

# Tempris Lyophilisation User Manual

Tempris- Temperature Measurement Systems T.LAB and T.PRO  
Tempris Lyophilisation Monitor (TLM) Version 10.1



Version 10, 2021-05-26

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## User Manual TLM

Tempris-Temperature Measurement System T.PRO  
Tempris Lyophilization Monitor (TLM) Version 10.1

Version 10, 2021-05-26  
Publisher: Tempris GmbH, Holzkirchen

|                  |       |
|------------------|-------|
| Software version | 10.1  |
| Modell           | TIRU3 |

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## Change History

| Version | Name            | Date       | Change  |
|---------|-----------------|------------|---|
| V1      | Franziska Sörtl | 2019-11-11 | Initial creation  |
| V2      | Franziska Sörtl | 2020-01-15 | Preparation of safety instructions and regulations  |
| V3      | Franziska Sörtl | 2020-02-13 | Creation of the software and hardware description with pictures and screenshots                     |
| V4      | Franziska Sörtl | 2020-08-03 | Change from software version 10.0 to 10.1   |
| V5      | Franziska Sörtl | 2020-20-30 | Improvement LED status display, correction of figure 4-41; 4-42                                     |
| V6      | Franziska Sörtl | 2020-11-23 | Adaption, that backup can only be deleted by users Admin and Configurator, correction of some typos |
| V7      | Franziska Sörtl | 2020-11-23 | Change of Layout  |
| V8      | Franziska Sörtl | 2020-11-23 | Change of Layout  |
| V9      | Franziska Sörtl | 2021-02-02 | Correction of Version Number  |
| V10     | Franziska Sörtl | 2021-05-26 | Adaptation of the FCC Statement, Addition antenna type  |

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## 1 Important Information

This documentation is part of the Tempris-System. It contains necessary instructions for the use of the Tempris system and the Tempris Lyophilization Monitor Software and must be thoroughly studied before using Tempris.

The operator may only put the Tempris system into operation after the persons responsible for operation have been instructed in its handling on the basis of the Tempris documentation.

The Tempris-System may only be used by persons, who have been verifyably instructed in proper handling.

### 1.1 Use of this Documentation

#### 1.1.1 Preparation and Publication of this Documentation

This documentation was created and published by Tempris GmbH and contains the current technical data and product information at the time of publication. The company Tempris GmbH reserves the right to change the contents of this documentation and the technical data of the products described therein without prior notice. Tempris GmbH accepts no liability for obvious printing and typesetting errors.

#### 1.1.2 Outline

- Chapter 1 contains important information about this documentation and the products described therein.
- Chapter 2 contains introductory information on the Tempris system for wireless temperature measurement, the Tempris functional principle and Tempris applications.
- Chapter 3 provides information on the interfaces and connections of the TIRU3 as well as on the commissioning of these systems and contains the instructions for installing the Tempris Lyophilization Monitor software.
- Chapter 4 describes the user interface and functions of the Tempris Lyophilization Monitor Software and contains detailed instructions for using the Tempris Lyophilization Monitor Software.
- Chapter 5 describes optional Tempris functions and contains instructions on how to use them.

### 1.1.3 Pictures

The images used in the Tempris documentation (photos, screen images, etc.) may differ from the original provided that the correct description of the functions illustrated by the image is not affected.

### 1.1.4 Duplications

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## 1.2 Symbols and Conventions

### 1.2.1 Product Names

The following Tempris product names are used in this documentation (Table 1-1).

*Table 1-1: Product names*

| Product name | Description   |
|--------------|---|
| TIRU         | Type designation for <b>Tempris Interrogation Unit</b> - interrogation unit of the Tempris system. TIRU2 is the second-generation interrogation unit. TIRU3 is the third-generation interrogator.   |
| T.LAB        | T.LAB is the product or type designation for TIRU3-based Tempris measuring systems for use in lyophilisation laboratories. T.LAB systems are available in different versions for operation with up to 4 Tempris interrogation antenna systems.          |
| T.LAB-A1     |   |
| T.LAB-A2     |   |
| T.LAB-A3     |   |
| T.LAB-A4     |   |
| T.PRO        | T.PRO is the product or type designation for TIRU3-based Tempris measuring systems for use in lyophilisation production. T.PRO systems are available in various configurations for use in lyophilisation production plants of various sizes.            |
| T.PRO-05     |   |
| T.PRO-10     |   |
| T.PRO-20     |   |
| T.PRO-30     |   |
| T.PRO-40     |   |
| T.PRO-50     |   |
| TL           | <b>Tempris Lyophilisation.</b> Prefix for components of Tempris systems for temperature monitoring in lyophilisation applications.  |
| TLM          | <b>Tempris Lyophilisation Monitor.</b> Windows software for communication with Tempris interrogation units and for recording, archiving and visualizing the measurement data of Tempris temperature monitoring systems for lyophilisation applications. |
| TLM-4        | TLM software module selection for visualisation and recording of up to 4, 5, 8, 10, 16, 20, 32 Tempris sensors. One of these modules is required for data capture with Tempris sensors.   |
| TLM-5        |   |
| TLM-8        |   |
| TLM-10       |   |
| TLM-16       |   |
| TLM-20       |   |
| TLM-32       |   |

## 1.2.2 Symbols Used in Operating Instructions

Unless otherwise noted, the following symbolic conventions are relevant in this documentation:

|                       |                             |
|-----------------------|-----------------------------|
| <b>MENÜ</b>           | Button, icon                |
| <i>Dialog</i>         | dialog window               |
| <i>Box</i>            | configuration box           |
| <i>filename</i>       | file or directory path name |
| <b>TLM-Automation</b> | License                     |



This symbol provides important user instructions and useful additional information.

### 1.3 Intended Use

Tempris is a system for wireless and battery-free product temperature measurement during freeze drying processes in the pharmaceutical sector. Measurement records obtained with Tempris can be used for the development, optimisation and monitoring of lyophilisation cycles, for hot and cold spot determination as well as for scale-up and transfer of lyophilisation cycles.

Tempris was developed for process development and optimization. Use in production requires special safety precautions. Tempris GmbH can therefore only accept liability for such use if it has been expressly informed at the time of purchase or within the framework of a maintenance contract that use in production is intended. In this respect, the provision in Section 1.8 shall apply accordingly.

 Functions or applications which are not listed above are excluded from intended use. Tempris product modifications possibly carried out by a specialist which lead to additional or changed functions or applications are excluded from intended use.

### 1.4 Authorized Users

The Tempris system may only be installed, operated and used by persons who have the necessary training or knowledge and experience.

Installation, expansions, adjustments, modifications or repairs may only be carried out by the manufacturer or by persons authorized by the manufacturer.

The Tempris user must have read the user manual completely. It is helpful if the user is familiar with the Windows operating system in a network environment. A basic understanding of the operation of radio communication systems and possible problems with their use is expected.

### 1.5 Operator's Responsibility

The operator of the Tempris system is responsible that:

- the national and local regulations for installation, operation, use and maintenance are complied with,
- the accident prevention regulations are observed,
- the Tempris system is in a proper and safe condition,
- the documentation required for the operation of the Tempris system is accessible at all times.

## 1.6 User Responsibility

When Tempris is used in a productive lyophilisation system, the user is solely responsible for the safety and quality of the products produced. He has to observe all safety regulations and safety recommendations of this user manual and in particular to ensure that (a) important measurements are always taken by several sensors simultaneously (redundancy) and that the consistency of the measured values is compared with each other and measured values from other sources and (b) all products manufactured using Tempris are subject to a strict outgoing goods inspection.

### 1.6.1 Entering Parameters

Please follow the following rules when entering parameters:

- Entered parameters must be verified by the user, i.e. the user must check the correctness of the entered values.
- If this check reveals deviations between the desired or required parameters and the parameters displayed on the device, the setting must be corrected before the function is activated.
- The specified actual values are to be compared with the specified set values.

### 1.6.2 Radio Transmission (general)

For radio transmission the following must be observed:

- The Tempris® system operates in the license-free 2.4 GHz frequency band, which is basically available to an undefined group of users. Even if technical measures largely avoid mutual influences with other users, these cannot be completely excluded due to the principle. Due to the transmission and reception characteristics of wireless communication, data may occasionally be lost or delayed. This can be caused by variations in signal strength caused by changes in the characteristics of the transmission path. In addition, the Tempris temperature measuring system uses technical measures to largely avoid the erasure of the radio signal due to interference in the event of multipath propagation.
- However, this physical phenomenon, which can inherently influence any radio transmission, cannot be completely circumvented due to the laws of nature. If necessary, it may therefore be necessary to change the arrangement of the antennas or sensors so that the radio signal is no longer extinguished by multipath propagation.

### 1.6.3 Radio transmission in the freeze-drying chamber

During radio transmission in the freeze-drying chamber / liquid phase, the following must be observed:

- Due to its physical properties, liquid media\* (such as pharmaceutical products) absorb electromagnetic waves in the 2.4 GHz ISM band used. Therefore, during the liquid phase, the sensor position to the interrogating antenna should be at a distance defined by Tempris, corresponding to the antenna position in the chamber. The measurement data frequency is then up to a maximum of 98%. If the measuring range in the liquid phase is not sufficient, this can be improved by additional antennas or by simply re-aligning the existing antenna positions.

During radio transmission in the freeze-drying chamber / solid phase (primary and secondary drying) the following must be observed:

- From the solid phase\* "ice" the range to the sensor increases several times and is positively supported by the reflection in the chamber.

\*Note: The permittivity  $\epsilon$ , also known as dielectric conductivity or dielectric function, indicates the permeability of a material to electric fields. A permittivity is also assigned to the vacuum, since electric fields can occur or electromagnetic fields can propagate even in a vacuum. Comparative values of substances: Water r 80; ice r 3; vacuum/air r 1.

## 1.7 Safety Information

### 1.7.1 General Safety Information

- A prerequisite for safe working is compliance with all specified safety instructions and instructions for action. Therefore read the instructions thoroughly and follow them. Observe all warning notices.
- Read the operating instructions carefully before starting any work. It is a component part of the product and must be kept in the immediate vicinity of the device and accessible to personnel at all times.
- The Tempris system requires professional installation by Tempris GmbH and an official acceptance by the customer.
- Accepted Tempris installations may not be modified by the customer.
- Do not use the device if safety can no longer be guaranteed due to damage to the device.
- Tempris system components that are not intended for use inside the freeze dryer must not be used near water or when these components are damp.
- The cables of the Tempris system must be laid in such a way that no hazards arise. The general work safety measures must be observed at all times.
- Do not touch the power cables of the Tempris system with wet or damp hands.
- Ensure that the ventilation openings and cooling fins of the Tempris components are not blocked. All installation instructions must be observed.
- Observe the working temperature range from 0 °C to +35 °C for the Tempris components TIRU3 and O-BOX. Do not position these components near heat sources such as radiators, heat registers, stoves or other heat-generating devices. Protect these components from direct sunlight.
- Only use the accessories recommended by Tempris GmbH.
- The use of Tempris in a productive lyophilisation system requires the use of an uninterruptible power supply (UPS).
- Before use in a productive lyophilisation system, all Tempris components to be introduced into the interior of the freeze dryer must be cleaned and sterilized. Suitable cleaning and sterilisation procedures are listed in the data sheets of the Tempris components.
- The Tempris temperature sensors must be periodically inspected and calibrated. The frequency of inspections depends on the cleaning, disinfection and sterilisation procedures to which the sensors are exposed. For details on the inspection and calibration intervals, please refer to the Tempris temperature sensor data sheets. The inspection and calibration of the Tempris sensors must be carried out by a qualified maintenance service as offered by Tempris GmbH.
- All components must be handled carefully in order to prevent measuring point failures due to damage. The corresponding handling instructions from the data sheets of the Tempris components must be followed. Any additional instructions for handling components displayed or attached to the components themselves, or attached to component containers for transport and storage, must also be followed. The cleaning instructions given in the Tempris data sheets or in separately supplied maintenance schedules as well as information on preventive maintenance measures and their frequency must be observed.
- Consult a maintenance service authorized by Tempris GmbH for all maintenance work. Servicing is required when the device has been damaged in any way, e.g. such as power cords, plugs, or data cables are damaged, liquid has been spilled or objects have fallen into the device, the device has been exposed to rain or high humidity, does not operate normally, or has been dropped.

## 1.7.2 Safety Information for Installation and Operation of the System

- Install in a place without vibration
- Only install in environments with humidity <80% Rh (non-condensing)
- Storage Temperature: 0-60°C; ideal 25+-10°C
- Operating temperature: 0°C-45°C

## 1.7.3 Power Source War

The correct power source for the Tempris components can be found on the component labels. Only connect the components to sockets with the voltage and frequency specified on the respective label. If you are unsure, contact your power company for information about your power supply.

The AC and DC connections on the Tempris unit must be accessible and ready for operation at all times.

Logging does not continue when the PC goes into energy saving mode. Screen savers and screen locks do not affect logging. It is recommended to switch off the power saving mode.

## 1.7.4 Commissioning Requirements

The Tempris system must be in perfect condition. If the Tempris system shows mechanical damage which does not allow safe use, the system must not be put into operation. Damaged application parts must be replaced.

## 1.7.5 Repairs

The installation of the Tempris system as well as extensions, adjustments, modifications or repairs to the Tempris system may only be carried out by the manufacturer or by persons authorized by the manufacturer.

## 1.7.6 CE-Conformity

### Declaration of conformity with regard to the EU Directive 2014/53/EU (RED Directive)

This declaration applies exclusively to configurations (combinations of software, firmware and hardware) supported or provided by Tempris GmbH for use in the EU. The use of software or firmware not supported by Tempris GmbH may result in the device no longer fulfilling the legal requirements.



|  |   |
|--|---|
| Provision of radio equipment on the market | This equipment is in compliance with the essential requirements and other relevant provisions of DIRECTIVE 2014/53/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 April 2014    |
| Electromagnetic compatibility              | This equipment is in compliance with the essential requirements and other relevant provisions of DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 |

The CE mark is affixed to the product. The product complies with the following European directives:

|                    |   |
|--------------------|---|
| EN 300 328         | Wideband transmission systems - Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques - Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU (Endorsement of the English version EN 300 328 V2.1.1 (2016-11) as German standard)  |
| EN301 489-3 V2.1.1 | ElectroMagnetic Compatibility (EMC) standard for radio equipment and services - Part 1: Common technical requirements - Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU (Endorsement of the English version EN 301 489-1 V2.1.1 (2017-02) as German standard) |
| EN 62368-1:2014    | Audio/video, information and communication technology equipment - Part 1: Safety requirements (IEC 62368-1:2014, modified + Cor.:2015); German version EN 62368-1:2014 + AC:2015  |

The complete CE declaration of conformity for this product is available from Tempris GmbH.

### Antennas

To prevent faulty measurements or system failure, use only the antennas supplied with this product.

| Number | Characteristics | Model number | Plug  | Frequency range (GHz) | Gain(dB) | Cable loss (dB) | Effective gain (dBi) |
|--------|-----------------|--------------|-------|-----------------------|----------|-----------------|----------------------|
| 1      | Directional     | ANT-PH1      | R-SMA | 2.4 – 2.4835          | 8.5      | 1.0             | 7.5                  |

## 1.7.7 Federal Communications Commission - United States

### CFR 47 Part 15.105 (a)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### FCC 15.21:

*Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.*

### FCC 15.19:

*This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:*

- (1) *This device may not cause interference.*
- (2) *This device must accept any interference, including interference that may cause undesired operation of the device.*

### FCC exposure statement

To satisfy FCC exposure requirements a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operations at closer distances than this are not recommended.

## 1.7.8 Radio Equipment Standards Canada

### RSS GEN Issue 5

*This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:*

- (1) *This device may not cause interference*
- (2) *This device must accept any interference, including interference that may cause undesired operation of the device.*

*L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence.*

*L'exploitation est autorisée aux deux conditions suivantes:*

1. *L'appareil ne doit pas produire de brouillage;*
2. *L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement*

### FCC/ISED exposure statement

To satisfy ISED exposure requirements a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operations at closer distances than this are not recommended.

Pour satisfaire aux exigences d'exposition ISED, une distance de séparation de 20 cm ou plus doit être maintenue entre l'antenne de cet appareil et les personnes pendant le fonctionnement. Pour assurer la conformité, les opérations à plus courte distance ne sont pas recommandées.

## 1.8 Liability Limitation

The use of Tempris is the responsibility and risk of the operator or user. Any liability of Tempris GmbH for such damages is excluded and the operator and user are jointly obliged to indemnify Tempris GmbH from any liability towards third parties and other disadvantages with regard to such damages that arise through the use of Tempris outside the purpose of use provided for in the agreement with Tempris GmbH or in violation of the provisions of this user manual or which are otherwise based on a violation of the provisions of this user manual. This applies accordingly if the operator or user does not implement and execute the risk limitation measures recommended in this user manual.

## 1.9 Further Documentation

As a Tempris customer, you will receive project-specific installation instructions, manuals, work instructions, IQ/OQ documents, etc. as necessary or by arrangement. If you have any questions, please contact our Tempris Support Department. Our contact information can be found on the Tempris website at [www.tempris.com](http://www.tempris.com).

## 1.10 Addresses

We would be grateful if you would inform us of any errors, requests or suggestions regarding the implementation of new functions or the further development of existing functions of the Tempris system or the Tempris software. If you have any questions about the Tempris system or the Tempris software, or if you have problems using it, please contact us at:

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## 2 Introduction

### 2.1 Tempris for wireless temperature measurement without batteries

The essential quality feature in the production of pharmaceuticals, especially in freeze-drying, is the monitoring of the product temperature. Since this could not previously be measured directly in the manufacturing process, the proof was provided by several validation runs. This is associated with a high expenditure of time and money.

If the manufacturing process deviates from the validated process, e.g. due to an unforeseen power failure, or the batch can be partially loaded due to filling problems, this can lead to the loss of the batch if no reliable measurement data are available. For this reason, the user needs a process analytical technology (PAT) for the development, analysis and control of pharmaceutical manufacturing processes by measuring critical quality and performance characteristics of raw and processed materials to ensure the quality of the final product.

The Tempris technology closes this gap. The critical product temperature is measured in real time without the need to supply the sensor with an electrical cable or battery, thus eliminating the undesirable heat input into the product. The measuring system is retrofittable and offers different sensor sizes depending on the customer's primary packaging requirements, whether for different vial sizes, double chamber syringes and filling volumes or even tray applications.

The use of the Tempris system increases product quality, simplifies scaling and validation runs, enables process monitoring in routine processes by supporting automatic loading and unloading systems. Processes can thus be temperature-controlled rather than time controlled.

The system also fulfills the following criteria:

- FDA conform
- 21 CFR Part 11 compliant
- GAMP5
- Approved and Certified in many countries
- Modular software with the following functionalities:
  - Visualization of measurement data (temperature)
  - User Management with different user levels and access rights
  - Audit Trail to monitor all actions in the software
  - Backup function
  - INET to interconnect 2 TIRU3 systems for increasing functionality - for the usage of up to 8 antennas
  - Export functions
  - Measurement Data Statistics
  - Automation (SCADA/PLC) interface

## 2.2 Tempris Operating Principle

The Tempris system consists of a control unit, the Tempris Interrogation Unit (TIRU), a TIRU antenna and a sensor with associated sensor antenna (Figure 2-1). Depending on the configuration, the control unit is equipped with up to four integrated antenna interfaces for connection and operation with up to four TIRU antennas.

