



User manual

Emit ETS mini



This user manual describes the use of the Emit ETS mini, which is primarily used to record online intermediate times in sport events where the athletes use emiTags, or in orienteering races with the use of Emit e-cards and eControls.

The user manual first describes the ETS mini's various functions, and then explains how to connect and use the additional equipment.

Furthermore, we look at ETS mini's menu system and go through the menu options. In the menu you can set the clock, station code, display appearance, PC protocol, signal range, etc. We also discuss how to use the menu system for troubleshooting and explain recommended procedures when problems occur.

To process data from the ETS mini and to generate the result lists, you need a PC program that is compatible with emiTag / ETS mini.

ETS mini and emiTags can be used for timing in various sports, including cross-country skiing, biathlon, orienteering, ski orienteering, cycling (road cycling, time trial, off road, track cycling), running, triathlon, etc. You can control ETS mini from a computer or with the built-in the keyboard, with six variable menu keys and a numeric keypad. ETS mini has three LEDs and a graphic display that shows current information. The LEDs change color depending on the status of the event it is connected to. You can use ETS mini with an external eLine loop or with TFP/TFT/ePost in orienteering events. It is also possible to use Emit's hanging loop, if it is not possible to lay a loop across the track.

All available connection diagrams, illustrations and specifications for additional equipment can be found in the "Emitag - connection diagram" manual. This is available for download from Emit's support pages. Not all of them are equally relevant, but we prefer to include too much rather than leave out information that may be of interest to someone. Spare parts and accessories are marked with Elfa's product number and can be ordered directly from Elfa (our supplier), if you wish to install the parts yourself. However, some of the product numbers from Elfa may be out of date. The safest option is to buy the parts directly from Emit, installed and ready to use. The last part of the manual explains how to update the firmware in the ETS mini using the 'eUpgrade' program from Emit, and the ETS mini's technical specifications are shown on the last page. We have chosen to label 'input' (connection ports) with green, 'light emitting diodes' with blue and 'keys' with red to make it easier to distinguish between the different functions.

ETS mini records the time when emiTags pass the external eLine loop, or when stamping on TFP/TFT or ePost when used in orientation.

The participants' chip ID and time are transferred from emiTags to ETS mini via an internal radio. The data is stored locally before being transferred to a PC via USB, RS-485 or the built-in 4G modem.

Included equipment:

ETS mini is delivered with the following equipment included

- 220 V power cable
- USB cable
- This user manual

Optional additional equipment:

- External eLine loop (which is laid across the track)
- External eDuplo2 antenna (both radio and 4G antenna)
- Tripod stand for ETS mini
- Hanging loop (independent loop that is mounted on the stand)

ETS mini has four ports for connecting external equipment in the box on the right hand side of the station. These ports are as follows (from left to right when viewed from the front):



- **'Loop'** For connection of external eLine loop 1
- **'RS-485'** For transferring data via RS-485
- **'Ant'** For connecting an external radio antenna
- **'4G'** For connecting an external 4G antenna

Under the lid of the ETS mini there are two more ports:

- USB port for connection to PC
- Power for connecting the 220V power cable

Charging the built-in batteries

ETS mini has eight built-in rechargeable batteries of a total of 4.5 Ah NiMH. You charge the batteries by connecting the supplied power cable. When the charger is connected, the LED marked '**Charge**' lights up. Charge the ETS mini until the LED lights up green. The process takes up to 12 hours if the batteries were empty when you started. If you want top-charged batteries, you can continue charging for 1 or 2 more hours. The batteries will not be damaged by being connected to the charger for a long time.

The LED marked '**Battery**' indicates the remaining battery capacity. A red light indicates a battery capacity of less than 30%. An orange light indicates a battery capacity of 30-60%. A yellow light indicates 60-90% capacity, and a green light indicates that the battery capacity is more than 90%.

Surroundings

The ETS mini is not waterproof, so make sure that water does not seep into the connection ports on the side of the unit. You can use the ETS mini in temperatures as low as -20°C, and the device can be used outside in rain and snow - as long as the lid is closed.

CONNECTIONS

External antennas

If you wish to use an external radio antenna, it should be connected to the port marked '**Ant**'. You usually do not need an external antenna as long as the ETS mini is placed less than five meters from the track, but you may want to use an external radio antenna if the distance is longer than this. ETS mini has a built-in 4G antenna, which works well if the mobile coverage is OK. If mobile coverage is poor, you can connect an external 4G antenna to the port marked '**4G**'. In that case, we recommend using an eDuplo2 antenna. This has external antennas for both radio and 4G.

External eLine loop

If the ETS mini is to be used for intermediate times in cross-country skiing, biathlon, etc. an external eLine loop must be connected. Cut a groove for the loop with a chainsaw or other suitable tool, if the loop is to be placed in the snow. We recommend a distance of 60 cm between the cables in the loop. If the surface is asphalt or other solid ground, the loop must be taped and/or fixed under a mat that is suitable for the purpose. Make sure the loop is stable and secure so it doesn't disconnect and cause damage!

Place the loop in the groove and connect the cable to the ETS mini. The eLine loop has a black plug and should be connected to the '**LOOP**' port on the ETS mini.

The LED marked '**LOOP**' is green when the eLine loop is connected and working. A red light indicates that the eLine loop is disconnected or not working. An orange light indicates that the eLine loop was disconnected when the power was turned on, or that the connection was broken but is now OK.

