Updated 23.3.2023

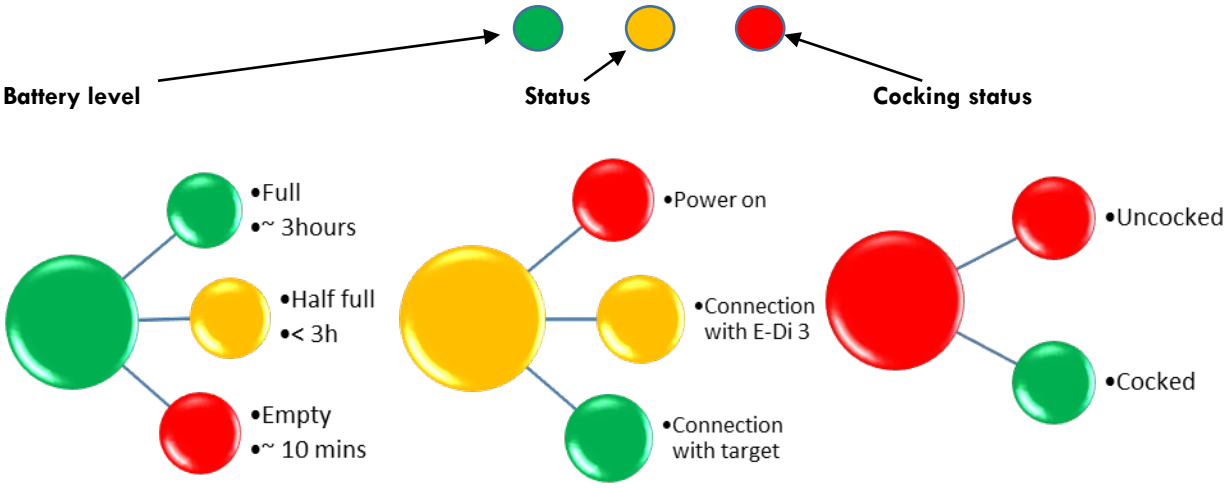
OWNERS MANUAL

CBR500 Biathlon set

Table of contents

1. FUNCTIONS OF THE GUN

1.1. Information provided by the status LEDs



1.1.1. Battery level indicator LED

RED indicates a critically low battery level. Make sure that the gun is fully charged before any competitions, and switch it off when not in use. ORANGE light indicates that there is still plenty of energy left for using the gun. Theoretically the gun can remain 'ON' for up to 6 hours when fully charged, but you should make sure it is always fully charged.

1.1.2. Status indicator LED

- RED indicates the gun is switched on, and the display unit is off, or placed at too long distance away from the gun. In this situation shooting actions cannot be registered by the display unit, but will still be registered in the gun.
- ORANGE indicates that the gun and the display unit are communicating. Shooting actions will be stored and displayed on the display unit.
- GREEN indicates that the display unit is within reach and the gun's camera 'sees' the infrared-LED on the target centre. This is basically a check for the target unit being switched on. If this LED does not turn green upon aiming, the target unit may be off or defect, and needs to be checked. As long as the status LED is green, you know that the gun can see the target centre.

1.1.3. Cocking status indicator LED

When the gun is cocked, this LED is GREEN. When not cocked, it is RED.

1.2. Cocking and shooting

Ecoaims units are cocked manually using a cocking lever. **Caution!** Incomplete cocking causes an extra shot, because the micro switch doesn´t remain open. To avoid this, be precise when cocking the gun. Do not pull the trigger before the cocking lever has been returned to its initial position.

1.3. Cross firing with the Ecoaims Optical Shooting System

Because the shooting results are calculated in the gun, cross fire is an irrelevant concern (shooting on the neighbour's target does not have any effect on the neighbour's score and is, if anything, a disadvantage to the shooter.) The position of the shooter from where the centre-LED light can be seen is around 16° (-8°-> +8°). The line to the target must therefore be rather perpendicular in relation to the target. Shooting outside this viewing sector will result in an unregistered shot. Plus or minus 8° at a 10 meters' distance corresponds to roughly plus or minus 1.40 meters' deviation from the perpendicular line between shooter and target.

1.4. Charging the battery

Charging the battery must be done via USB-port. The green charging LED indicates charging. The LED will turn off when charging is completed. As the gun or target will be charged via the display unit battery when these two units are connected, it is strongly recommended to charge the display unit at the same time, to avoid the pistol slowly discharging the display unit's battery. The time it takes to pair the entities is of little consequence.

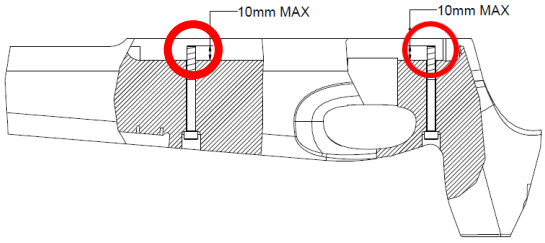
2. CBR500 rifle

The Electronic Biathlon Rifle CBR500 is an optical shooting device designed for shooters at any level. It suits everybody, from youngsters to professional athletes. Its functions are based on infrared light and camera, and it is completely safe, with no bullets, lasers, noise, or harmful metals.