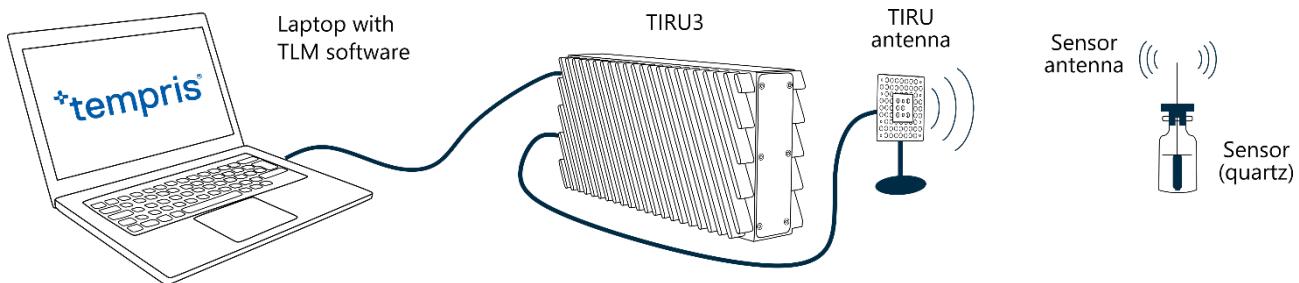


Figure 2-1: Structure of the Tempris system consisting of the control unit (TIRU) with TLM software, TIRU antenna and quartz-based sensor with associated sensor antenna.

An oscillating crystal in the sensor is excited by the TIRU via the TIRU antenna at a carrier frequency of 2.4 GHz. The change in temperature during freeze-drying causes the oscillation of the quartz to change, this frequency shift is transmitted via the sensor antenna to the TIRU antenna by radio signal. The information contained in the digital data about the temperature detected by the sensor is calculated and transmitted to the connected PC via a LAN connection to the Tempris Lyophilization Monitor (TLM) program. There it is recorded and displayed.

Since the sensors only return signals that can be evaluated near their natural resonances, the Tempris query unit first carries out a sensor search at the start of the measurement or after signal losses. Measuring the temperature via the frequency change significantly increases the quality of the measurement results, since the impact of physical influences is less than with temperature measurements via current or resistance values.

### 3 Tempris Device Setup

#### 3.1 Tempris System Components

A typical T.PRO or T.LAB measuring system consists (at least) of the following main components:

- Measuring device: TIRU3 (Interrogation Unit)
- Software: TLM (Tempris Lyophilization Monitor)
- Sensors
- Antennas

This documentation describes the use of the Tempris Lyophilisation Monitor (TLM) software for the purpose of parameterizing Tempris interrogation units and monitoring Tempris interrogation units during measurement operation. If the Tempris interrogation unit is operated via an automation interface with connected PLC or SCADA systems, then the use of the TLM software for monitoring the Tempris interrogation units in running measuring operation is not absolutely necessary, but still possible in parallel with the automation operation. For more information, please refer to our separate manual on "Automation".

### 3.2 TIRU3 Connections and Interfaces

The TIRU3 interrogation unit offers a PoE+ (Power-over-Ethernet Plus) interface, which is used both as a power supply and as a network connection. The unit also has up to four antenna interfaces in the form of SMA sockets for connecting and operating Tempris interrogation antenna systems (Figure 3-1).



*Figure 3-1: TIRU3 - Connections*

When connecting the Tempris antenna systems, carefully screw the plugs of the antenna cables onto the antenna sockets as far as possible. The recommended torque for fastening the screw connections of the Tempris antenna connectors is 0.5 to 1.0 Nm. To prevent damage to the antenna connector, we recommend the use of an optional torque wrench available from Tempris. (Figure 3-2).



*Figure 3-2: Torque Wrench (delivery option)*

On the side opposite the operating connections there is a service connection which is intended exclusively for use by TIRU3 service technicians. Figure 3-3 shows the service connection of the TIRU3 interrogator unit.



*Figure 3-3: TIRU3 - Cover for Service and DC connection*

One side contains a status LED with the following meaning (Figure 3-4 – LED 1):

- Green: Standby
- Orange: Measurement running (second interval), Fast flashing (boot process)
- Red: Error (rapid flashing)

For Backup there is an additional LED on the same side in the middle, at the bottom. This has the following meaning (Figure 3-4 – LED 2):

- Off: no backup license available
- Blue/turquoise: Backup licence available, MicroSD active/inserted
- Red: Backup licence available, no MicroSD inserted



Figure 3-4: TIRU3 – Status LED 1 and 2 with opened and closed cover

### 3.3 Tempris Lyophilisation Monitor Installation

In case the TIRU3 is delivered with a laptop, the Tempris Lyophilization Monitor Software will already be installed on it. You should therefore only install Tempris Lyophilization Monitor software when updating software or on externally used computers.

#### 3.3.1 Tempris Lyophilization Monitor System Requirements

The Tempris Lyophilization Monitor Software can be used with both T.LAB and T.PRO. The Windows computer running the Tempris Lyophilization Monitor software must meet the system requirements listed in Table 3-1.

*Table 3-1: Tempris Lyophilization Monitor System Requirements*

| Computer-System             | PC with x86 or x86_64 Processor  |
|-----------------------------|--|
| Operating System            | Microsoft Windows 10 Enterprise (32 bit or 64 bit)<br>Microsoft Windows 10 Pro (32 bit or 64 bit)<br>Microsoft Windows 8.1 (32 bit or 64 bit)<br>Microsoft Windows 7 Ultimate (32 bit or 64 bit)<br>Microsoft Windows 7 Enterprise (32 bit or 64 bit)<br>Microsoft Windows 7 Professional (32 bit or 64 bit) |
| Main Memory (RAM)           | 2 GB or more   |
| Hard Disk Space Requirement | 100 MB for Software-Installation and<br>10 GB or more for storing Tempris measurement data   |
| Graphic Resolution          | Resolution: 1280 × 1024 Pixel or higher;<br>Graphics extension recommended   |
| Adobe Reader                | For Display/Reading of the available Tempris Lyophilization user<br>manuals via <a href="#">HELP – MANUAL</a>  |

### 3.3.2 New-Installation

The Tempris systems usually includes a USB memory stick with the following TLM setup directories:

*Tempris-Lyophilization-Monitor*  
(TLM-Setup for 32-bit Version)

Tempris reserves the right to provide these setup directories alternatively via ZIP archives or download links from the Tempris websites.

To start the TLM software installation, navigate to the 32-bit TLM Setup directory and start the TLM Setup program from that directory:

*setup.exe*

Please note that you will need administrator rights to run the setup program and may need to contact your IT department for assistance. After successfully starting the setup program, please follow the instructions to complete the installation.

The Tempris Lyophilization Monitor software is installed by default (if you do not specify another target directory) in the Programs directory on the C drive. The icon for starting the Tempris Lyophilization Monitor software is set both on the Windows desktop and in the Windows-**START**-Menu under **ALL PROGRAMS - TEMPRIS - TEMPRIS LYOPHILIZATION MONITOR**.

In order to avoid possible data loss on your Windows PC, you should ensure that all Windows services or Windows applications that could trigger a Windows shutdown (e.g. restart after automatic updates) are deactivated before using the Tempris Lyophilization Monitor software for any productive application.

### 3.3.3 Update-Installation

You can update any Tempris Lyophilization Monitor version to the latest Tempris Lyophilization Monitor version by following the instructions in chapter 3.3.2 .

You can use the **ABOUT...** function from the **HELP** menu to find out the version number of the Tempris Lyophilization Monitor software currently installed on your Windows system. The following figure shows an example for the popup window of the **ABOUT...** function for Tempris Lyophilization Monitor version 10.1.051.



Figure 3- 3-5: TLM Help – About (Display Software Version)

## 4 Tempris Lyophilization Monitor User Interface and Program Functions

This section describes the Tempris Lyophilization Monitor (TLM) software. The information in this section applies to PC-based Tempris systems and does not necessarily apply to PLC-based Tempris systems. Detailed instructions for controlling Tempris via an automation interface can be found in our additional manual "Automation".

In the following, the term "channel" is frequently used. This refers to the assignment of a Tempris sensor to a data stream (data set) reserved in the Tempris Lyophilization Monitor. This allows the data streams of different sensors to be distinguished from each other during simultaneous interrogation. Depending on the system configuration, up to 32 such assignments can be made in Tempris, i.e. the Tempris Lyophilization Monitor software can simultaneously record and display up to 32 channels. Except for certain special constellations (e.g. antenna multiplexing), sensors of different frequencies are assigned to the individual channels. The assignment of sensors to channels is realized via parameter files stored in the system. If necessary (e.g. after a sensor exchange), these can be adapted to the current requirements via corresponding functions and dialogs from the [SETTINGS](#) function group (see Chapter 4.6.1).

## 4.1 Tempris Lyophilization Monitor Scope or Functions

You can use the Tempris Lyophilization Monitor program to:

Setting Up Network Connections to TIRU3 Interrogation Units

Set Tempris system settings according to your requirements:

- Selection of the number of (active) sensors used (1 to 32)
- Setting the sensor calibration coefficients
- Selection of the desired interface(s)
- Selection of the desired measuring interval
- Selection of the sensor measuring range

Store Tempris measurement data permanently ("logging"):

- Selection of log directory and name of log file
- Activating and deactivating the logging function
- Retrieve information about the Lyophilisation Run logged with Tempris from the log file.
- Generate Tempris log file reports and save them in a readable, printable format.

Visualize Tempris measurement data online or offline:

- Graphical display of measurement data (plots)
- Selection and display of measured value sections (zoom and pan functions)
- Interrogation of measurement data
- Load and evaluate measurement records from stored log files

Distribute and retrieve Tempris measurement data over a network:

- via Ethernet
- via Modbus over TCP/IP interface(s) (4 to 20 mA power interface; optional)

Generating Tempris log file reports with user-definable fields

Export Tempris measurement data (e.g. for further editing in Microsoft Excel)

Organization of data access and system settings:

- Password protection, traceability
- Ensuring the authenticity and integrity of the Tempris log files, i.e. including protection of the log files against manipulation (FDA 21CFR Part 11)

#### 4.1.1 Tempris Lyophilization Monitor Software Licenses

Table 4-1 lists the software licenses available with the Tempris Lyophilization Monitor software.

*Table 4-1: Tempris Lyophilization Monitor Software Licenses.*

| Software License  | Description  |
|---|--|
| TLM-MEASUREMENT   | Tempris Lyophilization Monitor Measurement software license to activate the basic functions for the measurement data recording of Tempris sensors  |
| TLM-LOGGING   | Tempris Lyophilization Monitor Logging software license to activate the functions for recording and processing of Tempris measurement data in Tempris log files  |
| TLM-4<br>TLM-5<br>TLM-8<br>TLM-10<br>TLM-16<br>TLM-20<br>TLM-32 | Tempris Lyophilization Monitor Sensor Tracking (TLM-n)<br>TLM software module selection for visualization and recording of up to 4, 5, 8, 10, 16, 20, 32 Tempris sensors. One of these modules is required for data recording with Tempris sensors.  |
| TLM-USERADMIN   | Tempris Lyophilization Monitor User Administration optional TLM software module for user management with different user levels and role-based access rights according to GAMP 5 guidelines   |
| TLM-AUDITTRAIL  | Tempris Lyophilization Monitor Audit Trail optional TLM software module for the generation of chronological records of activities that influence the operation of the Tempris system as required by GAMP 5 guidelines.   |
| TLM-BACKUP  | Tempris Lyophilization Monitor Backup optional TLM software module for redundant data backup of the measurement data recorded with the Tempris system according to GAMP 5 requirements via the backup system integrated in the Tempris system  |
| TLM-ANT-1<br>TLM-ANT-2<br>TLM-ANT-3<br>TLM-ANT-4                | Tempris Lyophilization Monitor Antenna Interface<br>TLM software module selection for accessing the antenna interfaces integrated in T.PRO and T.LAB<br>These antenna interfaces are used to connect and operate the Tempris antenna systems required for wireless Tempris sensor interrogation. Depending on the Tempris system configuration, up to four antenna interfaces are integrated or supported. The basic T.PRO and T.LAB systems include a TLM-ANT-1 software license for operating one TIRU3 antenna interface. |
| TLM-AUTOMATION  | Tempris Lyophilization Monitor Automation<br>Optional TLM software module for configuration and operation of the automation interface integrated in the Tempris interrogation unit for transmission of Tempris data via a Modbus-over-TCP/IP or 4-20mA power interface to programmable logic controllers (PLCs), SCADA systems and data recording devices (data recorders).  |

## 4.2 Program Start and Overview

The Tempris Lyophilization Monitor is started by double-clicking the Tempris Lyophilization Monitor program icon



Figure 4-1 shows an overview of the Tempris Lyophilization Monitor software. The software consists of the menu items: File, Modules, Settings, Options, Help and Service. The service mode is used for system maintenance and is only displayed if a service employee is logged in.

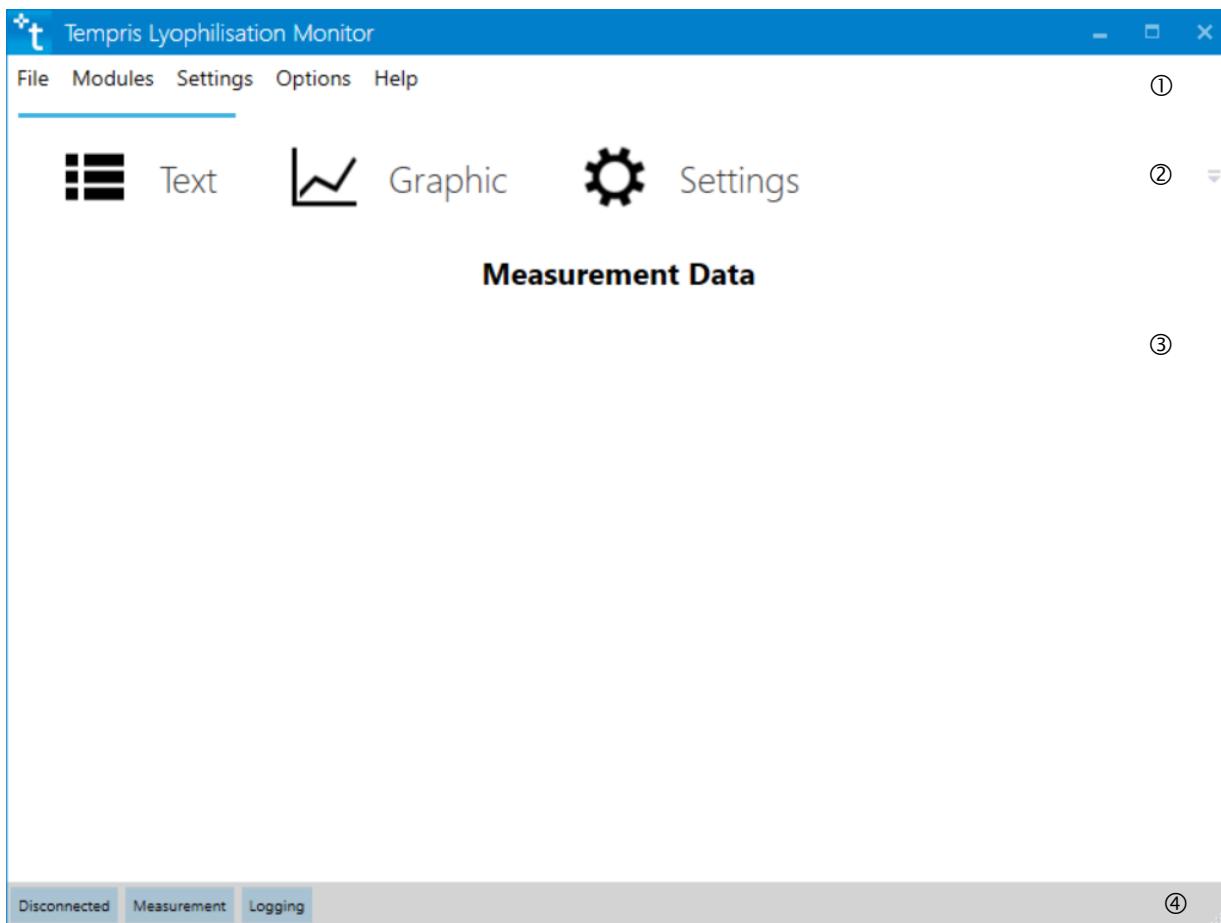


Figure 4-1: Structure of the software in 4 levels.

The user interface of the Tempris Lyophilization Monitor software is essentially divided into the following areas:

- ① Menu
- ② Dock-Panel
- ③ Main display area to show the view selected in the dashboard
- ④ Status-Display

The individual menu items and command keys are explained in the following sections. A brief explanation of the status display is given in Chapter 4.3 firstly.

## 4.3 Status Display and Error Reporting

### 4.3.1 Status Display Bar

The following figure shows an example of the displays in the status bar of the Tempris Lyophilization Monitor software (Figure 4-2).



Figure 4-2: TLM Status Display Bar

Table 4-2 contains an overview of the status display elements of the TLM software. By touch with the mouse, additional information for the respective status display will be provided by the TLM software.

Table 4-2: TLM Status Display Elements

| Status Display Element                 | Display / Content  |
|--|--|
| Connection Status                      | Disconnected = system is not connected to TIRU3<br>Connected = system is connected to TIRU3  |
| Measurement Status                     | Measurement = measurement stopped / inactive<br>Measurement = measurement started / active<br>Measurement = measurement/Logging active, no incoming data |
| Logging Status                         | Logging = logging to log file stopped / inactive<br>Logging = logging to log file started / active   |
| Backup Status<br>(requires TLM-BACKUP) | Backup = backup stopped / inactive (check memory space)<br>Backup = backup started / active<br>Backup = backup-system not available                      |
| Automation                             | Automation = No connection to a SCADA-System<br>Automation = Connection to SCADA-System  |
| Tempris User                           | display user ID of the user currently logged on to the TIRU3 system  |
| Last Measurement                       | display date/time of the last measurement; updated with every incoming measured value  |

## Measurement Monitoring with Alarm Function

If during ongoing measurement and active logging over a period of 10 measurement intervals for none of the sensors in measurement operation at least one valid measured value can be determined, a dialog box appears with the message "No valid measured value for 10 measurement intervals. Antenna problem?". The status display for measurements in the status display bar jumps to red and remains red until measured values are received again.

If the TIRU3 does not transmit any measurement data at all over a period of 10 measurement intervals, the message "No measurement data for 10 measurement intervals. Connection problem?" appears.

For information on setting the measurement interval, refer to Chapter 4.6.1 under Sensor Settings.

#### 4.3.2 Display of Status and Error Messages

Status messages, warnings and error messages are usually displayed in the field for displaying messages in the status display bar (see chapter 4.3.1) or in the main display area in the overlay display mode. If a message must be acknowledged by user confirmation, a popup window is activated to display the message with the corresponding user prompt.

## 4.4 Menu – File

### 4.4.1 Configuring Connections

The communication between your PC and your TIRU3 interrogation unit takes place via the integrated TIRU3 Ethernet interface.

Select the **CONNECTION...** icon in the **FILE** menu to establish a new connection with the TIRU. You can define one or more TIRU3 connections in the dialog box "*Manage Network Connections*" (Figure 4-3).