Signal 'contagion'

Note that the wireless signals from the eLine loops can have a range of several metres. It is recommended to establish a 'safety zone' of approximately 3 - 5 meters on both sides of the loop, and approximately 5 meters parallel to the direction of the race, to avoid incorrectly registered participants, who pass in another lane.

eLine loops for bicycle races

In cycling and other sports where the competitors pass at high speed, you need to increase the distance between the wires of the loop from 60 cm to 100 cm.

Online intermediate times in orienteering

ETS mini can also be used to record online intermediate times in orienteering races using emiTag and TFP/TFT or e-cards and eControls. Set the code on the ETS mini to the same code as the control unit. All control punches will then be registered on ETS mini and transferred to Emit's online server.

USB connection to PC

Connect the ETS mini to a PC with the supplied USB cable. ETS mini and the PC should be switched on before you connect them to the USB cable. Connect the cable to the port marked 'USB' under the lid of the ETS mini. Connect the other end of the cable to an available USB port on the PC.

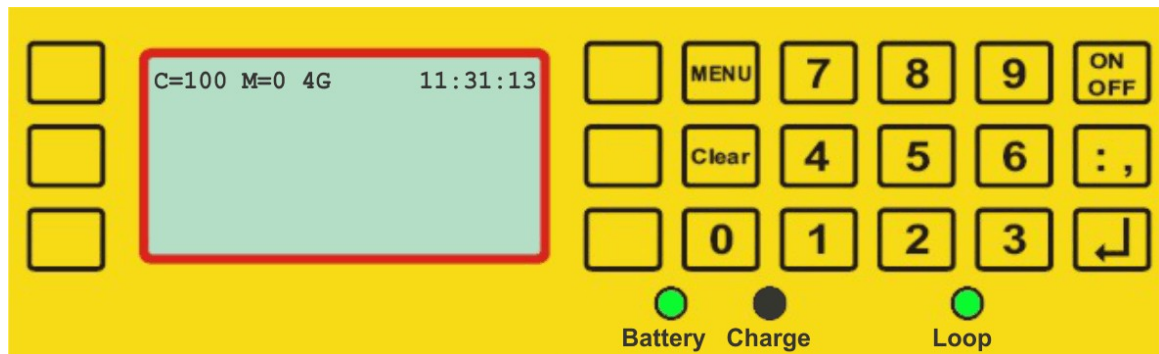
The first time you connect the ETS mini to a PC with a USB cable, you may need to install two drivers; 'USB Serial Converter' and 'USB Serial Port'. Normally this is done automatically, depending on your PC's operating system. If this does not happen automatically, correct drivers can be downloaded from Emit's support pages or directly from <https://ftdichip.com/Drivers/VCP.htm>

A virtual port is installed and displayed in the Windows Control Panel when you connect external USB devices. When the equipment is disconnected (or shut down), this port disappears from the control panel. The com port is often shown as 'com3' or 'com4', depending on how many com ports are already installed on the PC.

Using the RS-485 port

Data can be transferred long distances from the ETS mini using the RS-485 port. When using this port, cables can be several hundred meters long, but you must convert the signal to RS-232 or USB at the other end of the cable. For this purpose, we recommend using a RS-485 converter from Moxa.

USER INTERFACE



The display of the ETS mini has seven available lines and up to 32 symbols. Three keys on each side of the screen control the various menu options. In addition, the keyboard has numeric and comma keys, plus four setting keys.

- 'Menu' - enter or exit menu mode
- 'Clear' - deletes the last character or exits the menu
- 'On/Off' - turns ETS mini on or off (hold for 5 sec to turn off)
- 'Enter' - confirms selection

Operating mode

Start ETS mini by pressing the 'On/Off' key. Two seconds later, the version number, battery status, radio status and clock are displayed. You will also hear clicking sounds from the device - these are the drivers of the external eLine loop, which are automatically adjusted every time the ETS mini is switched on. When the start-up procedures have been carried out (approx. 5 sec.), the display will show what time it is (HH: MM: SS), how many messages (passings) have been registered (M = 0) and what code ETS mini is set to. (C = 100). If a 4G modem is connected (and activated), the display will show '4G' to the right of 'M = 0'.

Check that the loop LED is green if external eLine loop is connected. Also check that any external cables (ant, 4G, RS-485) are correctly connected. ETS mini is now in operating mode and is ready for use.

MENU SYSTEM

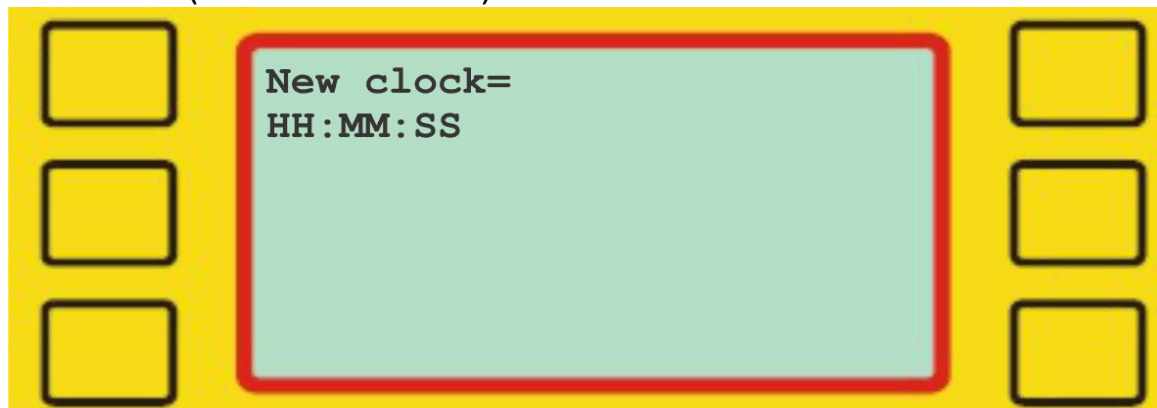
The menu system is used to customize various settings for the ETS mini. In this section we will go through all the menu items and explain how they work. Press the 'Menu' button to enter the main menu. Pressing 'Menu' again will take you back one step in the menu system - and if you are in the main menu, it will return to operating mode. By pressing 'Clear' you always return to operating mode.

