Champion WR1

User Manual

Champion INSTRUMENTS

4317 Park Drive Norcross, GA 30093 | 678-386-2208 | www.championinstruments.com

Welcome

Congratulations!

You have just acquired the latest dual-frequency WR1 GNSS Surveying System from Champion Instruments!

GNSS has revolutionized control surveys, topographic data collection and construction surveying. Purchasing the right tools for a professional job is essential in today's competitive business environment. Learning to put these tools to work quickly and efficiently will be the focus of the present manual.

Compared with other GNSS products the WR1 is more compact and lightweight while integrating more technology, such as the multi-constellation (GPS+GLONASS+SBAS) capabilities and internal tilt sensor.

The WR1 provides horizontal accuracies of 1cm+1ppm and vertical of 2cm+1ppm. Super bright OLED and voice message give you quicker access to the important information through your working day.

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Warnings

Warning messages are an essential part of the safety concept of the instrument. They appear wherever hazards or hazardous situations can occur.

Warning messages...

- make the user alert about direct and indirect hazards concerning the use of the product.
- contain general rules of behavior

For the users‘ safety, all safety instructions and safety messages shall be strictly observed and followed! Therefore, the manual must always be available to all persons performing any tasks described herein.

DANGER, WARNING, CAUTION and NOTICE are standardized signal words for identifying levels of hazards and risks related to personal injury and property damage. For your safety it is important to read and fully understand the table below with the different signal words and their definitions!

Supplementary safety information symbols may be placed within a warning message as well as supplementary text.

Type	Description
⚠ **DANGER**	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ **WARNING**	Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.
⚠ **CAUTION**	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in appreciable material, financial and environmental damage.

Hazards

Because of the risk of electrocution, it is dangerous to use poles and extensions in the vicinity of electrical installations such as power cables or electrical railways.

DANGER

Precautions:
Keep at a safe distance from electrical installations. If it is essential to work in this environment, first contact the safety authorities responsible for the electrical installations and follow their instructions.

During dynamic applications, for example stakeout procedures there is a danger of accidents occurring if the user does not pay attention to the environmental conditions around, for example obstacles, excavations or traffic.

WARNING

Precautions:
The person responsible for the product must make all users fully aware of the existing Dangers.

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

WARNING

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

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 can sustain injury.

CAUTION

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 used with accessories, for example masts, staffs, poles, you may increase the risk of being struck by lightning.

WARNING

Precautions:
Do not use the product in a thunderstorm.

If the product is used with accessories, for example on 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.

DANGER

Precautions:

- Do not use the product in a thunderstorm as you can increase the risk of being struck by lightning.
- Be sure to remain at a safe distance from electrical installations. Do not use the product directly under or close 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 regarding grounding antennas and masts. These installations must be carried out by an authorized 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, instrument - antenna.

Hazards

CAUTION

During the transport, shipping or disposal of batteries it is possible for inappropriate mechanical influences to constitute a fire hazard.
Precautions:
Before shipping the product or disposing of it, discharge the batteries by running the product until they are flat. When transporting or shipping batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping contact your local passenger or freight transport company.

WARNING

High mechanical stress, high ambient temperatures or immersion into fluids can cause leakage, fire or explosions of the batteries.
Precautions:
Protect the batteries from mechanical influences and high ambient temperatures. Do not drop or immerse batteries into fluids

WARNING

If battery terminals are short circuited e.g. by coming in contact with jewelry, keys, metalized paper or other metals, the battery can overheat and cause injury or fire, for example by storing or transporting in pockets.
Precautions:
Make sure that the battery terminals do not come into contact with metallic objects.

WARNING

Incorrect fastening of the external antenna to vehicles or transporters poses the risk of the equipment being broken by mechanical influence, vibration or airstream. This may result in accident and physical injury.
Precautions:
Attach the external antenna professionally. The external antenna must be secured additionally, for example by use of a safety cord. Ensure that the mounting device is correctly mounted and able to carry the weight of the external antenna (>1 kg) safely.

WARNING

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.

Only Champion Instruments authorized service workshops are entitled to repair these products

EMG

Description

The term Electromagnetic (EMG) 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, Champion Instruments 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 with accessories from other manufacturers, for example field computers, personal computers or other electronic equipment, non-standard cables or external batteries.
Precautions:
Use only the equipment and accessories recommended by Champion Instruments. When combined with the product, they meet the strict requirements stipulated by the guidelines and standards. When using computers or other electronic equipment, pay attention to the information about electromagnetic compatibility provided by the manufacturer.

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, Champion Instruments cannot completely exclude the possibility that the product may be disturbed by intense electromagnetic radiation, for example, near radio transmitters, two way radios or diesel generators.
Precautions:
Check the plausibility of results obtained under these conditions.

CAUTION

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.

Electromagnetic fields can cause disturbances in other equipment, in installations, in medical devices, for example pacemakers or hearing aids and in aircraft. It can also affect humans and animals.
Precautions:

CAUTION

Although the product meets the strict regulations and standards which are in force in this respect, Champion Instruments cannot completely exclude the possibility that other equipment can be disturbed or that humans or animals can be affected.

