# Leica GMX901 plus

# **User Manual**





# Introduction

#### Purchase

Congratulations on the purchase of a GMX901 plus instrument.





This manual contains important safety directions as well as instructions for setting up the product and operating it. Refer to "6 Safety Directions" for further information.

Read carefully through the User Manual before you switch on the product.

# Product identifica-

The type and the serial number of your product are indicated on the type plate.

Enter the type and serial number in your manual and always refer to this information when you need to contact your agency or Leica Geosystems authorized service workshop.

Type:	
Serial No.:	

#### Symbols

The symbols used in this manual have the following meanings:

Туре	Description
<u></u> ∆ Danger	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
<u></u> Warning	Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.
<b>A</b> Caution	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury and/or appreciable material, financial and environmental damage.
	Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

#### Trademarks

• Windows is a registered trademark of Microsoft Corporation All other trademarks are the property of their respective owners.

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# 1 How to Use this Manual

It is recommended to set-up the product while reading through this  $\dot{\ }$ 

manual.

**Index** The index is at the end of the manual.

Validity of this manual

This manual applies to the GMX901 plus sensor.

# Available documentation

Name of documentation	Description
GMX901 plus User Manual (this document)	All instructions required in order to operate the instrument to a basic level are contained in this User Manual. Provides an overview of the system together with tech- nical data and safety directions.
GMX900 Getting Started with GNSS Spider	Included are detailed descriptions of necessary steps to configure GMX901 plus and GMX902 with GNSS Spider.

# Format of the documentation

The GMX900 CD contains the entire documentation in electronic format. The GMX900 Getting Started is not available in printed form.

# Description of the System

		7
2.1	General	
The GMX901 plus sensors	<ul> <li>were designed specifically for monitoring applications, e.g. for mines, slopes, dams and buildings.</li> <li>are highly-suited to system integration, the sensor communication being handled by remote control software - Leica GNSS Spider.</li> <li>can be used in combination with suitable radio equipment, a mobile telephone or modem, in order to transmit data in the Leica LB2 format.</li> <li>Refer to "7 Technical Data" for further information.</li> </ul>	
Special features	<ul> <li>robust sensor with</li> <li>low power consum</li> <li>wide supply voltage</li> <li>including SmartTrac</li> <li>simple mounting</li> <li>seamless integration</li> </ul>	e range of 10.5-28V DC ck+ for higher accuracy and higher availability on with Leica GNSS Spider bower and signal reception
2.2	System Compone	ents
Main components	Receiver and antenna: Leica GNSS Spider:	To calculate a range to all visible satellites. To receive the satellite signals from the navigation satellites. The reference station software required to configure and operate the GMX901 plus receiver
Receiver	GMX901 plus:	L1+L2 GNSS, code and phase, real time capable, 120 channels.
	Refer to "7 Technical Data" for information on technical specification	
Leica GNSS Spider	The Leica GNSS Spider software operates GMX901 plus sensors. Refer to "GMX900 Getting Started with GNSS Spider".	
2.3	Data Streaming	
Raw data	raw data can be output the GMX901 plus will s	figured remotely via Leica GNSS Spider such that from the communication / power port. By default tream raw data at a 1 Hz (optionally 5 Hz if avail- t is turned on and is tracking satellites.

# 2.4 Power Supply

### External power supply only

 10.5-28 volt DC power supply through a cable offered by Leica Geosystems.

#### OR:

A 12 volt power supply connected via a cable.

#### On/Off behaviour

On: The sensor will turn on as soon as the power supply is connected.

Off: The sensor will be turned off if the power supply is disconnected.

#### Total discharge

Connecting the sensor to a battery itself may result in a total discharge of the battery if the sensor continues to operate when the power is low.

## 2.5 Operation using Leica GNSS Spider

## Leica GNSS Spider

The reference station software Leica GNSS Spider is required to operate the GMX901 plus receivers.

#### Use

- to connect from a PC to a GMX901 plus receiver locally or remotely.
- to configure receiver operation.
- to monitor receiver operation.
- to automatically receive raw data streams.
- to automatically convert data to RINEX format.
- to automatically archive data files.
- to automatically distribute data files to FTP locations.
- to compute and stream out positions.

Refer to the online help of Leica GNSS Spider for additional information.