Main menu (main menu)



In the main menu, you have five options: set the clock, start a new race, view technical information, set the device's code or change various settings. Some of the menu options lead to a sub-menu.

Set Clock (main menu – set clock)

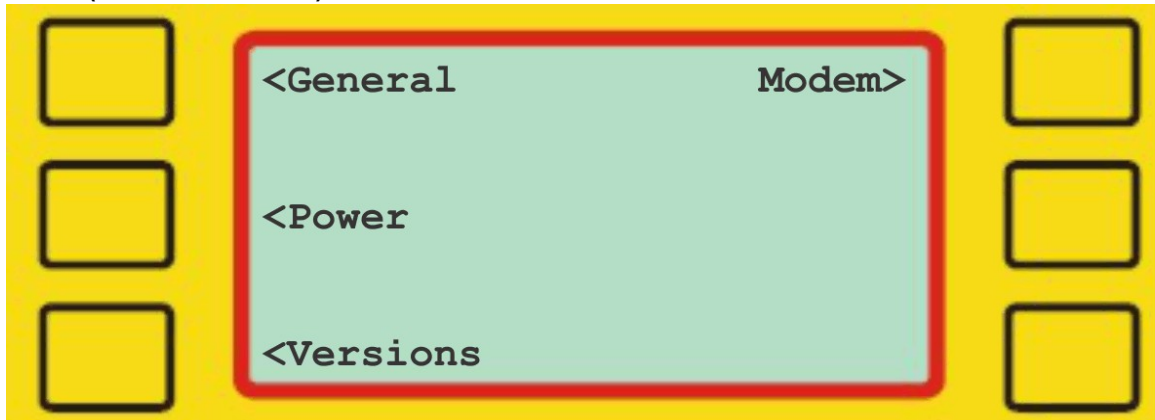


Use the number keys to set a valid time between 00:00:00 and 23:59:59. Start the clock by pressing 'Enter'.

New Race (main menu – new race)

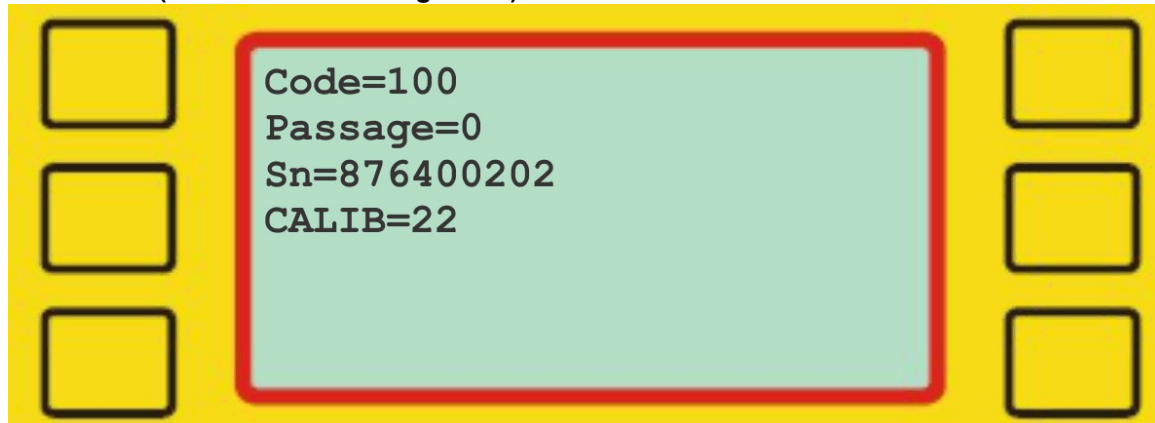
The 'New run' function resets the counter for registered emiTags
It is strongly recommended to do this before each race.

Info (main menu – info)



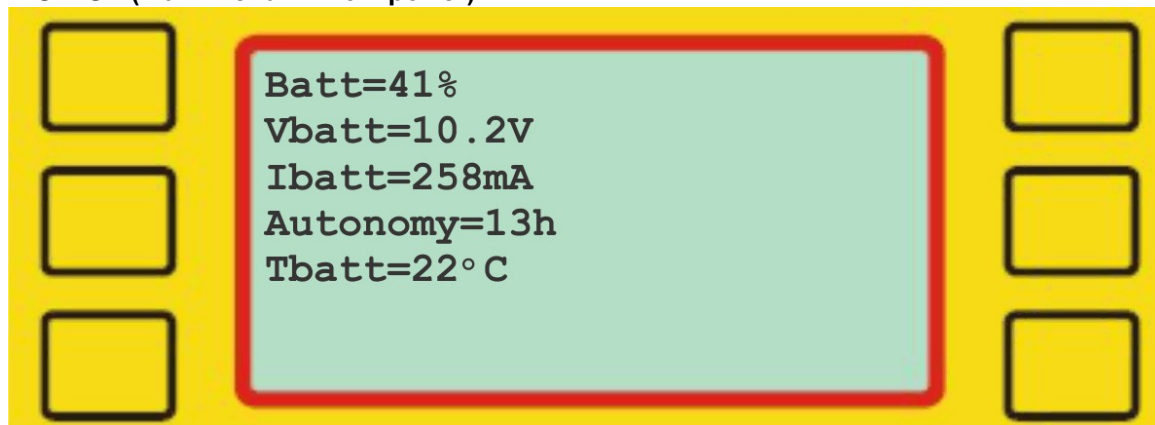
The Info menu shows various information for the ETS mini. There are four menu options in the info menu; general, power, versions and modem.