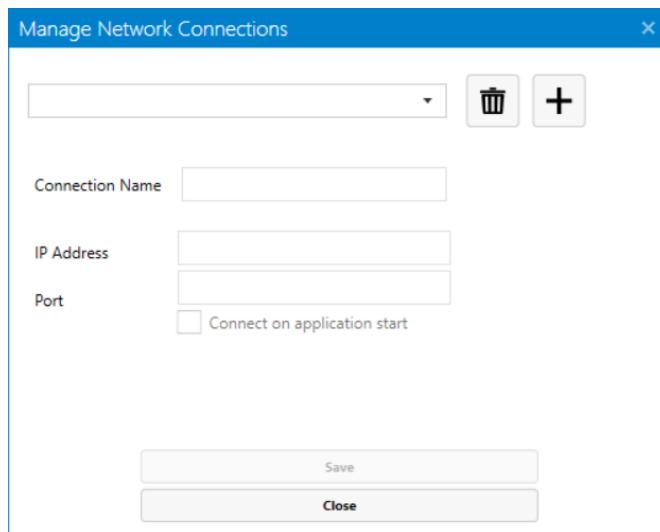


Figure 4-3: TLM File – Manage Network Connection

In the field **Connection Name** you can enter a freely selectable name for the TIRU3 system to be connected. The current IP address of your TIRU3 query unit is displayed or entered in the **IP address** and **Port** fields. In most cases, the factory IP address setting should be correct. However, you can also enter a different IP address here. This is necessary, for example, if you have changed the IP address on your interrogation unit to avoid an IP address conflict on your network, or if you want to connect to another TIRU3 interrogation unit with a different IP address. This can be useful on PCs that are permanently connected to a special TIRU3 interrogation unit (e.g. a T.LAB system).

If you select the option **CONNECT ON APPLICATION START** setup, the Tempris Lyophilization Monitor software automatically establishes at program start a connection to the TIRU3 interrogation unit specified via the IP address.

Click the **SAVE** button to accept the current settings and save them permanently on your PC in **FILE – CONNECT**.

#### 4.4.2 Establish a Connection

Make sure that the TIRU3 connection you want to use has been previously set up with the correct IP address and port number (see chapter 4.4.1) via [FILE - CONNECTIONS...](#)

To establish a connection, go to [FILE](#) and select [CONNECT](#). From the drop-down menu you can now select one of your previously configured connections (Figure 4-4). Click the [ESTABLISH CONNECTION](#) icon to establish a data connection and a (bidirectional) command connection to the selected TIRU3.

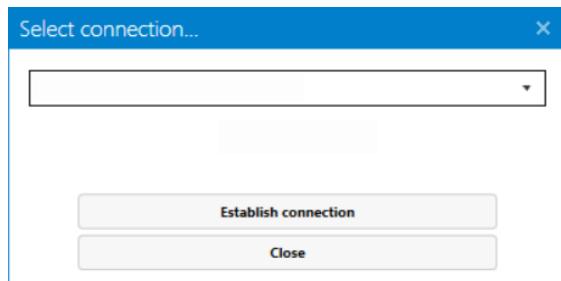


Figure 4-4: TLM File – Connect

Please make sure that the communication between your Tempris Lyophilization Monitor software and your TIRU3 interrogation unit is not blocked by Windows firewall settings, otherwise the TLM software cannot receive any measurement data from the interrogation unit. If you have any questions or problems with your firewall settings, please contact your system administrator.

If a **TLM-USERADMIN** license is detected, the dialog window for logging on to the TIRU3 opens automatically (see Chapter 4.4.4).

#### 4.4.3 Disconnect

To disconnect, select [DISCONNECT](#) in the [FILE](#) menu. Now the existing connection between your PC and the connected TIRU3 query unit is disconnected.

A measurement previously started with [START MEASUREMENT](#) on the TIRU3 interrogation unit will continue to run even if you disconnect the connection to the TIRU3 with [DISCONNECT](#). This means, that you must use the [STOP MEASUREMENT](#) function while your PC is connected to the TIRU3 interrogator if you want to stop a measurement running on the TIRU3 interrogator.

#### 4.4.4 Login

If the **TLM-USERADMIN** option is activated on your TIRU3 system, you must log on to the TIRU3 with your user name and password (Figure 4-5) using the **FILE - LOGIN** function after successfully connecting to the TIRU3 in order to be able to use further functions such as **MESSUNG STARTEN**.

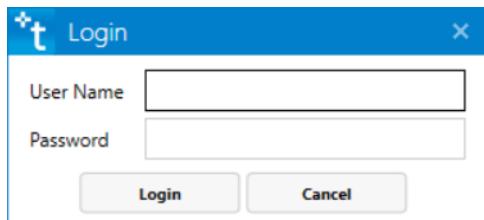


Figure 4-5: TLM File- Login

The TLM option **TLM-USERADMIN** implements role-based user management with privileged access rights for predefined user groups or security levels (roles). The role descriptions with the default settings of the individual users are described in more detail in chapter 4.6.2 under Users.

#### 4.4.5 Logout

To log off from the system, for example to change the user, go to the menu item **FILE – LOGOUT**. The connection to the TIRU3 will thus remain active.

#### 4.4.6 Loading the log file

If you have already created a log file and want to view it again, you can do so via the icon **LOAD LOG- FILE** in the menu **FILE**.



You can only load a log file if there is no connection to a TIRU3.

#### 4.4.7 Close Application

To close the application, you can either choose the **CLOSE** icon in the upper right corner of the application or **QUIT APPLICATION** in the **FILE** menu. To exit the program, confirm the entry with **QUIT** (Figure 4-6).

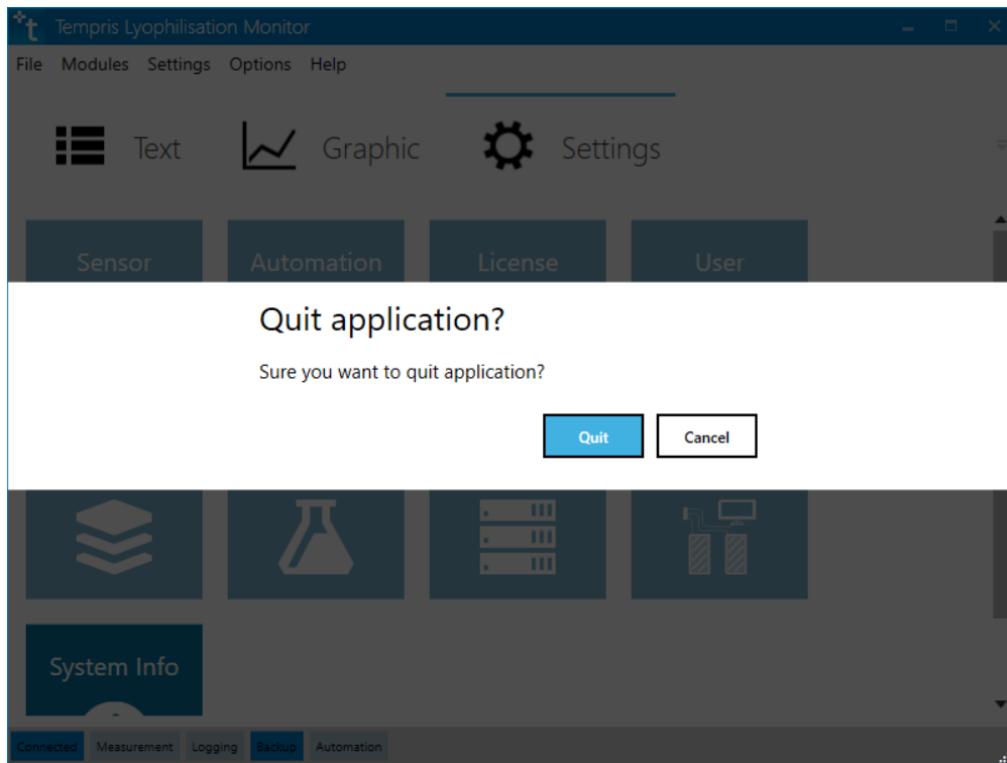


Figure 4-6: TLM File- Close Application

## 4.5 Menu Modules

### 4.5.1 Start Measurement

Before you start a measurement, you should configure your sensor settings in the menu item **SETTINGS** under **SYSTEM - SENSOR SETTINGS...** and upload the calibration data of your sensors to the TLM software. The pertaining calibration date has been supplied on a USB stick, to the TLM software. Detailed instructions can be found in chapter 4.6.1.

To start a measurement, select **MODULES** and then **START MEASUREMENT**. Using the "Audit Trail Comment" function you can add a comment to each measurement (Figure 4-7). This comment appears in **MODULES** at **AUDIT TRAIL...** and is described in chapter 4.5.6. By setting a check mark at **Use comment in log file name suggestion** the program takes over the name when recording a logging file as well (see chapter 0). Start the measurement by confirming with the **OK** button.

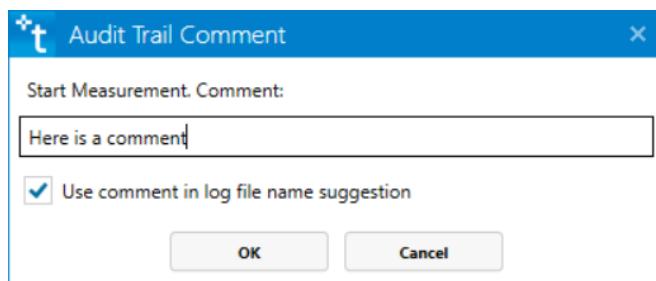


Figure 4-7: TLM Module – Start Measurement

**i** Starting a measurement does not start the recording in an additional file. You have to start the recording in the menu item **MODULES** and **START LOGGING**. The data from the measurement are nevertheless saved via the backup and can be retrieved as log-file.

The various display options in the Dock-Panel are described in more detail in Chapter 4.9 . The settings for displaying the temperature curves are also explained there.

### 4.5.2 End Measurement

To end a measurement, use the menu item **MODULES** and click **STOP MEASUREMENT**. By ending the measurement, you remain logged in and the connection to the TIRU3 is also maintained.

The activities of the TIRU3 interrogation unit continue in the current configuration. For example, a connected programmable logic controller (PLC) will continue to be supplied with data (e.g. via the current interface) (see also chapter 5). If the current configuration has been saved on the TIRU3 interrogation unit, it will be available again the next time Tempris Lyophilization Monitor is started (also from another PC or laptop) as soon as a connection is established between the Tempris Lyophilization Monitor and the TIRU3 interrogation unit.

### 4.5.3 Start Logging

To start a recording, go to [MODULES](#) and [START LOGGING](#). The “*Audit Trail Comment*” dialog box now opens (Figure 4-8). This serves to better reflect your measurement within the AuditTrail. By selecting the *Include comment in log file name suggestion* button you can accept your input for saving the log file.

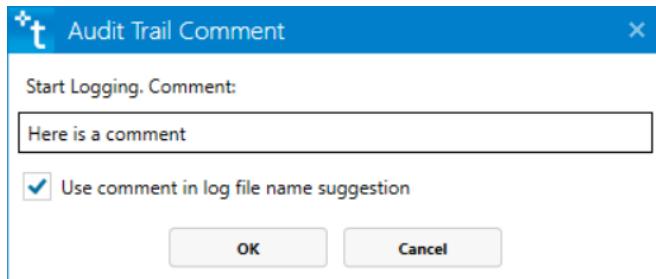


Figure 4-8: TLM Module – Start Logging – AuditTrail Comments

Click [OK](#) to confirm your entry and proceed to the next dialog box “*Data Entry*” (Figure 4-9). You can describe your measurement here. In addition, you can choose from a previously created template to better coordinate the input of the data. Chapter 4.7.2 describes in detail how to create a template.

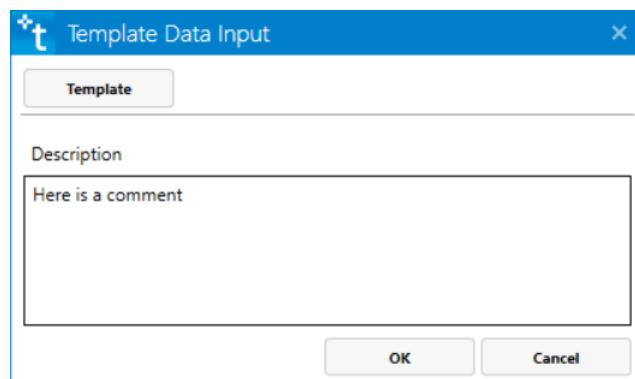


Figure 4-9: TLM Module – Start Logging – Data Entry

Confirm your entry with [OK](#). You will then be taken to the [SAVE AS](#) icon. Save your file in the Windows dialog under the desired name in the desired location.



If you enter the name of an existing log file, this file is overwritten. If you have previously stopped logging in the same session with [MODULES – STOP LOGGING](#), you should therefore assign a new log file name for another [START LOGGING](#) request during the same measurement.

At high data rates the log files can become very large (some 100 MByte). It therefore makes sense to select the data rate (see Chapter 4.6.1) according to your actual needs with regard to time resolution. Very large log files can cause long loading times during further processing, depending on your computer's performance.

Log files can be converted into common formats (e.g. \*.CSV) and then processed with suitable spreadsheet programs such as Microsoft Excel (see Chapter 4.5.5).

#### 4.5.4 Stop Logging

If you have recorded your data successfully and want to end your logging, go to the menu item **MODULES** to **STOP LOGGING**. Your logging will now be terminated and saved in the Windows-dialog under the name you selected when you started logging. Confirm the termination of logging by clicking **YES** in the dialog box (Figure 4-10).

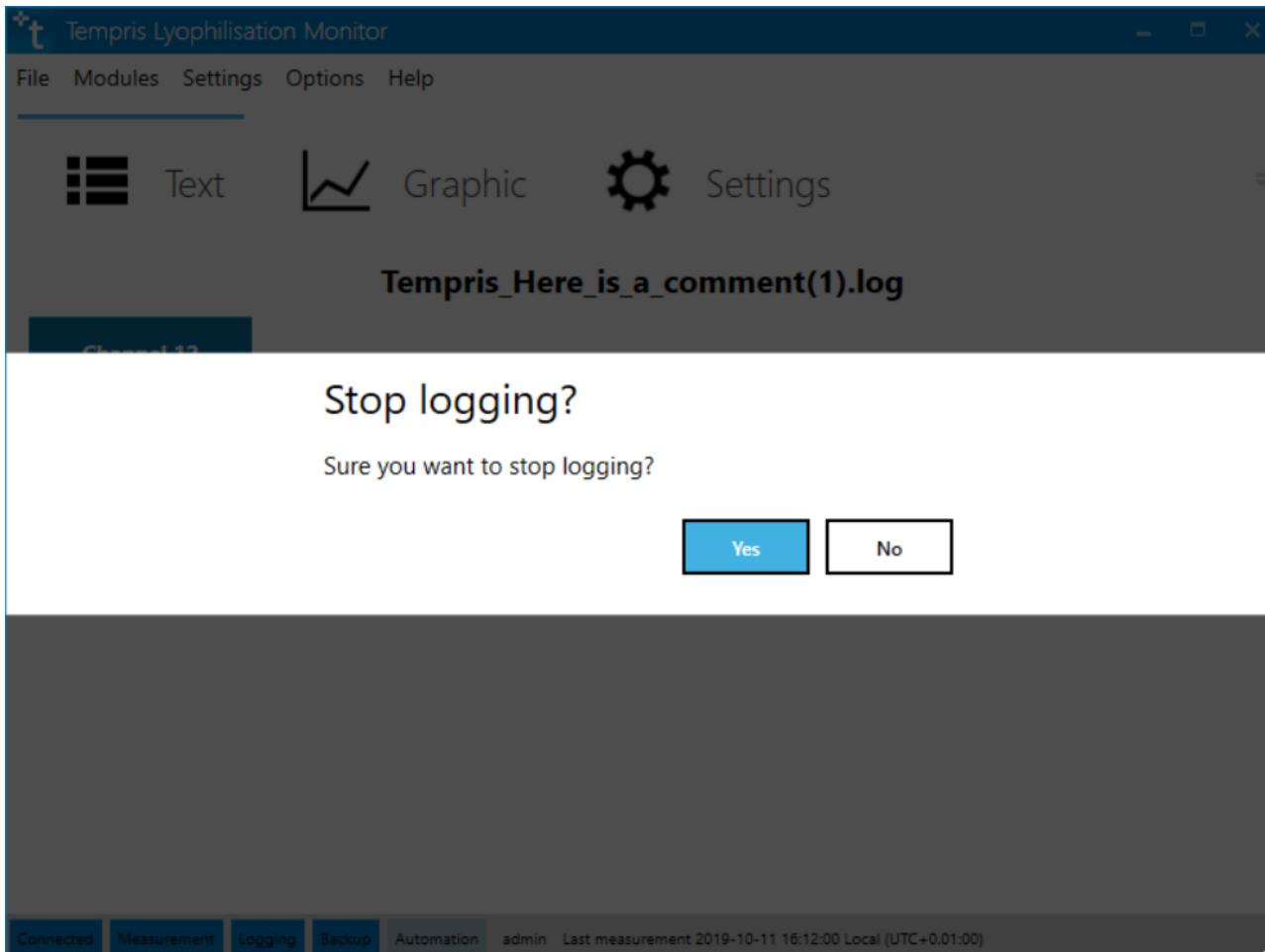


Figure 4-10: TLM Module – End Logging



After you have finished logging, your measurement continues. You can access the data from the measurement via the backup service. This is described in more detail in Chapter 4.5.7.



Logging does not continue when the PC goes into energy saving mode. Screen savers and screen locks do not affect logging. It is recommended to switch off the power saving mode.

#### 4.5.5 Report

In the menu item **MODULES** under **REPORT**, you can create a CSV file, a log file report, select the entire measurement data statistics of the logging or a screen section of same. In this section, the functions under Report are explained in more detail.

##### CSV-Export

By clicking **MODULES - REPORT** and then **CSV-EXPORT...**, you can export the measurement data of the log file as CSV-file. A dialog opens (Figure 4-11) in which you can choose further settings for the export. You can first select which of the recorded sensors you want to export. The colors of the symbols have the following meaning:

- Blue: The measurement data for this sensor are selected for data export.
- White: The measurement data for this sensor are not selected for data export.
- White, greyed out: There is no measurement data available for this sensor.

Clicking the **ALL ON** icon selects all sensors with measurement data for data export. The icon **ALL OFF** resets all sensor selections.

By default, the measurement data of the selected channels are exported over the entire recording period. After activating the "**CSV Export**" dialog box, the entries for the **Start time** and **End time** are automatically set to the start and end times of the loaded measurement data. If you only need a limited recording period in the CSV file, you can optionally define a time window for the export with the parameters **Start time** and **End time**. You can also select the **measurement interval** (the time between two measurement points).

The choice between **comma** or **semicolon** as field separator serves to facilitate Excel import. In German, you should select the semicolon here. You can also set the number of decimal places in the temperature display to 1 or 2.

As the last setting, you can adjust the time display. Choose between the **relative** time display (date and time) or the **absolute** time display (time since the beginning of the measurement). You can also choose between **Local** and **UTC** time formats. Confirm your entries by selecting the **EXPORT** icon.

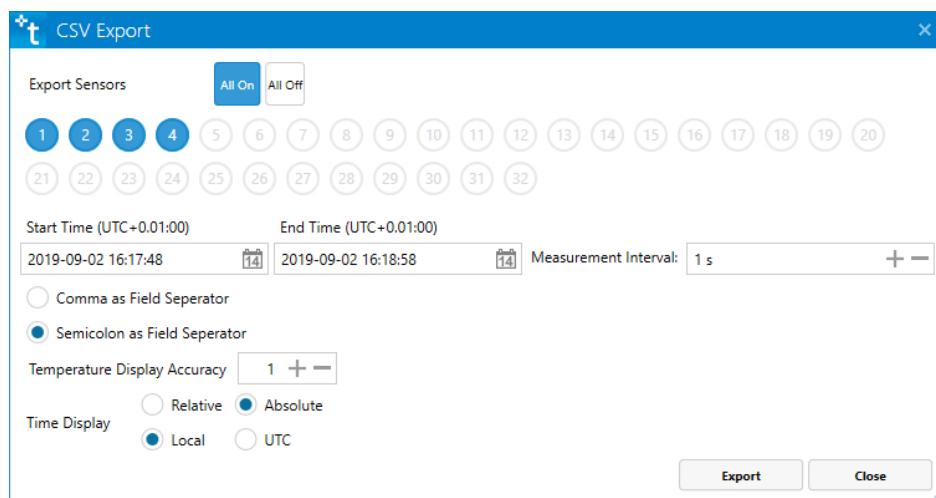


Figure 4-11: TLM Module – Report - CSV-Export

## Log File Report

The Log File Report function allows you to create a PDF from your log file. Um eine Log-Datei laden zu können müssen Sie abgemeldet und von der TIRU3 getrennt sein. The file name, date and time of the output date and system information (such as sensor settings, serial numbers, software versions, users) are automatically inserted in each log file. Through selecting **MODULES – REPORT** and then **LOG-FILE REPORT...** the dialog box "*Log file Report*" now opens (Figure 4-12). In the field **Report file name** you can change the file name. In the **Description** field, select a suitable description for your file.

