TreeTalker®Cyber

User Manual

Nature 4.0

Inspired to invent change

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Nature 4.0

Introduction

At Nature 4.0, we are committed to providing high-quality sensing solutions for environmental monitoring. Since 2018, our flagship system, TreeTalker®Cyber, has been carefully developed and fine-tuned to deliver highly granular time series data. This system is focused on fundamental approaches to plant ecophysiological monitoring, allowing us to capture intricate details about plant health and environmental interactions.

TreeTalker®Cyber empowers researchers and environmentalists with precise, real-time insights, helping to drive sustainable practices and enhance our understanding of ecosystem dynamics.

What's the reason

In today's world, the importance of understanding and monitoring ecosystem dynamics has never been greater. With the accelerating impacts of climate change, biodiversity loss, and environmental degradation, having precise and real-time data on plant health and ecological processes is crucial for making informed decisions. Systems like TreeTalker®Cyber, developed with expertise from leading scientists like Professor Riccardo Valentini and our PhD research team, provide the detailed insights needed to mitigate these global challenges. By applying advanced monitoring technologies, we can better understand how ecosystems are responding to stressors, ultimately fostering more sustainable land management, climate resilience, and conservation efforts.

Understanding scientific approach

Our scientific approach at Nature 4.0 is rooted in rigorous research, driven by the expertise of Professor Riccardo Valentini and our dedicated PhD research team. We emphasize a holistic understanding of ecosystem dynamics, combining cutting-edge sensor technologies with deep knowledge of plant ecophysiology. Under Professor Valentini's guidance, we integrate innovative methodologies with traditional scientific principles, enabling us to address complex environmental challenges and deliver impactful, data-driven solutions for sustainable environmental management.

"By understanding plant physiology and information analytics, we can provide state of the art sensing solutions for fine scaled real time plant monitoring"

TreeTalker®Cyber

Overview

The TreeTalker®Cyber is an advanced monitoring device that delivers real-time, high-resolution measurements of tree physiological processes and surrounding environmental conditions, enabling continuous, data-driven assessment of forest ecosystem dynamics.

As the latest evolution of the TreeTalker line, it integrates a comprehensive suite of sensors capable of capturing spectral signatures, sap velocity, radial growth, microclimatic conditions and tree movements, offering a holistic and real-time view of tree functioning

Thanks to its IoT architecture, the device sends data wirelessly to a cloud platform, where they can be accessed in real time. Beyond measurement, TreeTalker®Cyber provides actionable insights into tree physiology and the ways trees respond to environmental variations. Its continuous monitoring of physiological and microclimatic variables allows researchers and forest managers to track long-term trends in biomass, tree vitality, and carbon sequestration. This capability supports predictive modelling, sustainable forest management, and ecological research, helping to link high-resolution tree-level data with broader ecosystem and climate studies.

Sensors

1. **Spectrometer**
   The spectrometer (TetraSpec) offers 28-channel spectral analysis, covering the visible to near-infrared range (410 nm to 1000 nm). Powered by AS7265x and AS7341 sensors, it offers accurate and versatile spectral sensing for a wide range of applications.

2. **Sap flow Probe**
   The TreeTalker®Cyber offers two types of three-needle sap flow probes: the “Probe Forest” (28 mm in length) and the “Mini Probe” (6 mm in length), both designed to measure lymph velocity using customizable HPV (heat pulse velocity) methods.

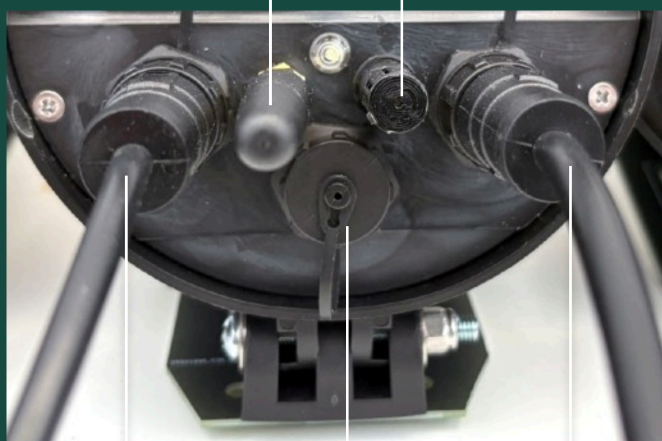
3. **Radial dendrometer**
   The TreeTalker®Cyber radial dendrometer is a high-precision, piston-based sensor with a measurement resolution of ~0.4 µm and a typical measurement error of about ±4 µm, allowing reliable detection of fine-scale stem growth and diel stem dynamics.

4. **Temperature and humidity**
   Temperature and humidity sensors are integrated into the main system hardware and provide accurate and precise measurements of temperature and humidity flows.

5. **Accelerometer**
   The device also includes an accelerometer to determine the inclination and corresponding standard deviations of a tree in different directions, xyz, contributing to the understanding of its stability.

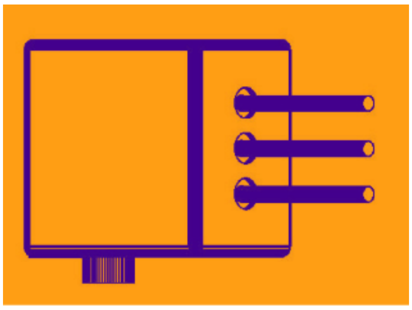

Spectrometer
Sap flow probe
Dendrometer
TreeTalker Cyber
Nature 4.0
Accelerometer
Antenna
Temp. and RH sensor


MADE IN ITALY
Spectrometer


Antenna
Temp. and RH sensor
Dendrometer probe
Sap flow probe
Data download port

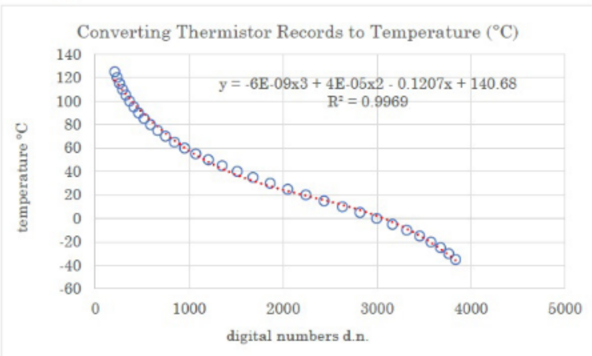
Sap Flow

TreeTalker®Cyber offers two variations of its three-probe configuration sap flow probes: the "Forest Probe", equipped with 29 mm long and 2 mm diameter needles, and the "Mini Probe", featuring 8 mm long and 1,5 mm diameter needles. Both types of probes have needles positioned 7.5 mm apart and are equipped with three thermistors, positioned in series across each needle.



