



Timingsense[®]

TS2+

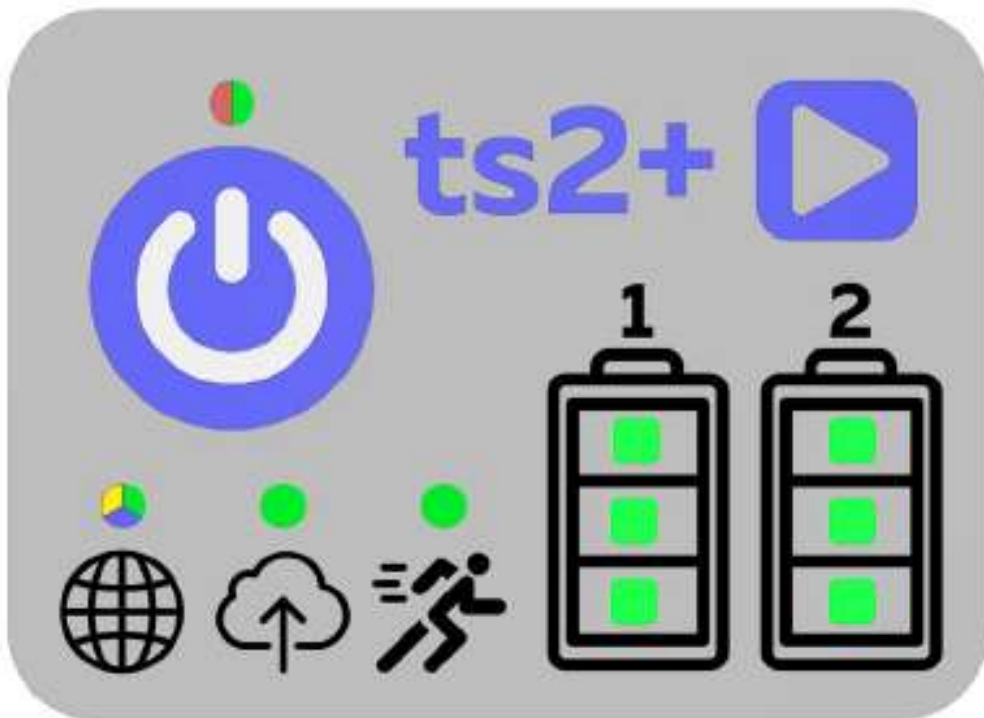
User Manual

VERSION 1.2

TIMINGSENSE

TS2 + Controller

User Manual



Version 1.2 | 2026

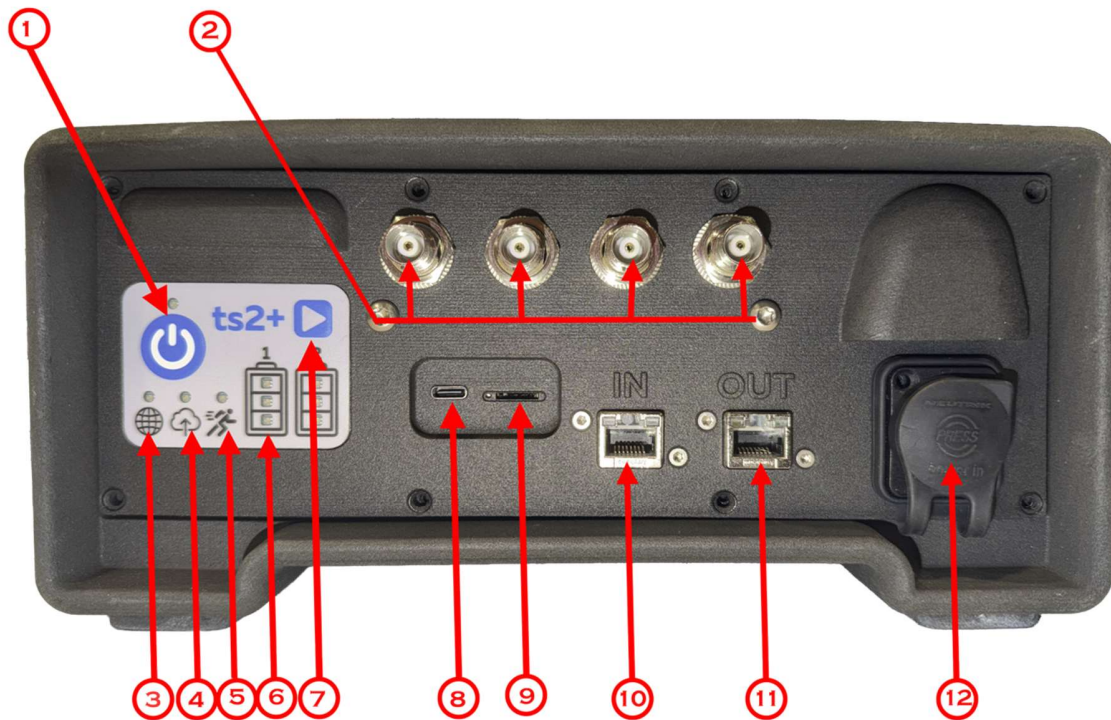
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Table of Contents

1.	Hardware Components	5
2.	Batteries, Battery Compartment & Charging Controller	6
2.1.	Batteries	6
2.2.	Battery Compartment	8
2.3.	Battery Charging	10
3.	Connecting RFID Antennas	12
3.1.	RFID Antenna Integrated into a Timing Mat	12
3.2.	RFID Antenna Connectors	14
3.3.	Additional Authorized Antennas	15
4.	Power On and Off	16
4.1.	Powering On the Controller	16
4.2.	LED Status During Startup	17
4.3.	Powering Off the Device	18
5.	Status LEDs and System Indicators	19
5.1.	Hardware Connection Indicator	20
5.2.	Timingsense Server Connection Status	21
5.3.	System Activity Indicator	22
5.4.	Battery Indicators	23
5.5.	Quick Operational Check	24
6.	Internet and Cloud Connectivity	25
6.1.	Network - Introduction	25
6.2.	Network - Prerequisites	25
6.3.	Network - Connecting to the TS2 + Wi-Fi	25
6.4.	Accessing the Web Interface – Summary Screen	27
6.5.	Network - Creating an External Wi-Fi Network Configuration	28
6.6.	Network - Connection via RJ45 Ethernet Cable	30
6.7.	Network - GSM Connection	31

6.8.	Network - Connectivity Priorities	32
6.9.	Web Interface - Energy Tab	33
6.10.	Web Interface - RFID Reader Tab	34
Appendix A – FCC Information.....		36
A-1	FCC Notice “List of Included Devices”	36
A-2	FCC Notice “Radiation Exposure Statement”	36
A-3	FCC Notice “Part 15, Section 15.203 notice.”	36
A-4	FCC Notice “Declaration of Conformity Information.”	36
A-5	FCC Conditions.....	37
Appendix B – Battery Compliance Data Sheets		38
B1	UL Certificate of Compliance	38
Appendix C – Hazardous Shipping Label.....		39
C1	Lithium Battery Shipping Label.....	39

1. Hardware Components



1. On/Off Switch
2. RFID Antenna Ports
3. 🌐 Internet Connection Type (Ethernet/WiFi/GSM)
4. ☁️ Connection Status to Timingsense Server
5. 🏃 System Activity indicator
6. Battery Indicators
7. Gun Start Switch
8. USB-C Port
9. SIM Card Slot
10. Ethernet IN Port (WAN)
11. Ethernet OUT Port (LAN)
12. Power Input Port

2. Batteries, Battery Compartment & Charging Controller

2.1. Batteries

The controller uses two Tefoo Energy Smart Lithium-Ion Batteries, Model # GS2054HH.