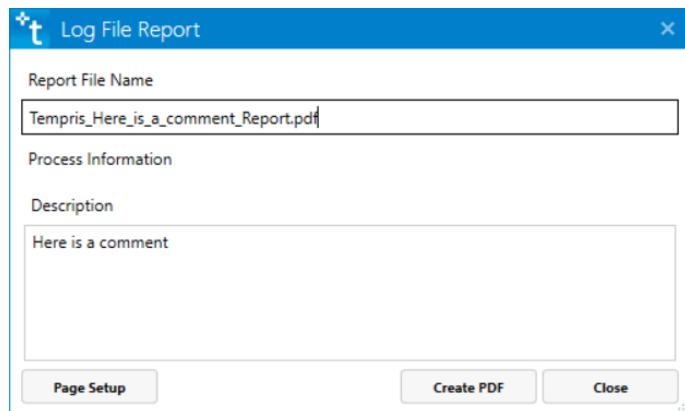


Figure 4-12: TLM Module – Report - Log-File Report

Selecting the **PAGE SETUP** button opens another dialog window with the name: "*Page Setup*" (Figure 4-13). You can set the number of decimal places in the temperature display to 1 or 2 here as well.

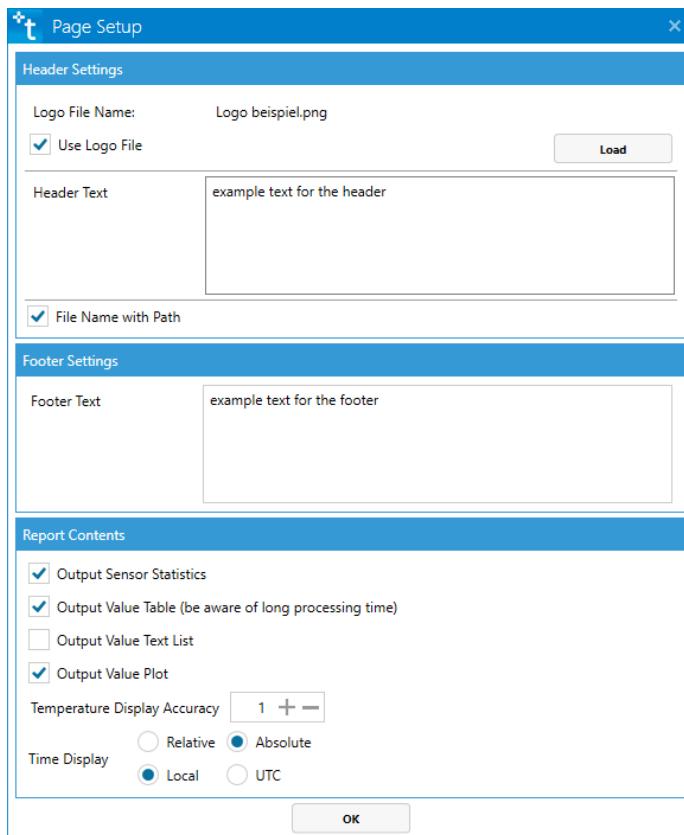


Figure 4-13: Page Setup of Log-File Reports under TLM Module – Report...

Under "*Header Settings*" you can upload your company logo (as png, jpeg, bmp or gif) and choose a text for the header. By ticking the box *Filename with full path* you add the currently used storage location to your document. In the "*Footer Settings*" you can add a footer text to the document.

Under "Report Contents" you can choose between the following evaluations in the report:

*Output Sensor Statistics* shows the measuring interval as well as the evaluation of the received data of each individual sensor (Figure 4-14). In addition, the antennas used and their measuring points are evaluated. The antenna with the best signal strength is automatically selected by the program.

#### Measurement intervals 78

Channel 1 AAAN  
Total: 77 (98.7%)  
Port 2: 7 (9.0%)  
Port 3: 70 (89.7%)

Figure 4-14: Measuring interval as well as the evaluation of the received data of each individual sensor.

The measured values can be output either as a *value table* (Figure 4-15 left) or as a *value text list* (Figure 4-15 right). Note that the value table has a long output time, especially for long measurements with small measurement intervals.

| Time<br>(UTC+01:00) | 1    | 2    | 3    | 4    |
|---------------------|------|------|------|------|
| Date/Time           | 22.2 | 22.2 | 22.1 | 22.0 |
| Date/Time           | 22.2 | 22.2 | 22.2 | 22.1 |
| Date/Time           | 22.2 | 22.2 | 22.1 | 22.0 |

| Time Local (UTC+01:00) | 1    | 2    | 3    | 4    |
|------------------------|------|------|------|------|
| 2019-09-05 10:57:07    | 22.2 | 22.2 | 22.1 | 22.0 |
| 2019-09-05 10:57:08    | 22.2 | 22.2 | 22.2 | 22.1 |
| 2019-09-05 10:57:08    | 22.2 | 22.2 | 22.1 | 22.0 |

Figure 4-15: Links: Value Table, rechts: Value Text List

By selecting the *Output Value Plot* icon, a graph of all measured sensors is also added to the report (Figure 4-16).

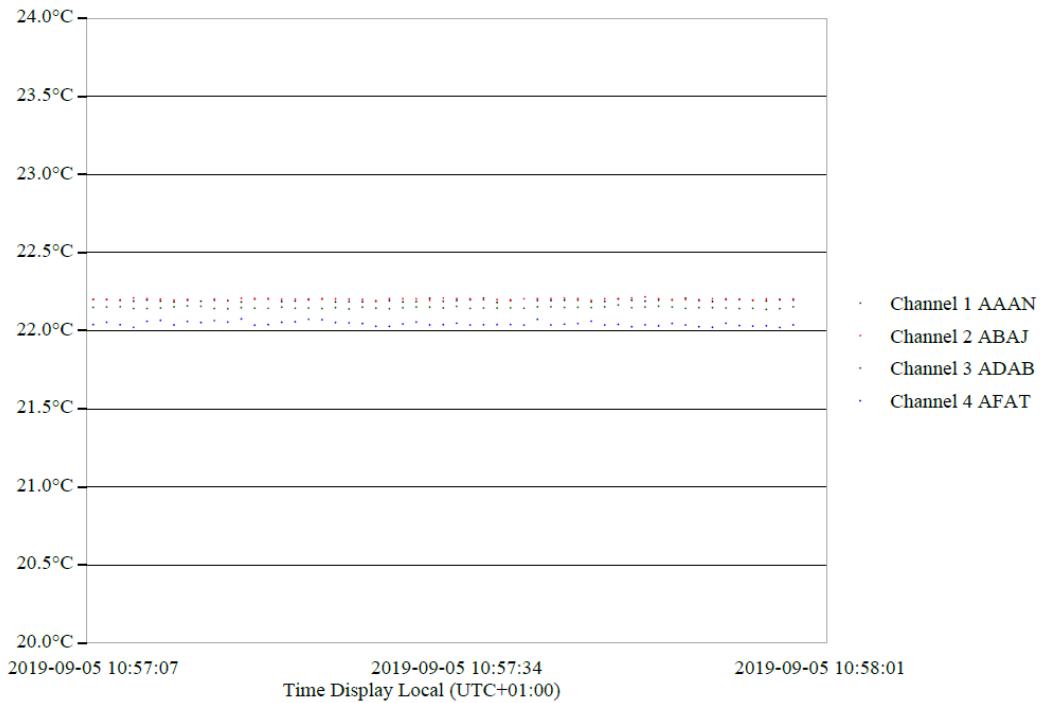


Figure 4-16: Value Plot in report PDF.

Finally, the *time display* can be selected between *relative* and *absolute* display as well as between the time formats *Local* or *UTC*.

## Total Measurement Data Statistics

To output the measurement data statistics, select the menu item **MODULES** under **REPORT** and **MEASUREMENT TOTAL DATA STATISTICS...** (Figure 4-17). Now the window "**Measured Data Statistics**" opens. Here you can view the number of measurement intervals. In addition, you will receive an evaluation of the obtained data points for each sensor active during the measurement. These are converted into a percentage by the number of measurement intervals. In addition, the distribution over the used antennas (ports) appears, these are also converted into percent.

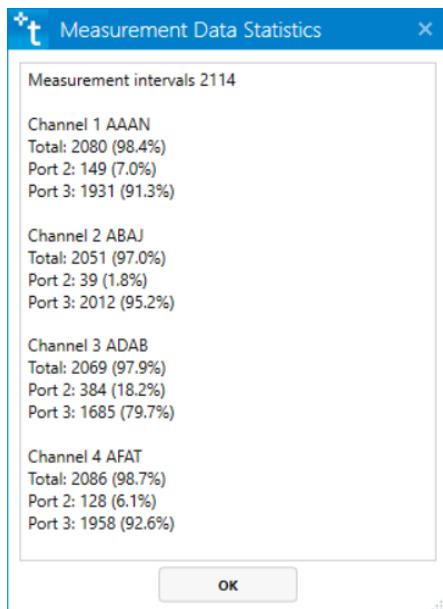


Figure 4-17: Measurement Data Statistics

To close the dialog, confirm by clicking **OK**.



As described in this chapter under Log File Report, this evaluation is transferred to the PDF of the report. The aim of this display is to achieve an optimum setting of the system, in particular the antenna configuration.

## Measurement Display Range Data Statistics

To output the measurement data statistics of a selected screen section, select the menu item **MODULES** under **REPORT** and **MEASUREMENT DISPLAY RANGE DATA STATISTICS...**. The "*Measurement Data Statistics*"-window now opens (Figure 4-18). Here you can view the number of measurement intervals of the image section selected under Dock-Panel **GRAPHIC**. In addition, you receive an evaluation of the received data points in this image section for each sensor active during the measurement. These are converted into a percentage by the number of measurement intervals. Furthermore, the distribution over the used antennas (ports) appears, these are also converted into percent.

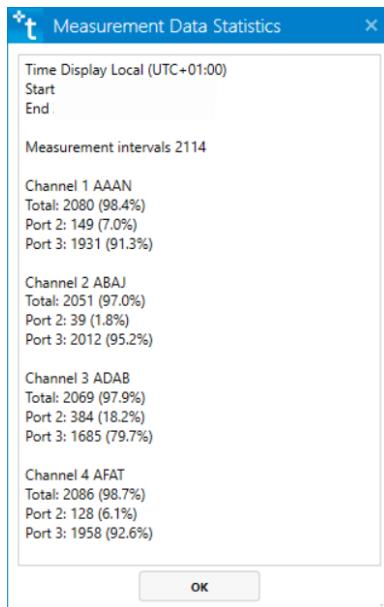


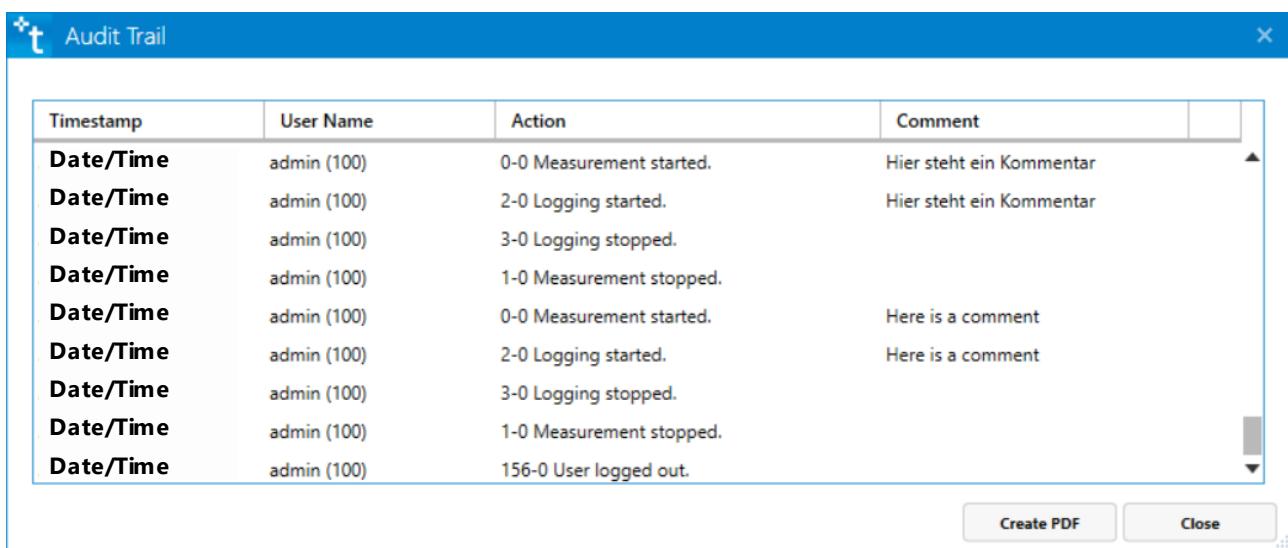
Figure 4-18: Measurement Data Statistics of an Image Section

#### 4.5.6 Audit Trail

The Tempris Lyophilization Monitor option **TLM-AUDITTRAIL** ("Audit Trail") records essential system events as well as all operator inputs and actions that create, modify, delete, or process system or record entries on the TIRU3 interrogation unit. These audit trails are stored in an unalterable, secure log file on the internal file system of the TIRU3 interrogation unit.

All user entries and -actions as well as system events, which cause the creation, modification or deletion of electronic system data, are recorded with time stamps in the audit trail.

The audit trails of the TIRU3 interrogation unit currently connected to the Tempris Lyophilization Monitor software can be accessed using the **AUDIT TRAIL...** function from the **MODULES** menu (Figure 4-19). You must be logged on to the TIRU3 as either an administrator or a configurator to be able to do so.



The screenshot shows a software window titled "Audit Trail". The window contains a table with four columns: "Timestamp", "User Name", "Action", and "Comment". The table lists several log entries, each with a timestamp, a user name (admin (100)), and an action description. Some entries also have a comment in a separate column. At the bottom of the window are two buttons: "Create PDF" and "Close".

| Timestamp | User Name   | Action                   | Comment                  |
|-----------|-------------|--------------------------|--------------------------|
| Date/Time | admin (100) | 0-0 Measurement started. | Hier steht ein Kommentar |
| Date/Time | admin (100) | 2-0 Logging started.     | Hier steht ein Kommentar |
| Date/Time | admin (100) | 3-0 Logging stopped.     |                          |
| Date/Time | admin (100) | 1-0 Measurement stopped. |                          |
| Date/Time | admin (100) | 0-0 Measurement started. | Here is a comment        |
| Date/Time | admin (100) | 2-0 Logging started.     | Here is a comment        |
| Date/Time | admin (100) | 3-0 Logging stopped.     |                          |
| Date/Time | admin (100) | 1-0 Measurement stopped. |                          |
| Date/Time | admin (100) | 156-0 User logged out.   |                          |

Figure 4-19: Audit Trail Function



The **CREATE PDF** icon allows you to extract the entire audit trail as a PDF file.

#### 4.5.7 Backup

The TIRU3 interrogation unit has an integrated backup system which can be activated with the **TLM-BACKUP** software license. If the **TLM-BACKUP** license is activated on the TIRU3 system, a backup log file with the metadata of the measurement run and the recorded measurement data is automatically stored on the backup system of the TIRU3 for each measurement run.

You can view the backup of all measurements/log files in the menu item **MODULES** under **BACKUP....** To download a file, select the desired log file and click the **DOWNLOAD** icon. The Windows dialog box "*Tempris Backup*" now opens (Figure 4-20). You can save the backup file with the desired name to the desired location here.

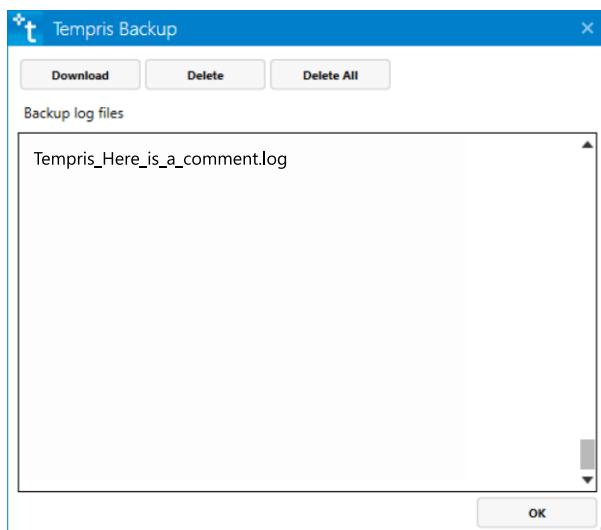


Figure 4-20: TLM – Modules – Display of Backups

It is also possible to delete files that are no longer needed after saving. This may be necessary if your backup storage is full. To delete a file, select a desired log file and click the **DELETE** icon. This is only possible with the user Admin. Now the "*Delete backup log file?*" dialog box opens. (Figure 4-21). If you want to delete the file permanently, confirm this dialog box with **YES**. Alternatively, you can delete all files at once to free up your backup storage.

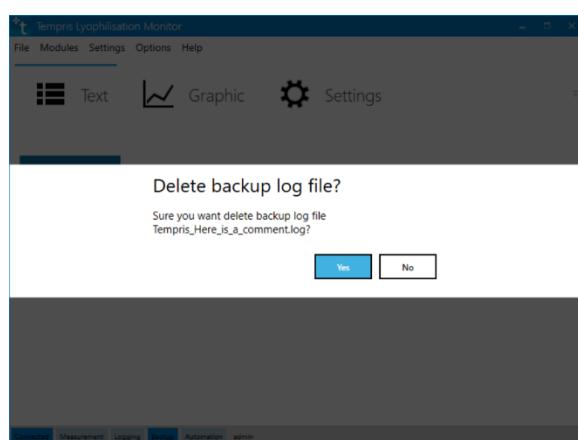


Figure 4-21: Confirm Deletion of Log-File



It is recommended to save the back up files before deleting them to prevent data loss.

## 4.6 Menu – Settings

### 4.6.1 System

#### Sensor Settings

The sensors are configured before the measurement via the menu item **SETTINGS** in the subtopic **SYSTEM** under the item **SENSOR SETTINGS....** First you should upload the calibration files supplied by Tempris on a data carrier under "Calibration file options". Calibration data must be available for all sensors used in the planned measurement in order to carry out a measurement that is as accurate as possible.

You can load existing sensor configurations in the "**Sensor Settings**" dialog box (Figure 4-22). If you have not yet set the configurations, add them with the plus sign. Please note: Loading the respective configuration does not only display it, but sets the setting as active configuration at the same time.

At the same time, you also set the measuring interval, which is the distance between two measuring points, to be recorded. For the measuring interval, second values from 1 to 600 (10 minutes) can be entered. Please note, that the time grid of the actually recorded data (sampling rate) may deviate slightly from the specified measuring interval in special cases, as several milliseconds may elapse between the time the measured value query is activated and the return transmission of the determined measured value to the interrogation unit.

For longer measurements lasting several days, we recommend setting a longer measuring interval of e.g. 10 or 30 seconds, as otherwise the recorded data quantities can become so large that it will take considerable effort to process them afterwards.

Click the **PLUS** button under "**General Settings**" to create a new setting.

