

**CP2011®**

**Avalanche Transceiver and  
Moving Objects Checkpoint**

**User Manual  
Technical Data**

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**Abbreviations**

aaa dummy

**References**

[1] none

**Document - Versions**

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## 1. Introduction

This document describes the checkpoint CP2011 of Girsberger Elektronik AG.

## 2. Summary

The checkpoint CP2011 shall indicate to backcountry skiers or freeriders that their avalanche transceiver has been switched on and is working properly. Triggering the receiver or the motion sensor will be recorded. The recorded data may be read out via an USB interface for subsequent processing. This provided detailed information about the use of a backcountry or freeriding area.

The built in batteries allow for operating the checkpoint autonomously for up to one year.

### 2.1 Base Unit CP2011

- For mounting on a mast or for integration into an information panel
- Internal LED
- PC – Software for configuration and data readout

### 2.2 Options

#### 2.2.1 457 KHz Receiver

The CP2011 can be equipped with a 457 KHz receiver for registering persons carrying a transceiver. The receiver comes with three orthogonal antennas so its range will be completely independent of the spatial orientation of the transmitting antenna.

#### 2.2.2 Motion Sensor

Persons walking by the checkpoint can be detected by means of a motion sensor. The sensor is based on infrared technology.

#### 2.2.3 Key

As an alternative, persons may be counted by means of an external push button.

### 3. Mounting the CP2011

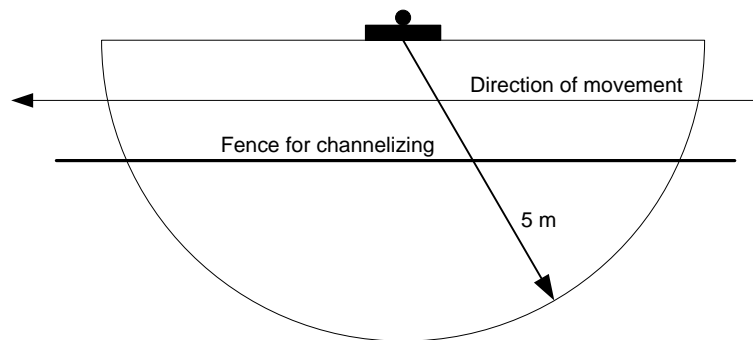
There are two options for mounting the CP2011:

#### 3.1 Integration into an Information Panel

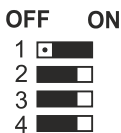
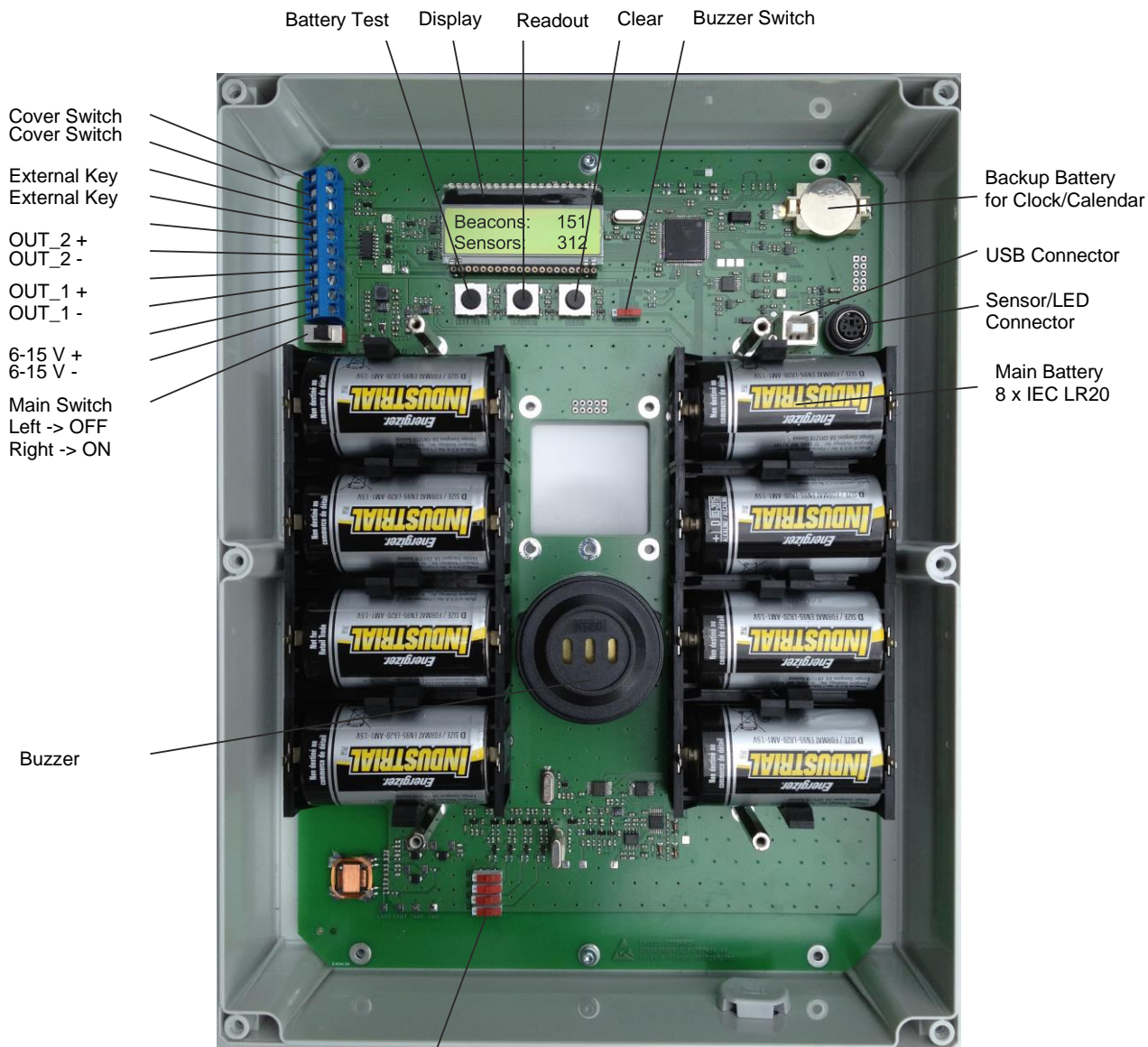
The CP2011 may be mounted onto the back of an information panel. In that configuration, detecting persons does not make much sense, since several persons may be within range of the motion sensors at the same time. Checking and recording transceivers is still possible, whereas it is still recommended that a single person be within the range of the 457 KHz sensor at the time

#### 3.2 Independent Positioning in the Field

The CP2011 may be mounted on a mast in any place. In order to improve the reliability of counting persons, we recommend to channelize the by-passers, e.g. by means of some kind of fence. The setup should avoid persons standing still in front of the checkpoint, since this may lead to false counts. When the motion sensors are used, there must not be any moving objects (windows, bushes, trees, flags etc.) within a radius of at least 5 meters around the front of the checkpoint.



### 4. User Interface / Connectors



**BEACON RANGE ADJUST**

- 1+2+3+4 = ON: approx. 0.5 m
- 1 = OFF: approx. 0.8 m
- 1+2 = OFF: approx. 1.5 m
- 1+2+3 = OFF: approx. 2.5 m
- 1+2+3+4 = OFF: approx. 4.0 m

The main battery provides the normal supply. Batteries will last for 200 to 300 days of operation. High quality batteries are a must.

The backup battery supplies the built-in clock and calendar while the system is switched off or the main batteries are being exchanged. It provides for operation without main batteries for at least 400 days.

The USB connector is for connection to a PC or notebook computer. While the USB interface is connected, the CP2011 is supplied via the USB cable.

The big red/green optical indicator is used for indicating the registration to passers-by. If a transceiver is detected, the indicator will blink in green by the rhythm of the transceiver pulses. The built-in siren will produce a short tone. If a person without transceiver is detected, the indicator will show a red flash.

The display is used for reading the following items:

- Battery status (Voltage, %)
- Serial number and hardware and software versions
- Transceiver counter and sum of all motion detection counters

The connectors "External Key" are for an external push button or some other kind of contact.

The OUT\_1 output pulses at every triggering of a sensor. It can drive a maximum of 20 mA at about 7 – 12 Volts (depending on battery status).