General (main menu – info – general)



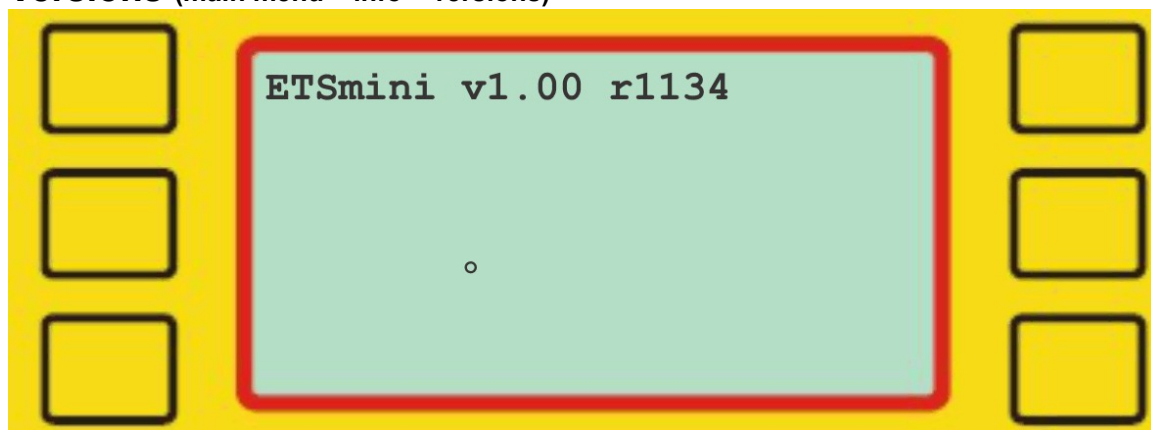
The general info menu shows which code ETS mini is set to on the first line. The second line shows how many passes it has recorded in the current session. The serial number is displayed on the third line, while the calibration factor is displayed on the fourth line.

Power (main menu – info – power)



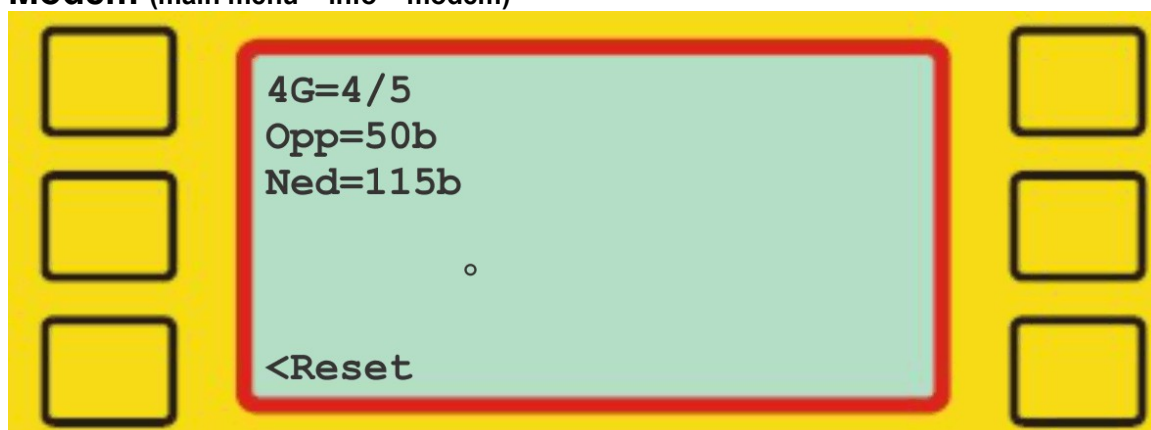
The power info menu shows how much battery capacity is left on the first line. The second line shows how many volts the battery has, while the third line shows how many mA are used. The fourth line shows how many operating hours the ETS mini has left, while the last line shows the temperature of the battery.

Versions (main menu – info – versions)



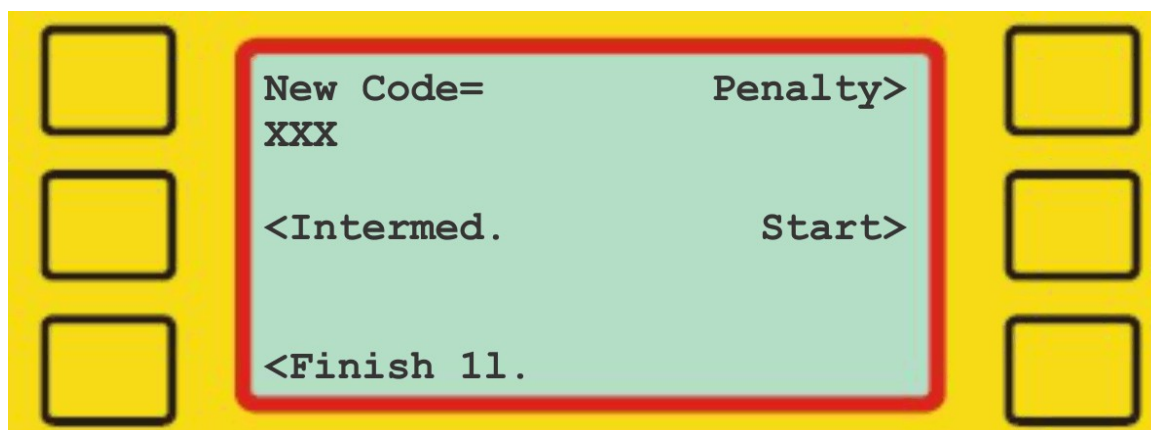
The version info menu shows the version number of the ETS mini on the first line.