# 2.6 Commands for Remote Control

### LB2

Special commands from Leica Binary 2 (LB2) format can be used to communicate with the sensor through the configured port. Documentation for LB2 is available on request from the Leica Geosystems representative.

# 2.7 Accessories

## **Equipment List**

Additional equipment such as cable and power supply are listed in the setup sections. Any further description of accessories is not part of this manual.

For article numbers see Equipment Lists for "Structural Monitoring" and "GNSS Networks and Reference Stations".

# 3 Operation

#### 3.1 Installation

Undisturbed satellite signal reception Successful data collection requires undisturbed satellite signal reception. Set up the GMX901 plus in locations which are free of obstructions such as trees, buildings or mountains.

Steady antenna for monitoring

For static data collection, the GMX901 plus must be kept perfectly steady throughout the whole occupation of a point.

Centered and levelled antenna Center and level the GMX901 plus precisely over the marker.

Mounting

The GMX901 plus sensor must be fastened with one 5/8" Whitworth thread for antenna mounting (or equivalent).

Cable installation

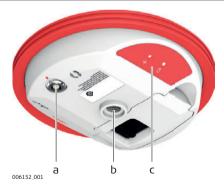
For the installation of the cables of the GMX901 plus sensors, the general rules for the installation of electrical wiring apply.

(F)

Please consider that a well-planned and thoroughly carried out electric installation not only protects the cables against damage, but also looks professional.

# 3.2 Interfaces

### Description

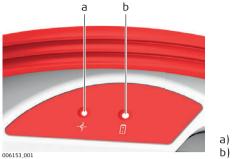


- a) LEMO connector, RS232 and power port
- b) 5/8" Whitworth thread, for antenna mounting
- c) LED indicators



Do not open the sensor or remove any connector as this will impair the protection against water, dust and sand.

# LED indicators



- a) Tracking LED b) Power LED

# Description of the LEDs

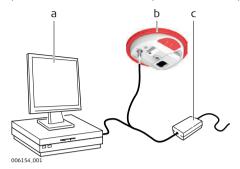
IF the	is	THEN
Tracking LED	green	satellites are tracked.
Power LED	green	power is okay.
	red	power is below 11.5 V.
	flashing red	power is below 10.7 V.

### 3.3

# Setup

# Setup with direct serial

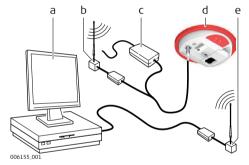
The following diagram shows the basic equipment setup for a GMX901 plus sensor connected locally to Leica GNSS Spider via serial cable.



- a) PC with Leica GNSS Spider installed
- b) GMX901 plus
- c) Power supply

# Remote setup with radio

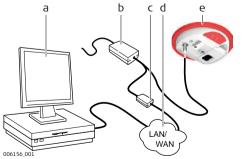
The following diagram shows the basic equipment setup for a GMX901 plus sensor connected remotely to Leica GNSS Spider via radio.



- a) PC with Leica GNSS Spider installed
- b) Radio modem
- c) Power supply
  - ) GMX901 plus
- e) Radio modem

# Setup with LAN/WAN

The following diagram shows the basic equipment setup for a GMX901 plus sensor connected remotely to Leica GNSS Spider via LAN/WAN.



- a) PC with Leica GNSS Spider installed
- b) Power supply
- c) Serial-IP converter
- d) Connection via LAN/WAN
- e) GMX901 plus

# 3.4 Methods of Operation

# Leica GNSS Spider

Recommended operation of GMX901 plus is with Leica GNSS Spider software or with the Leica Binary 2 (LB2) interface.

Contact your Leica Geosystems representative for information on LB2 documentation.

# 4 Connecting GMX901 plus to Leica GNSS Spider

## Description

Any further description of configuration of GMX901 plus sensors is not part of the manual.

Refer to the "GMX900 Getting Started with GNSS Spider" which is included on the GMX900 CD.

