

Leica PowerBox/PowerAntenna Technical Data



- when it has to be **right**

Leica
Geosystems

RedLine GNSS Technical Data

Models and Options

	PowerBox	PowerAntenna with MCP950c
SmartTrack +	x	x
Dual-Frequency L1+L2	x	x
GPS	x	x
GLONASS	with GLONASS option	with GLONASS option
Galileo prepared	x	x
SmartCheck +	x	x
DGPS capability	x	x
Positioning output 1Hz	x	x
Positioning output 2Hz	with Positioning PLUS option	with Position Xtra option
Positioning output 5Hz	with Positioning PLUS option	with Positioning PLUS option
Positioning output 20Hz	with Positioning PLUS option	---
Baseline Length 2.5 km	x	x
Baseline Length 5.0 km	with BaseLine PLUS / Networking PLUS	with BaseLine Xtra / Networking PLUS
Baseline Length unlimited	with BaseLine PLUS / Networking PLUS	with BaseLine PLUS / Networking PLUS
receive Network correction	with Networking PLUS	with Networking PLUS
configurable via Remote and MCP950c Terminal	x	x
configurable via Remote and RX1210 Terminal	with MYC1250 cable	---
Start Base Station using SmartWorx	---	Sys900 firmware
Start Base Station using GeoPad	with BaseStation PLUS option	x
Survey Rover with GeoPad	x	x
internal Memory	x	x
removeable storage	---	on MCP950c
Bluetooth	---	X
GFU clip on Ports	2x	1x on GHT56
serial Ports	4x	1x
standard Lemo connectors for PWR out (12V) and Data	x	---
CAN Hardware prepared	x	---
dedicated Port of Data and Power in	x	x
advanced Power protection for Load Dump	x	---
Fulfils EN13309	x	---

System Components

Receiver

	PowerBox / PowerAntenna with MCP950c
Receiver technology	SmartTrack+ is built on SmartTrack technology and enhanced for GNSS signals. Includes discrete elliptical filters. Fast acquisition. Strong signal. Low noise. Excellent tracking, even to low satellites and in adverse conditions. Interference resistant. Multipath mitigation.
L5 and GALILEO prepared	Yes
No. of channels	72 channels: 14L1 + 14L2 GPS 2SBAS 12L1 + 12L2 GLONASS
L1 measurements (GPS)	Carrier phase full wave length C/A narrow code
L2 measurements (GPS)	Carrier phase full wavelength with C code and AS off or on P2 code Equal performance with AS off or on
L1 measurements (GLONASS):	Carrier phase full wavelength C/A narrow code
L2 measurements (GLONASS):	Carrier phase full wavelength P narrow code
Independent measurements	Fully independent L1 and L2 code and phase measurements
RTK Technology	SmartCheck+ processes GPS and GLONASS measurements simultaneously for centimeter-accuracy. Continuously checking provides the highest possible reliability. Initialization typically 8 seconds. A unique, built-in integrity monitoring system checks all results immediately. Up to 99.99% Reliability for baselines up to 30km and 20Hz RTK position update.
Time to first phase measurement after switching ON	Typically 30 secs

	PowerBox
Ports - Serial RS232 / RS422 - CAN - Power in / out - Antenna	Data / RX Port: Lemo-1, 8 pin; PWR in / serial data Communication for MCP950c, Machine PC (fixed 115'200 Baud) Port 1 / 2: Lemo-1, 8 pin; PWR out (fix 12V) / Serial Data Communication (max 115'200 Baud) Port 3: Lemo-1, 8 pin; PWR out (fix 12V) / Serial Data Communication (max 115'200 Baud) / RS422 Antenna connector: TNC CAN Port: 2x M12, 5 Pin; PWR in / out, CAN communication (prepared)
Supply voltage	Nominal 12V DC, range 9-30V DC Advanced Power Protection Advanced Reverse Polarity Protection
Power consumption	3.8W typically, 320mA (without radios and PowerAntenna)
Weight, receiver only	2.7 kg (6.0 lb)
Dimensions (without connections and brackets):	length x width x thickness: 190 x 159 x 82 mm (7.5" x 6.3" x 3.2")
LED	3: for power, tracking, memory
internal Memory	256 MB