The default method employed for measuring sap velocity is the heat pulse velocity family (HPV) methods with 6 sec duration of heat pulse in hourly interval measurements. The energy input is approximately 780 (J m-1). Temperature readings from the thermistors in the TreeTalker®Cyber's sap flow probe consists of three measurements: the downstream probe (TD), the heater (TM), and the upstream probe (TU). These temperature readings are captured approximately every 13 seconds, covering maximum measurement points, and are recorded as sensor digital numbers. The sensor digital numbers are inverted into Temperature Degrees Celsius by way of a calibration function as described below.

T (°C) = $-6E\text{-}09x^3 + 4E\text{-}05x^2 - 0.1207x + 140.68$, where x is the d.n.



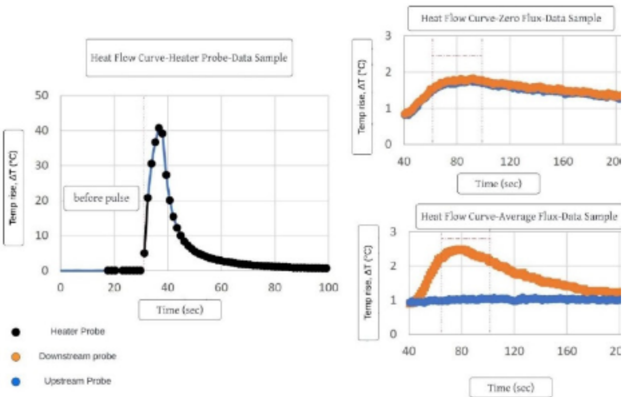
Applying the HRM (Heat Ratio Method) temperature changes both upstream and downstream of a heater probe after a heat pulse is emitted. We analyze the ratio of these temperature changes at equidistant points to estimate sap flow velocity.

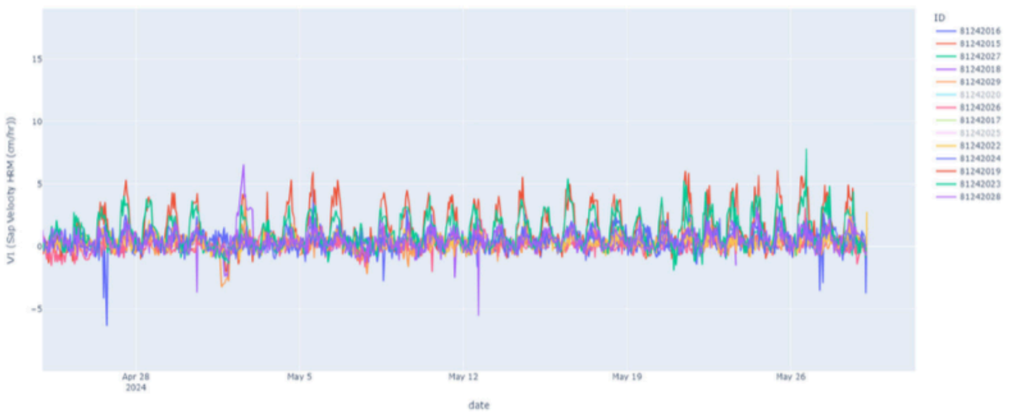
$$V = \frac{D}{X}\ln\left(\frac{\Delta T_D}{\Delta T_U}\right)$$

Where:
V= Heat pulse velocity
D= is the thermal diffusivity ΔTD dand ΔTU = are the temperature increases in downstream and upstream probes.
X=is the distance between the heater and the temperature probes.

$$\Delta T = \frac{H}{4\pi K t}\exp\left(-\frac{pc((x - Vt)^2 + y^2}{4Kt}\right)$$

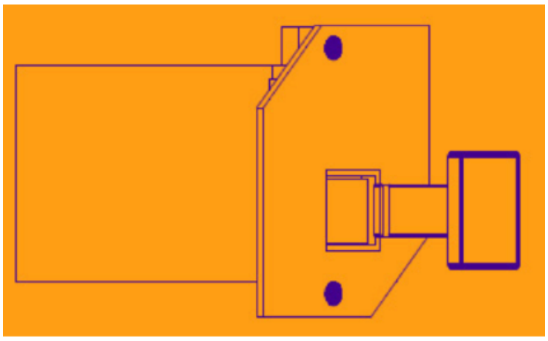
where:
ΔT is the temperature difference at a point (x, y) from the heater, V is the heat velocity, K is thermal conductivity, and (x,y) is volumetric heat capacity (Marshall, 1958; Vandegehuchte & Steppe, 2012).