# Care and Transport

5.1	Transport
Transport in a road vehicle	Never carry the product loose in a road vehicle, as it can be affected by shock and vibration. Always carry the product in its transport container and secure it.
Shipping	When transporting the product by rail, air or sea, always use the complete original Leica Geosystems packaging, transport container and cardboard box, or its equivalent, to protect against shock and vibration.
5.2	Storage
Product	Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle. Refer to "7 Technical Data" for information about temperature limits.
5.3	Cleaning and Drying
Product	Use only a clean, soft, lint-free cloth for cleaning. If necessary, moisten the cloth with water or pure alcohol.  Do not use other liquids; these may attack the polymer components.
Damp products	Dry the product, the transport container, the foam inserts and the accessories at a temperature not greater than 40°C/108°F and clean them. Do not repack until everything is completely dry.
Cables and plugs	Keep plugs clean and dry. Blow away any dirt lodged in the plugs of the connecting cables.

# 6 Safety Directions

#### 6.1 General

#### Description

The following directions should enable the person responsible for the product, and the person who actually uses the equipment, to anticipate and avoid operational hazards.

The person responsible for the product must ensure that all users understand these directions and adhere to them.

## 6.2 Intended Use

#### Permitted use

- Measuring raw data and computing coordinates using carrier phase and code signal from GNSS satellites.
- Carrying out measurement tasks using of various GNSS measuring techniques.
- Streaming GNSS raw data.
- Data transfer via serial communication interface.
- Computation and evaluation by means of software.
- Continuously measure raw data in permanent and semi-permanent monitoring installation.

#### Adverse use

- Use of the product without instruction.
- Use outside of the intended limits.
- Disabling safety systems.
- · Removal of hazard notices.
- Opening the product using tools, for example screwdriver, unless this
  is specifically permitted for certain functions.
- Modification or conversion of the product.
- Use after misappropriation.
- Use of products with obviously recognizable damages or defects.
- Use with accessories from other manufacturers without the prior explicit approval of Leica Geosystems.
- Inadequate safeguards at the surveying site, for example when measuring on roads.
- Controlling of machines, moving objects or similar monitoring application without additional control- and safety installations.
- Use as a surveying rover field system.



Adverse use can lead to injury, malfunction and damage.

It is the task of the person responsible for the equipment to inform the user about hazards and how to counteract them. The product is not to be operated until the user has been instructed on how to work with it.

# 6.3 Limits of Use

#### **Environment**

Suitable for use in an atmosphere appropriate for permanent human habitation: not suitable for use in aggressive or explosive environments.

# **∱** Danger

Local safety authorities and safety experts must be contacted before working in hazardous areas, or in close proximity to electrical installations or similar situations by the person in charge of the product.

# 6.4 Responsibilities

## Manufacturer of the product

Leica Geosystems AG, CH-9435 Heerbrugg, hereinafter referred to as Leica Geosystems, is responsible for supplying the product, including the user manual and original accessories, in a completely safe condition.

### Manufacturers of non Leica Geosystems accessories

The manufacturers of non Leica Geosystems accessories for the product are responsible for developing, implementing and communicating safety concepts for their products, and are also responsible for the effectiveness of those safety concepts in combination with the Leica Geosystems product.

## Person in charge of the product

The person in charge of the product has the following duties:

- To understand the safety instructions on the product and the instructions in the user manual.
- To be familiar with local regulations relating to safety and accident prevention.
- To inform Leica Geosystems immediately if the product and the application becomes unsafe.

# **↑** Warning

The person responsible for the product must ensure that it is used in accordance with the instructions. This person is also accountable for the training and the deployment of personnel who use the product and for the safety of the equipment in use.

# 6.5 International Warranty, Software Licence Agreement

## International Warranty

The International Warranty can be downloaded from the Leica Geosystems home page at http://www.leica-geosystems.com/internationalwarranty or received from your Leica Geosystems dealer.

# Software Licence Agreement

This product contains software that is preinstalled on the product, or that is supplied to you on a data carrier medium, or that can be downloaded by you online pursuant to prior authorization from Leica Geosystems. Such software is protected by copyright and other laws and its use is defined and regulated by the Leica Geosystems Software Licence Agreement, which covers aspects such as, but not limited to, Scope of the Licence, Warranty, Intellectual Property Rights, Limitation of Liability, Exclusion of other Assurances, Governing Law and Place of Jurisdiction. Please make sure, that at any time you fully comply with the terms and conditions of the Leica Geosystems Software Licence Agreement.

Such agreement is provided together with all products and can also be found at the Leica Geosystems home page at http://www.leica-geosystems.com/swlicense

or your Leica Geosystems dealer.