	PowerAntenna
Supported Signals	L1/L2 GPS/GLONASS
Technology	SmartTrack+
Groundplane	Built-in groundplane
Ports - Serial RS232 / RS422 - Power in / out	Lemo-1, 8 Pin; USB, RS232, PWR in Military, 8 Pin; RS232 / RS422, PWR in
Supply voltage	Nominal 12V DC, range 9-30V DC
Power consumption	2.5W typically
Weight (incl. Battery)	1.7 kg (3.7 lb)
Dimensions (without Bluetooth antenna):	diameter x thickness: 186 x 90 mm (7.3" x 3.5")
LED	3: for power, tracking, Bluetooth

GPS Antenna for Machine Automation Application

	PowerBox
Standard Machine Automation antenna	MNA1202 GG
Supported Signals	L1/L2 GPS/GLONASS
Technology	SmartTrack+
Groundplane	Built-in groundplane
Dimensions (diameter x height)	170mm x 62mm
Weight	0.44kg
Supply voltage	Pre-amp: 4.75-15VDC, 50mA max.
Gain	typically 27 dBi
Phase centre stability	< 1mm
Environment	advanced vibration, shock and bump protection

PowerBox / PowerAntenna with MCP950c

Measurement Precision and Position Accuracies

Important Note

Measurement precision and accuracy in position and accuracy in height are dependent upon various factors including number of satellites, geometry, observation time, ephemeris accuracy, ionospheric conditions, multipath etc. Figures quoted assume normal to favourable conditions. Times can also not be quoted exactly.

Times required are dependent upon various factors including number of satellites, geometry, ionospheric conditions, multipath etc.

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

Code and Phase Measurement Precision (irrespective whether AS off/on)

Carrier phase on L1 / L2	0.2mm rms	/	0.2mm rms
Code (pseudorange) on L1 / L2	2cm rms	/	2cm rms

Accuracy (rms) in single receiver navigation mode

Navigation accuracy	5-10m rms for each coordinate
Degradation effect	Degradation possible due to SA

Accuracy (rms) with real-time/RTK

	PowerBox / PowerAntenna with MCP950c
RTK capability, standard	Yes
Rapid static (phase), Static mode after initialization	Horiz: 5mm + 0.5ppm Vertical: 10mm + 0.5ppm
Kinematic (phase), moving mode after initialization	Horiz: 10mm + 1ppm Vertical: 20mm + 1ppm
Code only	Typically 25cm

Accuracy (rms) with DGPS / RTCM

	PowerBox / PowerAntenna with MCP950c
DGPS / RTCM	DGPS/RTCM standard Typically 25cm (rms)

Position update and latency

	PowerBox / PowerAntenna with MCP950c
Position update rate	Selectable: 0.05 sec (20Hz) to 60 secs (depends on Option)
Position latency	0.03 sec or less (on serial Port)

Real-time RTK and DGPS/RTCM Data Formats

	PowerBox	PowerAntenna with MCP950c
	Real-time RTK standard	
	DGPS/RTCM standard	
RTRTK Data Formats for data transmission	with BaseStation PLUS option: Leica proprietary format, CMR, CMR+	Leica Lite proprietary format
RTK Data Formats for data reception	Leica proprietary format, CMR, CMR+	Leica proprietary format, CMR, CMR+
RTCM Format for data transmission	with BaseStation PLUS option: RTCM Versions 2.x supporting messages 1,2,3,9,18,19,20,21,22,23,24 And RTCM Version 3	No
RTCM Format for data reception	RTCM Versions 2.x supporting messages 1,2,3,9,18,19,20,21,22,23,24 And RTCM Version 3	RTCM Versions 2.x supporting messages 1,2,3,9,18,19,20,21,22,23,24 And RTCM Version 3
Simultaneous transmissions	2 real time output interfaces via independent ports, providing identical or different RTK/RTCM formats	1 real time output interfaces

Reference station Networks Real-time RTK Data Formats

	PowerBox / PowerAntenna with MCP950c
Default Reference Station Networks	No
Reference Station Networks (with Networking PLUS / Bundle option)	RTK rover fully compatible with Leica's Spider i-MAX & MAX formats, VRS and Area Correction (FKP) reference station networks.