On the left side of the gun, you can find the red power switch and mini-USB-port. There are also a group of five LED lights, that indicate hits and misses, and another group with three status LED lights indicating different operating states (pictured earlier).

2.1. Mounting the rifle unit on the stock

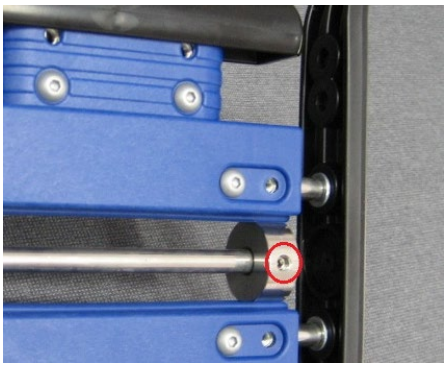
You can mount the CBR500 rifle unit on stocks compatible with Anschutz Fortner and Izhmash biathlon rifles. CBR500 is mounted through the same screw holes that are used to mount the stock to a real rifle. Detach the hex-bolts (4pcs) holding your rifle and stock together. You need to use standard bolts attaching the CBR500. Original Anschutz bolts have different threading, so they are not compatible.



Please note the following: **the mounting screws may not protrude into the stock more than 10 mm.** Too long screws will damage the electronic parts inside the CBR500 rifle unit.

Mounting screw locations:

2.2. Adding / changing the weights in composite stock



2.2.1. Rear stock

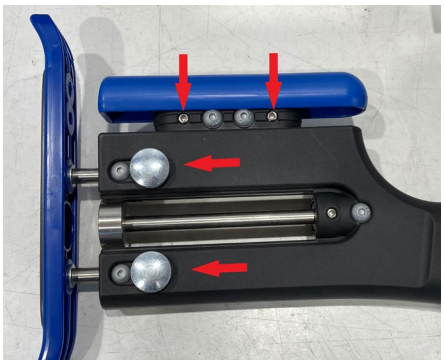
The additional weights are attached with a hex-key.

2.2.2. Front stock

Open the bolts from beneath of the front stock, and detach the shell. Beneath You can find similar weight-rod as in the rear-end of the stock. The weights are attached with similar hex-key.

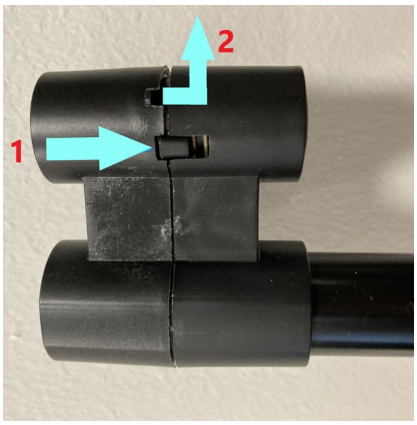
2.3. Adjusting the shoulder- & cheek piece

Adjust the length of the stock & height of the cheek piece by loosening the Allen screws, adjusting the settings, and tightening the screws again.



2.4. Changing of the front sight ring

There are different sizes of front sight rings provided with your CBR500. Ring sizes are available every 0,5mm from 3mm to 6mm. The ring can be changed by (1.) pulling the little claws in the sides of the front sight tunnel, and (2.) gently pulling back and lifting the front ring at the same time.

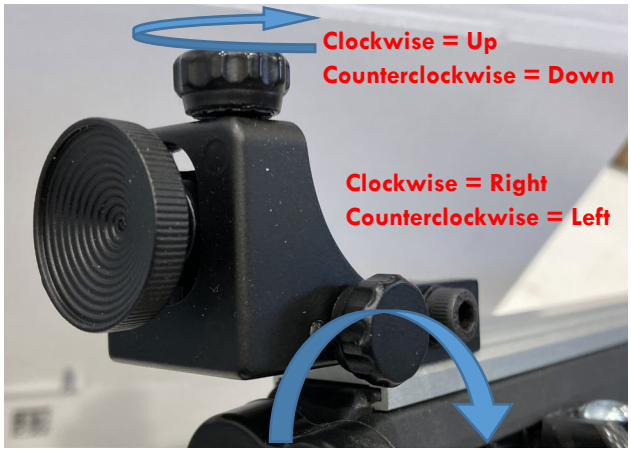


2.5. Adjusting the rear sight

Turning the screw on the right side of the sight clockwise will move the hits to the right.

Turning the screw on top of the sight clockwise will move the hits upwards.

Factory setting is for approx. 10 meters shooting distance.