You must not install or use the software unless you have read and accepted the terms and conditions of the Leica Geosystems Software Licence Agreement. Installation or use of the software or any part thereof, is deemed to be an acceptance of all the terms and conditions of such licence agreement. If you do not agree to all or some of the terms of such licence agreement, you may not download, install or use the software and you must return the unused software together with its accompanying documentation and the purchase receipt to the dealer from whom you purchased the product within ten (10) days of purchase to obtain a full refund of the purchase price.

# 6.6 Hazards of Use



The absence of instruction, or the inadequate imparting of instruction, can lead to incorrect or adverse use, and can give rise to accidents with far-reaching human, material, financial and environmental consequences.

#### Precautions:

All users must follow the safety directions given by the manufacturer and the directions of the person responsible for the product.



Watch out for erroneous measurement results if the product has been dropped or has been misused, modified, stored for long periods or transported.

#### Precautions:

Periodically carry out test measurements and perform the field adjustments indicated in the user manual, particularly after the product has been subjected to abnormal use and before and after important measurements.



Inadequate securing of the working site can lead to dangerous situations, for example in traffic, on building sites, and at industrial installations.

#### Precautions:

Always ensure that the working site is adequately secured. Adhere to the regulations governing safety and accident prevention and road traffic.



Only Leica Geosystems authorised service workshops are entitled to repair these products.



If computers intended for use indoors are used in the field there is a danger of electric shock.

#### **Precautions:**

Adhere to the instructions given by the computer manufacturer with regard to field use in conjunction with Leica Geosystems products.



If the accessories used with the product are not properly secured and the product is subjected to mechanical shock, for example blows or falling, the product may be damaged or people may sustain injury.

#### Precautions:

When setting-up the product, make sure that the accessories are correctly adapted, fitted, secured, and locked in position. Avoid subjecting the product to mechanical stress.



If the product is improperly disposed of, the following can happen:

- If polymer parts are burnt, poisonous gases are produced which may impair health.
- If batteries are damaged or are heated strongly, they can explode and cause poisoning, burning, corrosion or environmental contamination.
- By disposing of the product irresponsibly you may enable unauthorized persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.

#### Precautions:



The product must not be disposed with household waste. Dispose of the product appropriately in accordance with the national regulations in force in your country. Always prevent access to the product by unauthorized personnel.

Product specific treatment and waste management information can be downloaded from the Leica Geosystems home page at http://www.leica-geosystems.com/treatment or received from your Leica Geosystems dealer.



If the product is used with accessories, for example masts, staffs, poles, you may increase the risk of being struck by lightning. Danger from high voltages also exists near power lines. Lightning, voltage peaks, or the touching of power lines can cause damage, injury and death.

#### Precautions:

- Do not use the product in a thunderstorm.
- Be sure to remain at a safe distance from electrical installations. Do not use the product directly under or in close proximity to power lines. If it is essential to work in such an environment contact the safety authorities responsible for electrical installations and follow their instructions.
- If the product has to be permanently mounted in an exposed location, it is advisable to provide a lightning conductor system. A suggestion on how to design a lightning conductor for the product is given below. Always follow the regulations in force in your country with regard to grounding antennas and masts. These installations must be carried out by an authorised specialist.
- To prevent damages due to indirect lightning strikes (voltage spikes) cables, for example for antenna, power source or modem should be protected with appropriate protection elements, like a lightning arrester. These installations must be carried out by an authorized specialist.

 If there is a risk of a thunderstorm, or if the equipment is to remain unused and unattended for a long period, protect your product additionally by unplugging all systems components and disconnecting all connecting cables and supply cables, for example, receiver - antenna.

# Lightning conductors

Suggestion for design of a lightning conductor for a GNSS system:

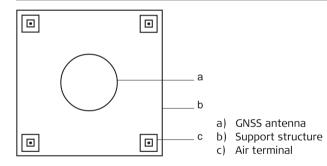
- 1. On non-metallic structures
  - Protection by air terminals is recommended. An air terminal is a pointed solid or tubular rod of conducting material with proper mounting and connection to a conductor. The position of four air terminals should be uniformly distributed around the antenna at a distance equal to the height of the air terminal.