Power Supply for PowerBox

	Power could be supplied via Data / RX Port, CAN #1 or CAN #2. It is either possible to connect the receiver directly to a machines battery. Or, in case of Surveying, use an external GEB171 (7Ah/12V NiMh) battery.
External battery	GEB171 rechargeable 7Ah/12V NiMh battery
Operation time	1 GEB171 powers receiver plus antenna plus RX Terminal for about 25hrs

Power Supply for PowerAntenna with MCP950c

Internal battery	GEB211 rechargeable Li-Ion battery 1.9Ah/7.2V, 1 battery fits into PowerAntenna and 1 battery fits into MCP950c
Operation time	1 GEB211 powers PowerAntenna for about 5h 1 GEB211 powers MCP950c for about 8h
Weight, GEB211 battery	0.11kg (0.2 lb)

Receiver Control & Operation

Receiver operation

Operation using OWI	Receiver configuration, operation, data output (NMEA,...), survey-data acquisition, monitoring Receiver Status, Staring as a real-Time Base Station. via remote SW application using OWI command control 3 LED's indicate power, tracking, recording Can be used for initial receiver configuration and status information display. MCP950c can be used with GeoPad for Survey functionality.
Built-In Status LED's MCP950c Controller	

OWI interface for PowerBox

Protocol Versions OWI interface ports	Leica proprietary Outside World Interface - OWI – for receiver control commands from PC etc, for receiver configuration, control and status Binary or ASCII <ul style="list-style-type: none"> ▪ All serial ports Simultaneous access, control and message output using these ports is fully supported
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NMEA output for PowerBox

NMEA sentences supported NMEA Messages	NMEA Data output format, internationally standardized format for data and position output, For real-time/RTK, DGPS, navigation positions. Simultaneous transmissions: 2 NMEA output interfaces via independent ports, providing identical or different NMEA messages Output coordinates can be WGS84 and / or local coordinates depending on the active Coordinated System. NMEA 0183 V2.20 and Leica proprietary GGA, GGK, GGQ, GLL, GNS, GSA, GSV, LLK, LLQ, RMC, VTG, ZDA
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Data links

	PowerBox	PowerAntenna with MCP950c
	Support of various Radio modems and GSM/TDMA cellular mobile phones for RTK, DGPS or remote control operation modes.	
No. of simultaneous data links	Up to four generic data links can be attached simultaneously.	single data link
Default Radio modem	Any suitable radio modem with RS232 interface and operating in transparent mode	Radios in GFU Housing: - Satellite 3AS - Pacific Crest PDL - Intuicom
Recommended radio modems	- Satellite 3AS - Pacific Crest PDL - Intuicom	- Satellite 3AS - Pacific Crest PDL - Intuicom
GSM phone modem	Any suitable model	With Networking PLUS option: - Siemens MC75 - Bell CDMA for USA / Canada

Coordinate Systems

Management of ellipsoids, projections, geoid models, transformation parameters	
Ellipsoids	All common ellipsoids User-definable ellipsoids
Map projections	Mercator Transverse Mercator
User definable and country specific	UTM Oblique Mercator Lambert (1 and 2 standard parallels) Soldner Cassini Polar Stereographic Double Stereographic RSO (rectified skewed orthomorphic projection) Other country-specific projections
Geoid model	Upload geoid model from LGO
Transformation in receiver	Classical 7-parameter 3-D Helmert One step and two step (direct WGS84 to grid)

Environmental specifications

Receivers	PowerBox
Temperature, operating	-40°C to +65°C Compliance with ISO9022-10-08, ISO9022-11-special and MIL-STD-810F, Method 502.4-II, MIL-STD-810F, Method 501.4-II
Temperature, storage	-40°C to +80°C Compliance with ISO9022-10-08, ISO9022-11-special and MIL-STD-810F, Method 502.4-I, MIL-STD-810F, Method 501.4-I
Humidity	Up to 100%* Compliance with ISO9022-13-06, ISO9022-12-04 and MIL-STD-810F Method 507.4-I * The effects of condensation are to be effectively counteracted by periodically drying out the product
Protection against Water, Sand and Dust	IP67 Protected against water jets Protection against blowing rain Waterproof for temporary submersion in water (max. depth of 1 meter) Dust-tight, protected against blowing dust Usable in salty atmosphere Compliance with IP67 according IEC60529 and MIL-STD-810F Method 506.4-I, MIL-STD-810F Method 510.4-I, MIL-STD-810F Method 512.4-I
Vibration, Shock	Withstands vibrations and shocks during operation on large civil construction machines 5 Hz – 150 Hz, 15 mm, 5 g: MIL810F, Fig. 514.5C-3 MIL810F (60g, 6 ms)
Shock & vibration mounts	Internal shock absorbers