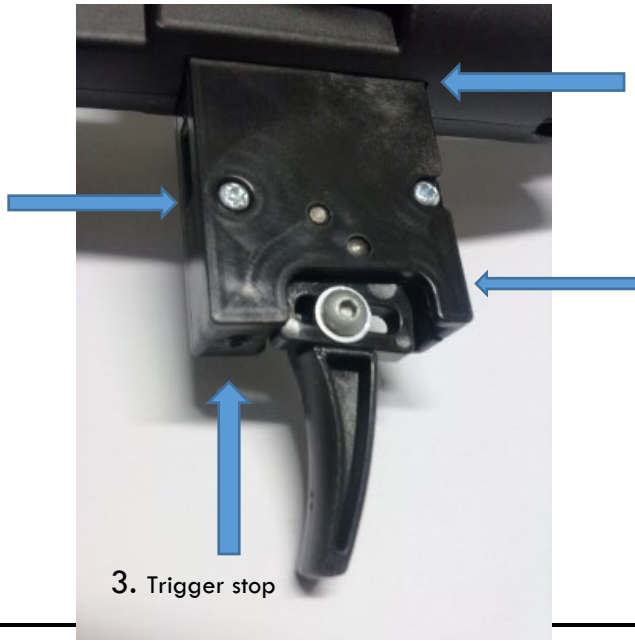


2.6. Trigger unit

A micro-switch and a magnet form the basis for the trigger mechanism. The functions of the micro switch are adjusted at the factory and should not be manipulated. Any unauthorized opening of the trigger mechanism will void any guarantee from the manufacturer's side.
To do adjustments to the triggering unit, you will need to dismount the CBR500 rifle unit from the stock. Unscrew the four Allen screws (in composite, 3 in wooden stock) attaching the stock to the unit (locations pictured on page 3). Two of the screws can be found, inside the front stock. There are four adjusting screws in the triggering unit, which can be adjusted with 1,5mm and 2mm hex-keys.
The trigger adjustments are set at the factory to basic settings. A smooth function is ensured. You may want to adjust the trigger to fit your personal needs. Adjustments are recommended to be carried out in following order:

- Adjust the blade angle. Turning the screw clockwise will turn the blade backwards.
- First stage travel. Turning the screw clockwise will shorten the first stage travel.
- Trigger stop. Turning the screw clockwise will shorten the after-travel of trigger after triggering. Caution! Too tight adjustment will eventually prevent the trigger mechanism from travelling over the threshold, and firing a shot.
- Second stage pressure. Turning the screw clockwise will decrease the pressure required to trigger the gun.

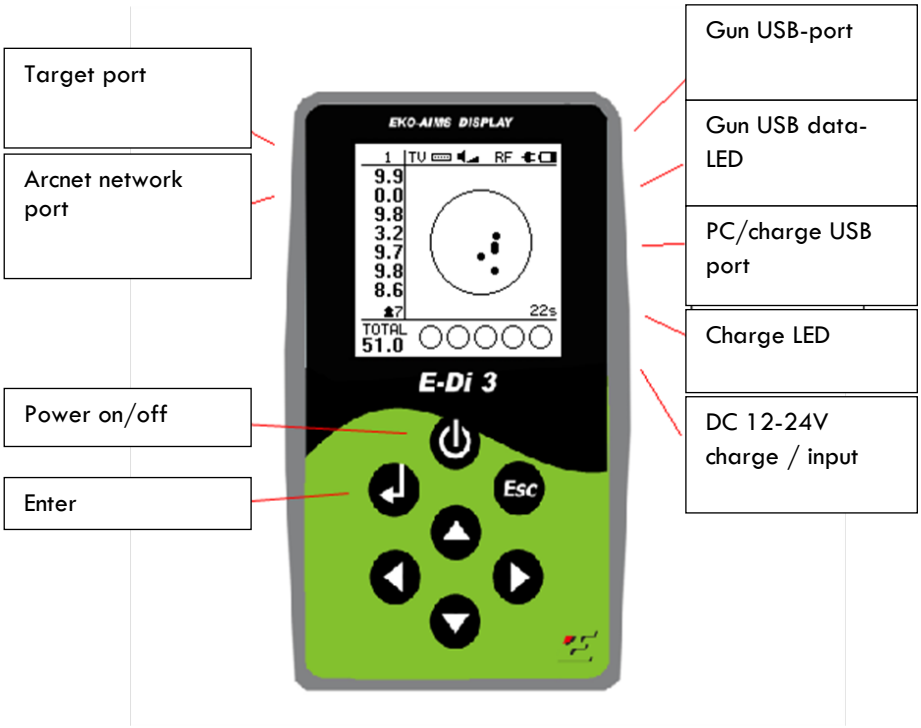
2.6.1. Adjusting the trigger



3. E-Di3 display unit

The E-Di3 display unit offers an elegant and simple way to control the overall system. It functions simultaneously as the display- and data storage unit, as well as the keyboard which controls and adjusts the overall system. It also controls the functions of the electronic ELT530/630 target.