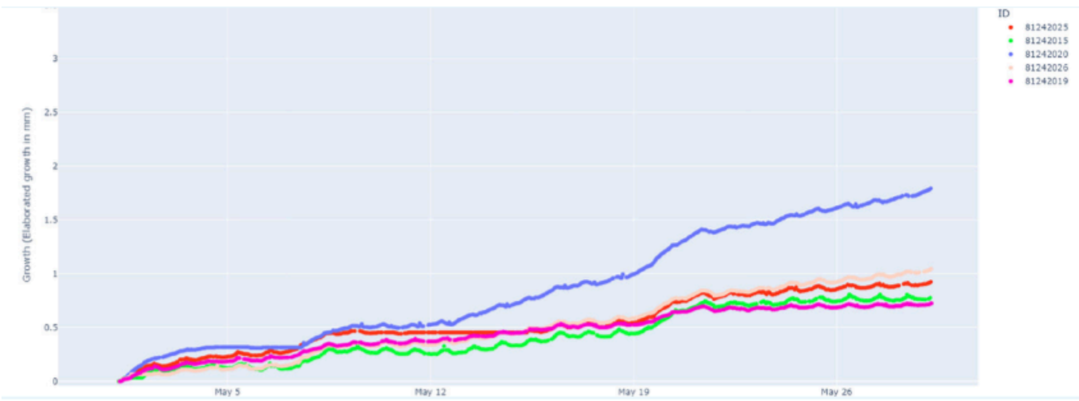
Dendrometer

The TreeTalker®Cyber includes a high-resolution radial dendrometer designed to detect fine-scale changes in stem growth and diel stem dynamics. The sensor is intended for trees with a diameter at breast height (DBH) of 7 cm or greater, a threshold determined by the installation procedure, which requires drilling two 3 mm holes to a depth of 20 mm.



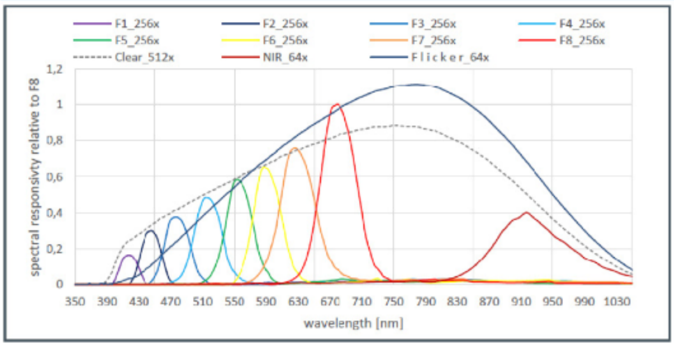
The measurement system is based on a magnetic sensing principle and incorporates a robust incremental encoder, engineered for outdoor operation under a wide range of environmental conditions. The mechanical design and materials are optimized for long-term stability, enabling multi-year, continuous monitoring with minimal maintenance.

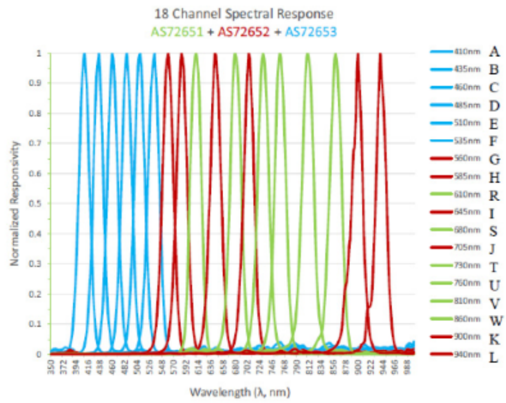
Sensor Features	
Supply Voltage	3.3V
Measurement range	0 — 35cm
Digital number range	0 — 4096 over 2mm dipole
Operating temperature	-40°C — + 80°C
Measurement resolution	0.488 µm (12bit / 2mm pole pair)
Temeprature sensitivity	0.13 µm change per 1°C



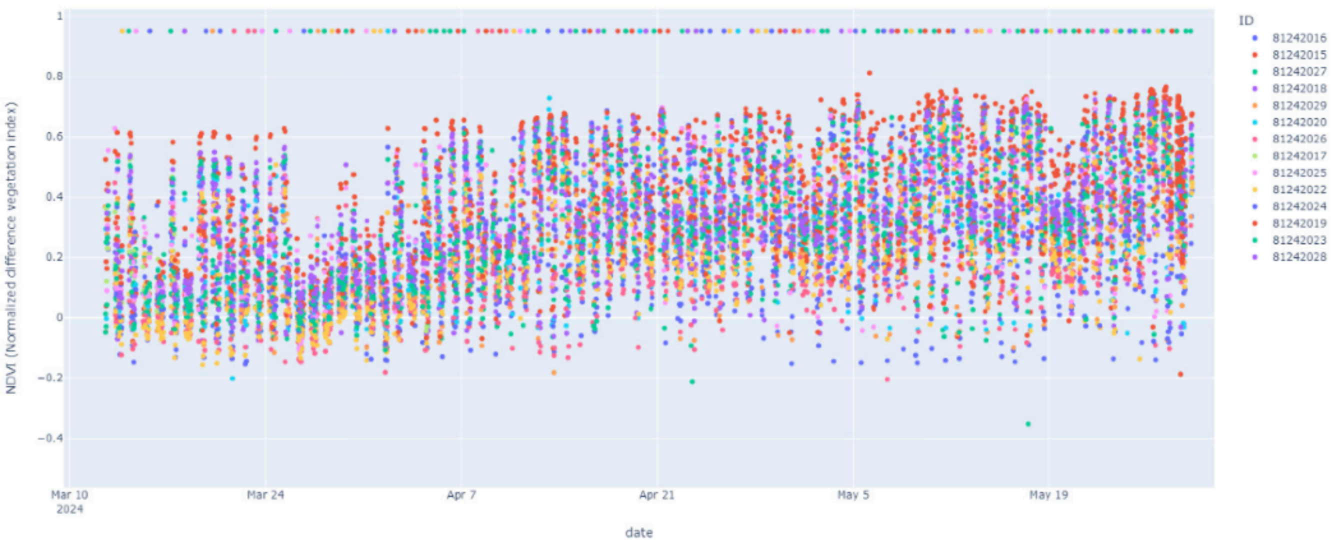
Spectrometer

The TreeTalker®Cyber Spectrometer, also known as TetraSpec as illustrated, is composed of a fusion of four chipsets that integrate AS7265x and AS7341 spectral devices. AS7265x, an 18-channel multispectral sensor, comprises AS72651, AS72652, and AS72653, and operates within a wavelength range of 410 nm to 940 nm, with a full width at half maximum (FWHM) of 20 nm. Among the AS7265x family, AS72651 (610 nm to 860 nm) acts as the primary unit, working in conjunction with AS72652 (560 nm to 940 nm) and AS72653 (410 nm to 535 nm) as detailed in Figure 8. The fourth sensor, AS7341, is a 10-channel spectrometer with an approximate FWHM of 30 nm, functioning within the spectrum of 415 nm to 1000 nm. This includes 8 channels in the visible (VIS) region, one channel in the near-infrared (NIR) region, and one clear channel. These multi-spectral sensors are flexible instruments for spectral analysis, with the ability to distinguish different attributes within the visible and near-infrared (NIR) range. Hereafter, you will encounter an extensive depiction of the varied spectral and optical traits demonstrated by these sensors.