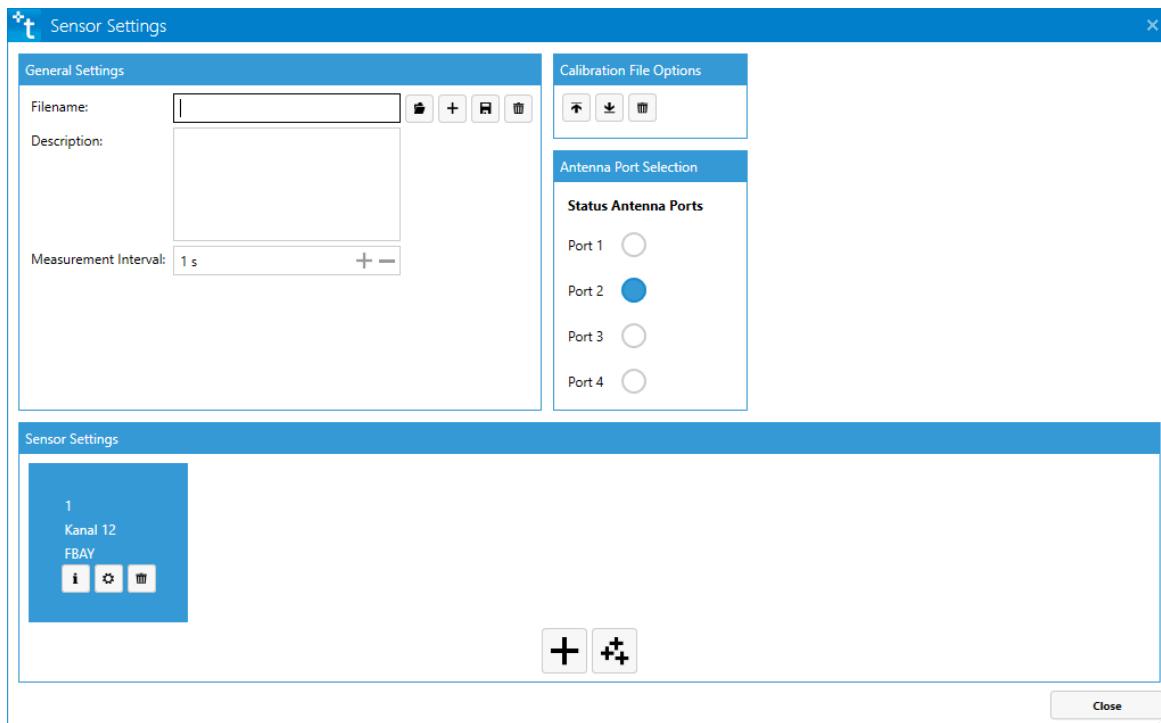


Figure 4-22: Create New Sensor Settings

You can now select the number and position of the antenna ports according to your system (corresponding to the numbering in Chapter 3.2 Figure 3-1). Under "*Sensor settings*" you can add a sensor by clicking on the  icon. We do recommend to only add sensors used by the system to save system resources. In the newly added blue square, you can set each sensor:

-  Show Sensor Calibration Data: Displays the calibration data of this sensor.
-  Change sensor calibration data: Click to adapt data set of the calibration data of this sensor
-  Delete sensor from settings: Deletes the sensor from the current settings

By clicking the  icon, the TIRU3 automatically detects the existing sensors. The detected sensors are now displayed for selection (Figure 4-23). By confirming with **OK**, the sensors can be entered into the settings.

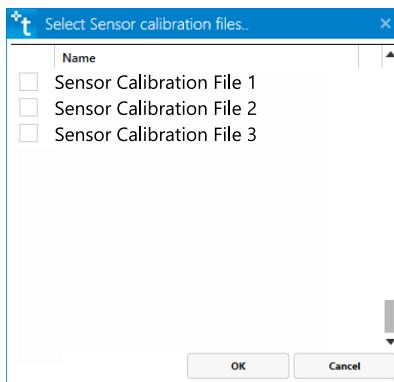


Figure 4-23: Load Sensor Settings

Figure 4-24 shows an example of a sensor configuration of the loaded sensors 1, 2, 4 and 6 with the two connected antenna ports 2 and 3.

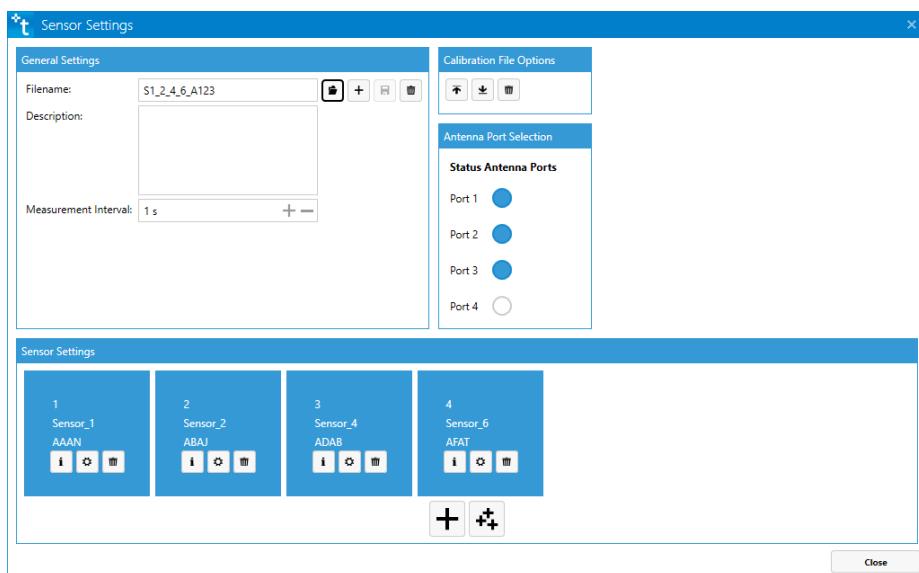


Figure 4-24: Sensor Settings – Sensor Configuration



If the Tempris system is operated with more than one interrogation antenna, the interrogation system of the TIRU3 unit ensures that suitable Tempris antennas are dynamically selected and used during the entire Tempris measurement run for all Tempris sensors in the process.

## License Management

To operate various options in the software, you will need licenses for each TLM software option. You can view and manage the TLM software licenses of the TIRU3 interrogation unit currently connected to your Tempris Lyophilization Monitor software using the [LICENSE MANAGEMENT...](#) function from the [SETTINGS - SYSTEM](#) menu. If the **TLM-USERADMIN** license (user administration, see Chapter 4.6.2) is installed on your TIRU3 interrogation unit, you must be logged on to the TIRU3 unit as an administrator to access the [LICENSE MANAGEMENT...](#) function. The [LICENSE MANAGEMENT...](#) function activates the "*License Manager*" dialog (Figure 4-25). Here you can activate a license with your device ID and the license file purchased from Tempris.

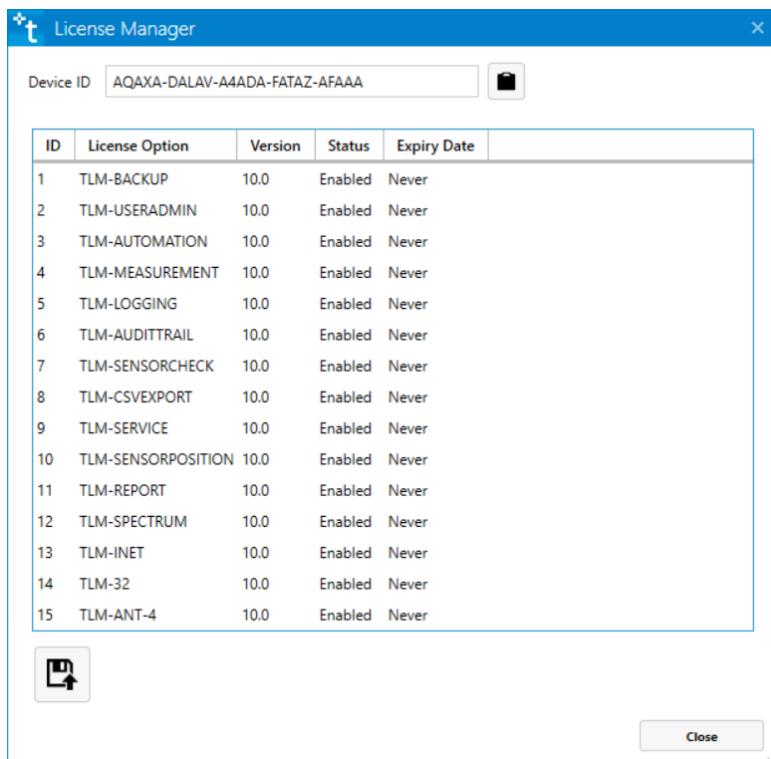


Figure 4-25: License Manager

## 4.6.2 User

In the menu item **SETTINGS** under **USER** there are two sub-items: On the one hand the **USER ADMINISTRATION** and the option **CHANGE PASSWORD**.

### User Management

The TLM option **TLM-USERADMIN** implements role-based user management with specific access rights for the following predefined user groups or security levels (roles):

#### Listener

Authorization to display the current Tempris system process, but without authorization to execute functions that influence the process flow of the Tempris system.

#### Operator

Has all Listener privileges and is also entitled to use the Tempris system in its intended application for recording and processing measurement data.

#### Configurator

Has all Operator privileges and is also authorized to define settings for the measuring operation, to select the sensors and interrogation antenna systems for the measuring operation, to manage the parameter data of the Tempris measuring sensors, and to parameterize the interfaces of the automation system (SCADA, PLC).

#### Administrator

Has all Configurator privileges and is also authorized to manage Tempris users, access audit trails, make settings for the TIRU3 network operation and perform special functions required for the maintenance and service of the Tempris system.

Table 4-3 contains the list of user accounts that are predefined on newly delivered TIRU3 systems.

*Table 4-3: Predefined TLM-User*

| Role          | Login-Name   | Password      | TLM-Display  |
|---------------|--------------|---------------|--------------|
| Administrator | admin        | administrator | admin        |
| Configurator  | configurator | configurator  | configurator |
| Operator      | operator     | operator      | operator     |
| Listener      | listener     | listener      | listener     |

If you are logged in as an administrator you can open the "[Tempris User Administration](#)" dialog for access control (Figure 4-26). Here you will find the login name, the description, the role, the creation date, the expiration date as well as status information on whether a user has been deleted or blocked.

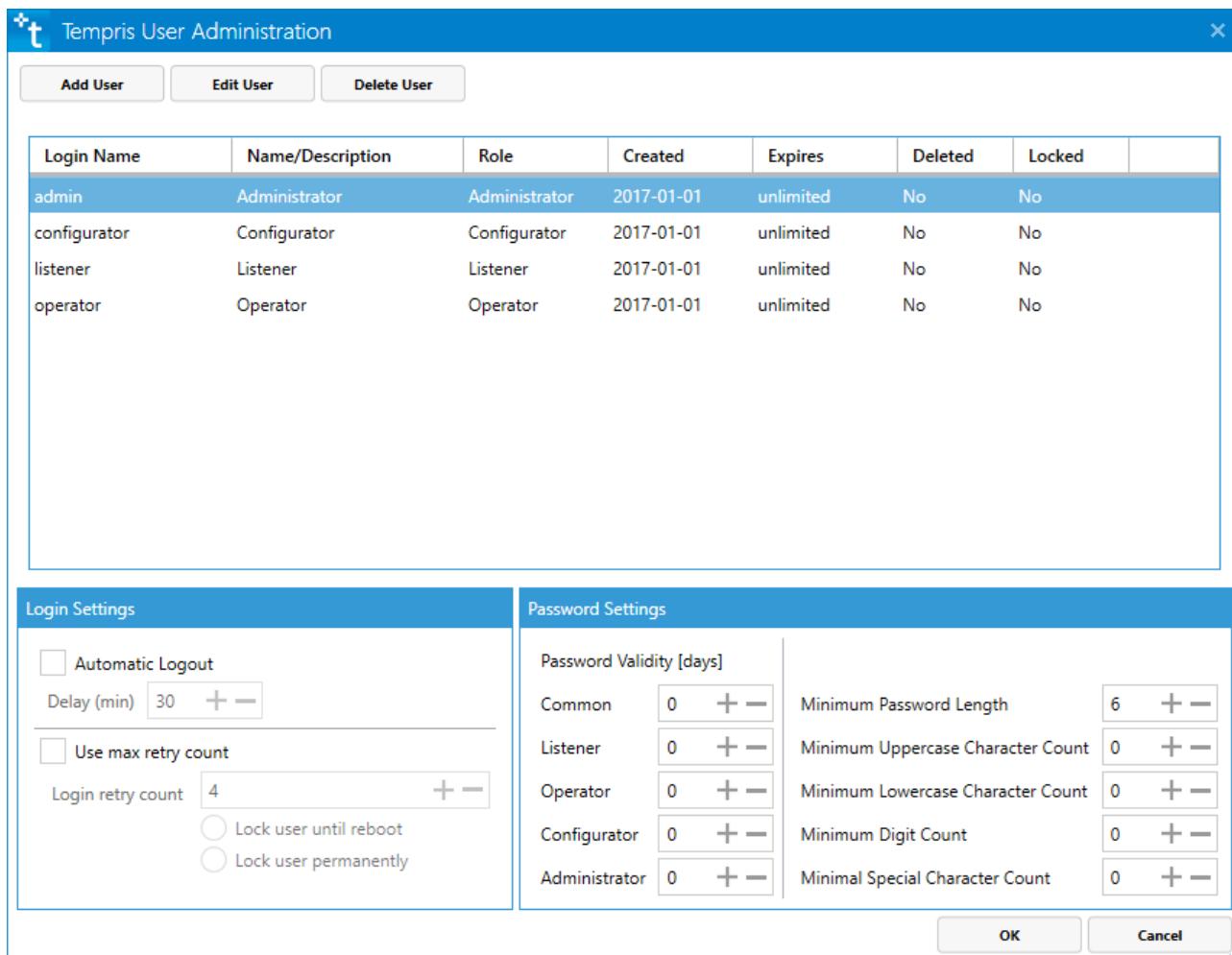


Figure 4-26: Tempris User Management

You can add, edit, or delete users in this panel. To add a user, click on the [ADD USER](#) icon. Now the dialog "[Add User](#)" opens (Figure 4-27). Here you can enter a user name with password. You must repeat your password to prevent incorrect entry. Then you can assign a validity for the password and add a description. Now you have to define the role of the new user (description of rights described in Chapter 4.6.2 under User administration on page 51.) Confirm your entries with [SAVE](#).

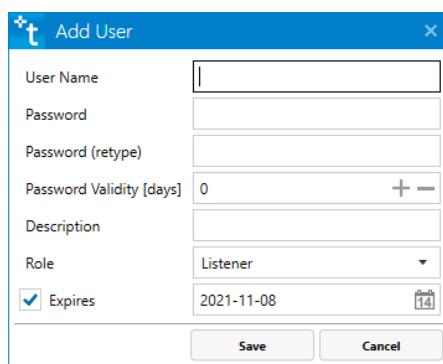


Figure 4-27: Tempris User Management – Add User

## Login Settings

You can also set global login and password settings for all users. In the login settings you can set the duration after which a user is automatically logged out. This can be used to prevent unwanted access. You can also set a maximum number of retry count after which a user will be blocked. You can specify whether the user should be locked permanently or until the next restart. The minimum number of attempts that can be set is 2. A maximum number of attempts is not defined.

## Password Settings

Another feature in the user management is the password setting. Here you can select the password validity in days for the individual roles. You can also define global password settings here:

- Minimum Password Length
- Minimum Uppercase Character Count
- Minimum Lowercase Character Count
- Minimum Digit Count
- Minimum Special Character Count

## Function Access Matrix

Table 4-4 shows the access matrix for the functions of the Tempris Lyophilization Monitor Software. Depending on the context, some menu items may not be selectable (grayed out). Under Notes you can read which functions are necessary to activate menu items. For example, to start a measurement, an active connection to the TIRU3 must exist and you must be logged in, only then does the access field no longer appear grey.

Table 4-4: TLM-User Management – Function Access Matrix

| Menu     | Function/Submenu                             | Admin. | Config. | Operator | Listener | Logged off | Comments   | TLM option, if required |
|----------|--|--------|---------|----------|----------|------------|--|-------------------------|
| FILE     |  | •      | •       | •        | •        | •          |  |                         |
|          | CONNECTIONS...                               | •      | •       | •        | •        | •          |  |                         |
|          | CONNECT                                      | •      | •       | •        | •        | •          | available when not connected to TIRU3  |                         |
|          | DISCONNECT                                   | •      | •       | •        | •        | •          | available when connected to TIRU3  |                         |
|          | LOGIN  |        |         |          |          |            | available when connected to TIRU3 and not logged on to TIRU3   | TLM-USERADMIN           |
|          | LOGOUT                                       | •      | •       | •        | •        | •          | available when connected to TIRU3 and logged on to TIRU3   | TLM-USERADMIN           |
|          | LOAD LOG-FILE                                | •      | •       | •        | •        | •          | available when not connected to TIRU3  |                         |
|          | QUIT APPLICATION                             | •      | •       | •        | •        | •          |  |                         |
| MODULES  |  | •      | •       | •        | •        | •          |  |                         |
|          | START MEASUREMENT                            | •      | •       | •        |          |            | available when connected, logged on to TIRU3 and measurement not active  | TLM-n                   |
|          | STOP MEASUREMENT                             | •      | •       | •        |          |            | available when measurement active and logging not active   | TLM-n                   |
|          | START LOGGING                                | •      | •       | •        |          |            | available when measurement active and logging not active   | TLM-n                   |
|          | STOP LOGGING                                 | •      | •       | •        |          |            | available when logging is active   | TLM-n                   |
|          | REPORT                                       | •      | •       | •        | •        | •          | available when measurement data is recorded or loaded  |                         |
|          | CSV EXPORT...                                | •      | •       | •        | •        | •          | available when measurement data is recorded or loaded  |                         |
|          | LOG-FILE REPORT...                           |        |         |          |          |            | available when log file is loaded  |                         |
|          | MEASUREMENT TOTAL<br>DATA STATISTICS...      | •      | •       | •        | •        | •          | available when measurement data is recorded or loaded  |                         |
|          | MEASUREMENT DISPLAY<br>RANGE DATA STATISTICS | •      | •       | •        | •        | •          | available when measurement data is recorded or loaded  |                         |
|          | AUDIT TRAIL...                               | •      |         |          |          |            |  | TLM-AUDITTRAIL          |
|          | BACKUP...                                    | •      | •       | •        | •        |            |  | TLM-BACKUP              |
|          | DELETE BACKUP FILES                          | •      |         |          |          |            |  | TLM-BACKUP              |
| SETTINGS |  | •      | •       | •        | •        | •          | available when connected to TIRU3 and no measurement started; Automation Override or Automation disable required |                         |
|          | SYSTEM                                       | •      | •       | •        | •        | •          | available when connected, logged on to TIRU3, no measurement nor logging started                                 |                         |
|          | SENSOR SETTINGS...                           | •      | •       |          |          |            | available when connected, logged on and no measurement nor logging started                                       |                         |
|          | LICENSE MANAGEMENT...                        | •      |         |          |          |            | available when connected, logged on and no measurement nor logging started                                       |                         |
|          | USER   | •      | •       | •        | •        | •          | available when connected, logged on and no measurement nor logging started                                       | TLM-USERADMIN           |
|          | USER MANAGEMENT                              | •      |         |          |          |            | available when connected, logged on and no measurement nor logging started                                       | TLM-USERADMIN           |
|          | CHANGE PASSWORD                              | •      | •       | •        | •        | •          | available when connected, logged on and no measurement nor logging started                                       | TLM-USERADMIN           |
|          | CHAMBER SETTINGS...                          | •      | •       |          |          |            | available when connected, logged on and no measurement nor logging started                                       | TLM-SENSORPOSITION      |