The air terminal diameter should be 12 mm for copper or 15 mm for aluminium. The height of the air terminals should be 25 cm to 50 cm. All air terminals should be connected to the down conductors. The diameter of the air terminal should be kept to a minimum to reduce GNSS signal shading.

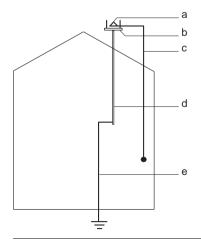
2. On metallic structures

Protection is as described for non-metallic structures, but the air terminals can be connected directly to the conducting structure without the need for down conductors.

## Air terminal arrangement, plan view



# Grounding the receiver/antenna



- a) GNSS antenna
- b) Lightning conductor array
- c) Antenna/receiver connection
- d) Metallic mast
- e) Connection to earth

# 6.7 Electromagnetic Compatibility EMC

#### Description

The term Electromagnetic Compatibility is taken to mean the capability of the product to function smoothly in an environment where electromagnetic radiation and electrostatic discharges are present, and without causing electromagnetic disturbances to other equipment.

# **№** Warning

Electromagnetic radiation can cause disturbances in other equipment.

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed.

# **↑** Caution

There is a risk that disturbances may be caused in other equipment if the product is used in conjunction with accessories from other manufacturers, for example field computers, personal computers, two-way radios, non-standard cables or external batteries.

#### Precautions:

Use only the equipment and accessories recommended by Leica Geosystems. When combined with the product, they meet the strict requirements stipulated by the guidelines and standards. When using computers and two-way radios, pay attention to the information about electromagnetic compatibility provided by the manufacturer.

# **⚠** Caution

Disturbances caused by electromagnetic radiation can result in erroneous measurements.

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that the product may be disturbed by very intense electromagnetic radiation, for example, near radio transmitters, two-way radios or diesel generators.

#### **Precautions:**

Check the plausibility of results obtained under these conditions.

# **M** Warning

If the product is operated with connecting cables attached at only one of their two ends, for example external supply cables, interface cables, the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.

#### Precautions:

While the product is in use, connecting cables, for example product to external battery, product to computer, must be connected at both ends.

#### 6.8

# FCC Statement, Applicable in U.S.



This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation.

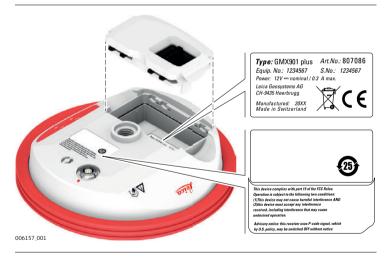
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



# Labelling

Changes or modifications not expressly approved by Leica Geosystems for compliance could void the user's authority to operate the equipment.



# 7 Technical Data

# 7.1 Tracking Characteristics of the Receiver

Instrument technology Leica SmartTrack+

Number of chan-

GMX901 plus: 120

nels

Depending on the satellite systems and signals configured, a maximum

number of 120 channels is allocated.

Satellite reception

GMX901 plus: • L1 only, optional: L1+L2

GPS only, optional: GPS+GLONASS

Supported frequency and codes

Satellite system	Frequency	Code
GPS	L1	C/A
	L2	P, L2C
GLONASS	L1	C/A
	L2	Р

(B)

Carrier phase and code measurements on L1 and L2 are fully independent with AS on or off.

Satellites tracked

GMX901 plus:

- Up to 16 simultaneously on L1, L2 (GPS)
- Up to 14 simultaneously on L1 and L2 (GLONASS)
- Up to four SBAS (EGNOS, WAAS, MSAS, GAGAN)

# 7.2 Accuracy



Accuracy is dependent upon various factors including the number of satellites tracked, constellation geometry, observation time, ephemeris accuracy, ionospheric disturbance, multipath and resolved ambiguities.

The following accuracies, given as root mean square, are based on measurements processed using LGO and on real-time measurements.

The use of multiple GNSS systems can increase accuracy by up to 30% relative to GPS only.

#### Differential code

The baseline precision of a differential code solution for static and kinematic surveys is 25 cm.



The measurement of accuracy is compliant with ISO 17123-8.

