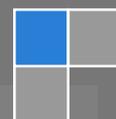


# Manual

# MagnoTRACKER

Please read the following manual carefully before using your MagnoTRACKER. This manual contains important information on how to properly operate this antenna.



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## 1. Introduction

Dear customer,

By purchasing this MagnoTRACKER you acquired a professional Antenna, which allows measurement from 1Hz to 9kHz (ELF Versions) and 9kHz – 1MHz (LF Versions).

This product fulfills the requirements of the applicable European and national guidelines.

### 1.1. Liability

This document was compiled with great care and checked for accuracy.

But nevertheless mistakes cannot be excluded. We do not take over any liability. We cannot guarantee the completeness, the correctness and the accuracy of information.

We reserve ourselves the right to change our products, specifications and documentations without any notice. We have no obligation for revision of documents and manuals we delivered in the past.

### 1.2. Warranty

Despite the greatest care in development and production of this device and the free MCS software; Aaronia AG takes only liabilities for certain purposes, if this has been assured in writing. No warranty can be assumed for the performance and flawlessness of the software for all usage conditions and cases and for the results produced when utilized by the user. No additional guarantees or assurances are made regarding marketability, freedom of defect of title, integration or usability for certain purposes unless they are required in accordance with the law and cannot be limited. Justified guarantee claims are limited to the right of require rectification or replacement delivery. Regarding infringements, violations of patents, rights of ownership or the freedom from interference by third parties, Aaronia AG cannot warrant or guarantee that it is free of error.



### 1.3. Safety Guidelines

In the event of any damages resulting from failure to follow these operating instructions the claim under guarantee is discharged. We accept no liability for consequential damages.

In the event of property and personal damages resulting from improper handling or failure to follow safety advice, Aaronia AG accept no liability.

For reasons of safety and admissibility (CE) the unauthorized conversion and/or alteration of the product is not permitted.

As voltage source please only use a proper mains socket (100-240Volt, 50/60Hz). Make sure that the cable isn't squeezed or damage by sharp edges.

In order to avoid any damage, please read this user manual carefully before starting to use the device.

The commissioning should only be performed by qualified and instructed personnel.

Never expose the device to water. Never use it outdoors while it is raining. Otherwise the sensitive electronics could be damaged.

Avoid to high temperatures. Do not leave the device on a heating, in direct sunlight or in your car.

Only clean it externally with a damp cloth.

The antenna is sensitive to shock. So never drop the antenna and for safekeeping and transport please use the carrycase.

Even though the device is well secured through the use of counter-sunk screws, it should still not be reachable by children as it could easily be diverted from its intended use.

This devices that is connected with mains voltage and derived voltages, is not meant for the hands of children.

Consider the regulations for prevention of industrial accidents for electrical installations and equipment, by government safety organization in industrial facilities.

In schools, educational establishments, hobby and self-help workshops the operation of this product must be supervised by trained personnel.

### 1.4. Scope of delivery

LF2 and ELF2



- 1) *MagnoTRACKER antenna*
- 2) *Adapter plate (blue) with screws (pre-installed on antenna in case tripod is ordered)*
- 3) *Transport Case*
- 4) *International Power supply*
- 5) *Internal pre-amplifier with integrated LiPo-Battery*

**Accessories (optional)**

- 6) *Pistol Grip*
- 7) *Tripod incl. Bag*
- 8) *GPS-Logger*
- 9) *N to SMA Adapter*
- 10) *SMA Cable*