| Menu             | Function/Submenu    | Admin. | Config. | Operator | Listener | Logged off | Comments   | TLM option, if required |
|------------------|---------------------|--------|---------|----------|----------|------------|--|-------------------------|
|                  | Function/Option     |        |         |          |          |            |  |                         |
|                  | PRODUCT SETTINGS... | •      | •       |          |          |            | available when connected to TIRU3 and automation disabled                  | TLM-SENSORPOSITION      |
| OPTIONS          |                     | •      | •       | •        | •        | •          |  |                         |
|                  | LANGUAGE            | •      | •       | •        | •        | •          |  |                         |
|                  | GERMAN              | •      | •       | •        | •        | •          |  |                         |
|                  | ENGLISH             | •      | •       | •        | •        | •          |  |                         |
|                  | CHINESE             | •      | •       | •        | •        | •          |  |                         |
|                  | TEMPLATES           | •      | •       | •        | •        | •          |  |                         |
|                  | FIRMWARE UPDATE     | •      | •       | •        | •        | •          |  |                         |
| HELP             |                     | •      | •       | •        | •        | •          |  |                         |
|                  | MANUAL              | •      | •       | •        | •        | •          |  |                         |
|                  | GERMAN              | •      | •       | •        | •        | •          |  |                         |
|                  | ENGLISH             | •      | •       | •        | •        | •          |  |                         |
|                  | AUTOMATION MANUAL   | •      | •       | •        | •        | •          |  |                         |
|                  | ENGLISH             | •      | •       | •        | •        | •          |  |                         |
|                  | ABOUT TIRU3         | •      | •       | •        | •        | •          | available when connected to TIRU3  |                         |
|                  | ABOUT               | •      | •       | •        | •        | •          |  |                         |
| Functional Index |                     | •      | •       | •        | •        | •          |  |                         |
|                  | TEXT                | •      | •       | •        | •        | •          |  |                         |
|                  | GRAPHIC             | •      | •       | •        | •        | •          |  |                         |
|                  | 3D-VIEW             | •      | •       | •        | •        | •          |  | TLM-SENSORPOSITION      |
|                  | SETTINGS            | •      | •       | •        | •        | •          |  |                         |
|                  | SENSOR              | •      | •       |          |          |            | available when connected, logged on and no measurement nor logging started |                         |
|                  | AUTOMATION          | •      | •       |          |          |            | available when connected, logged on and no measurement nor logging started | TLM-AUTOMATION          |
|                  | AUTOMATION MONITOR  | •      | •       | •        | •        |            |  |                         |
|                  | LICENSE             | •      |         |          |          |            | available when connected, logged on and no measurement nor logging started |                         |
|                  | USER                | •      |         |          |          |            | available when connected, logged on and no measurement nor logging started | TLM-USERADMIN           |
|                  | CHAMBER             | •      | •       |          |          |            | available when connected, logged on and no measurement nor logging started | TLM-SENSORPOSITION      |
|                  | PRODUCT             | •      | •       |          |          |            | available when connected, logged on and no measurement nor logging started | TLM-SENSORPOSITION      |
|                  | TIRU IP             | •      |         |          |          |            | available when connected, logged on and no measurement nor logging started |                         |
|                  | INET                | •      |         |          |          |            |  |                         |
|                  | SYSTEM INFO         | •      | •       | •        | •        | •          |  |                         |
|                  | ARCHIVE             | •      |         |          |          |            |  |                         |

## Change Password

To change your password, go to the menu item **SETTINGS** under **USER** and select the option **CHANGE PASSWORD....** The "*New Password*" dialog opens (Figure 4-28). Here you can assign a new password. Confirm your password by clicking the **SAVE** button.

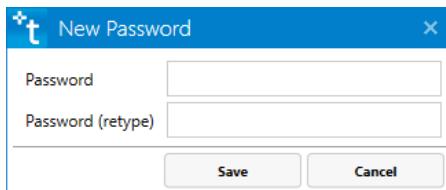


Figure 4-28: Assign New Password

#### 4.6.3 Define chamber dimensions

To enter the chamber dimensions of your freeze dryer, click on the button **SET CHAMBER DIMENSIONS...** in the menu item **SETTINGS** or enter **SETTINGS** on the **CHAMBER** tile via the dock panel. The "*Chamber Layout*" dialog box now opens. (Figure 4-29).

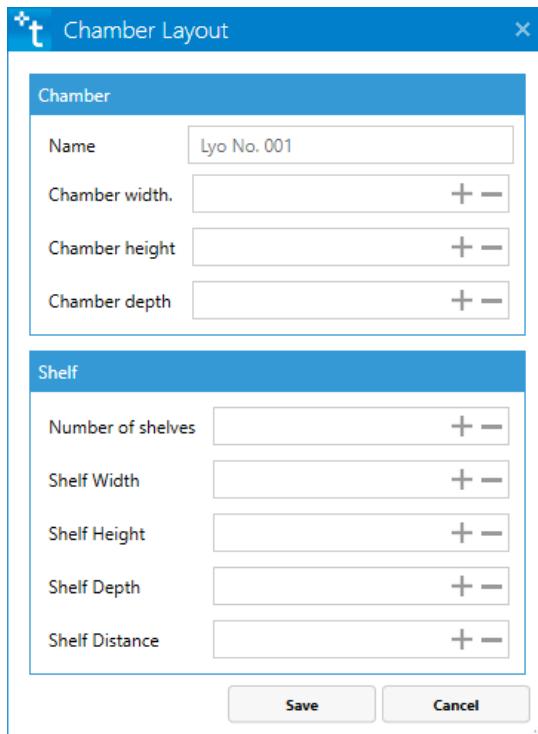


Figure 4-29: Define Chamber Dimensions

In the chamber settings, enter the *name* of your freeze dryer, the chamber *width*, *height* and *depth*. In addition, you can enter the *number*, *width*, *height*, *depth* and *distance* of the shelf in the shelf area. Confirm your entries with **SAVE**.

#### 4.6.4 Product Management

By pressing the "Product" button or in the **SETTINGS** menu item of the **PRODUCT MANAGEMENT...** button, the **"Product settings"** dialog opens. Here you enter your *product name*, the *vial size* and the *vial filling quantity*. The field **"Supported sensor size"** now shows you which sensors you can use for the measurement of this product. The use of the correct sensor size is decisive for the measurement quality of your data.

Figure 4-30 shows an example for the product "Product No. 1" with a vial size of 50 R and a filling volume of 50 ml. In this case, use the TL-28 sensor from Tempris to measure the temperature of your product.

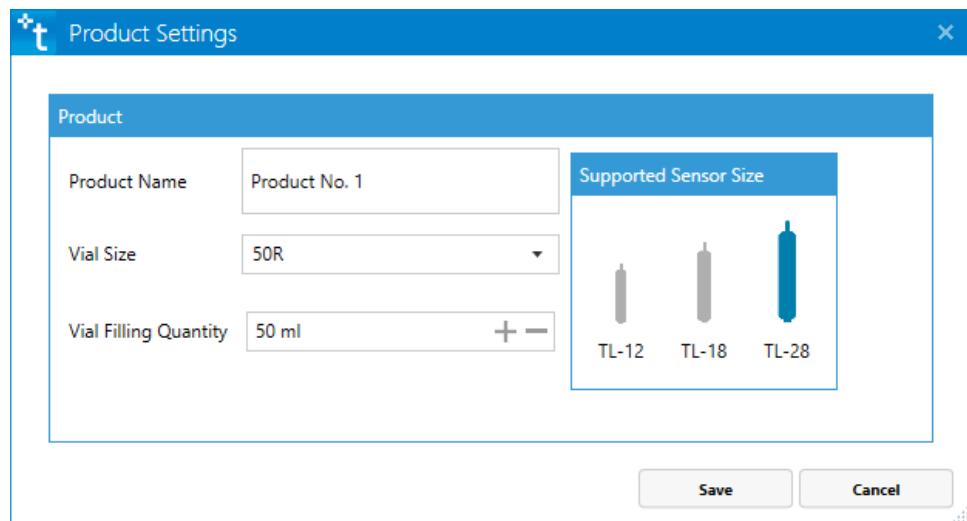


Figure 4-30: Define product settings and find the right sensor.

## 4.7 Menu – Options

### 4.7.1 Languages

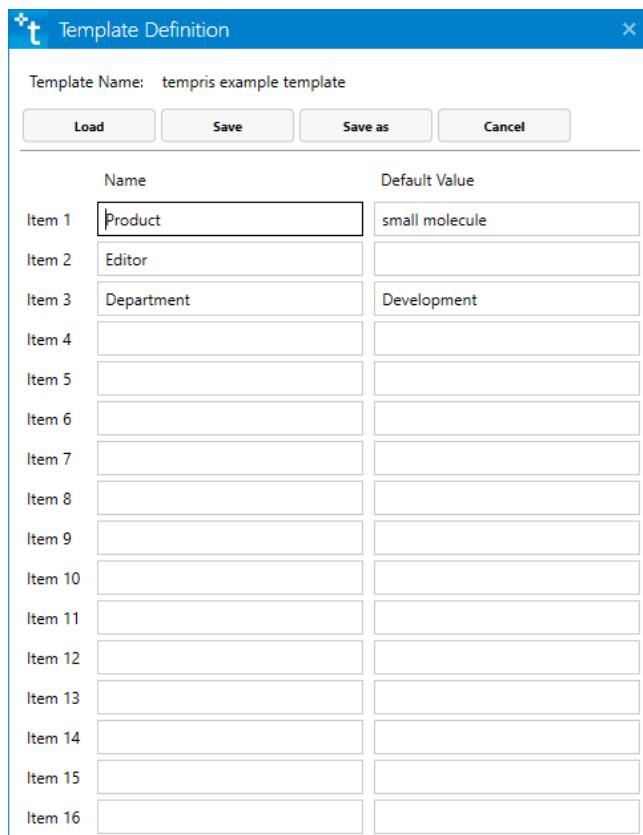
In the menu item **OPTIONS** under **LANGUAGE** you can currently choose between the languages English and German. The user interface with menu, dock-panel and status display is then changed to the desired language.

### 4.7.2 Templates

In the menu item **OPTIONS** under **TEMPLATES...**, you can create a template that you can use when you start logging. The dialog "*Template definition*" opens (Figure 4-31). Here examples are displayed in the following fields:

- *Field 1* the category 'Product' and default value 'Small Molecule'
- *Field 2* the category 'Editor'
- *Field 3* the category 'Department' with the default 'Development'.

You can customize and save these fields to your liking, or create different templates for your applications.



|         | Name       | Default Value  |
|---------|------------|----------------|
| Item 1  | Product    | small molecule |
| Item 2  | Editor     |                |
| Item 3  | Department | Development    |
| Item 4  |            |                |
| Item 5  |            |                |
| Item 6  |            |                |
| Item 7  |            |                |
| Item 8  |            |                |
| Item 9  |            |                |
| Item 10 |            |                |
| Item 11 |            |                |
| Item 12 |            |                |
| Item 13 |            |                |
| Item 14 |            |                |
| Item 15 |            |                |
| Item 16 |            |                |

Figure 4-31: set template definitions to create a new template

By clicking the **SAVE** icon you can save the created template under the desired name, here *tempris example template* (Figure 4-32).

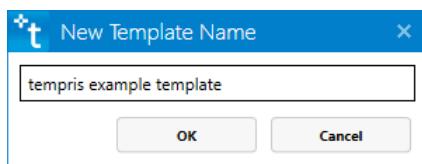


Figure 4-32: saving a template under a desired name

If you now start logging, your created and loaded template appears in the "*Data Entry*" dialog box (Figure 4-33). You can now fill in the fields *Product*, *Processor* and *Department* here and confirm with **OK**.

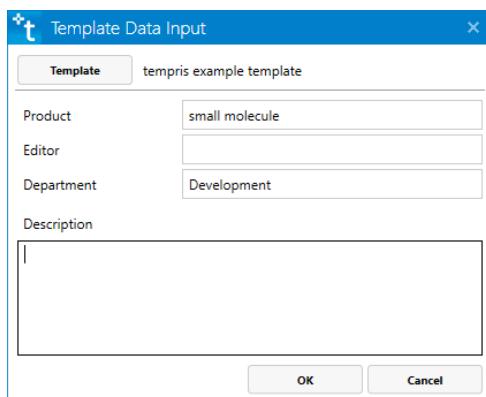


Figure 4-33: data input when starting logging



You can also select another template from your template catalogue using the **TEMPLATES** icon in the "*Data Input*" dialog box.

#### 4.7.3 Firmware Update

A firmware update can be obtained from our Tempris service personnel. Please contact us for this: [service@tempris.com](mailto:service@tempris.com)

## 4.8 Help

### 4.8.1 User Manual

The manual of the Tempris system for lyophilization can be found in digital form in the TLM software under **HELP** and **MANUAL**. The manual is currently available in German and English.

### 4.8.2 About TIRU3

Once a connection is established with a TIRU3 system, you can call up a window with information on the connected TIRU3 system in the **HELP** menu under **ABOUT TIRU3...** Figure 4-34 below shows an example of such a TIRU3 information window.

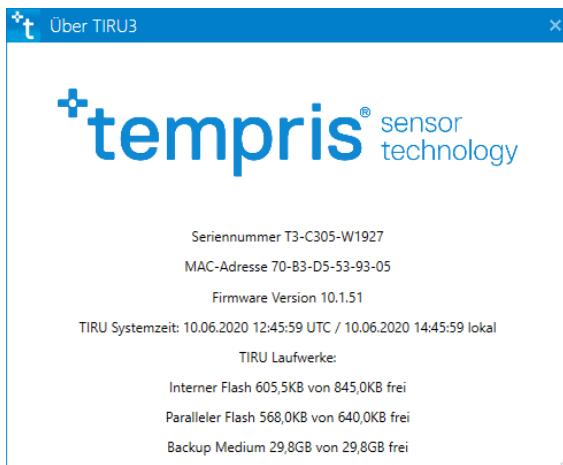


Figure 4-34: system information in menu item *About TIRU3*

### 4.8.3 About

General information about the TLM software can be found in the menu item **HELP** under **ABOUT....** After opening the window, the system displays the current version number, the Tempris website address and the contact to our support system (Figure 4-35). You will also receive information about our EULA (End User Licence Agreement).



Figure 4-35: System Information in the Menu Item 'About'

## 4.9 Dock-Panel



The individual windows of the Dock-Panel (TEXT, GRAPHICS, SETTINGS) can be moved to another position or dragged out of the window into a new one by simply dragging the respective panel.

The Dock-Panel consists of three units: TEXT Display, GRAPHIC Display, SETTINGS.

### 4.9.1 Text Display

During the measurement the Dock-Panel shows an overview of the currently active sensors. The following sensor properties are displayed (Figure 4-36):

- ① sensor name and number selected in the software
- ② sensor label (visible on sensor)
- ③ current temperature
- ④ aktive Antenne mit deren Signalstärke

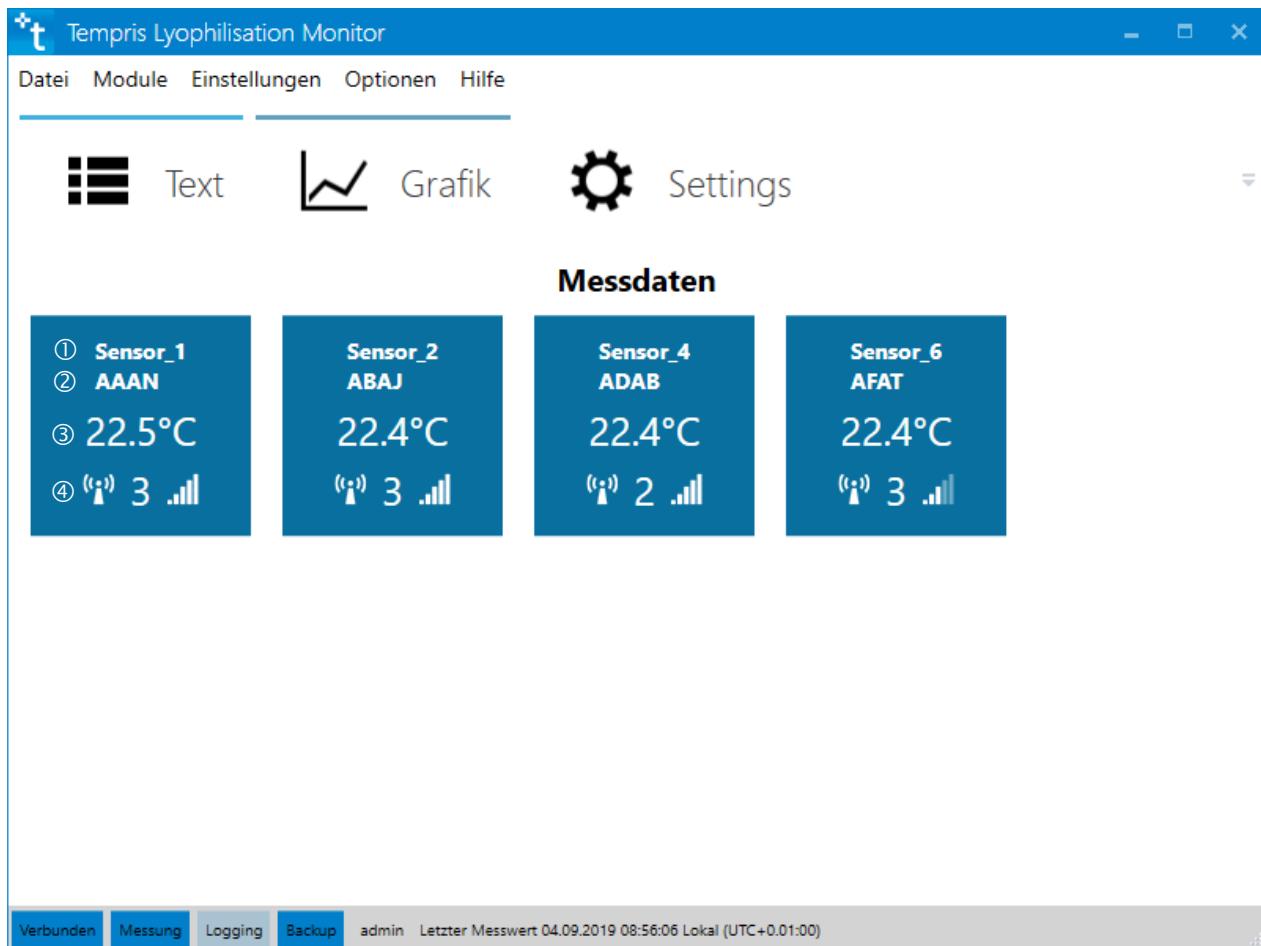


Figure 4-36: Dock-Panel – Text-Display

If a previously found channel (sensor) temporarily disappears from the antenna field, the last measured temperature value is displayed in grey. As soon as a "greyed" channel (sensor) enters the antenna field again, the currently measured temperature value appears again in normal (white) lettering.

## 4.9.2 Graphic Display

After connecting to the TIRU3 and starting a measurement, the Dock-Panel **GRAPHIC** displays the temperatures measured by the sensors in °C over time (Figure 4-37).