- Do not operate the product with radio or digital cellular phone devices in the vicinity of filling stations or chemical installations, or in other areas where an explosion hazard exists.
- Do not operate the product with radio or digital cellular phone devices near to medical equipment.
- Do not operate the product with radio or digital cellular phone devices in aircraft.

Radios or digital cellular phones

WARNING

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 reason able 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

Changes or modifications not expressly approved by Champion Instruments for compliance could void the user's authority to operate the equipment

Components

*Note: all packages may not include the items shown.

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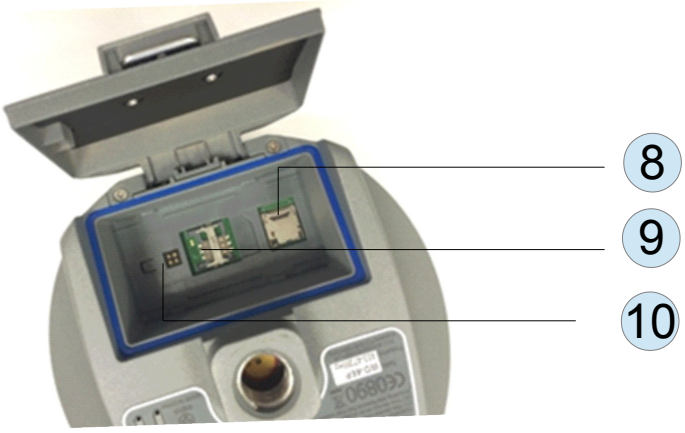
The WR1

1) Lower Housing
2) Upper Cover
3) Display/Operating Panel
4) UHF/GSM Antenna Connector
5) Protective Rubber Ring

1) Lemo Port
2) Battery Cover Lock
3) UHF/GSM Antenna Connector
4) Pole Connector
5) USB Connector
6) Speaker
7) Battery Cover
8) Micro SD Card Slot
9) SIM Card Slot
10) Battery contacts



Batteries

WARNING!

The WR1 comes packaged with 2 Lithium Ion batteries.

The WR1 should only be used with the manufactured supplied batteries. The batteries should be charged with the supplied charger only.

An optional cable is available to allow the WR1 to be powered by a 12 volt battery.

Please consult your authorized Champion Instruments dealer with any questions relating to supplying power to or charging batteries for the WR1.

Battery disposal should be done through a recycling center as improperly handled battery disposal can be dangerous.

Do not use the batteries if they have been dropped or the housing is cracked. This can cause damage to the WR1 and or personal property and person damage.

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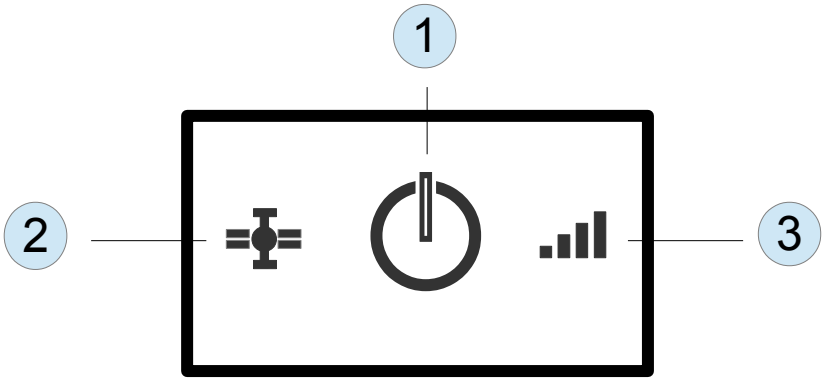
Keypad



1) Power Button and Battery Status 2) Satellite Indicator 3) Differential Indicator

Button Function

Power On: Press and hold the Power Button down for 1 Second.

Power Off: Press and hold the Power Button down for 3 seconds release it when the receiver goes “ding dong”.

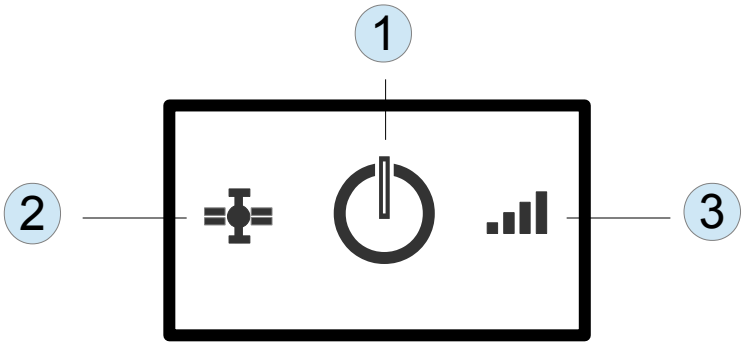
Auto Set Base: With the receiver OFF, press and hold the Power Button down for 6 Seconds. The receiver will say “Auto Set Base” release the power button and the receiver will “get” a new satellite position and start transmitting base corrections.

Switching Work Modes: Double click the Power Button to switch from Base to Rover to Static. Each double click will scroll you to the next work mode. To select the mode Single click the Power Button.