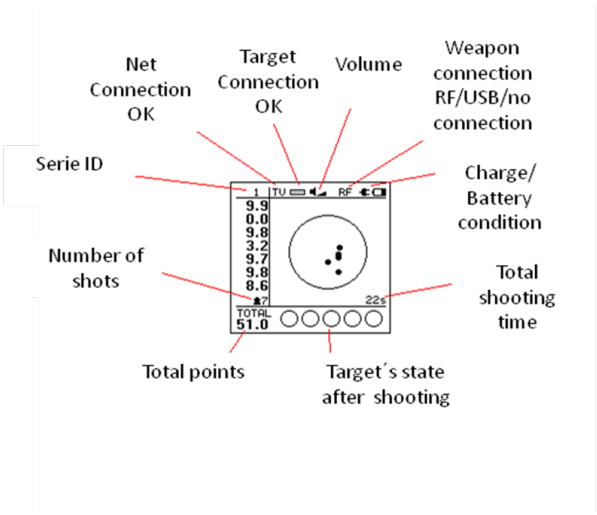
Because all shooting software is located in the gun's circuit card, it is necessary to have either a radio or a cable connection to the gun.
Turn the display unit on, by pushing the on/off button for one second. The display goes to 'Full Display' mode. The previous settings are active, and the latest shooting result from the memory will be shown on the display. Practically, you can start shooting immediately. If you want to see how the system is set at this moment, pressing 'ESC' will show the STATUS PAGE for 5 seconds.



3.1. Main screen

What you see in the display, from top-left:

- ID number of the round: This figure shows how many 5-shot rounds have been stored in the memory. All these can be browsed by using the "right-left" arrows on the keyboard.
- TV: Net connection via ARCNET is functioning
- Target: The connection between the display unit and electronic target is functioning (if connected).
- Sound Volume: The volume of the sounds.
- RF indicates that the display is communicating with the gun wirelessly. When USB is shown, there is a cable connection. If this is blank, there is no connection at all.
- Battery icon: Indicates the battery or charging status of the display unit.



Vertical, left:

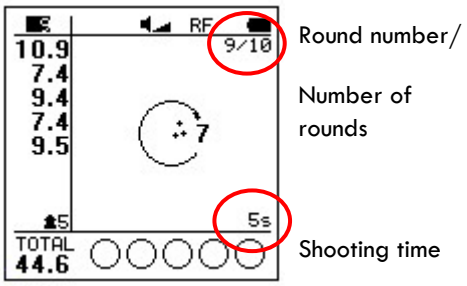
- The value of single shots, and below that the number of shots in the round.

Lowest left:

- Total points of the latest round.

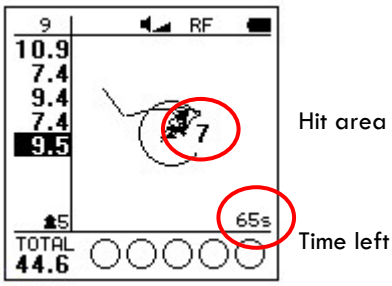
Lowest horizontal line:

- White, 'open', circles indicate successful shots, black circles missed shots, and either the total shooting time or time left is shown, depending on the chosen shooting mode.



Middle field:

- This shows the chosen hit area. Its value is given in numbers on the right side, but not during the shooting. The lowest right corner indicates, depending on the shooting mode, either how much time has been used or how much time is left.



3.2. Replaying previous rounds

The memory of the display unit can store about 220 most recent shots, making it possible to check or re-analyse them later on. Previous rounds can be browsed by using the arrow keys on the main screen.

A single shot can be recalled by using arrow keys up/down and by pushing "ENTER".

The display will:

- repeat the aiming from 2 seconds before and 1 second after the shot.
- show the shooting time or time left.
- hit/miss status after the shot.

3.3. Status page

The main display area shows you which mode the gun paired to this display unit is in. In this example the display tells you, that

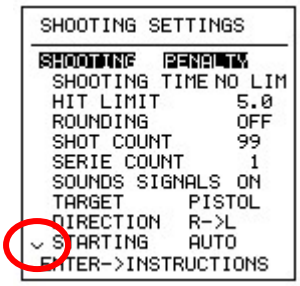
- The selected shooting mode is BIATHLON STAND.
- There are no limitations in the shooting time.
- The hit limit is number 7 which means that any shot that has a value equal to or better than 7, will be "a hit".
- The target option is BIATHLON TARGET and the number of shots is FIVE.

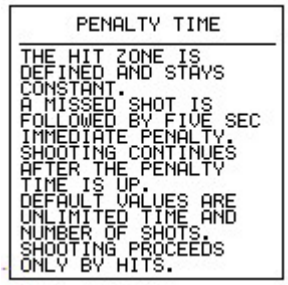
If you want to change the settings, push ENTER in main display. If the shooting isn't finished yet, quit it by pushing first ESC and then ENTER.