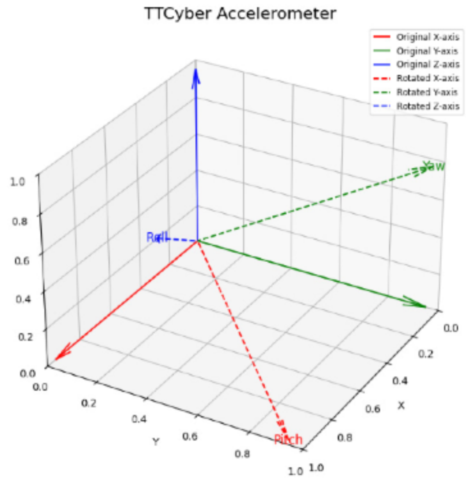
The TetraSpec system generates two types of digital number records, "6" and "7," within a range of 0 to 65,000. Calibration was performed using the Ocean Optics E65000 spectrometer and the HL-3 plus calibrated halogen light source, which provides precise measurements across the 400–1000 nm spectral range with a resolution of 0.8 nm. The calibration used a 16X gain setting and a 100 ms integration time to ensure accuracy.
The calibration process significantly improves data reliability, with average calibration coefficients (MEAN [count/μW/cm2/nm]) calculated for each band. While the TetraSpec's autogain feature, along with a light diffuser, reduces light saturation, saturation is still observed in midday conditions for the CLEAR and NIR bands. Calibration coefficients for these bands are currently unavailable but will be updated in the next version of the system.

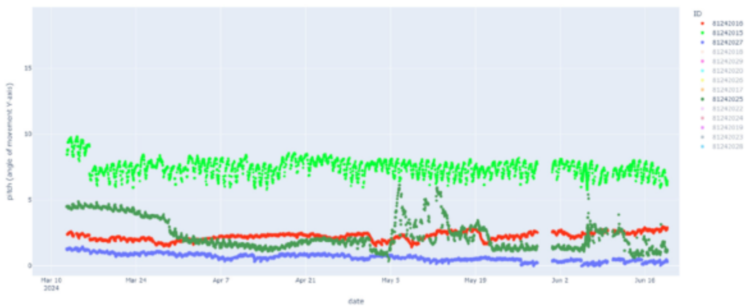


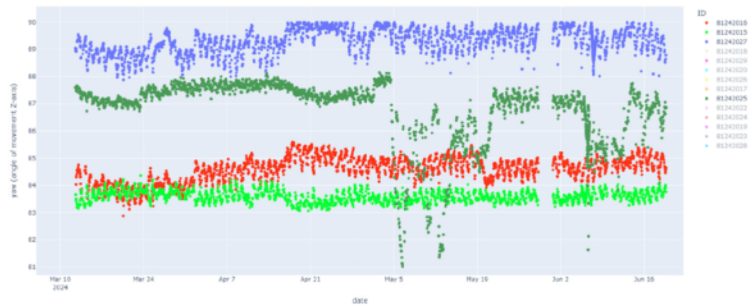
Accelerometer

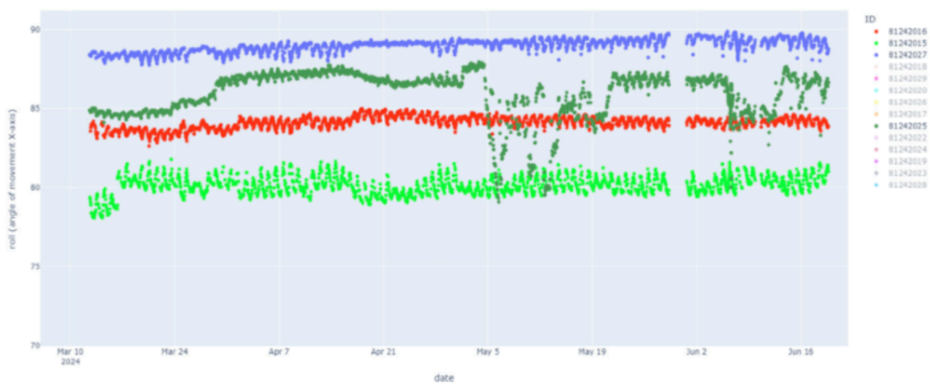
The TreeTalker®Cyber integrates an accelerometer that records tree movement along three orthogonal axes (x, y, z). The sensor captures variations in stem inclination and oscillation, providing quantitative information on tree motion. Measurements are acquired at hourly intervals.

These data generate time series describing stem movement dynamics at the individual-tree level and can be analyzed to characterize temporal patterns of tree motion. When combined with other physiological and environmental measurements, accelerometer data contribute to a multi-parameter description of tree dynamics.