# Differential phase in post-processing

## Static and rapid static

Static		Kinematic	
Horizontal	Vertical	Horizontal	Vertical
5 mm + 0.5 ppm	10 mm + 0.5 ppm	10 mm + 1 ppm	20 mm + 1 ppm

#### Static with long observations

Static		Kinematic	
Horizontal	Vertical	Horizontal	Vertical
3 mm + 0.5 ppm	6 mm + 0.5 ppm	10 mm + 1 ppm	20 mm + 1 ppm

# Differential phase in real-time

Static		Kinematic	
Horizontal	Vertical	Horizontal	Vertical
5 mm + 0.5 ppm	10 mm + 0.5 ppm	10 mm + 1 ppm	20 mm + 1 ppm

# 7.3 General Technical Data of the Receiver

**Dimensions** 

 Type
 Height [cm]
 Diameter [cm]

 GMX901 plus
 6
 18.6

Weight

0.7 kg

Connector

LEMO-1 female, 8 pin

Mounting

5/8" Whitworth

Power

Power consumption:

1.7 W typically

External supply voltage:

Nominal 12 V DC, voltage range

10.5-28 V DC

**Operating times** 

Designed for continuous operation.

Electrical data

Туре	GMX901 plus
Voltage	10.5-28 V DC
Frequency	GPS L1 1575.42 MHz GPS L2 1227.60 MHz GLONASS L1 1602.5625-1611.5 MHz GLONASS L2 1246.4375-1254.3 MHz
Gain	Typically 27 dBi
Noise Figure	Typically < 2 dBi

# Environmental specifications

Туре	Condition	Description
Temperature	Operating Storage	-40°C to +65°C -40°C to +80°C
Protection	Against water, dust and sand	IP67 (IEC 60529) Dusttight: Protected against water jets. Waterproof to 1 m temporary immersion
Humidity	Up to 100%	The effects of condensation are to be effectively counteracted by periodically drying out the receiver.
Vibration	_	10Hz - 500Hz, ±0.35mm, 5g
Shock		40g, 6ms

# Serial ports

Description	Default setting
Baud rates 4800-230400 baud	115200/N/8/1

# Data output

- raw data
- ephemeris

#### 7.4

# **Pin Assignments**

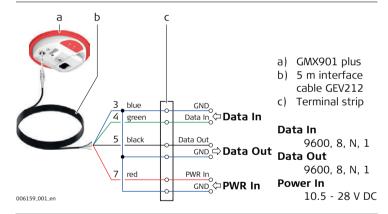
## Serial port

Pin	Name	Description	Direction
1	-	-	-
2	-	-	-
3	GND	Signal ground	-
4	RxD	RS232, receive data	In
5	TxD	RS232, transmit data	Out
6	-	Do not use	-
7	PWR	5 - 28V power supply	In
8	-	Do not use	-

#### **Custom wired**

For permanent user specific GMX901 plus installations, where external power and RS232 communications are required, the GMX901 plus can be custom wired with the optional 5 m interface cable GEV212. The interface cable has the GMX901 plus Lemo connector on one end and is unterminated on the other end.

## Diagram



View on external face of interface cable GEV212	Cable connector pin assignment	Cable wire colour	GMX901 plus Signal
/8	1	-	-
7 - 1111 2	2	-	-
6 111 3 3 5	3	Blue	Ground
	4	Green	Data In
	5	Black	Data Out
	6	-	-
	7	Red	Power In
006158.001	8	-	-

#### 7.5

# **Conformity to National Regulations**

## Conformity to national regulations

- FCC Part 15 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the GMX901 plus is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity may be consulted at http://www.leica-geosystems.com/ce.



Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA Member state.

 The conformity for countries with other national regulations not covered by the FCC part 15 or European directive 1999/5/EC has to be approved prior to use and operation.

#### Frequency band

1227.60 MHz

1575.42 MHz

1246.4375 - 1254.3 MHz 1602.4375 - 1611.5 MHz

#### Output power

Receive only

#### **Antenna**

Internal GNSS antenna element (receive only)

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#### Total Quality Management: Our commitment to total customer satisfaction.



Leica Geosystems AG, Heerbrugg, Switzerland, has been certified as being equipped with a quality system which meets the International Standards of Quality Management and Quality Systems (ISO standard 9001) and Environmental Management Systems (ISO standard 14001).

Ask your local Leica dealer for more information about our TQM program.

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