Technical Specifications

- **Voltage:** 14.4V (Nominal)
- **Capacity:** 6.8Ah / 98Wh

- **Cell Chemistry:** Rechargeable Lithium-Ion (utilizes 8 standard 18650 cells in a 4S2P configuration)
- **Max Discharge Current:** 10A
- **Certifications:** Fully compliant with IEC 62133-2 and UL 62133-2 safety standards
- **Features:** Includes an integrated Smart Battery Management Module, SMBus communication, and an always-on 5-Bar LCD fuel gauge display.

See Appendix A – Battery Specifications for full battery specifications and compliance documentation.

The controller is compliant for flying in the passenger compartment of commercial aircraft.

However, if the controller is to be flown as baggage, the two Lithium-Ion Batteries must be removed and carried on as hand baggage!!

If the controller is to be shipped by a commercial carrier, then it must bear the appropriate UN 3481 warning label.

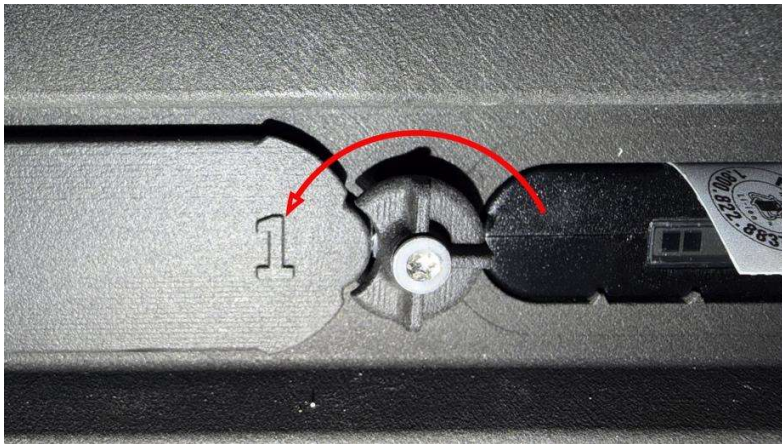


2.2. Battery Compartment

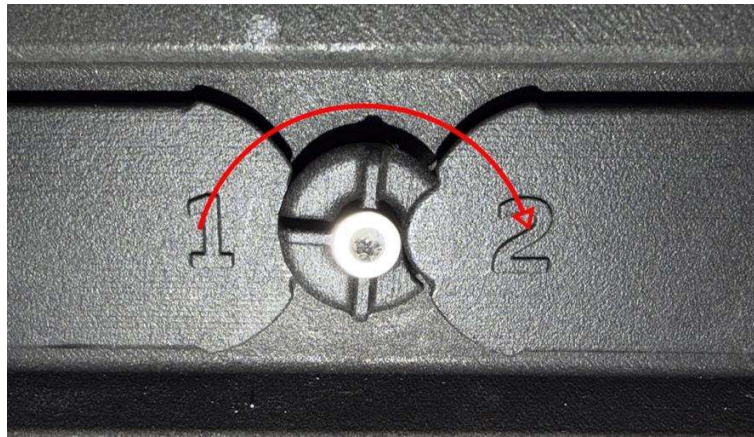
Insert the two batteries into the battery compartment (pull tag UP).



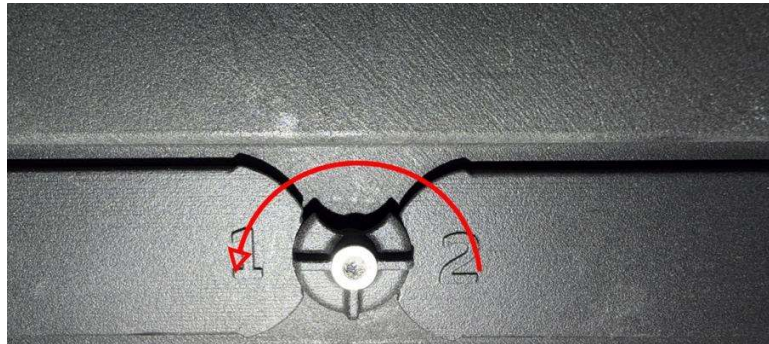
The battery doors can then be closed by rotating the retaining knob so the cut-out aligns with the battery door



The second battery door is then locked in a similar manner



Finally, both doors remained locked by placing the retaining knob at the 12 o'clock position



2.3. Battery Charging

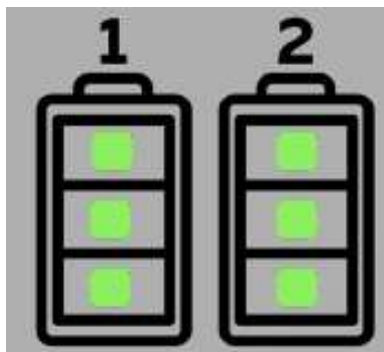
To charge the Timingsense TS2 + Controller, use the dedicated Timingsense Power Adapter provided with your system.

Insert the power plug into the power socket of the controller so the alignment key is at about 10 o'clock - See arrow - **(A)**

Now rotate the power plug clockwise until it latches at about 12 o'clock - see arrow **(B)**



The system will indicate it is charging by flashing the battery indicator lights for the battery being charged.



The system will charge when powered off or while it is running.

To remove the power plug from the controller, reverse the above operation. The indicator tab will be at about 12 o'clock. Pull the tab back and twist the connector anti-clockwise.



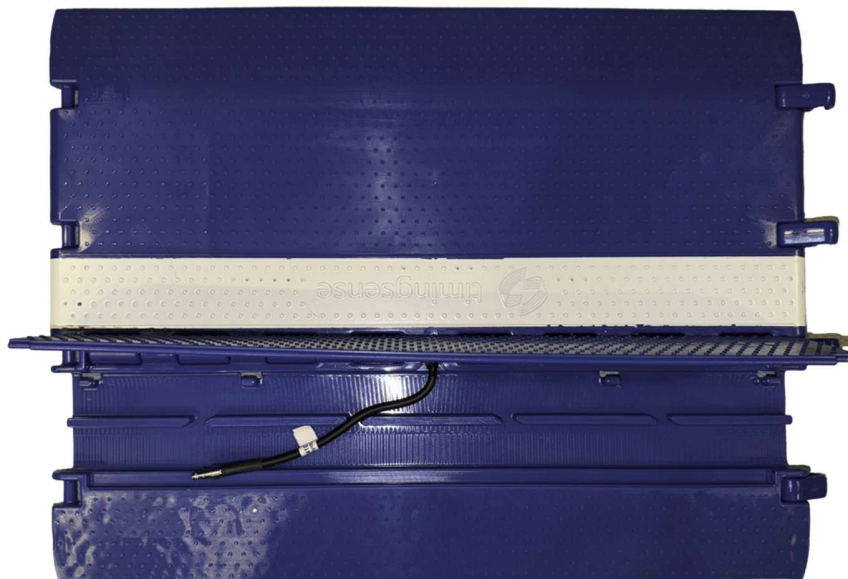
3. Connecting RFID Antennas

The Timingsense TS2 + Controller has been certified to use the Timingsense Folding Antenna System. This system consists of four RFID antennas integrated into timing mats, 4 cables and 4 four spacer mats.