3.4. Main menu

SHOOTING SETTINGS is where you can set and change shooting mode and settings in different modes.
DISPLAY SETTINGS takes you to the page where you control settings like zoom, sound, and so on.
GENERAL SETTINGS takes you to the other management page, i.e. settings like language, volume and contrast. You can also reset to the default settings.
CLEAR MEMORY erases the display's memory.
INFO gives you the basic information of the equipment connected.
DOWNLOAD GUN MEMORY makes it possible to download shots from the gun's memory to the display unit. The choice will be visible only when the gun and the display unit are connected by USB-cable.

3.5. Shooting settings





Note: If the display shows just question marks (?) instead of giving the values, there is no connection between the gun and the display unit. The reason might be:

- The distance between the units is too big (over 5 meters).
- The gun is switched off.
- The units are not paired.

The arrow on the left indicates that there is no room for all options on the display. Scrolling is done by using the arrow keys up/down. The options that are not possible in the current shooting mode are dimmed. Pressing ENT on this display opens a short description of the shooting.

3.6. Pairing

Connect the gun and the display unit with USB-cable. Mini-USB goes to the charging port of the gun, and normal USB connector to the display unit.
The text presented in the picture in the left appears. Press ENTER to pair the devices.
When text "OK, Press ESC"-appears, the devices are paired and you can remove the USB-cable.

3.7. Shooting modes

The shooting mode options are:

- **Biathlon stand:** Shooting follows the IBU rules. Default values include starting shooting from the left and a hit area of 5 or better. This is equivalent to a hit area of 4,5 in real biathlon shooting; difference is caused by the software programming.
- **Biathlon prone:** Shooting follows the IBU rules. Default values include starting shooting from the left and a hit area of 9 or better. This is equivalent to a hit area of 8 in real biathlon shooting; difference is caused by the software programming.
- **Training shooting:** Default values are not defined. This is an informal shooting mode for training.
- **Pentathlon:** Shooting follows the UIPM rules. Default values are 70 sec shooting time and a hit area of 7 or better. The shooting proceeds only by hits, and is completed after five successful hits or when the shooting time is up.
- **ISSF shooting:** Shooting follows the ISSF rules. Six 10-shot rounds as a default. Interruption of the rounds terminates the shooting.
- **Progressive shooting:** Shooting game, the hit area of the first shot is defined. After each shot the hit area decreases by one. Default values are unlimited time and 5 shots. Shooting is completed after the predefined number of shots is achieved.
- **Rapid shooting:** Shooting game, the aiming spot is determined on random basis, and shooting time will shorten after every shot. The hit area is defined and it remains constant. Shooting will be terminated after the determinate number of missed shots.
- **Penalty time:** Shooting game, the hit area is defined and it remains constant. A missed shot is followed by immediate penalty time. Shooting continues only after the penalty time is up. Default values are unlimited time and unlimited number of shots. Shooting proceeds only with hits.
- **Precision:** Shooting game, real precision shooting. The hit score equals to the distance between the hit and the target center. The unit of measure is centimeters. The bigger the value is the farther away the hit is from the target center.
- **Moose:** Shooting on running or still moose target.

3.8. Shooting parameters

- **SHOOTING TIME** can be set between 5 and 120 seconds with 5 second steps, or the option can be NO LIMIT.
- **HIT LIMIT** determinates the lowest value which will be accepted as a HIT. Hitting on that area will be indicated by a green color. The choice can be from 1 to 10. It can also be NO LIMIT. In some shooting modes the value is mandatory.
- **ROUNDING** means that the score tally will be done either in whole numbers or with decimals.
- **SHOT COUNT** can be set from 1 to 50 or 99.
- **ROUND COUNT** can be set from 1 to 10. A new round always begins automatically.
- **SOUND SIGNALS** are the warning and information signals given by the gun. They can be ON or OFF.
- **TARGET** choice determinates the target in score counting. This doesn't affect the shooting mode but can be used to make shooting easier e.g. for children. The targets and diameters on 10 meters' distance are:
    - Biathlon 37,0 mm
    - Rifle 45,5 mm
    - Moose 60,0 mm
    - Assault rifle 66,7 mm
    - Pistol 155,5 mm
- **DIRECTION** determinates from which side (left or right) the shooting will begin with a 5-spot target.
- **STARTING** A new shooting can start either automatically or manually. For manual start press ESC.
- **PENALTY TIME** can be set from 1 to 15 sec. The choice is valid only in penalty shooting.

3.9. Display settings

ZOOM adjusts the part of the target you will be able to see on the display.
AIM MODE This actually indicates how you will see the aiming on the screen.

- 'CROSS' means that the aiming will be indicated by a + on the screen
- 'CROSS+LINE' means that in addition to above, the tracking line will be indicated on the display until the shot has been released. The tracking line will be stored in the memory.
- 'LINE' means that only the tracking line will be seen on the screen
- 'OFF' means that the aiming is not indicated. Only the shot location.