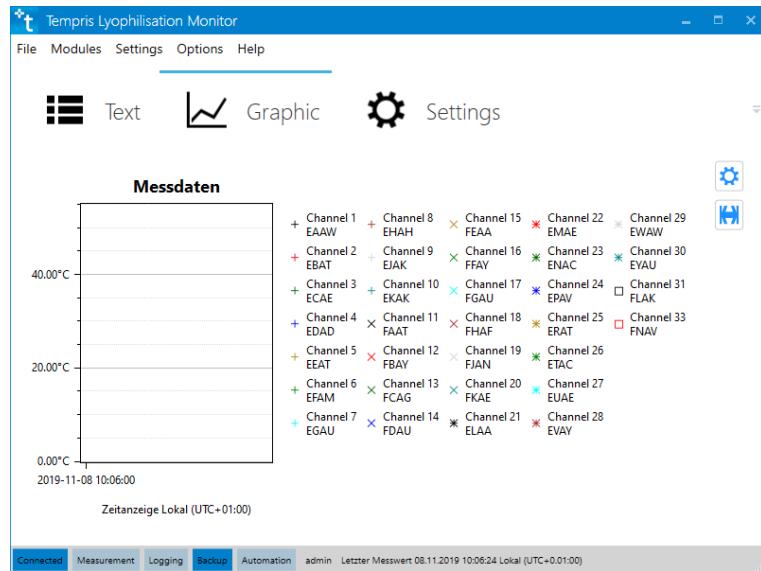


Figure 4-37: Dock-Panel Graphic-Display

To make settings on the view, click on the blue settings icon: Now a sidebar (Figure 4-38) opens on the right, in which you can set whether you want all sensors to be displayed, only those with data collected, or no sensor at all.

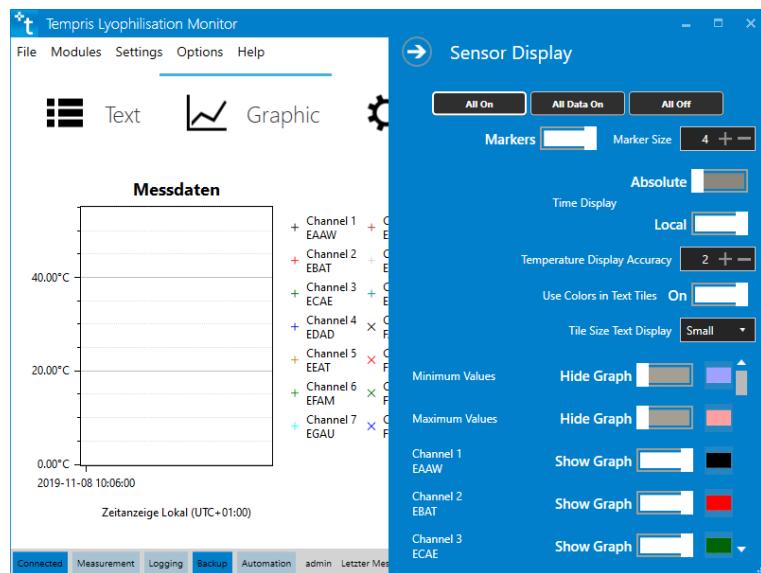


Figure 4-38: Dock-Panel Graphic-Display – Sidebar for Setting the Graphic Display.

## Sensor Display

In this setting you select whether you want all, only those with data collected or no sensor to be displayed. You can also switch between **LINE** and **MARKER** display (Figure 4-39). If you are in the marker display, you can also select the **SIZE** of the markers (between 1 and 6).

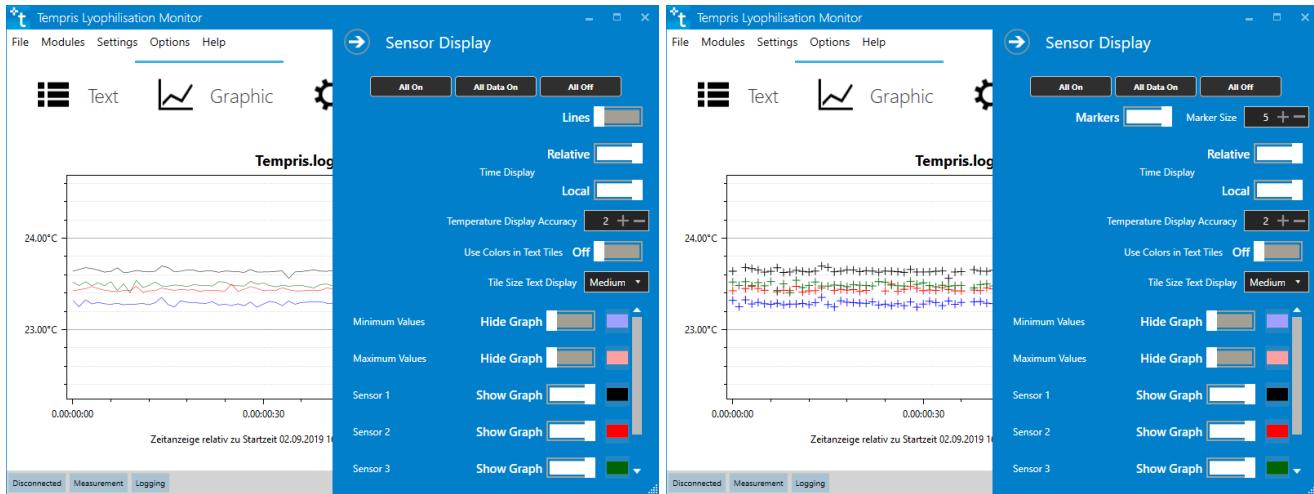


Figure 4-39: Dock-Panel Graphic View - Sidebar for setting the graphic display. Display of measurement data in line (left) or as marker (right).

You can also manually turn the sensor display for each sensor on or off. By right-clicking on a sensor, you can turn off all but the selected sensor (Figure 4-40).

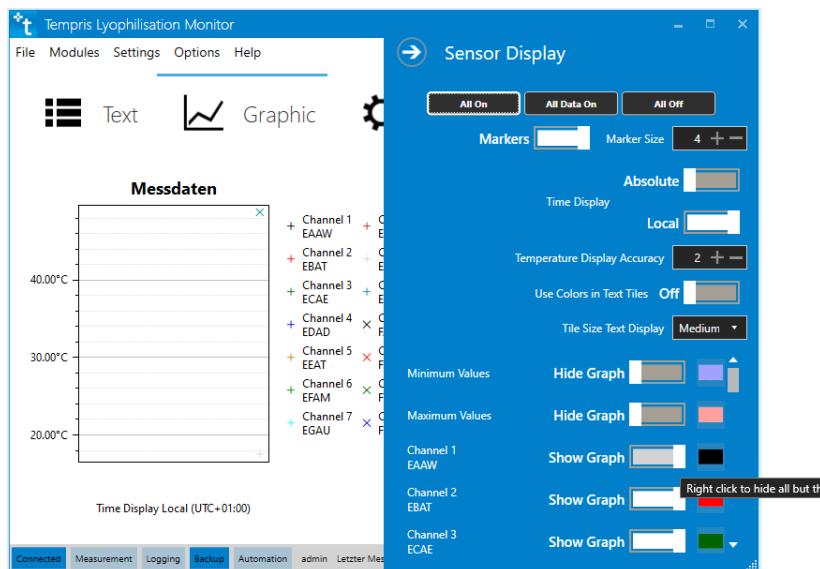


Figure 4-40: Dock Panel Graphic View - Hide all sensors except this one.

## Color settings of the sensor channels

You can change the colors for each sensor by clicking on the color box of the respective sensor. Here you can choose from the standard colors (Figure 4-41) or in the Advanced tab (Figure 4-42) from any color value.

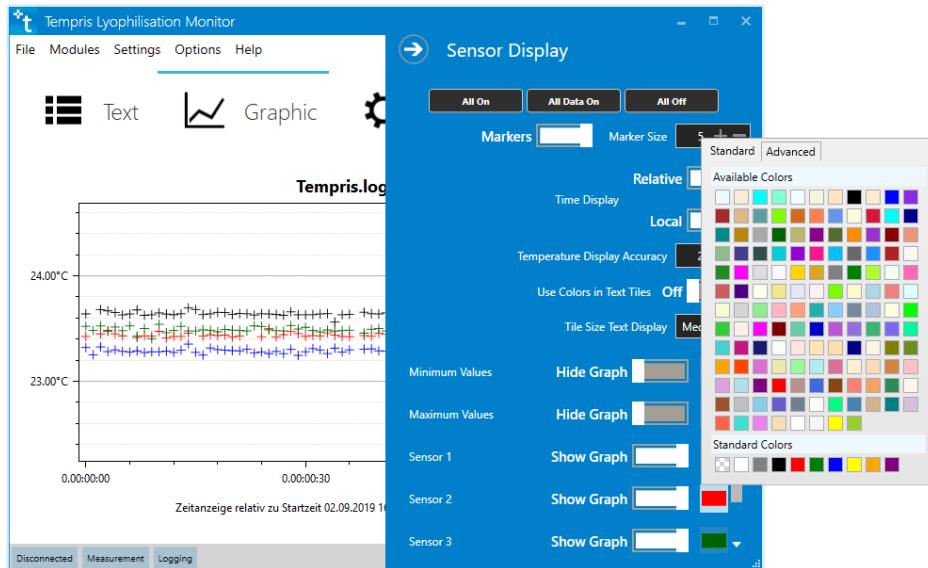


Figure 4-41: Dock-Panel Grafik display – Colour selection standard colours

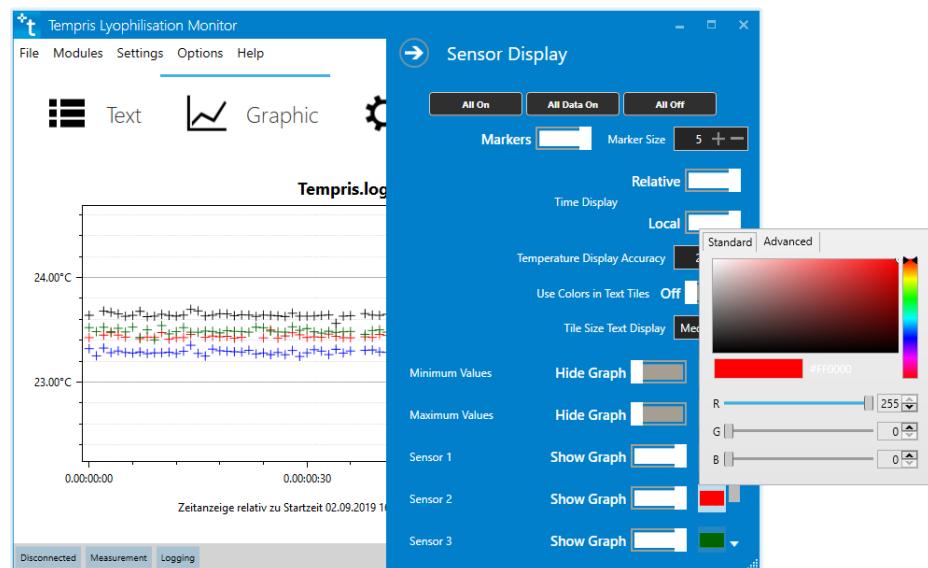


Figure 4-42: Dock-Panel Grafik display – Colour selection extended

## Time Display

It is also possible to change the time display. Here you can choose between **RELATIVE** (time since start of measurement) and **ABSOLUTE** time (date and time), as well as between **LOCAL** and **UTC** time system. (Figure 4-43).

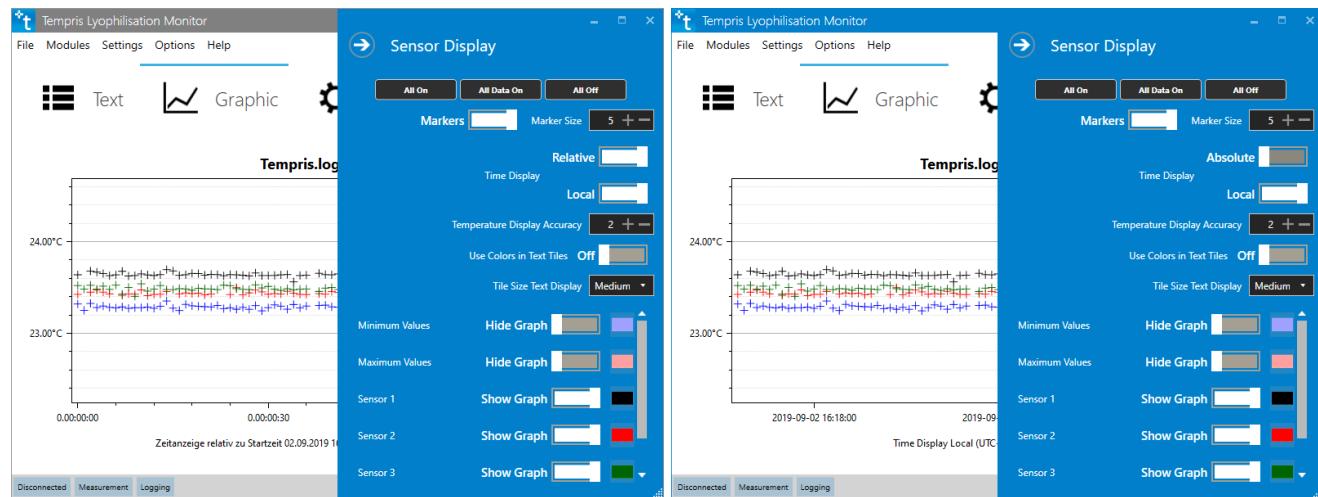


Figure 4-43: Dock-Panel Graphic View - Sidebar for setting the graphic display. Display of the measurement data in absolute (left) or relative (right).

## Temperature Display Decimal Places

You can also set the display of the accuracy (temperature display decimal places) of your measured values via the side menu. Here you can choose between **ONE** or **TWO DECIMAL PLACES**.

## Text Fields in Channel Color

Also select whether you want the tiles to be displayed in the **TEXT** view in the **CHANNEL COLORS** or in **ONE COLOR** (for an example, see Figure 4-44).

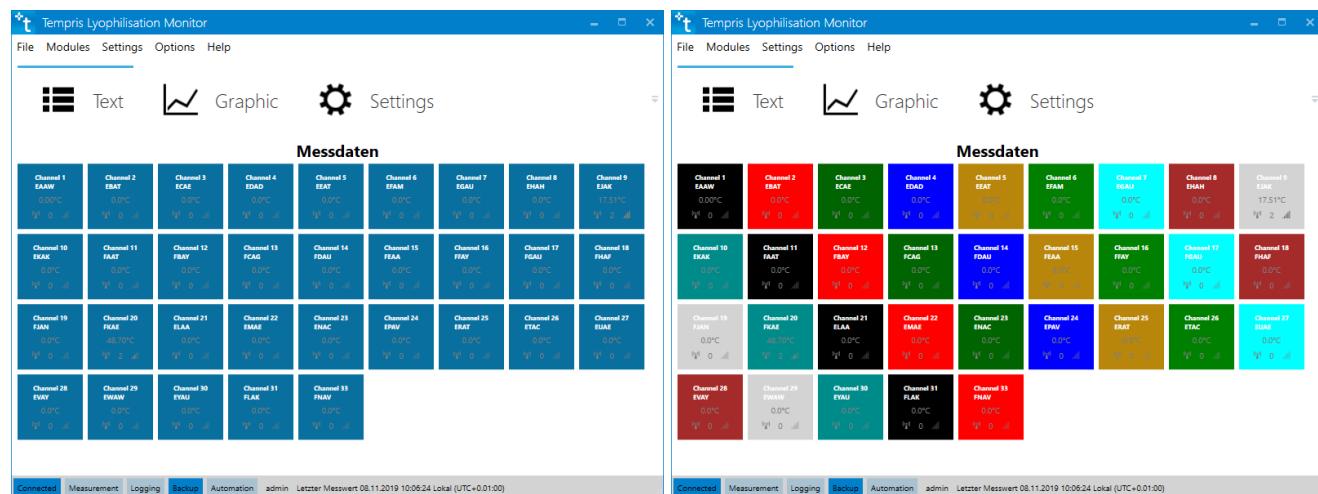


Figure 4-44: Dock Panel Graphic View - Links: Text fields in channel color off - Right: Text fields in channel color on

## Tile Size Text Display

As a further setting you have the possibility to adjust the **TILE SIZE**. This helps you to keep an overview of all sensors with a large number of sensors (see Figure 4-45).

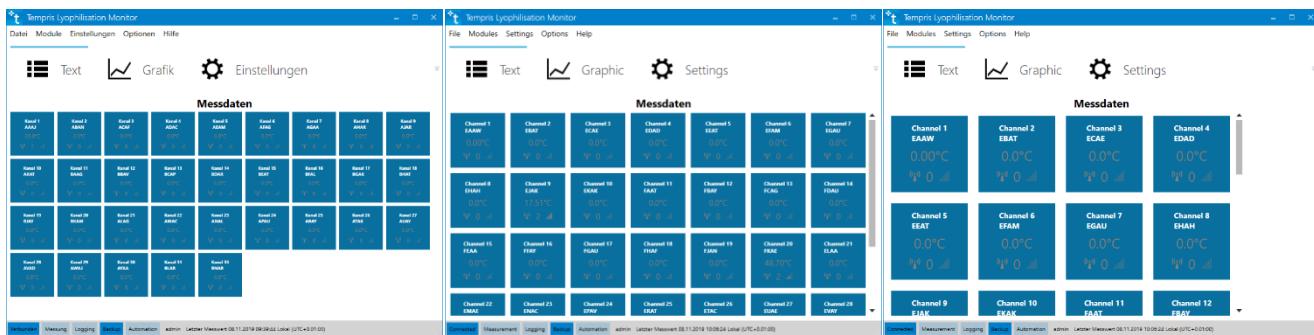


Figure 4-45: Dock Panel Graphic View - Links: Text Size Small; Middle: Text Size Medium; Right: Text Size Large.

## Show and Hide Minimum and Maximum Values

In the sidebar it is also possible to display the **MAXIMUM** (red) and **MINIMUM** values (blue). (Figure 4-46).