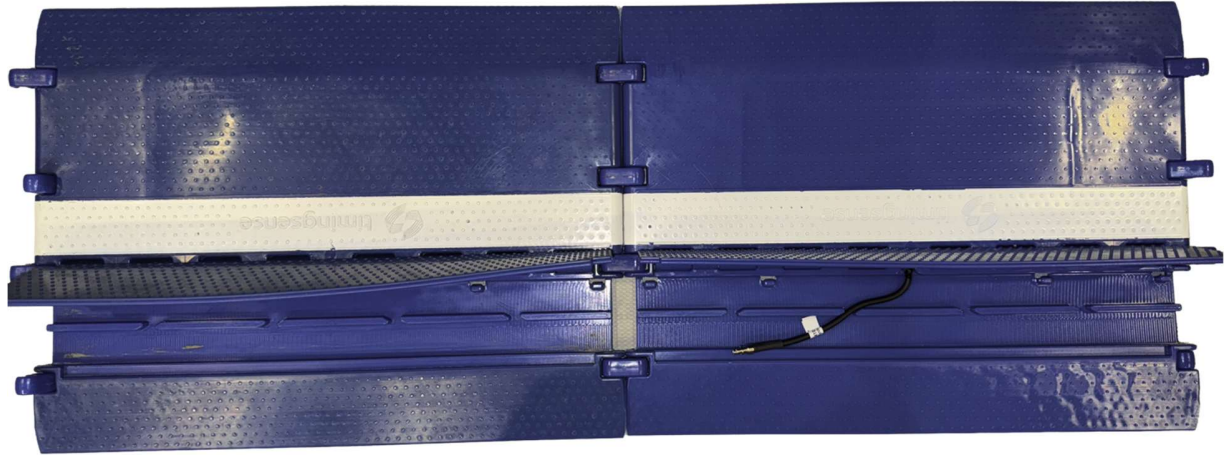
3.1. RFID Antenna Integrated into a Timing Mat



The timing mat has an integrated RFID Antenna molded into the plastic



The timing mat with integrated antenna is 50 cm long, and the TS2 + Controller can power 4 such timing mats/antennas. To create a 4-meter line, each mat/antenna is paired to a mat with no antenna



A 4-meter timing line consists of 4 integrated mats/antennas and 4 mats with no antennas.

3.2. RFID Antenna Connectors

Each antenna is connected to the controller using one of four cables provided by Timingsense.

Each cable is a different length to accommodate the distance of each antenna from the controller. Each cable has two distinctive connectors.

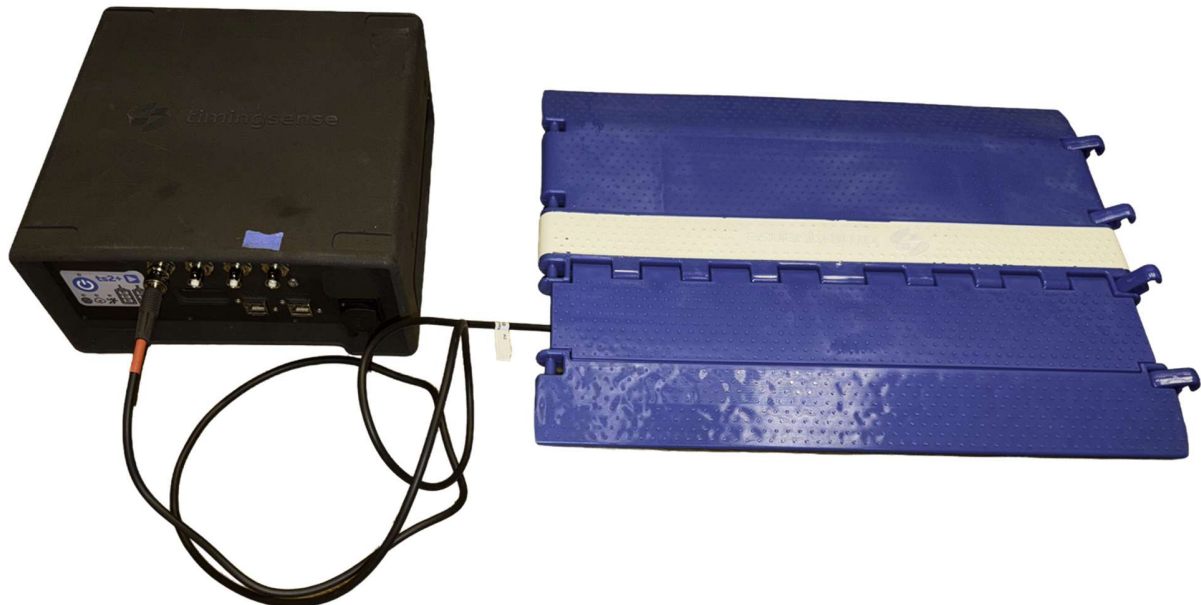


Large RFID BNC Cable
Connector



Small RFID BNC Cable
Connector

The Large BNC Connector is connected to the TS2 + Controller. Line up the lugs of the antenna port with the grooves of the large BNC cable connector and twist clockwise. Likewise, on the antenna end, insert the small RFID BNC Connector onto the antenna pigtail lugs and twist clockwise.



Now, continue the process for the other three antennas.

To remove the antennas, just reverse the process.

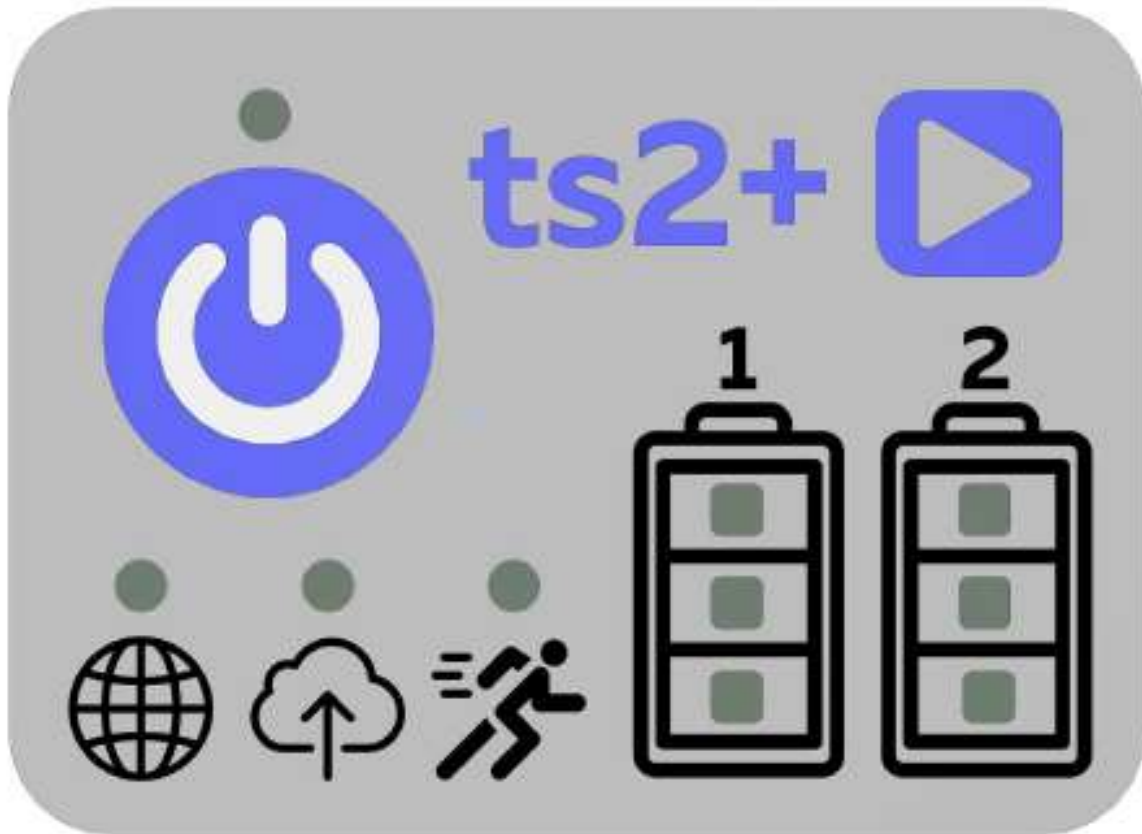
3.3. Additional Authorized Antennas

In addition to the Timingsense Folding Antenna System, the following antennas are also authorized for use with the Timingsense TS2 + Controller:

Timingsense Classic Antenna

4. Power On and Off

On the front panel of the TS2 + Controller there is a touch pad membrane that has two (2) push pads. The Power Push Pad and the Gun Start Push Pad (Right Arrow)



4.1. Powering On the Controller

To power on the TS2 + timing device, press and hold the power button for approximately 3 seconds.



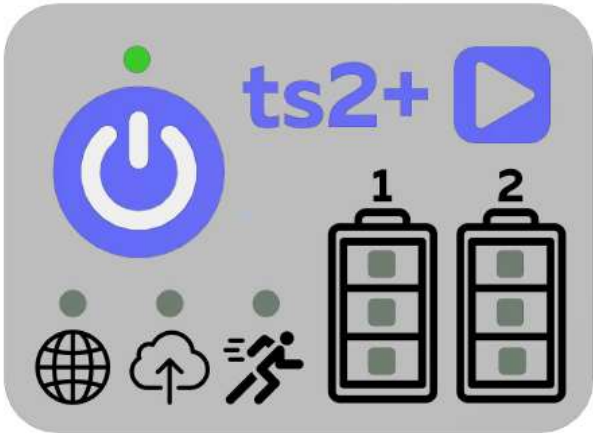
4.2. LED Status During Startup

During startup, the LED over the Power Button turns **RED**, indicating that the controller is booting. This may take one to two minutes. Once fully booted, the LED turns **GREEN**.

Power Button LED	Description
------------------	-------------



The controller is powering on. If the Power Button LED is flashing, the controller is encountering a problem during the boot-up process. If the problem persists, then contact Timingsense Support.



The controller is powered on and ready

4.3. Powering Off the Device

To power off the timing device, press and hold the power button for 3 seconds.



During the shutdown process, the LED will alternate between **RED** and **GREEN**, indicating the device is shutting down correctly. Once completely powered off, all LEDs will turn off.

Figure 4.2 — Red & Green LEDs flash during controller shutdown

Note: For a detailed description of every LED on the device panel, refer to Section 5: Status LEDs and System Indicators.

5. Status LEDs and System Indicators

The TS2 + timing device features a front panel with icons and LEDs that allow quick verification of power, connectivity, and overall system status.

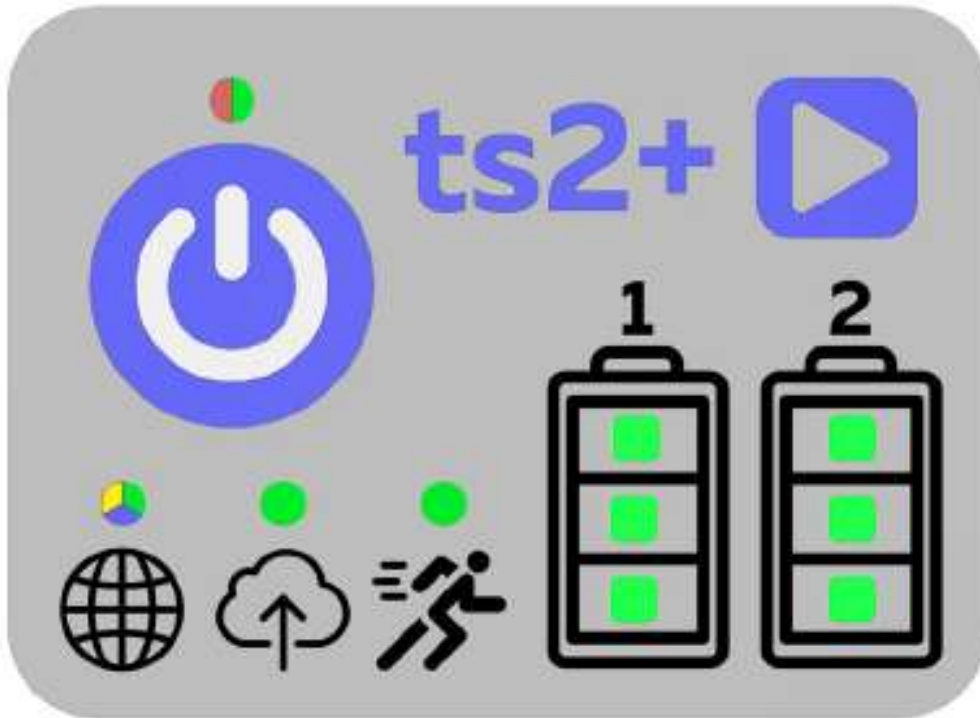
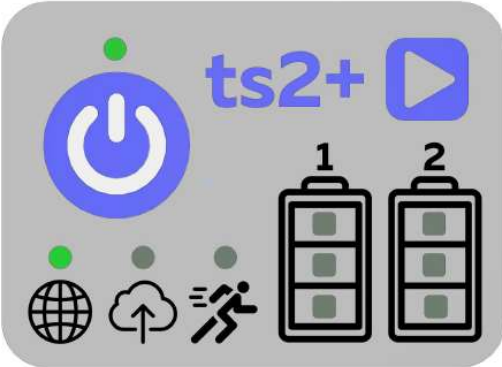
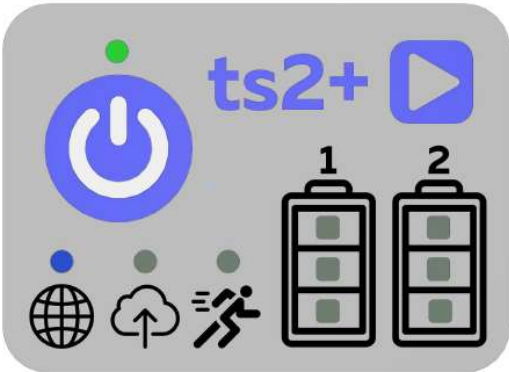


Figure 2.1 — TS2 + Front Panel Layout

5.1. Hardware Connection Indicator

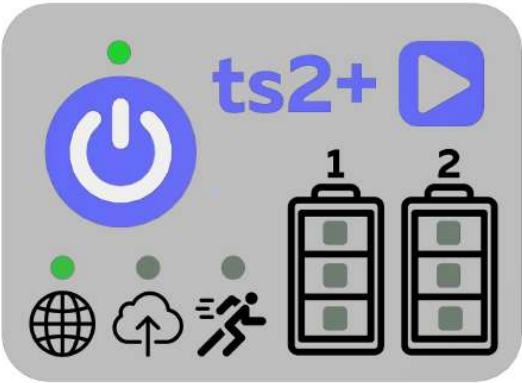
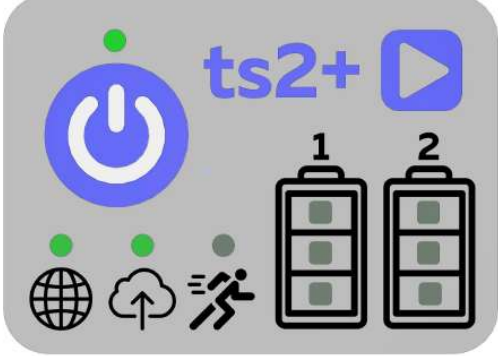
The LED over the Globe Symbol  shows what connection type the controller will use to connect to the Timingsense Server

LED	Description
	 Controller detected ETHERNET connection
	 Controller detected WiFi connection
	 Controller detected GSM connection

 **Note:** The color only indicates the connection medium. It does not show connectivity to the Timingsense Server.

5.2. Timingsense Server Connection Status

The LED over the cloud icon  indicates the connection status between the TS2 + and the Timingsense Server.