The OUT\_2 output is configurable. It may deliver either an impulse of a given duration or be permanently active while a sensor is detecting a transceiver or some movement. It can drive a maximum of 20 mA at about 7 – 12 Volts (depending on battery status).

The input 7 – 15 Volts can be used to connect an external power source in place of the main batteries. Depending on the configuration and operation state, the consumption will be about 2 – 4 mA, with peaks of up to 80 mA when one of the outputs or the optical indicator are active.

The main switch can be used to disconnect the batteries from the device, e.g. while exchanging the batteries. Left -> OFF, Right -> ON.

The "Battery Test" key triggers the display of the battery status. If the key is pressed once more while the battery status is shown, the battery status display will be followed by the display of the serial number and of the software and hardware versions.

The "Readout" key triggers the display of the transceiver and motion sensor counter values.

The "Clear" key serves to clear the counters. It will only work after the counters have been read out, and the readout via USB has been de-activated in the configuration. If readout via USB is enabled, the key has no effect.

The buzzer switch is used for suppressing the siren signal upon detection of a transceiver or a person.

The 457 KHz range adjust switches are used to control the range of the 457 KHz receiver.

## **5. Data Collection**

### **5.1 Events Registered**

All events that have triggered the transceiver or by the motion sensor are registered. An event record is made of the following:

- Year, month, day, hour, minute
- Type of event (transceiver / movement or push button)

If the transceiver sensor only is triggered, a transceiver event will be recorded. If a person is detected and the transceiver sensor is triggered, a transceiver event will be recorded. If a person is detected and there is no transceiver signal, a person event is recorded. At the same time, the counters for the individual event types are updated. The counters can be read out to the LCD display at any time by pressing the "Readout" key.

The event data is stored in non-volatile memory. It cannot get lost by a power interruption (e.g. change of batteries). The maximum capacity is about 49'000 events.

### **5.2 Data Readout**

The recorded data may be read out by means of Windows software. It is stored in a `.txt` file, one line per event. The file name is made of the serial number and of the date of readout. The file may be imported into an Excel file for further processing.

### **5.3 Erasing the Data**

The records may be erased via the USB interface, using a Windows program that is delivered with the product. The data cannot be erased before it has been read out and saved in a file. Due to the limited endurance of the flash memories used, the number of erase cycles is limited to about 30'000.

### **5.4 Privacy**

No person specific data is recorded.



## **6. Input Devices**

### **6.1 457 KHz Receiver**

The 457 KHz receiver operates on three orthogonal antennas in order to be independent of the spatial orientation of a transceiver. The sensitivity can be set so it will trigger only on transceivers in the immediate vicinity (ca. 0.5 to 4 meters). It is compatible with all transceivers that are conforming to the standard EN 300718. If the checkpoint is used for purposes other than winter sports, the 457 KHz receiver may be disabled in the configuration in order to minimize battery consumption.

### **6.2 Motion Detector**

A motion detector is provided for registering persons without a transceiver. It may be activated independently in the configuration.

#### **6.2.1 Electronic Sensors**

For registering passers-by, two options are available:

##### **6.2.1.1 Infrared**

Infrared sensors are sensitive to changes in the heat image within the range of the sensor. Objects that are not moving are not recognized.

Infrared sensors are well suited for detecting tangential movements (orthogonal to the axis of the sensor). They are sensitive to wind, dust and fast temperature changes (shadowing due to moving clouds). The sensors must be covered by means of some window that is transparent to infrared radiation. The window must not be dirty and should provide no points of attack for vandalism. The performance may be degraded by strong background radiation, e.g. by sunlight which is reflected by the snow surface. If multiple persons are within range simultaneously, individual detection is not possible. There should not be any moving objects within (bushes, trees, grass, flags etc.) within the range of the sensor. It is not possible to establish an exact range limit, since several parameters have an influence on range (temperature difference, size of heat source, speed and direction of movement).

##### **6.2.2 Push Button**

A big push button on the front of the checkpoint is a simple alternative.

However, this requires some more participation by the user: It is not sufficient to walk by the checkpoint, but pressing the button is also required. The push button is completely insensitive to environmental influence and does not consume any energy when not activated. Individual persons are easily detected, and there is not detection of persons returning from the backcountry or freeride area. The distinction between persons carrying a transceiver and persons without a transceiver is very reliable, since the push button range is inside the range of the 457 KHz sensor. The only drawback is some susceptibility to sabotage by multiple operation of the button. But this can be alleviated by not registering multiple activations during some time window.