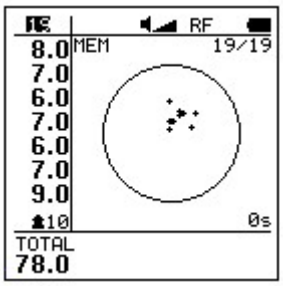
SHOT SOUND You can choose between 'PISTOL', 'RIFLE' or OFF.
SPEECH can be ON or OFF.

3.10. General settings

- **LANGUAGE** You can choose either English or Finnish. This will provide the text on the displays in the language you choose, and will in addition let the display unit speak to you in that language.
- **VOLUME** lets you adjust the volume (1 – 12) of the sound coming out of the display unit.
- **CONTRAST** sets the contrast of the display (1 – 20). This is relevant for adjustment between bright daylight and lower light intensities indoors
- **BACKLIGHT** When set to 'AUTOMATIC', display goes into power saving mode and switches off the back light, if equipment is not used in 20 seconds. You can choose permanently 'ON', 'AUTOMATIC' or 'OFF'.
- **TARGET INTENSITY** Target intensity is for the adjustment of the 5-spot target. In bright sunshine you might like to increase the intensity. When shooting indoors or in dark conditions, too bright lamps may however disturb your aiming. The intensity can be adjusted between 5% and 100%, in 5% steps.
- **DEFAULT SHOOTINGS** allows you to go back to factory settings.

3.11. Downloading shots from the gun

Approximately 100 previous shots, including tracking data, are stored in the memory of the gun. It takes about 30 seconds to download them. The gun and the display need to be connected with a cable. This feature is meant for backing the system up, in case of possible interference.
The feature can be utilized if e.g. training has been done without a display unit and you want to view it afterwards. Downloading will load all the shots from the gun to the display unit. When browsing rounds on the display, downloaded rounds will have a MEM symbol on the upper-left side of the display.



3.12. Clearing the memory

The display unit will store a total of 220 shots. If you shoot more than 220 shots without erasing the memory, shots will be deleted from the memory in a 'first in – first out' fashion, also when downloading shots from the gun's memory. With this function you can delete all the shots from the display unit's memory.

3.13. Info

Info includes the following information:

- The version number and release date of the display units software.
- The version number of the guns software.
- Connection to the electronic target if in use.
- Connection to the ARCNET (e.g. data collection in competitions).
- The radio IDs of the display unit and the gun.

3.14. Charging

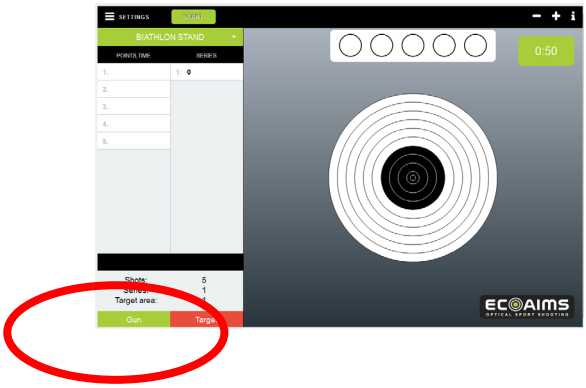
The battery of the display unit can be charged via the Mini USB-port or the DC 12 V port. The display will recharge also when switched off. The green charging LED indicates charging in both modes and will switch off when charging is completed.

The display unit will also recharge the lithium batteries of the gun or target when connected via USB or target control cable. When using this kind of setup, it is strongly recommended to use a power source to power the E-Di3 display unit, to avoid depleting the battery of the display unit, while recharging the connected devices. Note that the display unit must be switched ON to charge the gun or target at the same time.