LF6 and ELF6



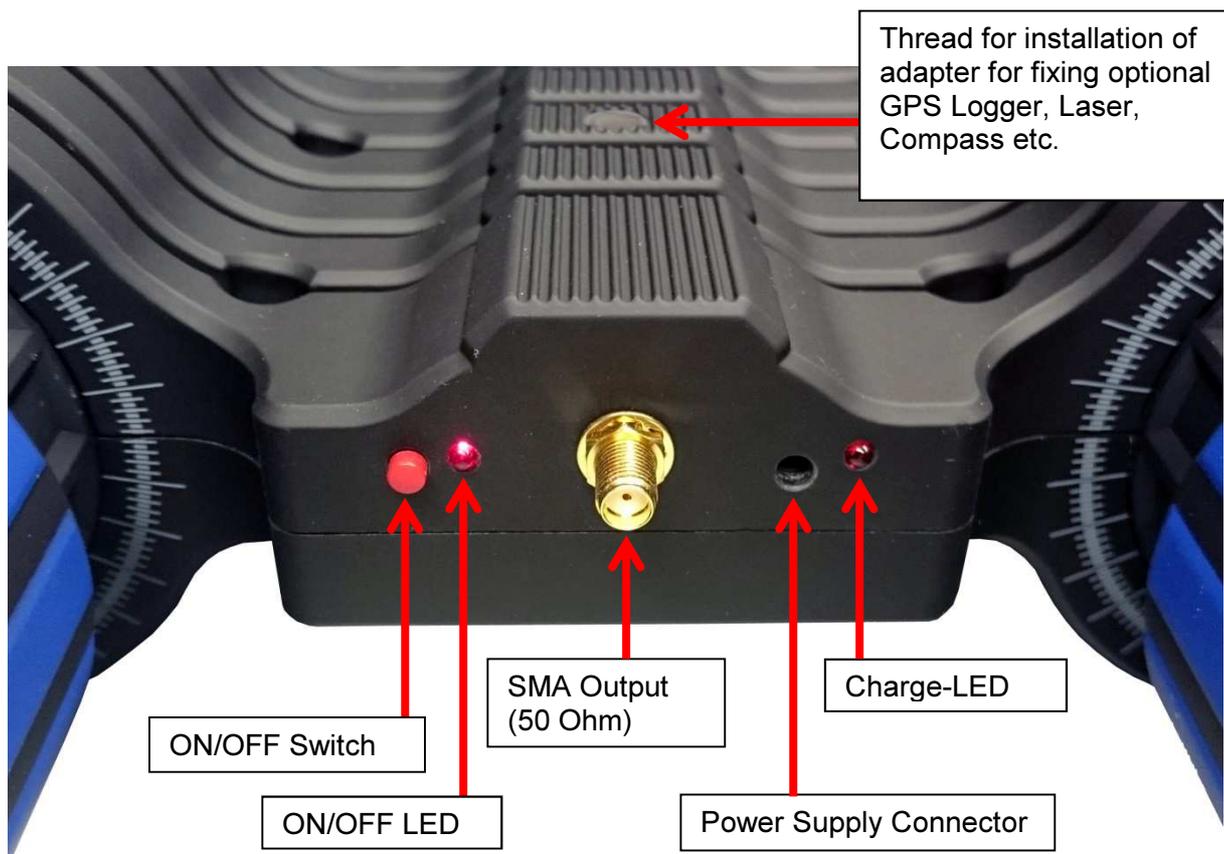
Please check the package contents for completeness before first operation. Report missing parts immediately at Aaronia or your Aaronia dealer.