## **7. Output Devices**

### **7.1 LED**

A super bright green LED blinks with the rhythm of a transceiver that is within range. A super bright LED blinks three times when a passer-by without a transceiver is detected.

### **7.2 Acoustic**

A siren (buzzer) produces a loud acoustic signal with the rhythm of a transceiver that is within range. This may be switched off if so required. When a passer-by without transceiver is detected, three tones are put out.

### **7.3 Signal Outputs**

#### **7.3.1 OUT\_1**

The output OUT\_1 provides a signal with the rhythm of the detected transceiver that may be used for controlling other devices. The electrical parameters are 7 – 12 Volts / 20 mA. If the infrared sensor is triggered, there is a single 100 ms pulse.

#### **7.3.2 OUT\_2**

The output OUT\_1 can provide a static signal (active as long as any sensor is triggered) or a pulse (one pulse only in case of a transceiver) that may be used for controlling other devices. The electrical parameters are 7 – 12 Volts / 20 mA. If the infrared sensor was triggered, there is a single 100 ms pulse. If the pulse option is selected, the pulse duration may be configured between 500 ms and 10 seconds.

### **7.4 Indicators**

Inside the case, there are two indicators that are mapping the two outputs.

### **7.5 LCD – Display**

Inside the case, there is a LCD display with two lines of 16 characters each. It is used for indicating the battery status, the counter values and the serial number and software and hardware version.

### **7.6 USB – Interface**

All records events can be read out via the USB interface and saved to a file.

### **7.7 Keys**

Inside the case, there are some keys for triggering special functions:

#### **7.7.1 Battery Test**

One of the keys triggers a battery test. The remaining capacity in % is shown on the display.

If, during the display of the battery status, the key is activated again, the battery status indication will be followed by a display of the serial number and of the software and hardware versions.

#### **7.7.2 Counters Readout**

One key triggers a readout of the transceivers and sensors counters.

### **7.7.3 Clearing the Counters**

One key serves to clear the counters. In order to avoid accidental clearing, the key must be pressed for at least 2.5 seconds before becoming effective. If the checkpoint is configured for data readout via USB, then the key has no effect until all data has been read out. This serves to avoid any loss of registered data.

## **7.8 Switches**

Inside the case, there are some switches for configuring the device:

### **7.8.1 Main Switch**

The main switch separates the batteries from the device, e.g. while exchanging batteries.

### **7.8.2 Range of 457 KHz Receiver**

Four switches serve to adjust the range of the 457 KHz receiver to the local requirements. A total of five ranges are available (ca. 0.5 m to 4 meters).

### **7.8.3 Siren (Buzzer)**

One switch serves to de-activate the built-in siren (buzzer).

## 8. PC Software

A program for Windows XP, Vista or 7 serves to configure the checkpoint and to read out the stored data.

The software also permits to set the date and time of the internal clock. The stored data can also be erased by means of this software. The USB interface is only available if the cover is taken off.

The software is part of the basic delivery.

### 8.1 Login

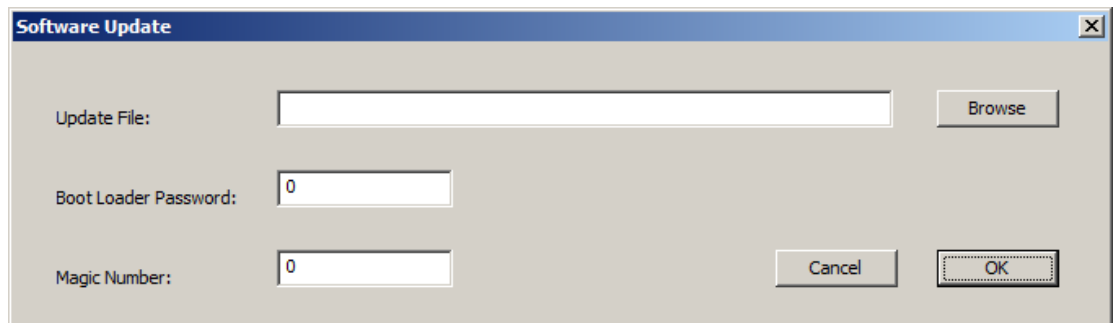
Before anything else can be done, a login must be executed. All other buttons are locked until after the login.

### 8.2 Modify

All parameters that are not required to be fixed in hardware for reasons of power efficiency (turn on delays, turn off delays etc.) are stored in a special area of memory. This button permits to update some of these parameters in the field, so there is no need to return the checkpoint to the factory for updates.

### 8.3 Update

By clicking the "Update" button, a software update is initiated. The software update will not touch any parameter settings nor any events that have already been registered. A new dialog is opened:



The user may browse for an update file (\*.bup).

The boot loader password must match with the password stored in the boot loader. If not so, the software update will not be loaded.

The magic number must match with the magic number as stored in the update file (\*.bup). If not so, the software update will not be loaded.

### 8.4 Password

Some functions, e.g. the change of configuration, are protected by a password. The password must be at least 5 and at most 8 printable characters. The default password is "12345678". This button is used to change the password. Obviously, it requires knowledge of the current password.

### 8.5 Device

This area displays the basic checkpoint data and the battery status.

### 8.6 Clock

After a login, the state of the clock and calendar at the time of login are displayed. The clock is not updated after login. The clock and calendar may be set to the actual values. This may be necessary at first installation.

The built-in clock and calendar are supplied from a separate battery. They are therefore independent of an interruption of the main battery current, e.g. when exchanging batteries. The clock and calendar will continue to count when the main battery is switched off.

### 8.7 Counters

This area displays the state of the individual event counters as well as the total number of events. The counter states are determined by counting the event entries in the data base of the checkpoint. They are computed automatically upon a login. They can only be cleared when the "Events Readout" feature is disabled. The following event counters are provided:

**Beacons**      Number of detected transceivers. Note that the transceiver events are prioritized above all other event types.

**Radar**          Not used in the current version of the checkpoint.

Infrared	Number of events detected by the infrared sensor, excluding persons carrying a transceiver.
Sensors	Not used in the current version of the checkpoint.
Key	Number of push button activations (if applicable).
Cover On/Off	Number of times the cover of the checkpoint was taken off / put back on. Once the cover has been taken off, all sensors are disabled in order to avoid false counts.
Dummy	Number of dummy events. These serve for internal data administration by the checkpoint, they have no relation to the sensors at all.

## 8.8 Events

The "Readout" button triggers the readout of all recorded data to a file. The file name is created automatically, it cannot be modified. The file is created in the directory where the program is located. By making the file name from the serial number, the file can always be associated with the location of the checkpoint. Having the date and time in the file name serves to prevent any loss of data, e.g. by a readout – clear – readout sequence. The recorded data can only be cleared after at least one readout. Reading out 49'000 records takes about 3 minutes.

## 8.9 Features

In this area, the features can be activated/deactivated:

Beacon Sensor	Activates the 457 KHz sensor. This feature can only be activated when there is a 457 KHz sensor in the hardware.
Radar Sensor	Not used in the current version of the checkpoint.
Infrared Sensor	Activates the infrared sensor. This feature can only be activated when there is a infrared sensor in the hardware.
Key	Activates the push button sensor.
Beacon Always On	If a motion sensor is available, then it is sufficient to switch on the 457 KHz sensor upon activation of the motion sensor only. This serves to save on battery consumption.
Radar AND Infrared	Not used in the current version of the checkpoint.
OUT 2 Pulsed	The second signal output is active as long as any sensor is detecting. As an alternative, it may be configured to become active for a short pulse upon the triggering of any sensor. The impulse duration is programmable.
Events Readout	When this feature is activated, direct clearing of the counters is disabled for both the internal key as well as for the PC software. One must first read out the records before they can be erased. This helps to avoid any loss of data.
Show LEDs	When this feature is de-activated, there will be no output to the LEDs and to the siren.
OUT 2 Pulse Width	This value sets the duration of a possible pulse on OUT_2. The range is 500 ms to 10 seconds.

Starting with CP2011 software version 5.0:

Sensor Blink Count	Number of times LED will be blinking when a sensor is triggered. Range 1 – 10.
Sensor Pause	Delay after last LED blinking until the sensor is armed again. Range 100 ms to 10'000 ms.
Key Blink Count	Number of times LED will be blinking when the contact is triggered. Range 1 – 10.
Key Pause	Delay after last LED blinking until the contact is armed again. Range 100 ms to 10'000 ms.

Some features depend on each other, and some depend on the actual hardware (sensor options). All settings are checked for compatibility before being transmitted to the checkpoint. If anything is found wrong, a message is displayed, and the settings are not transferred to the checkpoint.

Once the configuration is complete, you must click the "Set" button for triggering a transfer to the checkpoint. This functionality is protected by a password.

## 8.10 Quit

To quit the program.

## 9. Power Supply

The main power is supplied from 8 Alkali Manganese batteries of the LR20 / D type that are located inside the case.

Stored records are preserved for at least one year without batteries.

The internal clock and calendar are supplied from a separate Lithium backup battery of type CR2032. Time and calendar continue to operate during an exchange of the main batteries.

## 10. Electrical Data

457 KHz receiver frequency:	457.000 kHz (compatible with EN 300718)
457 KHz sensor range:	0.5.....4.0 m (adjustable)
Sensors range:	ca. 2 - 4 meters, depending on heat source.
Outputs:	
OUT_1	7 – 12 V depending on battery state, max. 20 mA
OUT_2	7 – 12 V depending on battery state, max. 20 mA
External push button:	Floating contact, closed active, max. Load 3 V / 1.5 mA
Power supply	8 Alkali – Manganese - Batteries Type LR20 / D
Battery life time:	about 1 year
Backup-Battery:	at least one year without main supply
Maximum number of events:	ca. 49'000 (total)
Lightning protection:	The electronics are protected against overvoltage. However, a direct lightning hit or a hit nearby may cause a total failure.

## 11. Mechanical Data

Case material:	Polycarbonate
Protection class:	IP66 (splash water proof)
Dimensions:	300 x 230 x 90 mm
Dimensions with rain cover: and mounting fixtures	320 x 250 x 110 mm
Dimensions of front design:	285 x 200 mm
Material for front display:	Vinyl, strongly sticking and laminated
Weight including batteries:	ca. 2 kg
Temperature range:	-20 °C to +50 °C

## 12. Accessories

Weather protection cover:	Stainless steel
Mast mounting:	Aluminum profile and steel strip

## 13. Warranty

### Limited two year warranty

Girsberger Elektronik AG is providing a warranty for two years from the date of purchase as per the purchase documentation.



### **Warranty conditions**

The setup and operation of the CP2011 are done as outlined in this user manual. In case of an event covered by the warranty, all parts that exhibit materials or production defects will be replaced free of cost.

Damage due to improper handling or regular use is not covered.

The warranty is void if a device has been manipulated by the buyer or by a non-authorized third party, or if a device has been fitted with replacement parts that have not been recommended by the manufacturer.

## **14. Liability**

Girsberger Elektronik AG is not liable for any direct or indirect damage or damage caused by an accident resulting from the use of the CP2011. Damage caused by improper use of the CP2011 is also excluded.

Liability is excluded for damage caused by

- Use for purposes other than detecting passers-by and their transceiver's status
- Disregarding recommendations given in this user manual
- Unauthorized modifications to the CP2011
- Continuing use of the CP2011 despite recognizable wear or malfunction
- Unauthorized repair
- Catastrophes, impact of foreign matter, supreme power

The information in this user manual describes the properties of this product without final confirmation.

## **15. Safety**

The CP2011 is not a measuring instrument but just a means for increasing safety and for assisting single persons who are going out on their own.

The CP2011 does not perform a full functional test for an avalanche transceiver. The only item that is assured is that the transmitting section of a transceiver is actually most probably operating properly and that the transmitting mode is currently activated.

## **16. Storage**

If the device is not in use for an extended period of time, e.g. during the summer months, we recommend that you remove the batteries. Damage caused by leaking batteries is not covered by the warranty.

## **17. Information**

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The technical data may change at any time without notice.

[www.girsberger-elektronik.ch](http://www.girsberger-elektronik.ch)  
[www.avalanche-training-center.ch](http://www.avalanche-training-center.ch)

## **18. Manufacturer's Address & Support**

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[info@girsberger-elektronik.ch](mailto:info@girsberger-elektronik.ch)