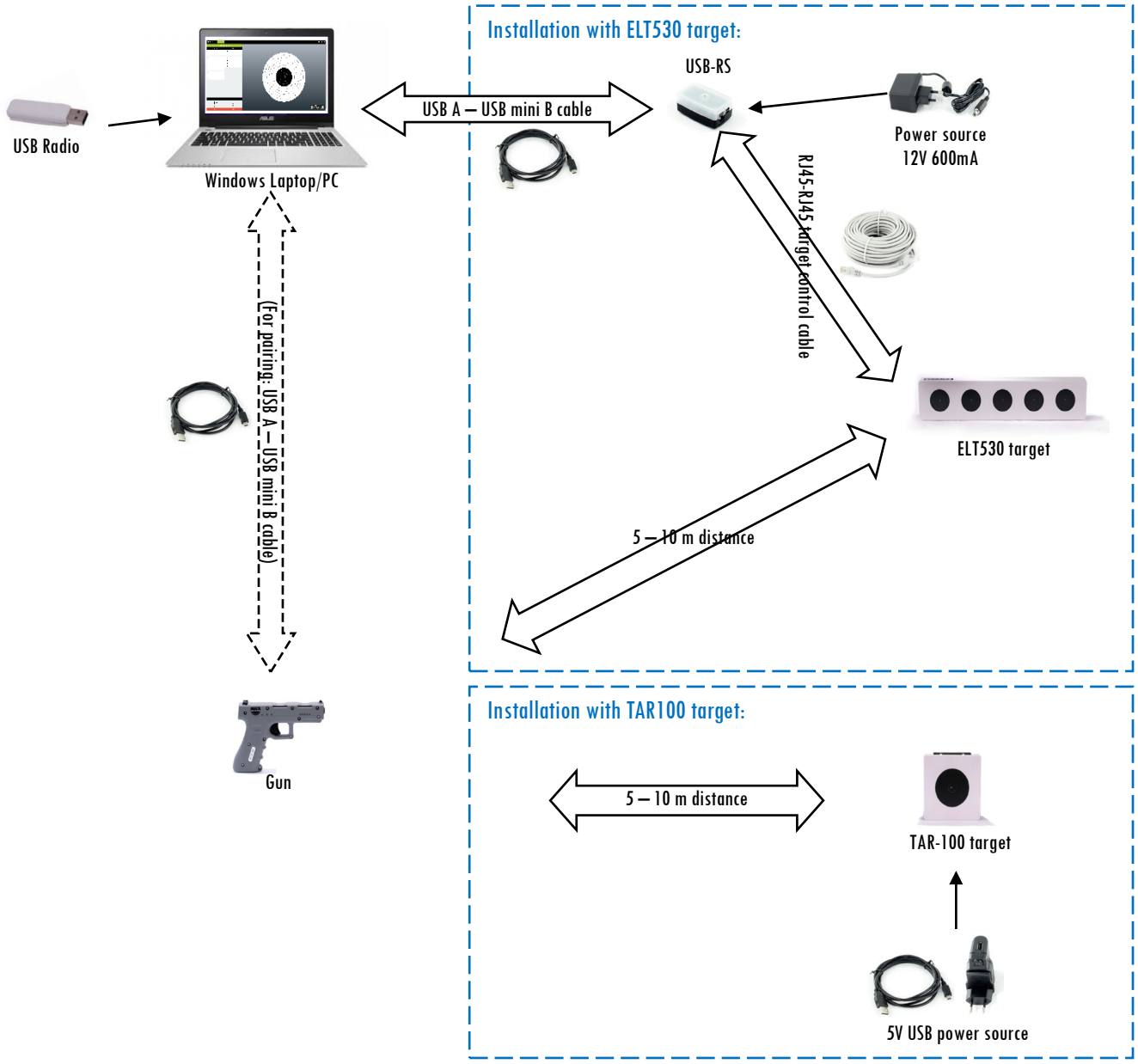
4. Ecoaims PC-Software

4.1. Installation

1. Download the Ecoaims PC-shooting software from: https://seafile.biathlontargets.com/f/e16ce7403b/ or www.ecoaims.com select INFO -sheet, DOWNLOAD SOFTWARE, Ecoaims PC Shooting Software Version 1.8
2. The software is compatible with Windows XP and newer versions.
3. Open the zip-file and run the setup.exe file. Follow the instructions on screen and install all suggested drivers, too.
4. After the installation, open the Ecoaims-software. Depending on the Windows version, a warning may appear upon the first startup. In that case, allow Windows to trust the software.
5. Before the first use, the gun and the USB radio stick must be paired once. While the PC software is running, connect the USB radio stick and the gun via USB cable to the PC. Switch on the power of the gun and confirm the pairing request.
6. After successful pairing, disconnect the USB cable and then click OK. The Gun-indicator in the lower right corner should now change color:
   Red = Gun not connected.
   Orange = Gun connected, but no vision on target (aim the gun at the target and the color should change to green).
   Green = The gun is connected and the camera sensor has a vision of the target's infrared-LED.



4.2. Parts:


Installation with ELT530 target:
USB-RS
USB Radio
USB A – USB mini B cable
Power source
12V 600mA
Windows Laptop/PC
RJ45-RJ45 target control cable
(For pairing: USB A – USB mini B cable)
ELT530 target
5 – 10 m distance
Installation with TAR100 target:
5 – 10 m distance
TAR-100 target
Gun
5V USB power source

4.3. Installation and use with 5-spot target (ELT530):

1. Install the Ecoaims PC-shooting software (see above) and pair the gun and USB radio stick.
2. Connect the USB-RS adapter to the PC; using a USB cable.
3. Connect the USB-RS adapter and the 5-spot target.
   (ELT530, using a RJ45-RJ45 target control cable, or ELT630 with xlr-RJ45 cable).
4. Connect the 12V 600mA power source to the USB-RS adapter. This will power the ELT530 target, via the target control cable.
5. Place the ELT530 target at 5-10m distance, straight in front of the shooter and switch on the power of the target. The target will run a short check-up and will flash its LED's briefly.
6. Open the PC-software and wait until the Gun and Target indicators change color:
   Gun = **Orange** or **Green**
   Target = **Green**
   The devices can also be reconnected by selecting: "Settings" → "Reconnect devices".