LED	Description
	 LED is OFF Controller is Powered On using WiFi, but THERE IS NO CONNECTION TO THE TIMINGSENSE SERVER!!!!
	 LED is SOLID GREEN CONTROLLER IS CONNECTED TO TIMINGSENSE SERVER



LED is **FLASHING GREEN**

SLOW FLASING GREEN

Controller has detected the Internet, but
**IS NOT CONNECTED TO THE
TIMINGSENSE SERVER**

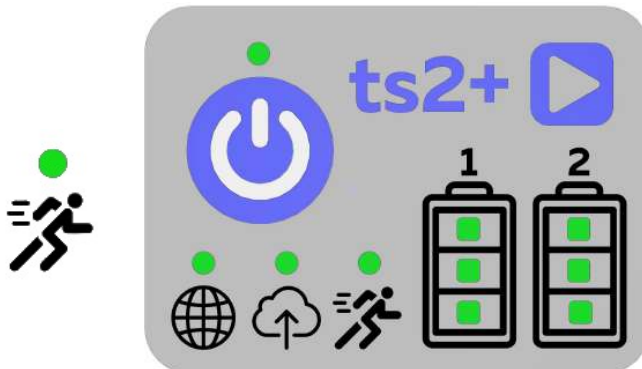
FAST FLASING GREEN

Controller is downloading an update.
Allow 5-minute installation time on next
reboot

Important: For remote services to work properly, the Connection Status LED must be **SOLID GREEN**.

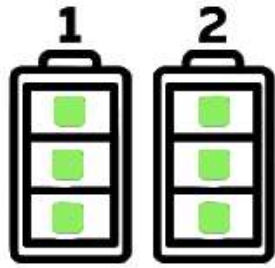
5.3. System Activity Indicator

The Running Man  symbol — indicates internal system activity. When **Solid or Blinking GREEN**, the antennas are connected, tag data is being processed, and the timing device is operating correctly.

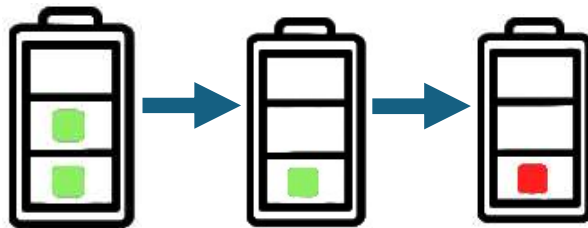


5.4. Battery Indicators

Symbols: Battery 1 and Battery 2 () — the TS2 + includes independent indicators for each internal battery. The LEDs show the charge level; more illuminated segments indicate a higher charge. Batteries are identified as Battery 1 and Battery 2.

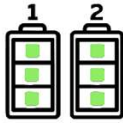


As battery power is used, the battery levels will decline. With 2 green lights, the battery has about 67% of power left. At one green light, the battery has about 33%, and when the light turns **RED**, the battery only has about 5% power remaining.



5.5. Quick Operational Check

To confirm the TS2 + timing device is fully operational, verify all of the following:

	 Power LED is on.
	Connection via  ETHERNET Connection  via WiFi Connection via GSM 
	Connection to Timing sense Server is SOLID GREEN .
	System Activity Indicator is Solid or Blinking GREEN .
	Battery charge levels are visible.

6. Internet and Cloud Connectivity

This section explains how to connect to the TS2 + timing device via its internal Wi-Fi network and how to configure an external Wi-Fi network for use at sporting events.

6.1. Network - Introduction

The TS2 + includes its own Wi-Fi access point, allowing direct connection from a mobile phone, tablet, or computer. This connection is required to access the timing device's web interface and to configure external Wi-Fi networks.

The TS2 + is itself a router and can provide connectivity to other devices:

- Ethernet RJ45: A device with GSM/Wi-Fi/Ethernet can provide internet to the TS2 + by connecting a cable to the IN port.
- Via Ethernet cable, the TS2 + can also provide internet to a connected PC.
- Wi-Fi: Thanks to independent antennas, the device can simultaneously connect to an external Wi-Fi network (office, MiFi, Starlink) and broadcast its own access point for other devices.

6.2. Network - Prerequisites

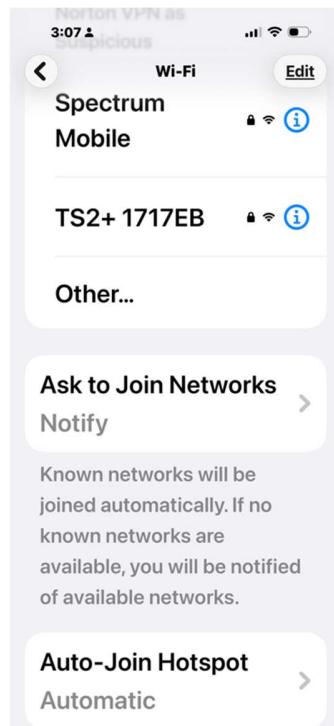
Before connecting, ensure the following:

- The TS2 + timing device is powered on and has sufficient battery.
- You have a mobile phone, tablet, or computer with Wi-Fi capability.
- You are physically close to the device.
- You know the name and password of the external Wi-Fi network to be configured.

6.3. Network - Connecting to the TS2 + Wi-Fi

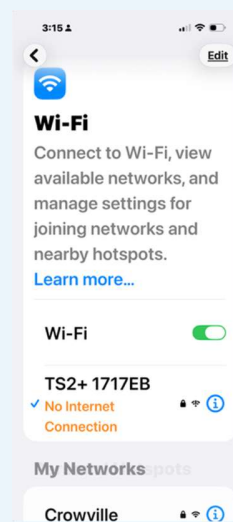
Follow these steps to connect your device to the TS2 + access point:

1. Open the Wi-Fi settings on your device.
2. Look for a network with a name similar to TS2+-XXXXXX.
In the example below TS2+ 1717EB is the controller that was found.



3. Select the device and enter the password: TS2plus@
4. Connect to the network
5. If prompted that there is no Internet access, accept the connection anyway

Note: It is normal for the TS2 +access point to have no Internet access. Its purpose is to allow configuration of the timing device, not general browsing.