Reset: With the receiver ON, hold the Power Button down for more then 6 Seconds. Release the Power Button when the receiver goes “ding dong”.

Mandatory Power Off: Withe the receiver ON press and hold the Power Button down for 8 seconds.

Keypad



1) Power Button LED 2) Satellite LED 3) Differential LED

LED Function

Power LED

Power LED Off: The receiver is not powered on.

Power LED Solid Yellow: The battery is charged to its highest state.

Power LED Solid Red: The battery is partially charged.

Power LED Slowly Flashing Red: The battery is very low.

Power LED Quickly Flashing Red: The battery is about to die.

Differential LED

Differential LED Off: There is no WiFi/GSM connection.

Differential LED Solid Green: The receivers WiFi/GSM is connected to the server.

Differential LED Slowly Flashing Green: The receivers WiFi/GSM is connected to the internet.

Differential LED Quickly Flashing Green: The receivers WiFi/GSM is trying to connect to the server.

Differential LED Slowly Flashing Red: In RTK Base/rover mode the receivers is sending or receiving corrections. In Static Mode the receiver is storing data.

Satellite LED

Satellite LED Off: No Satellite data is being received.

Satellite LED Flashing Green: Trying to track satellites

Satellite LED Solid Green: More than four satellites being tracked.

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Specifications

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Satellite Signals Tracked Simultaneously
220 Channels
GPS…….. Simultaneous L1C/A, L2C, L2E, L5
GLONASS……..Simultaneous L1C/A, L1P, L2C/A (GLONASS M only), L2P
SBAS……. Simultaneous L1 C/A, L5
Galileo……... Simultaneous L1 BOC, E5A, E5B, E5AltBOC
BDS…….……. B1, B2
QZSS…….. L1 C/A, L1 SAIF, L2C, L5

POSITIONING PERFORMANCE

Static and Fast Static GNSS Surveying
Horizontal…….2.5mm+0.5ppm RMS
Vertical……. 5mm+0.5ppm RMS

Post Processing Kinematic (PPK / Stop & Go) GNSS Surveying
Horizontal…….. 1cm+1ppm RMS
Vertical…… 2.5cm+1ppm RMS
Initialization time…….Typically 10 minutes for base while 5 minutes for rover
Initialization reliability……Typically > 99.9%

Real Time Kinematic (RTK) Surveying
Single Baseline
Horizontal…….. 8mm+1ppm RMS
Vertical……. 15mm+1ppm RMS

Network RTK
Horizontal…….. 8mm+0.5ppm RMS
Vertical…….. 15mm+0.5ppm RMS
Initialization time……..…Typically < 8seconds
Initialization reliability…….Typically > 99.9%

Code Differential GNSS Positioning
Horizontal……. 25cm+1ppm RMS
Vertical…… 50cm+1ppm RMS
SBAS …… 0.50m Horizontal, 0.85m Vertical

HARDWARE
Physical
Dimensions (W x H)…….153mm x 83mm (6.02inch x 3.27inch)
Weight……950g (2.09lb) without internal battery
Operating temperature……. -40°C to +65°C (-40°F to +149°F)
Storage temperature…… -40°C to +75°C (-40°F to +167°F)
Humidity…… 100%, considering
Water/dustproof…….. IP67 dustproof, protected from temporary immersion to depth of 1m (3.28ft).
Shock and vibration……Designed to survive a 3m(9.84ft) natural fall onto concrete.

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Specifications

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Electrical
Power 6V to 28V DC external power input
Power consumption ≤3.5W
Automatic switching between internal power and external power
Rechargeable, removable 7.4V, 5000mAh Lithium-ion battery in internal battery compartment

Internal Battery Life
Static 12hours
RTK rover (UHF/GPRS/3G) 8-10 hours
RTK base 8 hours

I/O Interface
1 xBluetooth, NFC
1 x standard USB2.0 port
1 x TNC antenna connector
1 x RS232 serial port
1 x DC power input (5-pin)

Tilt Survey System …. Electronic Bubble

COMMUNICATION
Network Communication
Fully integrated, fully sealed internal WCDMA, compatible with GPRS, GSM
Wifi frequency is 2.4G, supports 802.11b/g/n protocol
Network RTK (via CORS) range20-50km

Pacific Crest XDL Micro Internal UHF Radio
Frequency…….403~473MHz
Transmitting power…… 0.5W, 2W adjustable
Transmitting speed…….. Up to 19.2Kbps
Support most of radio communication protocol
Working range…… 3~5km typical, 8~10km optimal

SYSTEM CONFIGURATION
System
Data storage……16GB Internal storage (Support up to 32GB external SD card)
Record GNS and RINEX format simultaneously

Data Formats
1Hz positioning output, up to 20Hz
CMR: CMR, CMR+, sCMRx input and output
RTCM: RTCM 2.1, 2.3, 3.0, 3.1, 3.2 input and output
Navigation outputs ASCII: NMEA-0183 GSV, AVR, RMC, HDT, VGK, VHD, ROT, GGK, GGA, GSA, ZDA, VTG, GST, PJT, PJK, BPQ, GLL, GRS, GBS
Navigation outputs binary: GSOF