4.4. Installation and use with 1-spot target (TAR100):

1. Install the Ecoaims PC-shooting software (see above) and pair the gun and USB radio stick.
2. Place the TAR100 target at 5-10m distance, straight in front of the shooter. (Connect the power source if needed).
3. Note that when using a 1-spot target, the Target-indicator of the PC software remains red, as there is no connection between the PC and the target.

5. TARGETS

5.1. Notable things with target setup

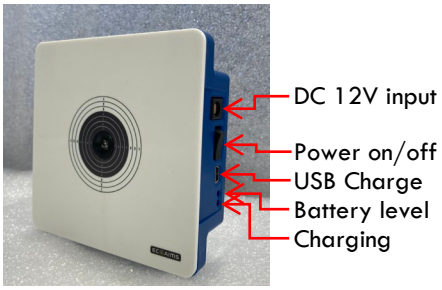
Bright and reflecting objects around the target may cause unwanted reflections to the gun's camera. It might be possible that the camera can't tell the difference between reflections and the IR-light coming from the target. To avoid any trouble, 50cm x 50cm area around the target should not have any reflecting materials. It's recommended to cover the area with non-reflecting material or paint it with matte finish paint.

IF the camera sees two targets (IR lights) simultaneously, the program is unable to count the value of the shot. To prevent this, it is recommended to keep at least 1m distance between targets.

5.2. TAR100 basic target

The target size (diameter of the circular black area) is 30mm. The rechargeable target has one 750 mAh battery, that can be charged either with USB-charger (basic equipment) or DC 12 V charger (accessory). The battery has a lifespan of at least two years in normal use and conditions.

The target unit has a number of electrical interfaces and one on/off switch on the side right side aspect, when viewed from the front, see figure- from top to bottom:



On top is a continuous 12V power port. Plugging a suitable 12V source (not included) makes the target function on mains current.

The power on/off switch should be used to choose the appropriate position, depending on whether the target unit is supposed to be on or off. Switch it off when not in use.

The battery charging port is located under the power switch. Below this you can find two small LEDs, the top indicating power on/battery level. In green, that the target unit is on, and full charge, orange (half left) or red (battery is empty, needs to be recharged). Lower indicating charging status, LED will light up during the recharging process.

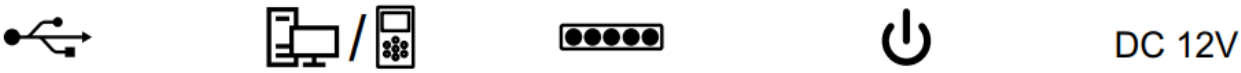
5.3. ELT530, rechargeable 5-spot electronic target

The ELT530 is 5 spot target for indoor use only. The diameter of the spot is 30mm on the ELT530

It is, so called active target, controlled by the display unit or PC, according to the settings of the selected shooting mode. A hit is indicated by a green light and a miss (or when there is no shot) by a red light. Always aim at the black spot.

The ELT530 target can also be used as display light to indicate hits and misses, eg. above the shooting position. Connect them as mentioned below, but use a TAR100 target for aiming.

Connections:



5V USB input	Connection to Display Unit or PC	Connection to second target (replica)	Power on/off	DV 12V input

Connect the target to the Display Unit or PC with a RJ45 target control cable.

A second target can be connected via RJ45 cable on the separate port. It will replicate the same lights and functionalities as the first target. It can be used e.g. for standing and prone position shooting, or as a display light.

A short press on the power button will switch on the target, a long press will switch it off.

The ELT530 target has a built-in rechargeable battery. It can be recharged in 3 possible ways: 1. Via the 12V DC socket . 2. Via the Micro USB socket on the target. 3. Most used: Via the target control cable, in this case the 12V DC power source is connected to the display unit, and the target will be recharged via the target control cable. A green indicator LED will light up during the recharging process. The battery lasts for about 3 hours, and it also takes about 3 hours to recharge it.

5.4. Biathlon target ELT630

Biathlon target ELT630 is a 5-spot electronic target for both outdoor and indoor use. The diameter of the spot is30mm. All shooting functions are similar to ELT530.

The ELT630 target has a built-in rechargeable lead battery. To charge the battery, connect the 12V lead battery charger to the charger plug (CHARGER) on the device and then to mains socket (230V 50Hz). Check the voltage used in your country. Note: only use the 12V lead battery charger to recharge the ELT-630 target.

Notice! ELT630 won't charge via target control cable !

Connections panel:

Power switch

Battery indicator

Connector for charging

Connector to E-Di3/PC

Always recharge the batteries before use and storage.

The red CHARGE led is lit indicating charging. Leave the charger connected until the red led turns off, indicating that the charging process is complete. It takes approx. 8h to completely recharge the battery. A fully loaded battery gives min. approx. 6 hours of operation time. The times are indicative, temperature and other factors can affect the operating time.

Enjoy Your time with optical shooting!