of the vehicle: as far forward as possible, and in the centre of the vehicle.
2. Use alcohol to clean the position on which will you will mount the GPS receiver.
3. Expose the adhesive surface of the magnetic plate. The notch in the magnetic plate must face away from the direction of travel.



4. Place the GPS receiver onto the magnetic plate so that it locks. The connection must thus face away from the direction of travel.

⇨ You have now mounted the GPS receiver onto the roof of the vehicle.

⇨ You can now connect the GPS receiver to a terminal.

3.2 Connecting the GPS receiver to a terminal

NOTICE

Terminal connector supplying power

Potential damage to the terminal from a short-circuit.

- Switch the terminal off before plugging in or removing the connector.

Procedure

This is how you connect the receiver to a terminal:

1. Switch off the terminal.
2. Guide the cable of the receiver into the vehicle cab.
3. Find the appropriate RS232 connection on the terminal. Refer to the operating instructions for the terminal to find out which connection this is. For the majority of terminals from Müller-Elektronik, this is going to be port **.**

⇨ You have now connected the receiver to the terminal.

3.3 Activating the driver of the GPS receiver on a terminal

You will need to activate the GPS receiver differently depending on where you have connected it.

Version	Driver
Via the terminal's serial interface	“AG-STAR, SMART-6L” or “GPS_STD”
Via the TRACK-Leader TOP steering job computer	“PSR CAN”
Via the TRACK-Leader AUTO steering job computer	“TRACK-Leader AUTO”

You can read how to activate a driver in the operating instructions for the terminal.

3.4 Configuring the GPS receiver

The GPS receiver can be configured differently for various terminals. You can find out how to do this in the operating instructions for the terminal.

The following tables show the values which you can select in the parameter “correction signal” during configuration:

Value	Path to path accuracy	Absolute accuracy	Comment
EGNOS/WAAS	15cm	60cm	
EGNOS/WAAS + GLIDE	<15 cm	60cm	
GLIDE	15-18cm	70cm	Alternative to EGNOS/WAAS for India, Africa and South America
RTK radio	2cm	2.5cm	

Value	Path to path accuracy	Absolute accuracy	Comment
RTK GSM	2cm	2.5cm	
TerraStar-C	4cm	4cm	
TerraStar-L	15cm	40cm	

Information for GLIDE

If you have selected a correction signal with GLIDE, please note:

- Switch the GPS receiver off when driving on roads.
- After starting the systems each time, it takes ca. 5 minutes until the system is ready for operation. Wait on the field to be worked during this time, before you start working.
- Ensure that the GPS receiver does not lose the GPS signal during work. (e.g. due to shadowing by buildings or trees). If the signal gets lost, it can cause the GLIDE to restart. This can lead to track offset.

Information for TerraStar

If you have selected “TerraStar” as a correction signal, please note:

- There are two different TerraStar correction signals: TerraStar-C and TerraStar-L. These differ mainly in their accuracies.
- The accuracies are available ca. 5 to 10 minutes after switching on the GPS receiver under the open sky.
- If the GPS signal fails due to shadowing by buildings or trees, the full accuracy is available again at the latest after ca. 5 minutes. For this reason, you should avoid driving along rows of trees or buildings.
- During the convergence, the GPS receiver and the vehicle should not be moved and the location should not be changed.

Information for RTK

If you have selected “RTK radio” or “RTK-GSM” as a correction signal, please note:

- For the values “RTK radio” and “RTK GSM” you need an RTK activation and additional hardware.
- You can also use the optional “RTK-Assist” function.
  If the RTK signal fails during work, RTK-Assist bridges the failure with TerraStar satellite correction data for up to 20 minutes.
- The RTK-Assist bridging accuracy is available approximately 30 minutes after switching on the GPS receiver under the open sky.
- If the receiver does not receive any correction data even after bridging with RTK-Assist, it switches to autonomous operation. Automatic steering and SECTION-Control are then no longer possible.

4 Technical specifications

GPS receiver SMART-6L

Operating voltage	8 – 36 V DC
Current consumption	241 mA at 12V DC
Power input	2.9 W
GPS standard	NMEA 0183
Frequencies	GPGGA, GPVTG, GPGSA, GPZDA, GPRMC
Transmission rate	19200-115200 baud
Data bits	8
Parity	no
Stop bits	1
Flow control	None

5 List of accessories

GPS receiver

Item number	Item name
3030247606	DGPS/GLONASS receiver SMART-6L with connector cable to the terminal
3130247606	DGPS/GLONASS receiver SMART-6L with no connector cable to the terminal

Complete GPS receiver package with additional components

Item number	Item name
3030248901	DGPS/GLONASS receiver SMART-6L with GSM modem, GSM antenna and RTK activation
30302489	DGPS/GLONASS receiver SMART-6L with VHF radio modem (135-174 MHz), VHF mobile antenna and RTK activation
3030248900	DGPS/GLONASS receiver SMART-6L with UHF radio modem (403-473 MHz), UHF mobile antenna and RTK activation

Retrofit

Item number	Item name
3030248920	GSM modem
3030248912	GSM antenna for GSM modem
3030248921	VHF radio modem (135-174 MHz)
3030248922	Radio modem UHF (403-473 MHz)
3030248910	Mobile antenna for radio modem VHF
3030248911	Mobile antenna for radio modem UHF
3030248931	RTK activation
3030248930	L band activation
3030248932	TerraStar-C activation, 1 year subscription
3030248952	TerraStar-C activation, 3 months subscription
3030248935	TerraStar-L activation, 1 year subscription
3030248936	RTK-Assist activation, 1 year subscription

Connector cable

Item number	Item name
31302476	Connector cable - DGPS/GLONASS receiver to terminal
31302453	Adapter cable for connection to the TRACK-Leader TOP steering job computer
31300583	Dust protection cap for the connector cable

Mounting accessories

Item number	Item name
3130247601	DGPS/GLONASS receiver – Magnetic plate and adhesive tape

Additional items

Item number	Item name
3030248150	RTK base station, VHF max. 5 W
3030248151	RTK base station, UHF max. 35 W

DUAL-Antenna – Components

Item number	Item name
3030248960	DUAL-Antenna upgrade kit with DGPS/GLONASS receiver SMART-6L, junction box and roof bracket for 2 GPS receivers
3030247607	DGPS/GLONASS receiver SMART-6L for DUAL-Antenna systems
3130248960	Roof bracket for 2 GPS receivers with fastening material
3130248920	Junction box for 2 GPS receivers
3030248961	DGPS/GLONASS receiver SMART-6L activation for DUAL-Antenna system
3130264341	ECU-S1 activation for extremely low speeds