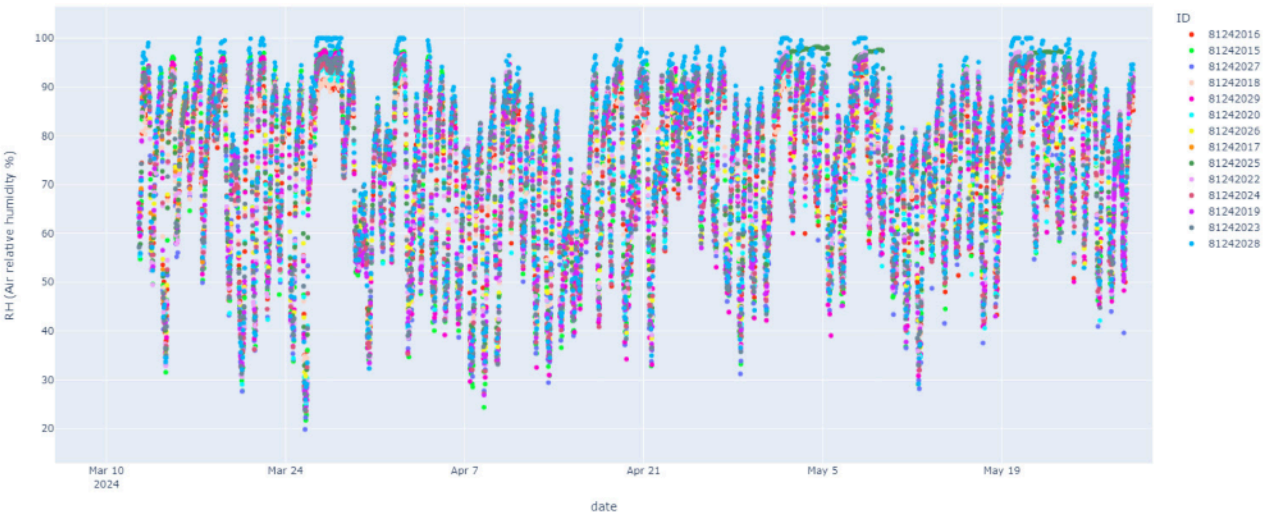


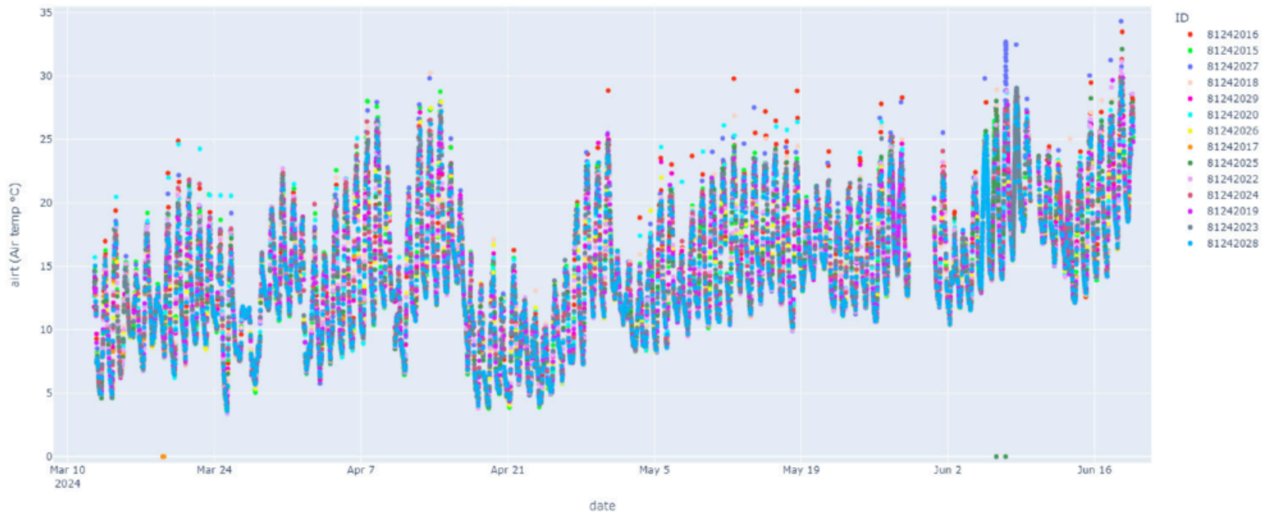


Temperature and RH

The TTCyber integrates sensors for **Air Temperature** and **Relative Humidity**, enabling continuous monitoring of the microclimatic conditions surrounding each tree. **Air Temperature** measures the thermal conditions of the air around the stem, while **Relative Humidity (RH)** quantifies the percentage of water vapor present in the air relative to its maximum capacity at that temperature. These sensors record fine-scale variations that influence key physiological processes, including transpiration, stomatal behavior, and sap flow dynamics. By providing hourly sequences of microclimatic data, the system enables quasi real-time assessment of how environmental conditions evolve around individual trees.

Additionally, shifts in Air Temperature and Relative Humidity can serve as early indicators of environmental stress, such as drought onset, heatwaves, or rapid atmospheric changes. When integrated with other TTCyber modules—such as the sap flow probe, spectrometer, and radial dendrometer—these measurements contribute to a comprehensive interpretation of tree functioning and ecosystem responses. Advanced data analytics can further combine these variables with other physiological measurements to enhance modeling efforts and support management decisions in both forest and urban environments.





Data string

Every hour, TreeTalker®cyber performs consecutive scans on its internal sensors, capturing and storing data locally and on a server. It provides raw, uncalibrated data as separate strings for each sensor.

4&5: Sapflow

6&7: Spectrometer

8: environmental data

Data string 4 & 5

A complete sap velocity measurement (one cycle) is composed of two consecutive strings: String 4 and String 5. The raw data recording is based on the Heat Pulse Velocity (HPV) method, which measures the movement of a thermal pulse within the xylem. The process consists of a complete cycle of ten temperature readings executed in sequence across the probe's three thermistors: downstream probe (**TD**), heater (**TM**), and upstream probe (**TU**).