GPS Antenna	valid for PowerAntenna
Temperature, operating	-40°C to +65°C Bluetooth: -30°C to +65°C Compliance with ISO9022-10-08, ISO9022-11-05 and MIL-STD-810F, Method 502.4-II, MIL-STD-810F, Method 501.4-II
Temperature, storage	-55°C to +80°C Compliance with ISO9022-10-08, ISO9022-11-06 and MIL-STD-810F, Method 502.4-II, MIL-STD-810F, Method 501.4-II
Humidity	Up to 100%* Compliance with ISO9022-13-06, ISO9022-12-04 and MIL-STD-810F Method 507.4-I * The effects of condensation are to be effectively counteracted by periodically drying out the product
Protection against Water, Sand and Dust	IP66 Protection against water jets IP67 Protection against blowing rain Waterproof to temporary submersion into water (maximum depth of 1m) Dust-tight, protection against blowing dust Compliance with IP66 and IP67 according IEC60529 and MIL-STD-810F Method 506.4-I, MIL-STD-810F Method 510.4-I, MIL-STD-810F Method 512.4-I
Drops	Withstands 1.5m drop onto hard surfaces
Vibration	Withstand vibration during operation on civil construction machines. Compliance with MIL810F, Fig. 514.5C-3 (5 Hz – 150 Hz, 15 mm, 5 g)
Bump	Withstands 4000 shocks with an intensity of 60g in each direction and axis within the temperature range. The duration of the nominal shock is 6ms.
Functional Shock	No loss of lock to satellite signal when used on a pole set-up and submitted to pole bumps up to 150mm
Topple over pole	Survives topple over from a 2m survey pole onto hard wood on a concrete floor

Remote Control Unit (MCP950c)

Description

The MCP950c is a WinCE controller which is used to interface with the PowerTracker(X). The controller can be used at the instrument connected via Bluetooth or RS232 or remotely from a variety of radio modules. By combining the MCP950c with Smart Holder all equipment is integrated on the pole for easy to use one man surveying. The MCP950c is also fully compatible with the entire range of Redline GNSS sensors giving the user an efficient and economic solution to all sensor control needs. The full QWERTY keyboard of the MCP950c makes it easy and fast to enter alphanumeric point numbers, select or enter codes or even short descriptions.

Control unit

Display	1/4 VGA (320*240 pixels), graphic LCD, touch screen, illumination
Touch screen	Toughened film on glass
Keyboard	Keyboard: 62 keys (12 function keys, 40 alphanumeric keys), illumination
Interface	RS232, External Radio Modem or Bluetooth

Internal Battery (GEB211)

Type	Lithium-Ion
Voltage	7.4 V
Capacity	1.9 Ah
Operating time	MCP950c typ. 8h

Weights

MCP950c	0.73 kg (1.61 lb)
Smart Holder	0.32 kg (0.71 lb)
GFU 23 Radio modem	0.32 kg (0.71 lb)
Battery (GEB211):	0.1 kg (0.22 lb)

Environmental specifications MCP950c

Working temperature range	-30°C to +50°C
Storage temperature range	-40°C to +80°C
Dust / water (IEC 60529)	IP67
Waterproof (MIL-STD-810F)	temporary submersion to 1m

Leica Geosystems can help you optimise site productivity with a complete range of construction site positioning solutions. From simple stakeout tasks to full 3D machine control Leica Geosystems can offer you unparalleled performance for your entire site.

Dozers, graders, excavators, concrete pavers and asphalt finishers are just some of the construction machines that can be fitted with scaleable, tough and reliable construction machine automation systems. With a wide range of support services to choose from, Leica Geosystems helps master your site.

When it has to be right.

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