Modem (main menu – info – modem)



The modem info menu shows the coverage on the first line (0 = no coverage, 5 = excellent coverage), while the second and third lines show how much data has been uploaded and downloaded. Press 'Reset' to reset this information.

Code (main menu - code)



Select one of the available options, or enter a three-digit code from 031 to 249 using the number keys, followed by 'Enter'.

'Penalty' sets the code to 67, which is used to record the number of passes in the biathlon penalty round.

'Intermed.' sets the code to 70, which is used for intermediate times.

'Start' sets the code to 0, which resets the internal clock in the emiTags. This is particularly important if you use the internal clock in the emiTags for timekeeping.

'Finish 11.' sets the code to 90. Used for finish with one eLine loop.

The code used determines the type of registration you get and the frequency at

which the tag sends data. It is therefore very important that the ETS mini is set to the correct code. We recommend using the following codes:

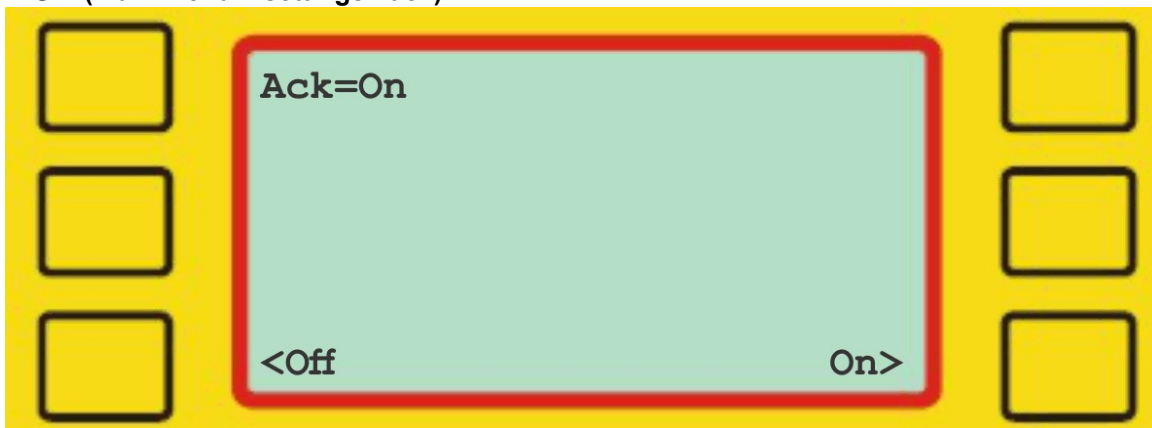
- *Start – code 0*
- *Relay – code 66*
- *Penalty – code 67 (only in biathlon)*
- *Intermediate time – code 70*
- *Finish with one eLine loop – code 90*

Settings (main menu - settings)



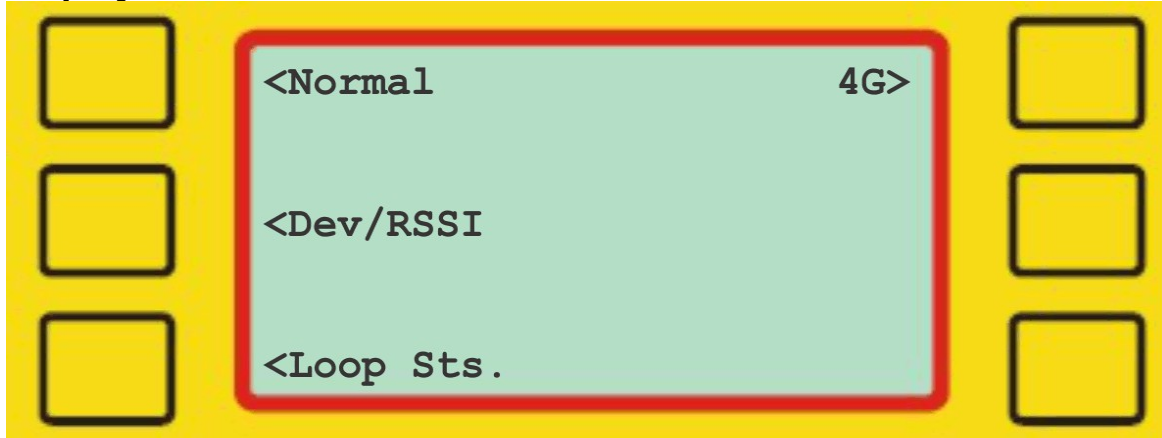
In the 'Settings' menu, it is possible to change many different settings, e.g. how the registrations are displayed, stored and transferred.

Ack (main menu – settings - ack)



Normally 'Ack' (acknowledgement) should be switched on, which is the default setting. This means that the emiTags stop sending data after receiving a confirmation from ETS mini that data has been received. Switch off 'Ack' only when the ETS mini is used in combination with another ETS mini.

Display (main menu – settings – display)



Select the display mode for the display:

- Normal: Shows running time, station code, chip number and total time.
- Dev/RSSI: Shows the radio's deviation in frequency and transmission performance
- Loop Sts.: Shows the eLine loops' consumption of power.
- 4G: Shows the signal strength of the modem (0 = no signal, 5 = very good signal)

Store All (main menu – settings – store all)

Use this menu option if you want ETS mini to save all registrations, without filtering the code. Normally, ETS mini only stores messages with the correct / corresponding code, which ETS mini is set to. The default setting is off.

Reset All (main menu – settings – reset all)

This menu option resets the ETS mini so that all data is deleted and the original settings are restored!

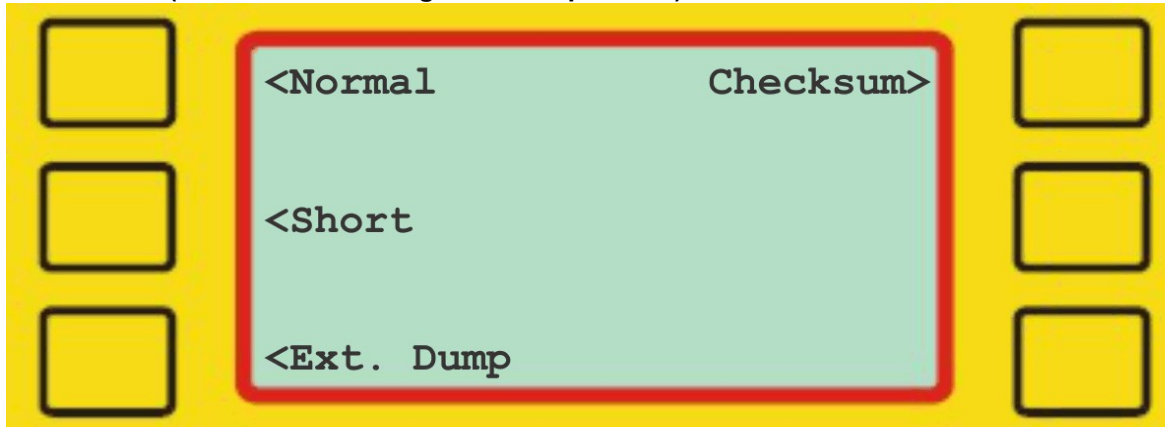
TO BE PERFORMED ONLY BY AUTHORIZED PERSONNEL!

More... (main menu – settings – more)



This is the continuation of the settings menu.

Protocol (main menu – settings – more - protocol)



Select protocol for transferring data to PC:

Normal: Standard values (default setting)

Short: Sends 34 bytes. Used with some external devices.

Ext. Dump: Sets a protocol with extended information, which is used for reading emiTags.

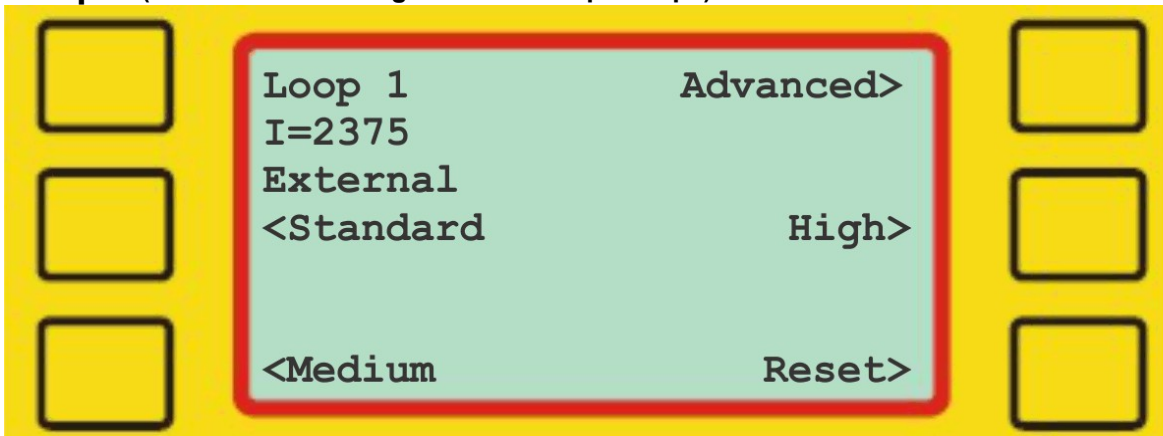
Checksum: All packets are transferred with a checksum

Loop (main menu – settings – more - loop)



Select Loop1 to adjust the amperage of the external loop.

Loop 1 (main menu – settings – more – loop – loop1)



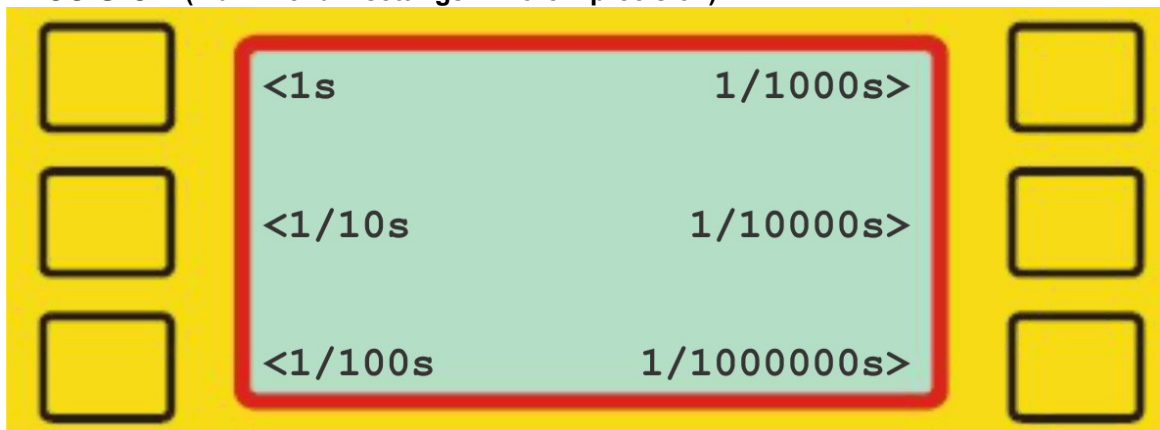
Use this function to adjust the amperage sent to loop1. The second line shows the amperage (I = 2375). The default setting is 'Standard', which should give an amperage of approximately 2300 (+/- 100). Select 'Medium' to get an amperage of about 4700 (+/- 100), and 'High' to get the maximum amperage, which is about 6800 (+/- 100). You can reset the amperage for loop1 by selecting 'Reset'.

Språk (main menu – settings – more – language)



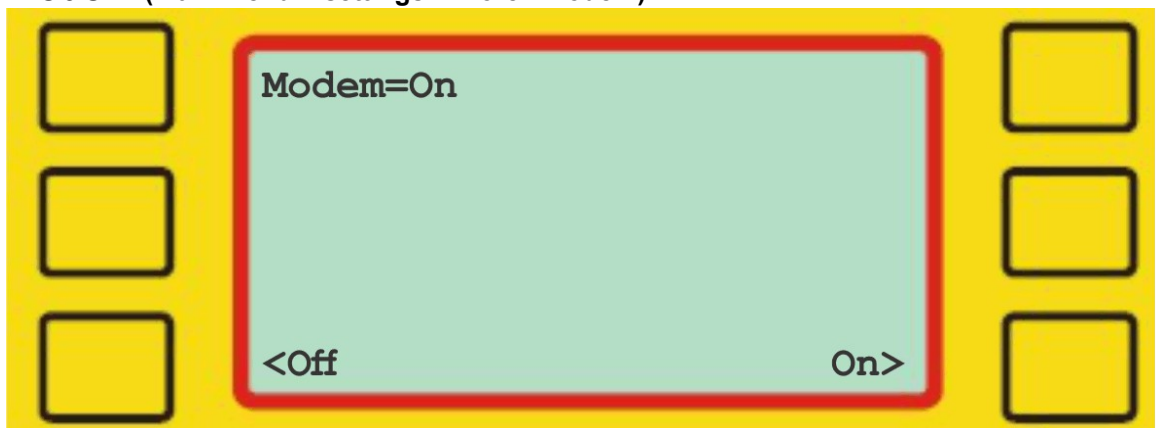
Select the desired language for the menus. Default setting is English.

Precision (main menu – settings – more – precision)



Velg den foretrukne presisjonen / oppløsningen for ETS mini. Data fra ETS mini (seriell, modem) bruker det foretrukne antallet desimaler på disse tidsbegivenhetene.

Modem (main menu – settings – more– modem)



Press 'Off' to disable the modem. The default setting is 'On'.

eUpgrade

eUpgrade is a program - provided free of charge by Emit - which is used to upgrade the internal firmware version of the ETS mini. The program can be downloaded from <http://195.159.103.189/software/>

ONLY USE EUPGRADE IF YOU KNOW THAT ETS MINI NEEDS UPGRADING!

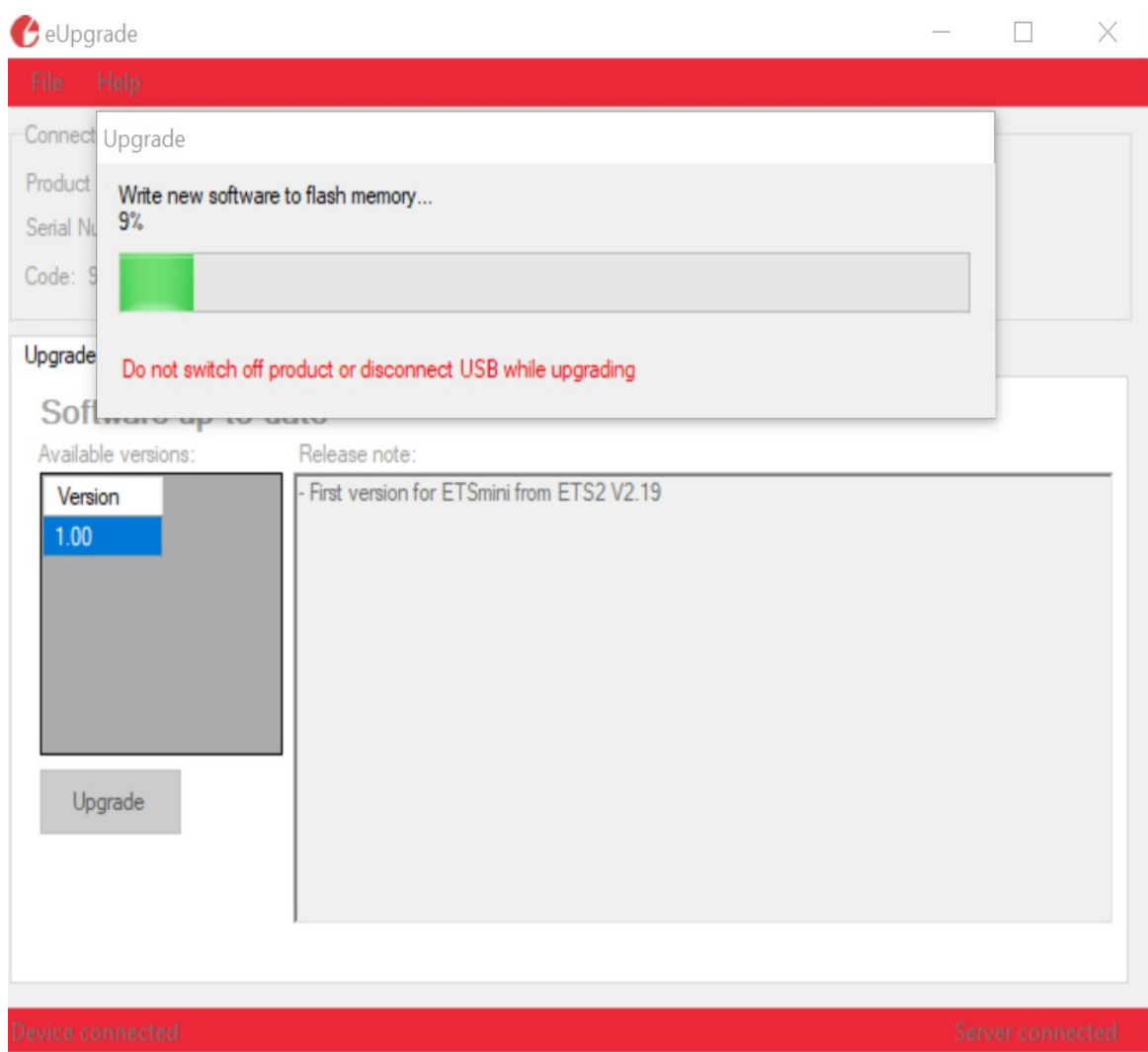
After you have downloaded and installed the program, connect the ETS mini to an available USB port and start eUpgrade.

At the top of the screen, eUpgrade shows the equipment type (ETS mini), hardware type (2), software version (1.00) and serial number (876400202).

If eUpgrade does not show any information, please check that the ETS mini is properly connected and that the USB driver is properly installed in Windows.

Click the "Get firmware from server" button to download the firmware files suitable for the ETS mini. Select the latest/highest firmware version and click the 'Transfer' button.

ETS mini will restart with the new firmware version within 1-2 minutes.



TROUBLESHOOTING

In the troubleshooting section, we have listed the most common problems that can occur, and the recommended solutions.

Problem	Solution
The emiTags are not registered when they pass the eLine loop	<p>Check if the emiTags flash when approaching/passing the loops.</p> <p>If they do not flash:</p> <ul style="list-style-type: none">• Check that the eLine loop is correctly connected to the input marked 'Loop'• Reset the loop using the menu option 'main menu - settings - more - loop - loop1 - reset' or by restarting the ETS mini.• Check the code. Codes 248 and 249 should only be used with two loops. <p>If they flash but are not registered:</p> <ul style="list-style-type: none">• Check that the ETS mini is standing close to the track (for the internal radio receiver)• Consider using an external eDuplo2 antenna.
ETS mini is not online	<p>There could be several reasons for this.</p> <ul style="list-style-type: none">• Check when ETS mini was online last. Go to Emit's server: https://195.159.103.189 and enter the ETS mini's serial number (876400xxx)• Check if the modem is activated (main menu - settings - more - modem - on)• Activate 4G info on the screen (main menu - settings - display - 4G) Check the signal strength (0 = no signal, 5 = best signal)• Check whether the modem has a SIM card with a valid subscription. This can be done by emailing emit@emit.no. Remember to include the SIM card number in the email. This information is on a sticker under the lid of the ETS mini.
ETS mini is online, but no times are registered in the results software (eTiming etc.)	<ul style="list-style-type: none">• Double check that ETS mini is online by going to Emit's server: https://195.159.103.189. The status message should be less than one minute old, if it is currently online.• Check that the serial number of the ETS mini is entered correctly in the software (876400xxx)

TECHNICAL SPECIFICATIONS ETS MINI v.1.0

Dimensions: 26x18x11 cm

Weight: 2.6 kg

Operating temperature: -20 to 70 °C

Relative humidity: 45%

Power supply: 110-230V ~ 50 / 60Hz 40W

Inputs: External antenna for radio and 4G

Outputs: An external eLine-loop output, RS-485

Serial interfaces: USB (FTDI) 115200 bit/s, RS485 19200 bit/s

Data outputs: USB, LCD, 4G modem

Temperature stability: +/- 2 PPM (0°C to + 40°C) / +/- 7.5 PPM (-40°C to + 85°C)

Aging of quartz: +/- 1.0 PPM (first year)

Temperature stability (24 hours 23 ° C): +/- 0.2 ppm (with calibration without charger after two hours.)

Battery life: approx. 20 hours

Hardware version: 81405-2

Firmware version: V2

Protection code: IP67 (partially waterproof)