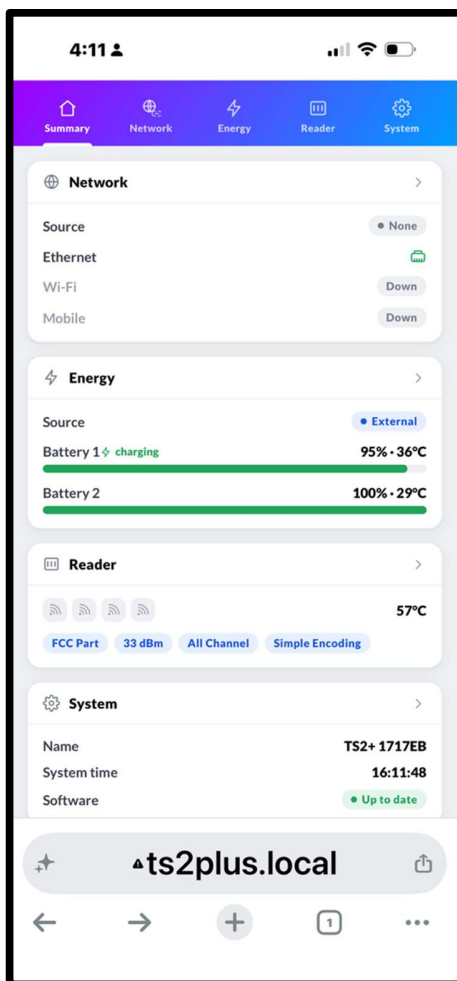


6.4. Accessing the Web Interface – Summary Screen

Once connected to the TS2+ Wi-Fi:

1. Open a web browser (Chrome, Edge, Safari, etc.).
2. Navigate to: <http://ts2plus.local>

The Initial TS2+ Dashboard will display information on Internet Connectivity (source and status), Battery Status, RFID Reader Status, and System Status.



Summary Tab

Network status shows that currently there in no devices connected to the TS2+

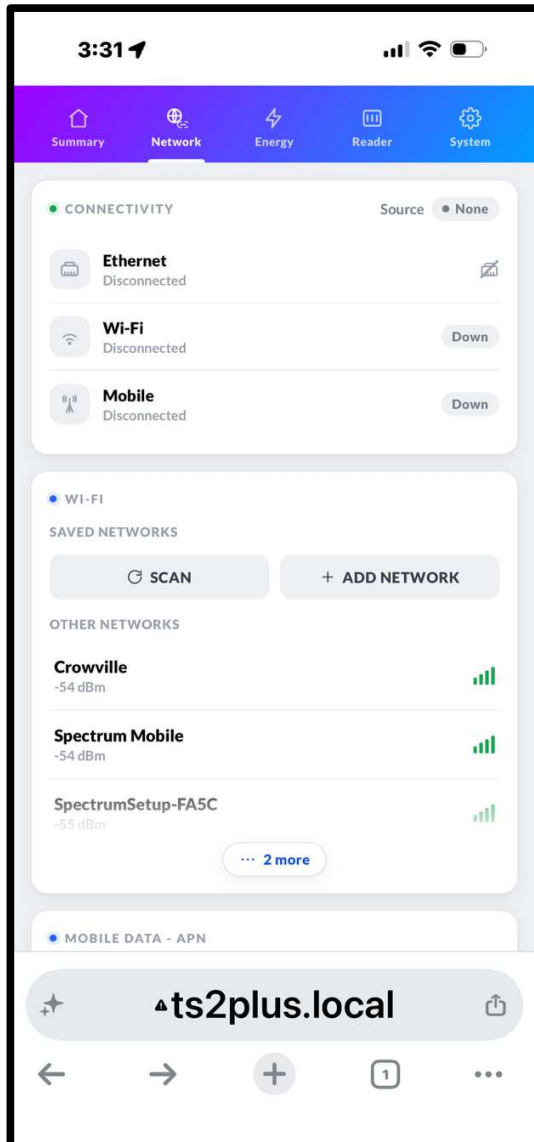
Ins this instance the batteries are almost fully charged

The RFID Reader is FCC set to full power with no antennas connected

The system ID is TS2+ 1717EB and is up to date. This is the ID you will need when consulting the device configuration screen on your laptop.

6.5. Network - Creating an External Wi-Fi Network Configuration

We are now ready to set up the Wi-Fi configuration so that the TS2+ can connect to your local network.



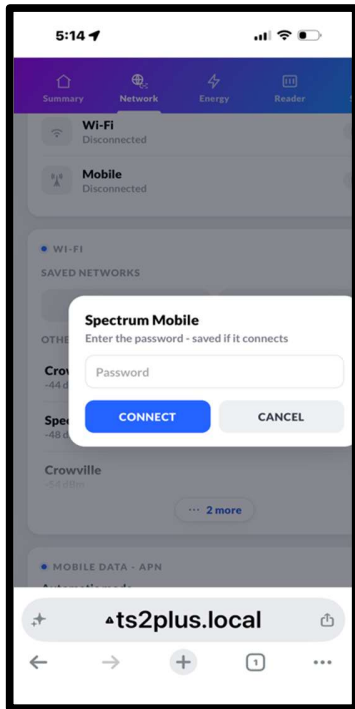
First, select the Network Tab from the Dashboard

In this case, we see that several local WiFi networks are already available, but 2 more are not being displayed. If the desired network is not seen, then press the <SCAN> Tab to see what else is available.

For this example, we will choose the “SpectrumSetup-FASC” network

If your APN does not support Auto Configuration, then unselect the Mobile Data – APN Automatic Mode Tab and enter:

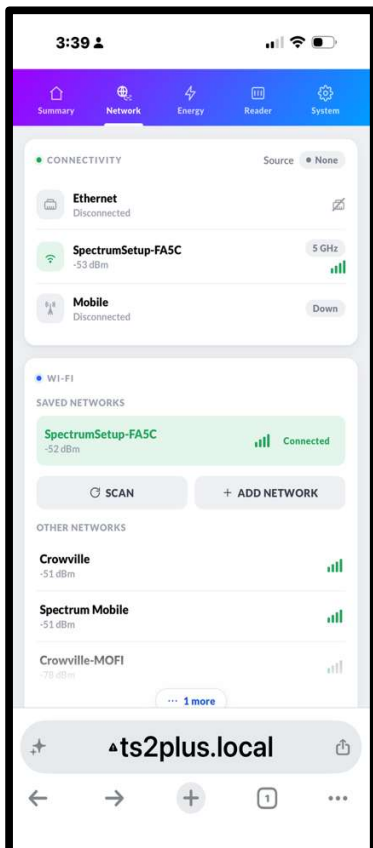
APN
USERNAME
PASSWORD



Once you have selected the Network, you will be prompted for the network password.

You can either key in this password, or if the password is already on your device, then just tap the password field and the password will be added.

The TS2+ will now attempt to connect to your local Wifi network.



This screen shows that the TS2+ is now CONNECTED to the “SpectrumSetup-FA5C” WiFi network and has been saved so it will automatically connect to this network upon a reboot.