String Example:

String 4:
07-11-2025 12:11:15,91259018,4,296441,0,39304,39256,39270,6,39302,16696,39267,22,39028,35232,39023,37,38744,37187,38807,53,38652,37886,38765

String 5:
07-11-2025 12:11:16,91259018,5,298032,83,38713,38447,38821,114,38801,38685,38891,144,38873,38822,38948,175,38933,38906,38992,205,38979,38962,39025

String type 4		String type 5	
07/11/25	date & time	**07/11/25**	date & time
12:11:15		**12:11:16**	
91259018	ID	**91259018**	ID
4	string type	**5**	string type
296441	timestamp	**298032**	timestamp
---	---	---	---
0	t1	**83**	t6
39304	TD-1	**38713**	TD-6
39256	TM-1	**38447**	TM-6
39270	TU-1	**38821**	TU-6
6	t2	**114**	t7
39302	TD-2	**38801**	TD-7
16696	TM-2	**38685**	TM-7
39267	TU-2	**38891**	TU-7
22	t3	**144**	t8
39028	TD-3	**38873**	TD-8
35232	TM-3	**38822**	TM-8
39023	TU-3	**38948**	TU-8
37	t4	**175**	t9
38744	TD-4	**38933**	TD-9
37187	TM-4	**38906**	TM-9
38807	TU-4	**38992**	TU-9
53	t5	**205**	t10
38652	TD-5	**38979**	TD-10
37886	TM-5	**38962**	TM-10
38765	TU-5	**39025**	TU-10

Legend			
t	**TD**	**TM**	**TU**
Time (sec)	Temperature of downstream probe	Temperature of heater probe	Temperature of upper probe

07-11-2025 12:11:15,91259018,4,	0,39304,39256,39270	6,39302,16696,39267	22,39028,35232,39023	37,38744,37187,38807	53,38652,37886,38765
07-11-2025 12:11:16,91259018,5,	83,38713,38447,38821	114,38801,38685,38891	144,38873,38822,38948	175,38933,38906,38992	205,38979,38962,39025

String Structure

The first four positions of each string contain essential metadata for measurement identification. Following the initial fields, the rest of the string is composed of **five repeated blocks**, each containing the data for a single thermal measurement.

Each measurement block is composed of 4 values in the following order:

$$\underbrace{t_n, TD_n, TM_n, TU_n}_{\text{Reading Black n}}$$

- t_n : Time Index
- TD_n: Downstream Probe (Digital Units)
- MM_n: Heater Probe (Digital Units)
- UU_n; Uptraim Probe (Digital Units)

The entire process is subdivided into the 10 consecutive readings recorded in String 4 (t1 to t5) and String 5 (t6 to t10).

Measurement Stages

1. **Baseline Reading (t1):** The cycle begins with reading t1, executed before the central element (TM) is activated. This establishes the basal and uniform temperature of the plant.
2. **Heating Start (t2):** The element TM is activated, injecting a controlled thermal pulse.

   A sharp drop in the digital value of TM is observed (e.g., in String 4) because the data format is inversely proportional to temperature (low value - high temperature).
3. **Monitoring Heat Dissipation:** The subsequent readings (t3 to t10) measure how the heat propagates.

   The sap velocity is then calculated by analysing the temperature differential established between TD and TU over the course of these 10 readings.

Data string 6 & 7

The transmitted light under the canopy records from the TreeTalker®Cyber's spectrometer are specified as string 6 and string 7. These two strings contain the digital counts acquired by the TreeTalker®Cyber spectrometer. The entire measurement consists of 28 total spectral bands that are distributed between the two strings: the first 18 values are contained in String 6, while the remaining 10 values, which also include the reference channels (CLEAR and NIR), are contained in String 7. These values represent raw, uncalibrated digital counts and therefore do not correspond directly to physical irradiance units without applying the appropriate calibration coefficients.

String 6 (Example):
28-11-2025
10:57:06,91259018,6,297730,3,802,1134,1333,1282,1189,1103,1143,1214,898,846,757,427,1870,1806,2049,2046,2310,
2338

String 7 (Example):
28-11-2025 10:57:07,91259018,7,298675,8,9628,14548,18131,21492,23027,24555,29639,34476,65535, 51621

String type 6		String type 7	
28/11/25	date & time	**28/11/25**	date & time
10:57:06		**10:57:07**	
91259018	ID	**91259018**	ID
6	string type	**7**	string type
297730	timestamp	**298675**	timestamp
3	Gain	**8**	Gain
---	---	---	---
802	A (410 nm)	**9628**	F1 (415 nm)
1134	B (435 nm)	**14548**	F2 (445 nm)
1333	C (460 nm)	**18131**	F3 (480 nm)
1282	D (485 nm)	**21492**	F4 (515 nm)
1189	E (510 nm)	**23027**	F5 (555 nm)
1103	F (535 nm)	**24555**	F6 (590 nm)
1143	G (560 nm)	**29639**	F7 (630 nm)
1214	H (585 nm)	**34476**	F8 (680 nm)
898	I (645 nm)	**65535**	CLEAR No Calib
846	J (705 nm)	**51621**	NIR No Calib
757	K (900 nm)		
427	L (940 nm)		
1870	R (610 nm)		
1806	S (680 nm)		
2049	T (730 nm)		
2046	U (760 nm)		
2310	V (810 nm)		
2338	W (860 nm)		

Data string 8

Within string 8 are grouped the information of the accelerometer (tree stability), environmental parameters (temperature and humidity), electrical status (battery and stepup) and the dendrometer data (growth increment). Following the initial metadata (Date/Time, ID, String Type, Timestamp), the string consists of fifteen values categorized as follows:

String 8 Variables

- **Stability Data (Accelerometer):** These values monitor the physical stability of the sensor and the tree. Negative values are common, indicating the direction of inclination.
  - **x, y, z:** Inclination/stability axes.
  - **std-x, std-y, std-z:** Standard deviation of the accelerometer data.

- **Electrical Status:**
  - **vbat:** Battery level in millivolts.

    Battery charged: 4100/4200 mV
    Battery requires charging: 3600/3500 mV

  - **v-stepup:** Heater probe power input.

    Values should be: ± 6600 mV

- **Environmental Conditions and Growth:**

  - **airt:** Raw air temperature. The value must be divided by 100 to obtain the temperature in degrees Celsius (C°).

  - **RH:** Raw air relative humidity. The value must be divided by 100 to obtain the relative humidity percentage (%).

  - **growth (d.n)**: TreeTalker®Carbon growth sensor record in digital numbers (d.n).

String type 8		
Raw data	**Label**	
28/11/25 07:41	Date & Time	Legend
91259018	ID	
8	String type	
301159	time stamp	
382	x	Accelerometer data
152	std-x	
-15901	y	
47	std-y	
-354	z	
76	std-z	
3994	vbat	Battery level in millivolts
6961	v-stepup	heater probe power input
1123	airt	Air temp, 1123/100 = 11.23 C°
5019	RH	air RH, 5019/100 = 50.19\% RH
1899	growth (d.n)	TTCarbon record in d.n.