## 2. Technical data

|                              | MagnoTRACKER LF-2  | MagnoTRACKER LF-6  | MagnoTRACKER ELF-2   | MagnoTRACKER ELF-6   |
|------------------------------|--|--|--|--|
| <b>Design</b>                | Magnetic Field Tracker   | Magnetic Field Tracker   | Magnetic Field Tracker   | Magnetic Field Tracker   |
| <b>Impedance:</b>            | 50 Ohm   | 50 Ohm   | 50 Ohm   | 50 Ohm   |
| <b>Connector</b>             | SMA (female)   | SMA (female)   | SMA (female)   | SMA (female)   |
| <b>Tripod connector</b>      | 3/8"   | 3/8"   | 3/8"   | 3/8"   |
| <b>Warranty*:</b>            | 10 years   | 10 years   | 10 years   | 10 years   |
| <b>Accessories / Options</b> |  |  |  |  |
|                              | Pistol grip 1/4" & 3/8"  |
|                              | N to SMA Adapter   |
|                              | Tripod incl. bag   | Tripod incl. bag   | Tripod incl. bag   | Tripod incl. bag   |
| <b>Internal Preamplifier</b> | 25dB Version with integrated LiPo-battery (3-4hrs. runtime) and Power supply incl. Adapter Set (optional 35dB with Option 708) | 25dB Version with integrated LiPo-battery (3-4hrs. runtime) and Power supply incl. Adapter Set (optional 35dB with Option 708) | 25dB Version with integrated LiPo-battery (3-4hrs. runtime) and Power supply incl. Adapter Set (optional 35dB with Option 708) | 25dB Version with integrated LiPo-battery (3-4hrs. runtime) and Power supply incl. Adapter Set (optional 35dB with Option 708) |
| <b>GPS-Logger</b>            | optional   | optional   | optional   | optional   |
| <b>Weight:</b>               | 3kg  | 5kg  | 4,2kg  | 9kg  |
| <b>Dimensions</b>            |  |  |  |  |
| <b>Length:</b>               | 26 cm  | 66 cm  | 26 cm  | 66 cm  |
| <b>Width:</b>                | 32 cm  | 32 cm  | 32 cm  | 32 cm  |
| <b>Height:</b>               | 11 cm  | 11 cm  | 11 cm  | 11 cm  |
| <b>Case:</b>                 | Plastic (shock-resistant & watertight)   | Plastic (shock-resistant & watertight, long version with rolls)  | Plastic (shock-resistant & watertight)   | Plastic (shock-resistant & watertight, long version with rolls)  |
| <b>Weight:</b>               | 4kg  | 11kg   | 4kg  | 11kg   |
| <b>Length:</b>               | 51 cm  | 113 cm   | 51 cm  | 113 cm   |
| <b>Width:</b>                | 41 cm  | 42 cm  | 41 cm  | 42 cm  |
| <b>Height:</b>               | 16 cm  | 16 cm  | 16 cm  | 16 cm  |

\*No warranty on batteries

### 3. Connectors



#### 3.1. Battery / Power supply

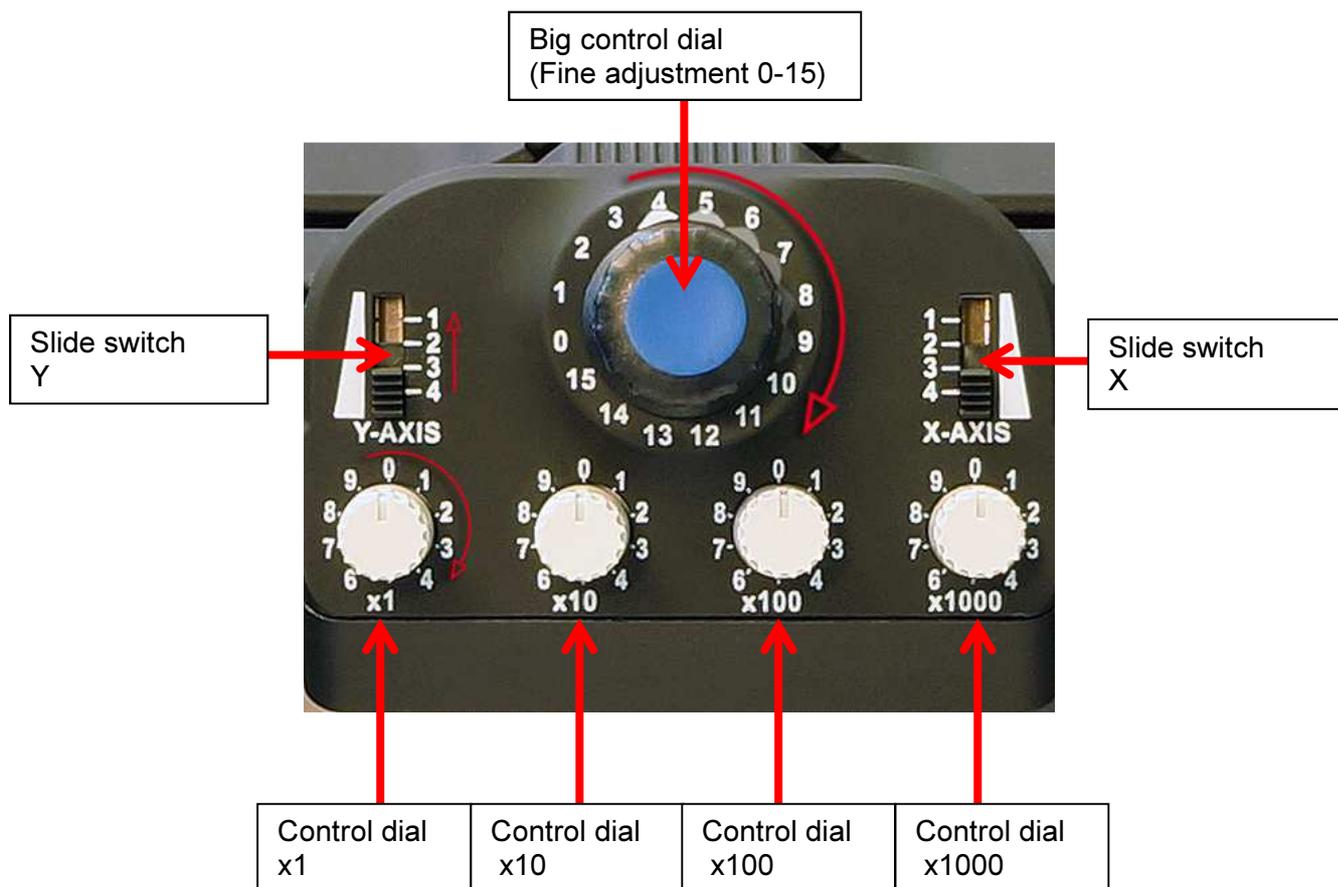
All MagnoTRACKER antennas are by default equipped with an internal 25dB preamplifier. These internal preamplifiers come with LiPo-Battery which has 3 – 4 hours runtime.