If an Ethernet Cable is NOT inserted, then the Globe Icon (Connection Source) should now turn GREEN

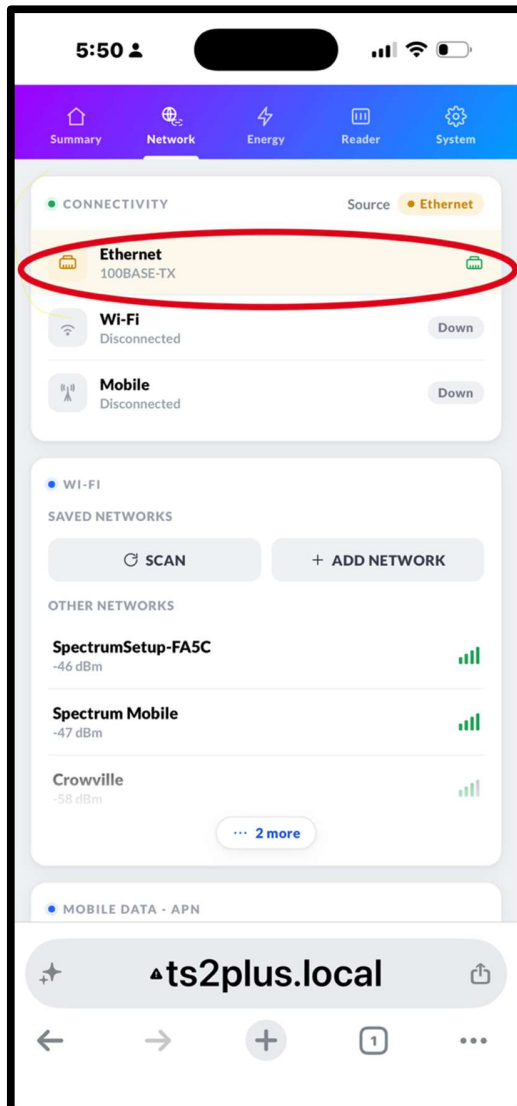


Your internet/server connection should also now turn GREEN

Other WiFi networks can be subsequently connected using this same process

6.6. Network - Connection via RJ45 Ethernet Cable

The TS2 + uses dynamic IP to facilitate Ethernet connection.



Connect the Ethernet cable to the IN port on the device.

Select the Network Tab from the TS2+

Validate the Ethernet Connection

The



Globe Icon should now turn YELLOW

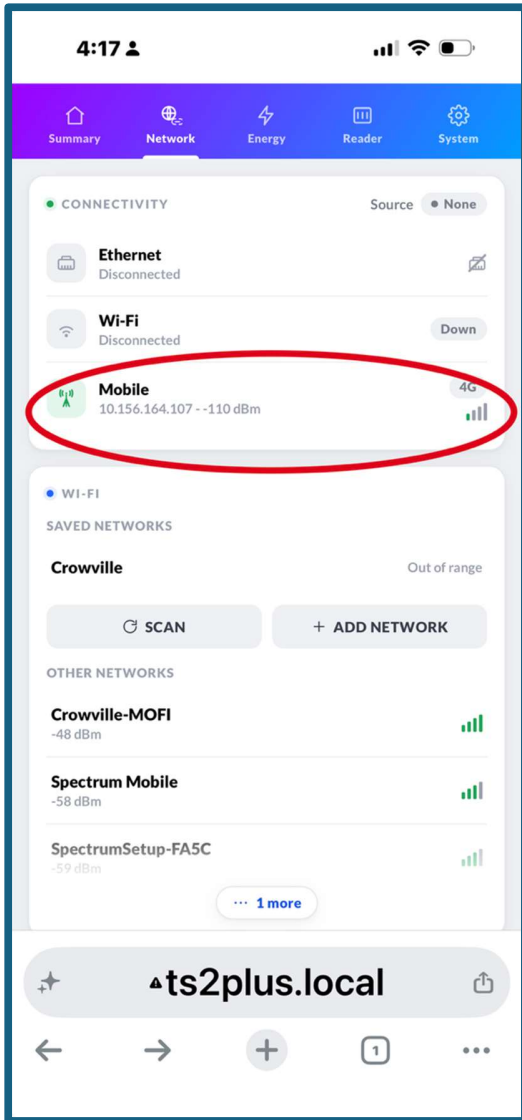
Your
now



internet/server connection should also
turn GREEN

6.7. Network - GSM Connection

The TS2 + supports Internet connectivity via Mobile (GSM) Radio



To activate the GSM Radio:

Remove the microSIM tray from the slot in front of the TS2+.

Insert the SIM card. The SIM Card goes into the top of the tray, label side up:



Power on the device and verify GSM connectivity in the Network Dashboard Tab.

If the Ethernet cable is not connected and WiFi is not Connected then:



The Globe Icon should turn Blue
and the

The internet/server connection should also
turn GREEN

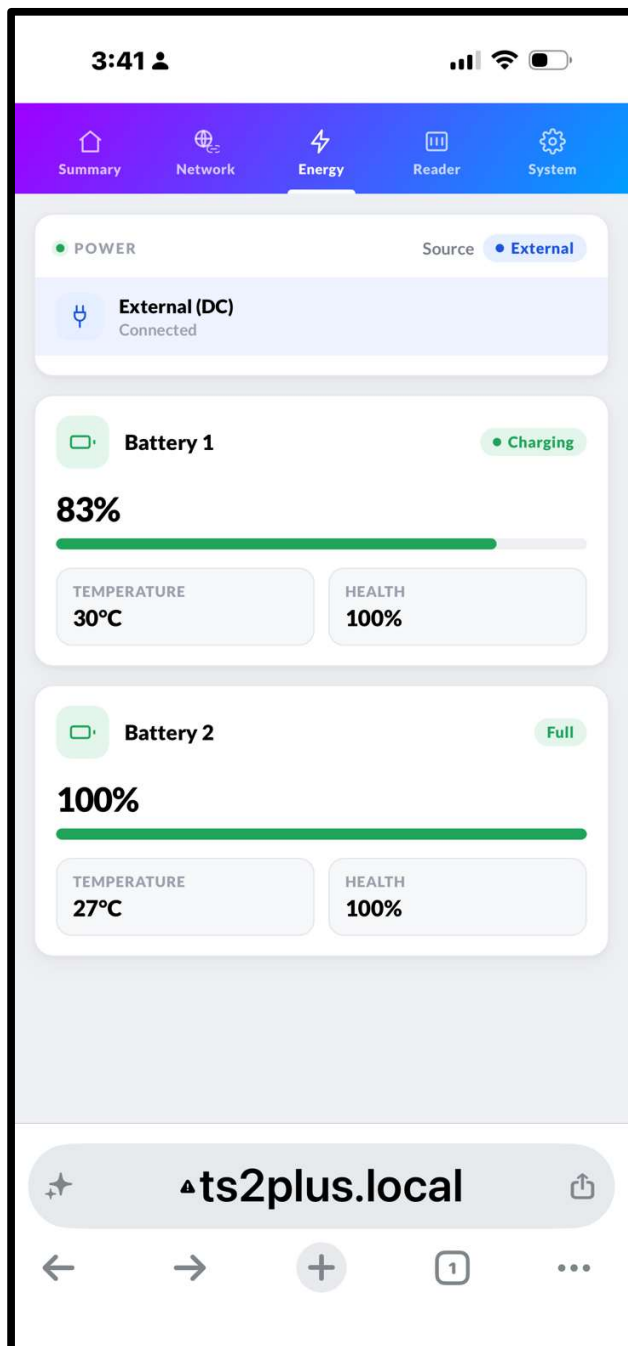
6.8. Network - Connectivity Priorities

The TS2 + automatically selects the active connection based on the following priority order. This cannot be manually overridden in the dashboard:

	Connection Type	Notes
1st — Highest	Ethernet	RJ45 cable connected to IN port
2nd — Priority	Wi-Fi	Configured Wi-Fi network available
3rd — Fallback	GSM / Mobile Data	Used only when Ethernet and Wi-Fi unavailable

 **Note:** It is recommended to use networks with good signal strength for reliable operation.

6.9. Web Interface - Energy Tab



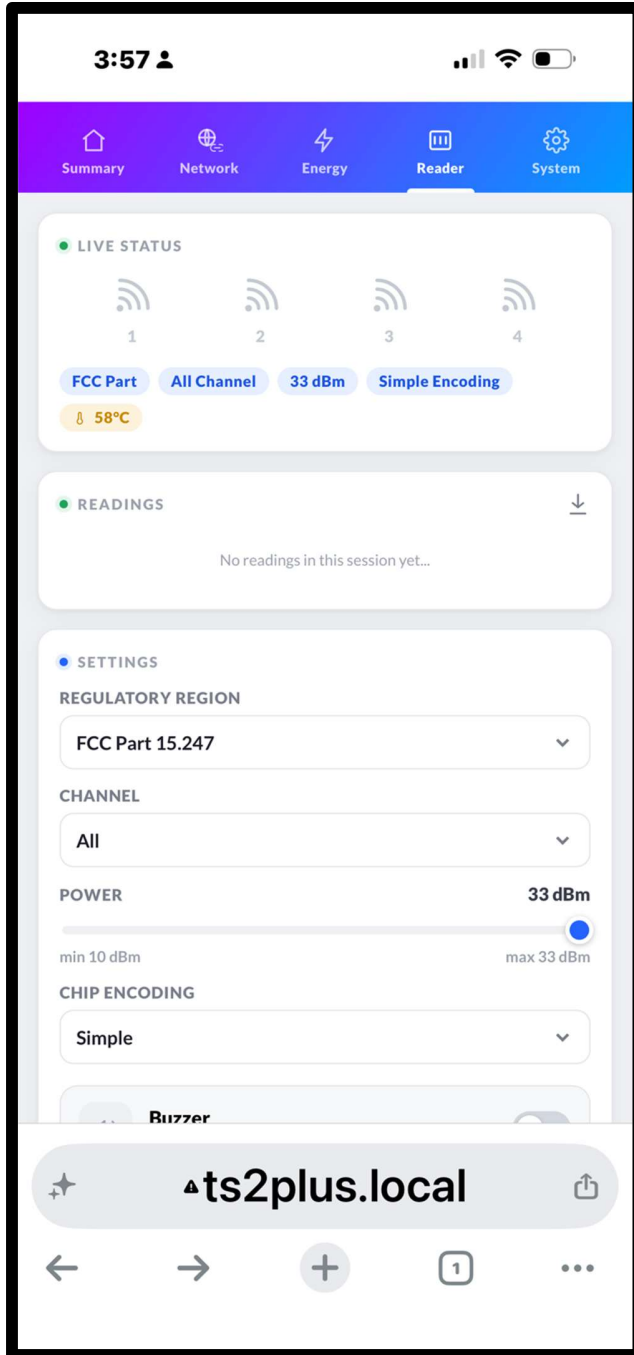
The Energy Tab indicates the status and health of the two batteries used to power the TS2+.

In this instance, it shows that the TS2+ is plugged into AC power through the supplied charger

Battery 1 is currently being charged

Battery Power Levels, Temperatures and Health Status

6.10. Web Interface - RFID Reader Tab



The Reader Tab displays relevant data associated with the RFID Reader embedded in the TS2+.

In this instance, the RFID Reader is FCC with no antennas attached.

It is set to maximum power – 33dBm

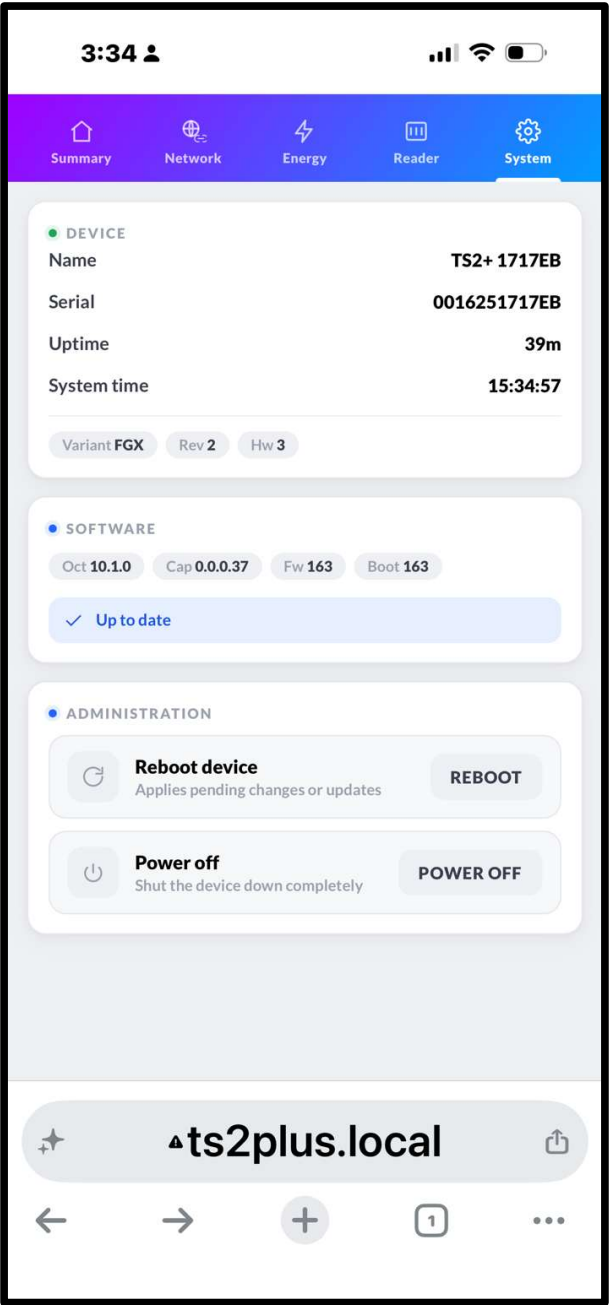
It is set to read tags with Simple Encoding

No Tags have been read to date

In this panel various RFID Reader settings can be changed

The FCC RFID Power Level can be set from 15 to 33 dBm

Simple Tag Encoding can be selected



The System Tab displays relevant configuration data for the TS2+.

Device configuration data

Current firmware versions in system components

The TS2+ can be powered off or rebooted from this screen

Appendix A – FCC Information

A-1 FCC Notice “List of Included Devices”

The Timingsense TS2 + Controller includes the following FCC devices:

Model: TS2Plus
FCCID: 2BOEF-TS2P-USA
Contains FCCID: XMR201903EG25G
Contains FCCID: 2AD56HLK-7628N
Contains FCCID: 2AL6KBL-M8821CU1

A-2 FCC Notice “Radiation Exposure Statement”

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 25mm between the radiator & your body

A-3 FCC Notice “Part 15, Section 15.203 notice.”

1. The TS2Plus Controller and the requisite Timingsense Folding Antenna System are only marketed and sold to verified, established professional race timers, not to the general public.
2. Prior to the sale to a new professional timer, that timer is required to sign a contract specifying the terms of the sale. The contract includes language that includes their agreement to undergo a one-day training course that specifies how the equipment is to be used, and that only certified Timingsense Folding Antennas can be connected to the TS2Plus Controller.
3. This equipment has a very narrow, specialized use case: it is used for timing road races and other race-type events. It is temporarily installed in public spaces (roadways, parks, etc.) for brief periods (generally under 8 hours) for RFID reading during an event.

A-4 FCC Notice “Declaration of Conformity Information.”

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 reasonable 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:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

A-5 FCC Conditions

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to the equipment or antennas not expressly approved by Timingsense USA, Inc could void the user's authority to operate the equipment.

Appendix B – Battery Compliance Data Sheets

B1 UL Certificate of Compliance

Appendix C – Hazardous Shipping Label

C1 Lithium Battery Shipping Label



The TS2+ contains lithium-ion batteries and is considered hazardous. It may be shipped by commercial carrier, but when shipped, the container must have the above label affixed to the outside.