Data Accessibility and Connectivity

TreeTalker®Cyber exemplifies seamless data collection and sharing: Collected data are remotely accessible through cutting-edge Narrowband Internet of Things (NB-IoT) or Long Range (LoRa-LoRaWan) technologies. Connectivity Choices:

1. NB-IoT Connectivity

NB-IoT relies on a standard cellular SIM card, making it extremely simple to deploy in areas covered by mobile networks. The TTCyber® NB-IoT version includes a 10-year prepaid SIM (500 MB) and operates fully autonomously without additional infrastructure. This option is ideal for sites with stable mobile coverage and for monitoring widely spaced trees (typically >600 m apart).

2. LoRaWAN Connectivity

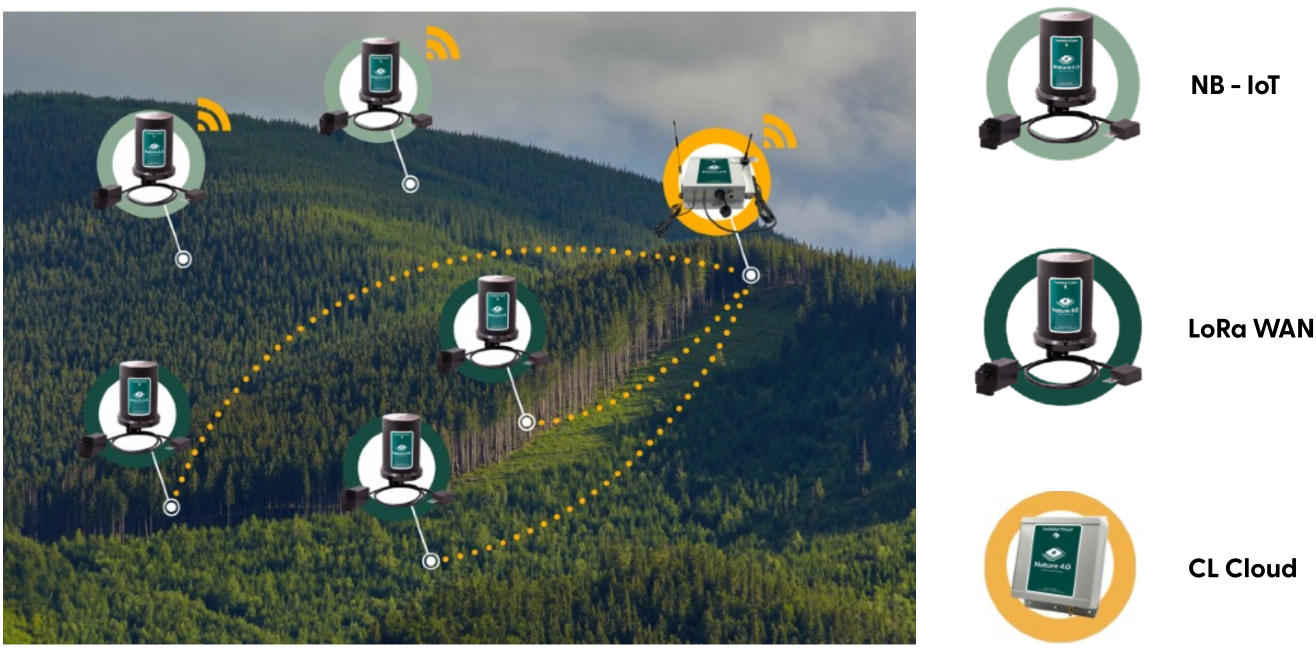
LoRaWAN is recommended for environments without reliable cellular reception or when managing a high number of devices. TreeTalker®Cyber transmit data to a local LoRa gateway, which must be placed in an area with internet access; the gateway then forwards the data to the server. Performance can be enhanced using a solar-powered gateway equipped with a high-gain antenna. This solution is well suited for remote sites, dense sensor networks, or areas with limited telecommunications infrastructure.

Users can choose either LoRaWAN or NB-IoT connectivity according to their specific needs. For LoRa WAN installations, customers must also purchase a compatible **CL CLoud**, preferably equipped with a **solar panel** to ensure continuous operation in remote areas.

Data Frequency:
The TreeTalker®Cyber records measurements at hourly intervals, with the option to adjust the acquisition frequency according to user needs.

Battery Management:
For uninterrupted operation, it is recommended to keep a stock of replacement batteries equivalent to at least 50% of the number of installed devices. This ensures timely substitutions during maintenance cycles.

Charging Solution:
A dedicated battery charger is required to guarantee proper charging performance and to maintain long-term operational efficiency.



Data Access:

By entering the URLs above in any web browser and replacing the placeholder with the **serial number of the specific TTCyber® device**, users can directly access the corresponding **raw data strings.**

These data strings follow the format and structure described in the previous chapters of this manual, allowing users to download and interpret the sensor outputs as needed.

- LoRaWan: http://nature4cloud.org:5001/downloads/TTCyber/"serial number of each TTCyber device"/ data.txt

- NB-IoT: http://nature4cloud.org:5002/nbiot_ap/TTCyber/"serial number of each TTCyber device" ttcloud.txt

Data Streaming:

For both the LoRaWan and NB-IoT versions, the same type of data stream is sent to the server. This data stream, transmitted every hour, includes the transfer of string types 4, 5, 6, 7, and 8. String types 4 and 5 encompass data related to sap flow measurement. String types 6 and 7 provide information about spectral bands, while string type 8 conveys details about battery level, microclimate data, tree stability, and growth. All the data are presented in raw format. We decided to send and store raw data for the benefit of our customers so they can apply diWerent algorithms and calibration equations according to their needs.
However, we also provide a specific software for automatic conversion in biophysical units. To illustrate the raw data and strings information:

29.08.23
16:15:18, 81234007, **4**, 198354, 0, 2095, 2090, 2082, 6,2095, 620, 2081, 6, 2095, 623, 2081, 18, 2091, 1702, 2080, 30, 2081, 1904, 2075

29.08.23
16:15:19, 81234007, **5**, 199697, 42, 2073, 1971, 2071, 54, 2070, 2004, 2070, 66, 2069, 2023, 2069, 78, 2069, 2035, 2069, 90, 2070, 2044, 2070

29.08.23
16:15:21, 81234007, **6**, 200699, 3, 117, 138, 190, 149, 139, 130, 108, 124, 82, 88, 120, 56, 186, 167, 260, 311, 364, 409

29.08.23
16:15:23, 81234007**, 7**, 202511, 10, 4570, 5965, 7851, 9715, 10719, 11276, 13308, 15125, 61391, 53 401

29.08.23
16:15:24, 81234007**, 8**, 204374, 2869, 66, -13317, 47, 8539, 111, 4028, 6199, 2438, 6321, 853

All strings commence with common data types, including the date and time, device ID (TTCyber device's serial number), string type, and timestamp. Currently, the date and time serve as a reliable source for understanding the precise measurement time, rendering the timestamp data unnecessary and can be disregarded due to improper firmware settings. Each string type data will be discussed in detail in a separate section based on the type of the measured variable.

1. **TTCyber-Sap Flow: String types 4 and 5**

2. **TTCyber-Spectrometer: String types 6 and 7**

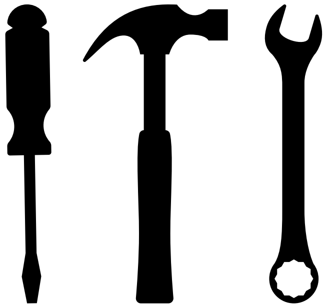
3. **TTCyber-Growth: String type 8**

Training Manual

TreeTalker®Cyber installation

Guidelines & regulation

Tool list for Installation



1. Electric Drill
2. Drill bit-2.1/2.2mm (for sap flow probes)
3. Metal Chisel
4. Template (drilling guide)
5. Rubber hammer (facoltative)
6. Phillips screwdriver
7. Wrenches: 8 mm (inclination), 10 mm (carbon screws)

Included components:

1. Antennas
2. Tree straps
3. Mounting plates
4. Nuts and Bolts
5. Template (drilling use)
6. Screws (screws for boreholes carbon probe)

Sap flow probe installation

1. Using a file or a plane, smooth the bark or remove part of it (if necessary). The objectives are:

   To create a homogeneous surface that allows the probe to adhere properly to the stem.

   To thin the bark so that the needles of the probe can reach the sapwood area (this action is species-specific).

2. Ensure that the drill bit length is equal to or greater than the length of the Sap Flow probe needles.

3. Use the template as a guide to drill the three holes required for the installation of the Sap Flow probe.

4. Drill again through the holes to make sure they are clean and properly formed.

5. Insert the probe into the stem (if necessary, use a rubber hammer to help it fit properly to the trunk).

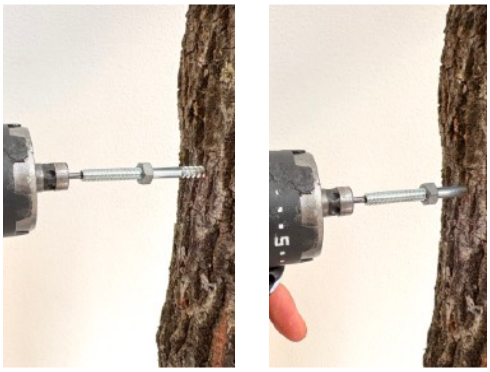
Dendrometer installation

When installing a dendrometer:
- Conifers: Avoid the lower side of leaning branches or stems, where dense compression wood may distort readings.
- Broadleaves: Avoid the upper side, where flexible tension wood can impact measurements.
Positioning on unaffected wood improves data accuracy.

1. Clean the surface of the tree for installation. Remove any surface irregularities and try to place the guide template on a part of the tree that is a 90 degree face.

2. Use the template as a guide to insert the screws that will support the Dendrometer.

3. Insert the screws until the end of the threading.



4. Place the nuts on the screws.

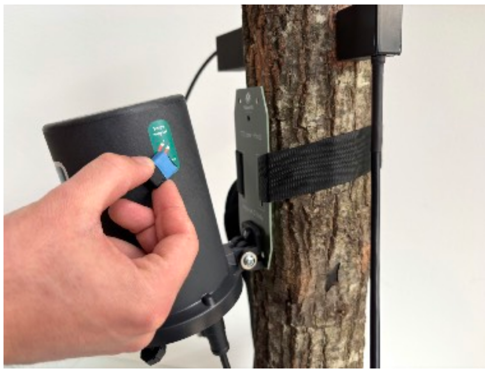
5. Insert the Dendrometer onto the screws, bringing it closer until the movable tip touches the trunk. The distance of the device from the trunk can be adjusted using the nuts.

6. Insert the rear nuts to lock the Dendrometer in place.

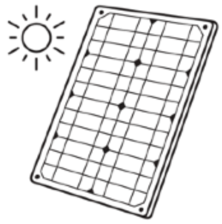
7. Example of the correct assembly of the Dendrometer

8. Example of the correct connection of the cables and antenna. Dendrometer on the left, Sap Flow probe on the right.

9. To turn on the device, move the supplied magnet over the area marked by the sticker on the side of the device and wait a few seconds for the light at the bottom to turn on.
To turn it off, use the opposite side of the magnet and wait for the light to go out.



Cloud installation



1. Choose a location to install the solar panel whic is exposed to most sun.
2. Mount the Cloud and the Battery in horizontal positions NOT vertical.
3. Connect the Solar Panel to the Battery.
4. Connect the Battery to the Cloud.
5. Press the button on the Cloud to activate. Press it again to deactivate.

   Do Not Disconnect the Battery from the Cloud while the Battery is still connected to the Solar panel. Disconnect the battery from the solar panel and then the Cloud from the battery.