The charging time for the LiPo-Battery is about 90 minutes. The Charge-LED will turn red in the beginning of charging. When charging is completed, the Charge-LED turns off.

When the antenna is turned on, the ON/OFF LED lights red. By pressing the ON/OFF switch, you can turn on and off the antenna.

For a continuous operation, the included power supply can be used.

#### 4. Frequency-Selection



The Selection can be done by choosing four control dials which cover four different scopes respectively:

x1; x10; x100; x1000

A fine-adjustment can be done by the big control dial (0-15).

The frequency selection of this antenna is very accurate, so that the disturbing and „uninteresting“ signals will be reduced very efficiently. The antenna has a SMA connector as output with 50 Ohm impedance. You can simply connect the antenna to your receiver, spectrum analyzer, oscilloscope, power meter, etc.

**Attention: The MagnoTRACKER ELF Models (ELF-2 und ELF-6) do not offer any kind of frequency selection!**  
 These antennas are usable over the full frequency range from 1Hz to 9kHz without selection.

#### 4.1. Control dials x1 to x1000 and Big control dial (0-15)

With the control dials the center frequency can be adjusted. Turn left for high frequency. The more you turn right, the lower the frequency will get (tuning more finely with Big control dial in the middle). For better understanding of the functionality, it is recommended to connect the antenna to a spectrum analyzer and start a quick sweep with 9 kHz to 1MHz Span. Then you will understand more clear on the operation modes of the antenna.

#### 4.2. Slide switches 1 to 4

With 2 Slide switches (1-4) the antenna can be adjusted to 4 different internal antennas (here both Slide switches must always have the same position). The higher frequency you want, the smaller setting you should choose. (1= high frequency, 4= low frequency, see page 11).

### 5. Application Example

The MagnoTRACKER is a magnetic field antenna. The antenna is not suitable for measurements of electric fields.

One of the typical application areas of the MagnoTRACKER is the detection of disturbing signals (e.g. on telecom wires like DSL, ADSL, etc.), which are generated e.g. from switching power supplies. Further typical application areas would be amateur radio, reception from submarine communication, maritime radio, Sferics and RFID appliance.

The possibility to fine-adjust the antenna offers a directivity/resolution of up to 1 degree or even better.

## 6. First measurement

### Example: Time Signal Transmitter DCF77

Let's say we measure a long-wave transmitter in Mainhausen (Germany), which provide standard time for most of the radio-controlled clocks in western Europe. The transmitter works at frequency 77,5 kHz with 50 kW power and it is possible to measure with the MagnoTRACKER and a proper instrument / Spectrum analyzer (e.g. SPECTRAN NF-5030) within Germany and a big part of neighboring countries.