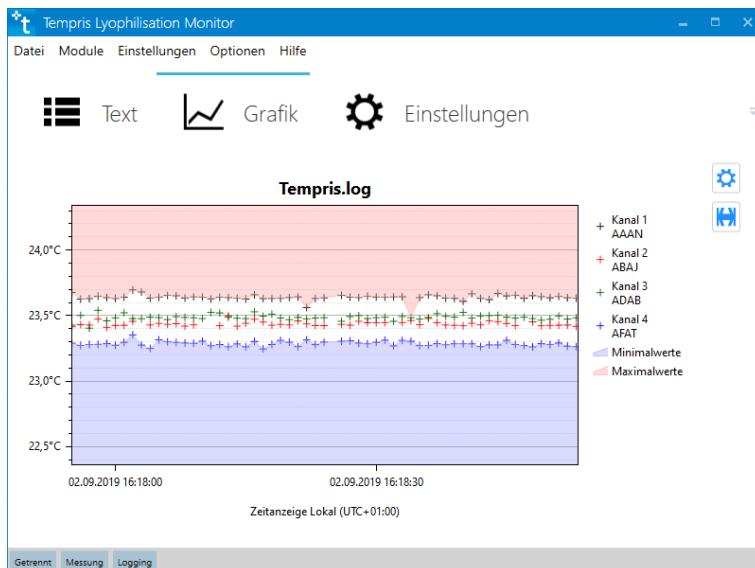


Figure 4-46: Dock-Panel Grafik-Display – Maximum (red)- and Minimum Values (blue)

## Display Settings in the Graphic

You can change the following settings directly in the graphic using the mouse:

- Left Mouse Key: display of sensor data as text at picked time (Figure 4-47)
- Right Mouse Key: Moving the measurement points (by right-clicking on the time or temperature axis, the range is only moved along the time or temperature).
- Mouse Wheel: Zoom in and zoom out (zooming in and out on the axes causes the zoom in and zoom out on the respective axis)
- Click the mouse wheel and drag: (Figure 4-48) (by clicking on the time or temperature axis the entire range along the time or temperature is selected)

To display all measuring points in the window again, click on the following symbol:

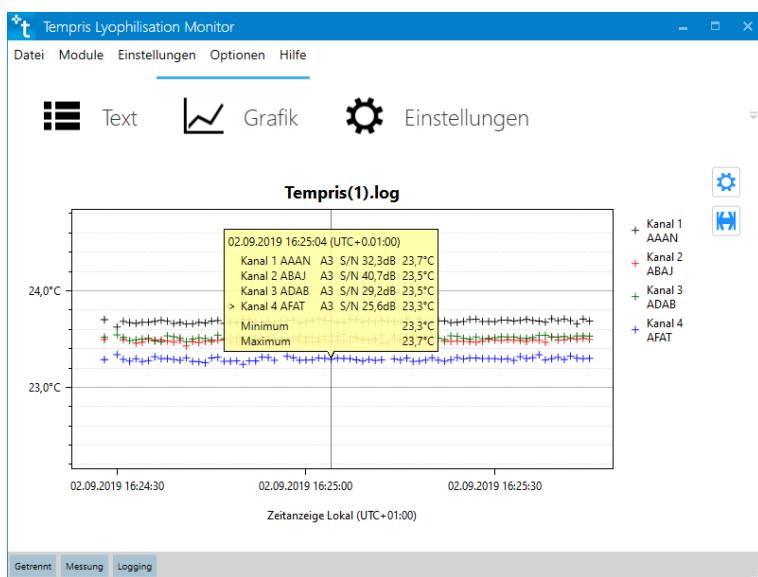


Figure 4-47: Dock-Panel Graphic-Display – Right Mouse Key: Detailed Measuring Point Information

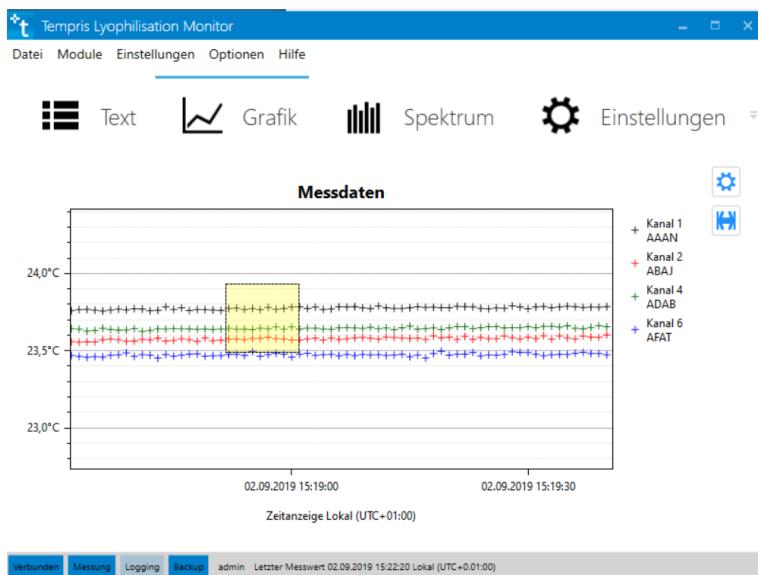


Figure 4-48: Dock-Panel Graphic-Display – click on the mouse wheel and drag to zoom to the selected yellow area

### 4.9.3 Settings



You cannot make any settings in the Dock-Panel during a measurement. To make settings, you must first stop the measurement.

The Dock-Panel **SETTINGS** provides you with a good overview for (Figure 4-49):

- **SENSOR**
- **AUTOMATION**
- **LICENSE**
- **USER**
- **CHAMBER**
- **PRODUCT**
- **TIRU IP**
- **INET**
- **SYSTEM INFO**

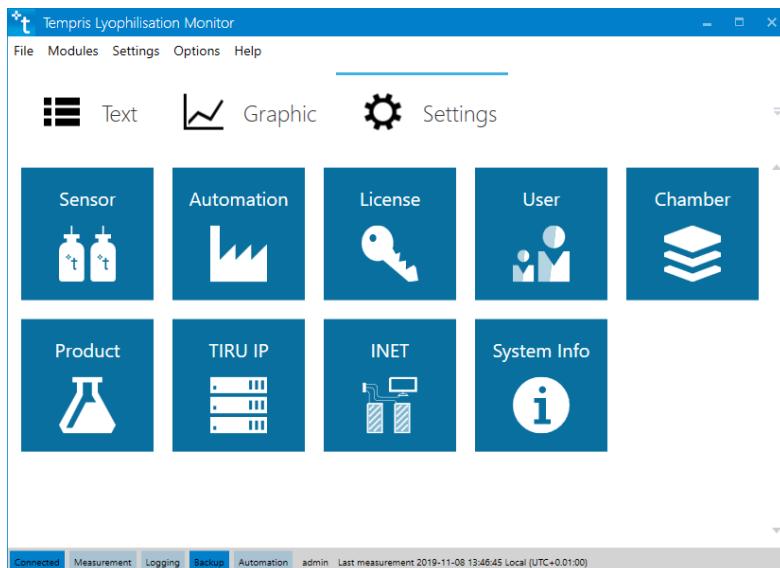


Figure 4-49: Dock-Panel Settings - Overview

#### Sensor

The **SENSOR** icon takes you to the sensor settings. A detailed description can be found in Chapter 4.6.1 under Sensor Settings.

## Automation

The Tempris option **TLM-AUTOMATION** (Tempris Lyophilization Monitor Automation) implements a freely parameterizable Modbus-over-TCP/IP automation interface for communication with SCADA, PLC and data recorder systems. A detailed description can be found in chapter 756.

## License

The [LICENSE](#) function takes you to the license management of the TLM software. A detailed description can be found in chapter 4.6.1 under License Management.

## User

The User function takes you to the [USER SETTINGS](#). A detailed description can be found in chapter 4.6.2.

## TIRU IP

You can change the IP address of your TIRU3 using the [TIRU IP](#) icon (Figure 4-50). This is necessary, for example, if you have changed the IP address on your interrogation unit to avoid an IP address conflict on your network, or if you want to connect to another TIRU3 interrogation unit with a different IP address. This can be useful on PCs that are permanently connected to a special TIRU3 interrogation unit (e.g. a T.LAB system).

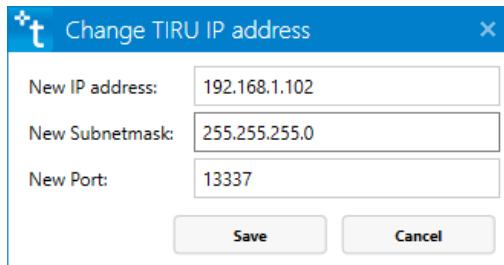


Figure 4-50: Change TIRU IP

## System Information

Under **SYSTEM INFO**, the system gives you an overview of the TIRU3 (Figure 4-51), the *antenna ports*, the *software licenses*, the *user accounts* and the *sensors* (with measuring channel, sensor channel, serial number, ID, minimum and maximum temperature and the next upcoming calibration date). You can export the complete system information of the TIRU3 as a PDF file. To do this, scroll down and press the **OK** icon.

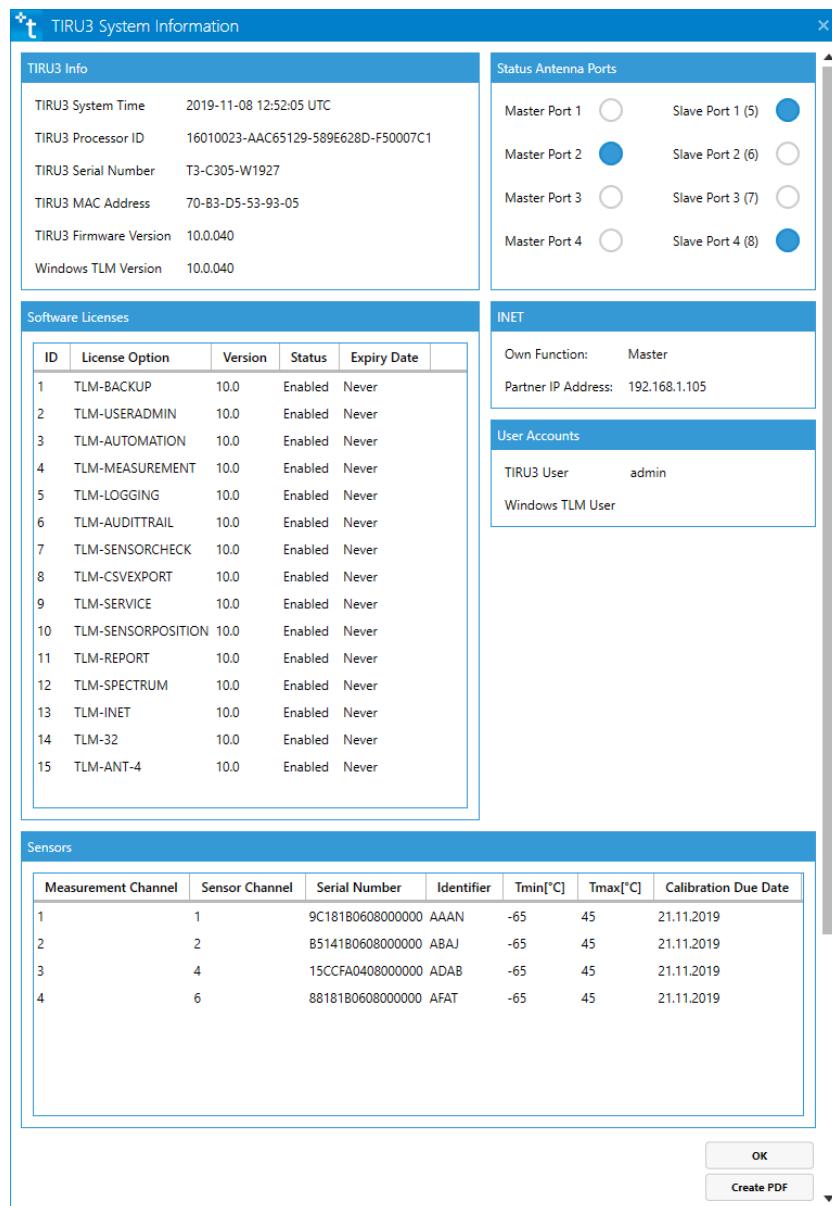


Figure 4-51: Dock-Panel Settings – System Information

## 5 Additional Modules

### 5.1 Automation

For configuration with your automation interface, please request our "Automation" manual at [info@tempris.com](mailto:info@tempris.com).

### 5.2 INET

To activate the function INET you need the license key **TLM-INET**. As soon as you have logged in with the corresponding license, the **INET** button appears under **SETTINGS**. (Figure 5-1).

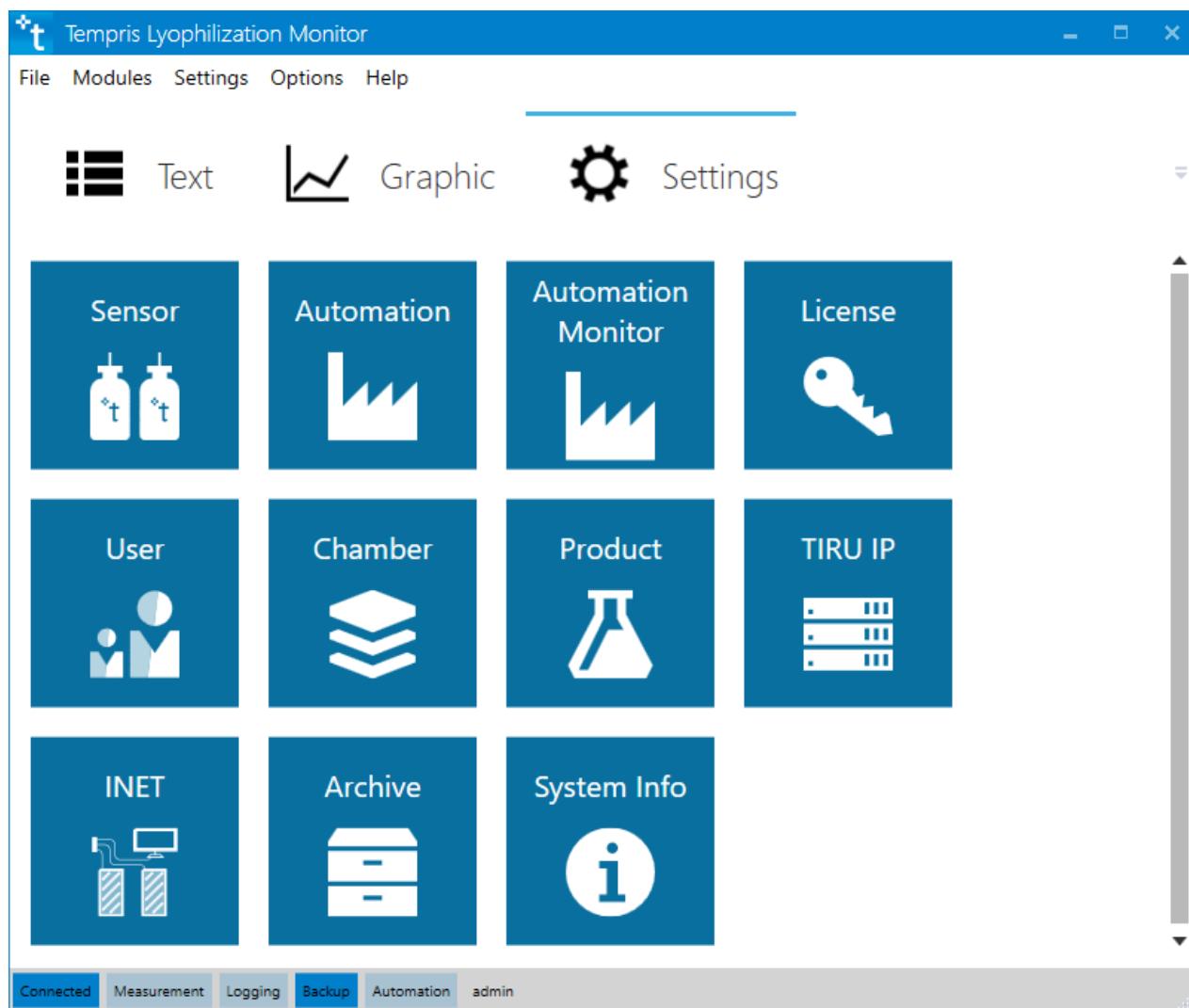


Figure 5-1: TIRU INET icon

To set up the TIRU INET, click on the **INET** button. Now the dialog box "**TIRU INET Settings**" opens. (Figure 5-2). Here you can operate several TIRU3 together to increase the number of antennas that can be used. To do this, you must first define a TIRU3 as slave (example IP: 192.168.1.101). To do this, log in with a TIRU3 and select **Slave** under **Own function** as shown in Figure 5-2. In the **Partner IP Address** field, enter the IP address of the second TIRU3 not logged in (example IP: 192.168.1.100). Confirm the procedure with **SAVE**.

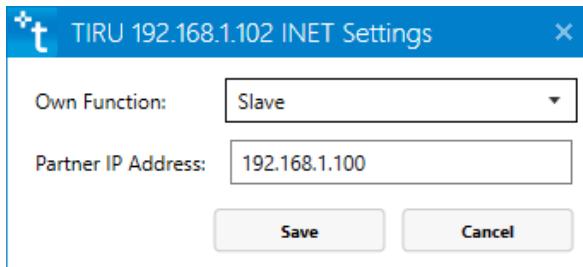


Figure 5-2: setup TIRU INET

Now you have to log in on the second TIRU and define it as master (example IP: 192.168.1.100). Go back to **SETTINGS** and select the **INET** button. In the same dialog box select **Master** and enter in the corresponding **partner IP address**, the address of the first TIRU3 defined as slave (example IP: 192.168.1.101) (Figure 5-3). Confirm the procedure again with **SAVE**.

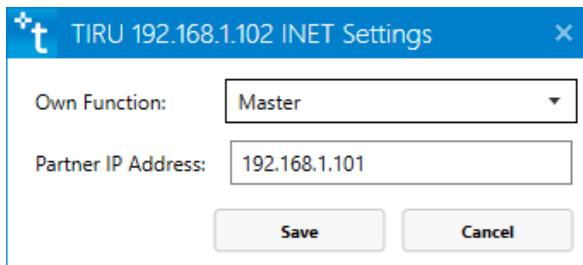


Figure 5-3: setup TIRU INET Master

Now the system establishes a connection with both TIRU3s. In this configuration you can operate up to 8 antennas. To control the measuring system, you must log in to the master TIRU.

The adjustment of the antennas and sensors is done via the button **SENSOR** in the Dock-Panel "Settings". The general settings, calibration file, options and the sensor settings remain as described in chapter 4.6.1 under **SENSOR SETTINGS....** Only the selection of antenna ports is now increased from 4 to 8 (Figure 5-4). On the left side select the connected antennas for your master TIRU3 (1-4) on the right side the slave TIRU3 (5-8). This information also appears in your log file and in the measurement data statistics

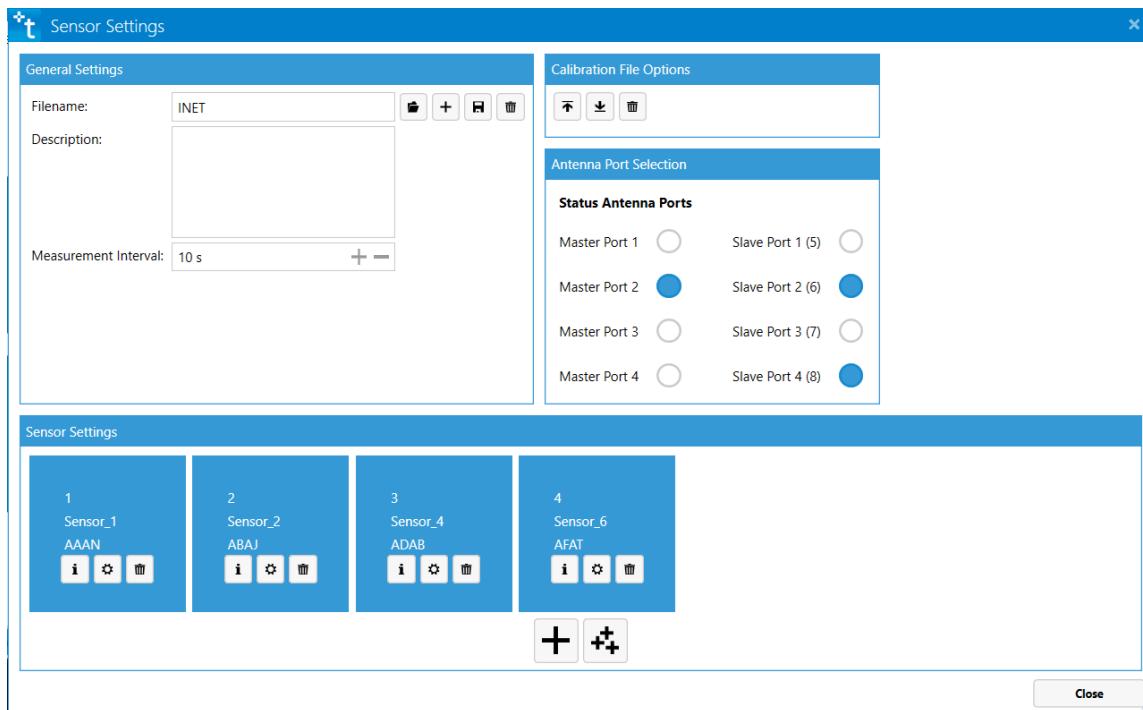


Figure 5-4: Sensor Settings with INET



In order to ensure that the measurements are carried out correctly, you must not set the measuring interval to <10 s in the INET mode.

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