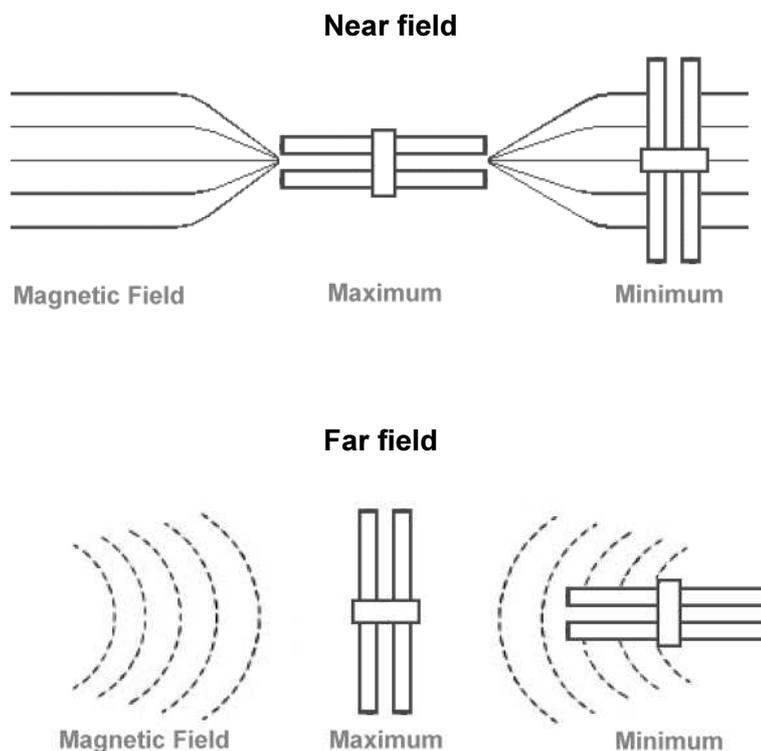
### Frequency setting 77,5 kHz

|                        |               |
|------------------------|---------------|
| Slide switch (X and Y) | both set at 1 |
| Control dial x1        | set at 0      |
| Control dial x10       | set at 0      |
| Control dial x100      | set at 6      |
| Control dial x1000     | set at 4      |

With correct signal reception, you should be able to see the amplitude changes of the DCF77 Signals without any problems (Signal strength changes in constant rhythm).

### 6.1. Direction finding

Locating the signals can be achieved by turning the antenna around very slowly. The most effective way of signal direction finding can be managed by means of the Minimum-Method. To do so place the antenna exactly 90° to signal source and then it will have the lowest sensitivity (see picture below). This method is generally the best and the easiest way in practice to quickly detect a signal, instead of time consuming search for the signal maximum.



### 7. Recommended Settings

You can find a recommended selection of settings depending on the measuring frequency in the following table.

| Frequency | Slide switch X & Y | Control dial x1 | Control dial x10 | Control dial x100 | Control dial x1000 |
|-----------|--------------------|-----------------|------------------|-------------------|--------------------|
| 10kHz     | 4                  | 0               | 0                | 3                 | 5                  |
| 20kHz     | 4                  | 0               | 5                | 3                 | 1                  |
| 30kHz     | 3                  | 0               | 0                | 2                 | 2                  |
| 40kHz     | 3                  | 0               | 2                | 2                 | 1                  |
| 50kHz     | 2                  | 0               | 4                | 9                 | 2                  |
| 60kHz     | 2                  | 2               | 2                | 0                 | 2                  |
| 100kHz    | 2                  | 0               | 2                | 7                 | 0                  |
| 500kHz    | 1                  | 7               | 9                | 0                 | 0                  |
| 1MHz      | 1                  | 0               | 0                | 0                 | 0                  |

In general, it is possible to set various frequency adjustments and different positions for the Slide switches (see point 4.2.). The data in this table are just recommendations for orientation.

The most neutral and wide-band setting for LF-2 and LF-6 antennas can be achieved by setting all the Control dial at position 0 and both Slide switches at position 1. This setting is recommended for measuring signals with unknown frequency and signals higher than 500kHz.

Below graphic shows the typical resonance characteristics of the internal antennas (particularly determined by the position of the Slide switches) of the MagnoTRACKER LF-2 and LF-6 antennas:

