USER GUIDE

TREL30-16U

LogTag

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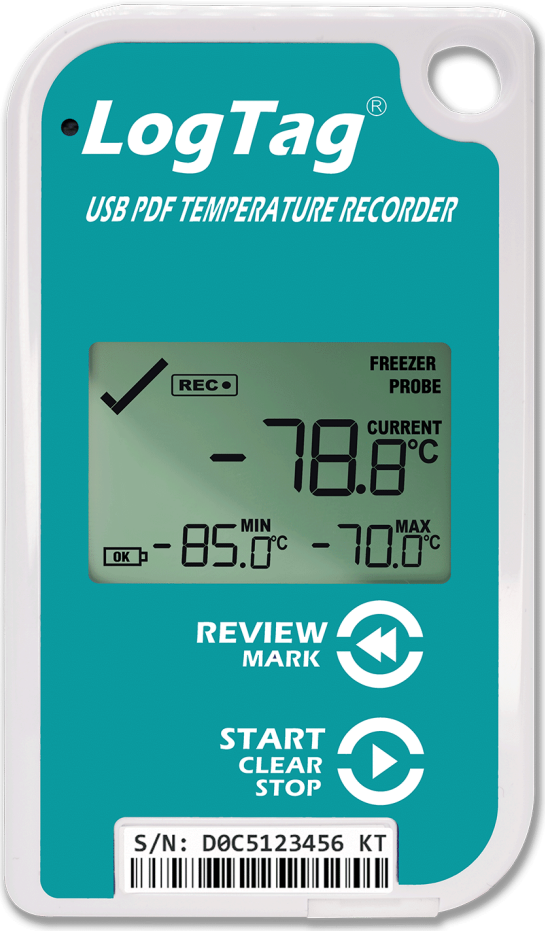

TREL30-16U

USB PDF Low-Temperature Recorder with Display

Product User Guide

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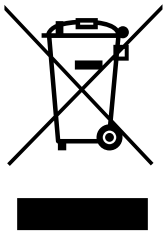
Safety Information



The TREL30-16U PDF USB temperature logger complies with the UL 4200 A standard, ensuring that it meets all necessary safety, performance, and regulatory requirements. Each model contains a user-replaceable, non-rechargeable Lithium Battery. When the battery indicates "LOW", you can replace it as described in the instructions for Battery Replacement on page 63.

Safety and General Warnings

⚠ WARNING

- **Ingestion Hazard:** This product contains a button cell or coin battery.
- **Death** or serious injury can occur if ingested.
- A swallowed button cell or coin cell battery can cause **Internal Chemical Burns** in as little as **2 hours**.
- **Seek immediate medical attention** if a battery is suspected to be swallowed or inserted inside any part of the body.
- Contains a user-replaceable **CR2032** 3V button cell.
- See below for additional details.

To ensure safe and proper use, please adhere to the following guidelines:

- Do not force discharge, recharge, disassemble, heat above each models published maximum temperature or incinerate. Doing so may result in injury due to venting, leakage or explosion resulting in chemical burns.
- When not in use, store the product and batteries in a cool, dry place according to the storage temperature requirements.
- Remove and immediately recycle or dispose of batteries from equipment not used for an extended period of time according to local regulations.
- Keep batteries out of reach of children. Coin cell batteries pose a choking hazard and can cause severe internal burns if swallowed.

- Note that even used batteries may cause severe injury or death.

> ⚠ **IN CASE OF AN EMERGENCY**
> If a battery is swallowed, seek medical attention immediately. For information on treatment, call the National Battery Ingestion Hotline at 202-625-3333 (USA) or your local poison control center.

- Inspect the battery compartment regularly for signs of corrosion, leakage, or damage, and if detected, stop using the product.

When the software indicates that a logger's battery is low, it must be replaced.

- Follow the instructions on the next pages.
- Avoid storing batteries in direct sunlight or in environments where temperatures exceed 60 °C (140 °F).
- Do not attempt to recharge the batteries used in these products.

Liability

LogTag North America's standard warranty terms apply. You can access the relevant statement via the terms and conditions page published on the LogTag North America website, or by emailing support@logtagrecorders.com. In addition, LogTag North America shall not be held liable:

- if the device was used beyond LogTag North America's stated limitations;
- for any claims due to the improper storage and use of the device;
- for any problems with refrigeration units;
- for the bad quality of the monitored goods, if any;
- for incorrect readings if the device was used with an activated low battery symbol; or
- for consequential loss.

Battery Life

The battery in the TREL30-16U is designed to power the device for up to 12 months of operation, provided:

- The device was not stored for more than 24 months prior to activation;
- A fresh battery from a reputable manufacturer is used;
- The device is not downloaded excessively to a PC (more than once a week);
- The Logger's display is not excessively activated (e.g. several times a day).
- Statistics are reviewed on the display no more than once daily for 30 seconds;

- The acoustic alarm is not active over long periods;
- The recording interval is not shorter than 5 minutes; and
- The device is stored and operated according to LogTag North America's recommendations.

The TREL30-16U unable to record readings when connected to USB. You cannot use a USB power supply to power the device!

Disclaimer

The TREL30-16U monitors temperature exposure and not the quality of the goods it accompanies. Its purpose is to signal if product quality evaluation/testing is required.

Typographical Conventions

Text refers to buttons on the TREL30-16U.

Text **in this font** refers to option settings, dialogue boxes or actions to be taken in LogTag Analyzer.

Text in this font describes features of the product.

This text describes certain aspects of the product, where incorrect use of a feature may lead to inadvertent loss of data.

This text contains important information for the correct operation of your TREL30-16U.

This text contains information that explains some aspects of a feature in more detail.

This text contains tips that help you get the best out of your TREL30-16U logger.

Introduction

The LogTag® TREL30-16U temperature logger features a data logging memory storing up to 17,526 temperature readings and a separate statistical memory, storing maximum and minimum reading as well as alarm duration for each of the last 60 days.

During recording the display shows the temperature of the most recent reading, whether or not this is within or outside the acceptance range, minimum and maximum values recorded since the trip began and the battery status.

Alarm events can be triggered when a number of readings are outside preset Alarm thresholds .

Logged temperature data can be downloaded via a standard LogTag® Interface or via USB to the free companion software LogTag Analyzer, where you can display data in chart, list or summary formats. The software also allows electronic archiving and exporting or transmitting data in support of sophisticated data management systems, including LogTag® Online.

You can also view a PDF report with any PDF reader software when plugging the logger into a USB port.

Features

The TREL30-16U temperature logger features the familiar LogTag® case layout.

Figure 1: TREL30-16U features

Case

- Mounting lug for secure fastening of logger to fixtures
- USB socket with protective cover
- Gold-plated, high-quality temperature external probe socket

- Robust polycarbonate case, IP65
- Durable communications contacts

Buttons

- **START/CLEAR/STOP** button ( )

  This is used to start the unit, stop the unit, and clear active alarms. It is also used to exit the statistics review and to advance to the next setting in the clock adjust procedure.
- **REVIEW/MARK** button ( )

  This is used to review recorded data during or at the end of the trip directly on the display, to reset the min/max data on the display.

  It is also used to place an inspection mark in the data.

Display

The display shows ‘at a glance’ if alarm events have occurred since the trip started. Details of alarm events can be checked directly on the unit by reviewing the statistics history on the logger's display or in more detail by downloading the logged data or generating a PDF report.

External Probes

The TREL30-16U will accept any external probe from the ST10 product range.

It will also accept the newly released CP10 Smart Probes.

What You Need

Required Equipment

In addition to your LogTag® TREL30-16U temperature logger you will need the following items:

- A USB interface for communication to the PC or a USB-C to USB-A cable
- An external probe of the ST10 series or the CP10 Smart Probe series
- For configuration - a PC running Windows 10 or later and LogTag Analyzer installed

Optional Items

In addition to the above, following items are useful accessories:

- A wallmount bracket, which can be used, for example, to attach the TREL30-16U to the side of a cabinet, freezer or fridge

- A silica sand/glass bead temperature buffer, which simulates environmental behavior of a vaccine vial

Temperature Probe Compatibility

The variety of different logger and probe models in the TRED30-16 and TREL30 product families can make it difficult to keep track of which probe can be connected to which logger to obtain a valid temperature reading.

You can find a detailed chart in our knowledge base, illustrating which values you will get at room temperature (25 °C) for each possible probe/logger combination. It will allow you to diagnose any issues you suspect may be related to using an incorrect probe.

You can find an overview of the probes on the LogTag website.

For now, refer to following summary of the correct logger and probe combinations for the TRED30-16 product range:

TREL30-16

Designed to be used with standard analogue probes of the ST10 range only.

The system requires calibration as a whole (logger and probe).

No special setting is required during configuration for probe selection.

TREL30-16CP

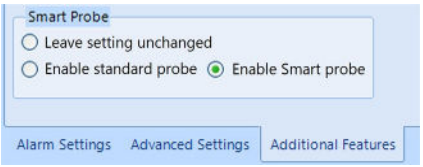
Primarily designed to work with the new CP11 Smart Probes, but can also be used with standard analogue probes of the ST10 range.

TREL30-16U

Primarily designed to work with the new CP10 Smart Probes, but can also be used with standard analogue probes of the ST10 range.

When TREL30-16U loggers are used with a Smart Probe, it is sufficient to calibrate only the probe to achieve a calibrated system. In this case, you must select "Enable Smart Probe" in the Additional Features tab during configuration.

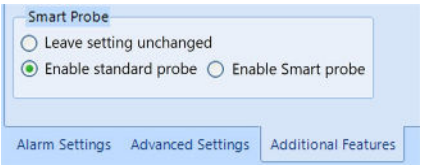
> ⚠ This is not the default ex-factory setting.



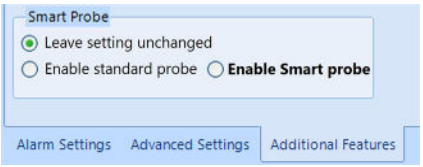
When used with the standard analogue probe, the system must be calibrated as a whole (logger and probe).

During configuration you must select "Enable Standard Probe" in the Additional Features tab.

> ⚠ This is the default ex-factory setting.



If you have configured the logger in the past and you wish to use the same probe, you can simply select "Leave settings unchanged". The currently configured probe is highlighted in bold. This is particularly useful if you wish to configure multiple units which have different probe types connected. With this setting, each logger retains the probe it was originally configured for.



Your reseller may have pre-configured the logger for you when it was ordered with a Standard Probe, however, you should always check this during configuration.

ST100, CP100 and CP110 probes

These probes can only be used with LogTag North America's standard-temperature loggers and will not work with the loggers described in this manual.

Getting Started

Your LogTag® TREL30-16U data logger is typically configured, placed with goods that require monitoring and then downloaded once the goods reach their intended destination. Other applications may involve stationary loggers placed in warehouses or to monitor fridges and freezers.

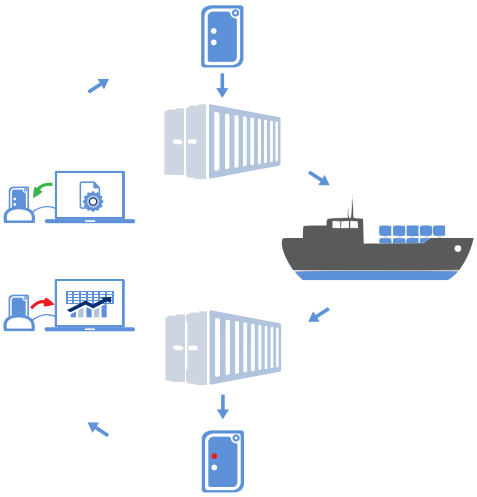


Figure 2: *LogTag® recording cycle*

Each application requires several steps so you can deploy your data logger and retrieve the recorded measurements. You may be able to skip some of the steps, depending on the way the logger was prepared when it was delivered to you and how you wish to analyze the data.

Things to do before you start logging

1. Download and install the latest version of LogTag Analyzer 3.
   You can do this from the LogTag North America Software Download page.
2. Configure the unit using LogTag Analyzer (see page 14).
3. Connect a probe and place the unit in the monitoring location (see page 25).
4. Start the logger (see page 30).

Things to do while recording data

5. Clear an active alarm(see page 35).
6. Review Minimum and Maximum values recorded during the trip, as well as alarm threshold violations (see page 42).
7. Reset Minimum and Maximum values (see page 36).
8. Place a mark in the recorded readings (see page 34).
9. Stop the logger recording data (see page 46).

Things to do when you have finished recording

10. Plug the unit into a USB port or an interface (see page 48).
11. View the PDF report generated by the TREL30-16U (see page 51).
12. Upload the generated CSV file to an online data management platform.
13. Download the unit to LogTag Analyzer for analysis.

1. Re-configure or reset the logger, ready for a new trip (see page 58).

Configuring the TREL30-16U for logging

Before a TREL30-16U logger can be deployed, it must be configured with the parameters required for starting and recording temperature values.

The TREL30-16U contains both a USB-C socket and contact pins at the rear. For configuration, you can either plug the logger into a USB port of your PC, or use an interface cradle.

Figure 3: Logger's USB-C port

Figure 4: Logger used with interface cradle

Loggers can be purchased unconfigured, or pre-configured, ready to be started, using one of a number of different profiles that are available.

You can check if your logger is already configured or not by briefly pressing the **REVIEW/MARK** button.

The logger is already configured to start

If your logger is configured to start it will show either

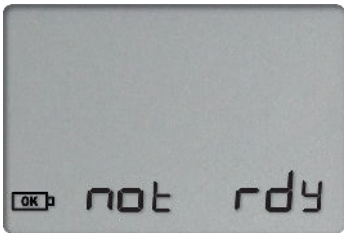
if the logger was pre-configured for a push-button start, or

if the logger was pre-configured for a Date/Time start.

If your logger shows one of these screens you may skip the configuration process, however, if you wish, you can re-configure the logger with new parameters.

The logger is hibernated (ex-factory default)

TREL30-16U loggers are delivered to you hibernated (i.e. in a state of low power consumption), and pressing the **REVIEW/MARK** button shows:



and then

You can find out more about hibernation in Hibernating a TREL30-16U (on page 59).

Starting a Logger from Hibernation

TREL30-16U loggers can be started even if they are hibernated when you receive them. To prepare the logger, press and hold both buttons simultaneously for approx 4 seconds. The "not rdy" screen from above will appear, and **READY** will blink.

After 4 seconds, READY will be permanently lit.

Release both buttons within 2 seconds.

The logger will now enter the clock adjust procedure, allowing you to set the clock to your local time. For a detailed explanation of this procedure please refer to Adjusting the Display Clock (on page 29).

The logger will ***not*** show the clock adjust screen if you:

- Release the button before **READY** is permanently on
- Keep holding the button for more than 2 seconds after **READY** is permanently on, and the screen turns off

Once you have set the clock, the logger shows the initial ready screen, as if you had configured it for a push-button start in LogTag Analyzer.

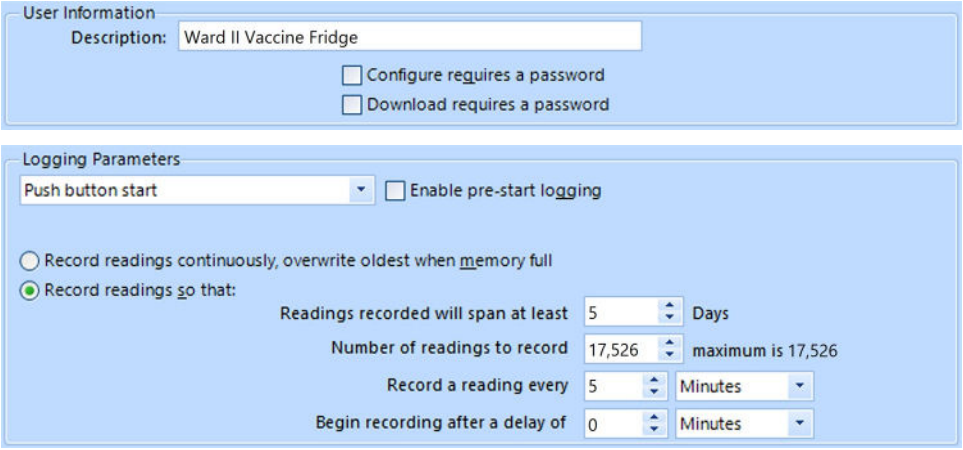
At the time this user guide is written, all TREL30-16U loggers are pre-configured ex-factory with following parameters:

- Push button start
- Single upper alarm threshold 8.0 °C
- Single lower alarm threshold 2.0 °C
- Alarm trigger delay for both thresholds 30 min consecutive readings
- Logging interval 5 min
- **FRIDGE** symbol to match the fridge logging parameters

Please check the latest settings with your local sales representative.

Standard Configuration Options

The standard configuration options include settings such as User ID, start method, pre-start recording, logging interval and duration, start delay, and password.



For detailed information about each parameter please read the section about **Configuring a LogTag® for logging** in LogTag Analyzer's User Guide or press F1 for help.

TREL30-16U Start Options

During configuration with LogTag Analyzer you can decide when the TREL30-16U starts taking temperature readings:

Push button start

The logger will start taking temperature readings the **START/CLEAR/STOP** button (see Starting the Logger on page 30).

When you choose the push button start option, you can **Enable pre-start logging** (or disable it) and also **Begin recording after a delay**.

Pre-start readings

If you enable pre-start readings, the TREL30-16U starts recording as soon as it is configured and will continue to do so until you start the unit via the button. No alarms are processed while pre-start readings are being taken, pre-start readings will not appear in the PDF file after the logger was started, and PDF or CSV files will not be generated if only pre-start readings are present in the logger. Using pre-start readings is a good way to avoid data loss if you forget to start the unit, as you can still access the data using LogTag Analyzer.

Start delay

If you configure the TREL30-16U to start after a delay period, the logger will not immediately record temperature readings after you have pressed **START/CLEAR/STOP**, but start a countdown timer instead, and record readings only after the timer has ended. The value for the timer is set during configuration. If pre-start readings are enabled, these will continue to be recorded during the delay period.

Date/Time start

The logger will start taking temperature readings at the date and time you enter during configuration (local time). You cannot combine a date/time start with pre-start readings or the start delay function.

Audible Alarm

The TREL30-16U is fitted with a buzzer. You can choose to activate the buzzer when an alarm event has been triggered to provide extra feedback. This is enabled or disabled in the when configuring the logger with LogTag Analyzer.

> ⚠ Please note, that continual activation of the audible alarm will reduce the working life of the battery, if no external power is applied. When an alarm event is triggered, the alarm should be cleared as soon as possible.

The alarm will sound once every four seconds for the first 24 hours, then sound less frequently to preserve battery life[1] until the alarm is cleared, the unit stops or is re-configured.

> The buzzer will temporarily turn off when you are reviewing data.

1 The interval at which the alarm sounds will increase to 8 seconds when the clock passes midnight for a second time (i.e. the alarm will sound every 4 seconds between 24 and 48 hours, depending on when during the day the alarm was first triggered). When the clock passes midnight a third time, the interval changes to 12 seconds until the alarm is cleared.

Alarm Configuration Options

The TREL30-16U can display an alarm if one or more of the configured alarm trigger conditions have been met. This is indicated on the display by showing the Alarm Indicator × and a Day Alarm Marker.

 is shown for an alarm triggered today, other markers are shown for alarms triggered on previous days, see for details on which marker is displayed for which day.

Each alarm trigger condition consists of a threshold temperature value, an activation type (which can be instant, consecutive or accumulative[2]) and a delay time, if it is not an instant alarm.

If an alarm trigger condition requires readings to exceed an upper threshold temperature it is called an ***upper alarm***. If an alarm trigger condition requires readings to go below a lower threshold it is called a ***lower alarm***.

All alarm trigger conditions are entered in the Alarm Settings tab during configuration of the logger with LogTag Analyzer.

The screen shows an example where:

- the upper primary alarm is triggered when the temperature is 8.0 °C or above for an accumulative time of 10 hours.
- the lower primary alarm is triggered when the temperature is 2.0 °C or below continuously for 1 hour.

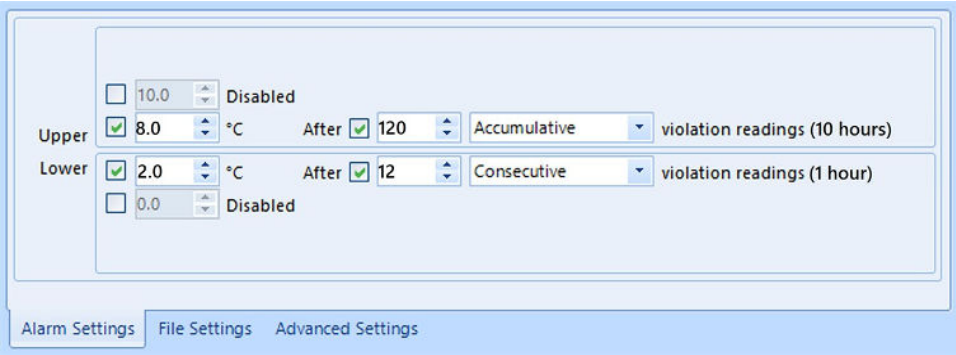


Figure 5: *Sample Alarm Configuration Settings for a TREL30-16U*

Once an alarm has triggered, the alarm indicator (×) remains shown until the alarm is cleared (see Clearing an Alarm on page 35) or the unit is reconfigured.

2
- Instant = one temperature reading is above (below) the threshold
- Consecutive = temperature readings are above (below) the threshold for the time defined in the activation delay without interruption
- Accumulative = temperature readings are above (below) the threshold for the total time defined in the activation delay time, but may not necessarily be sequential

> ⚠ A note on alarm re-triggering: As soon as an alarm is triggered, the corresponding delay time (but not any others) resets to zero and alarm processing starts again. The alarm processing for all other alarm delays is not affected. Therefore, accumulative or consecutive alarms will re-trigger, if the alarm conditions are met again, and the Alarm Indicator (×) will be shown, even if any previous alarm was cleared. **Clearing an Alarm does not reset any of the delay values.**

Advanced Configuration Settings

Select **Advanced Settings** for additional configuration settings. These settings decide how some of the elements are displayed on the unit's own display and set certain options specific to the TREL30-16U.

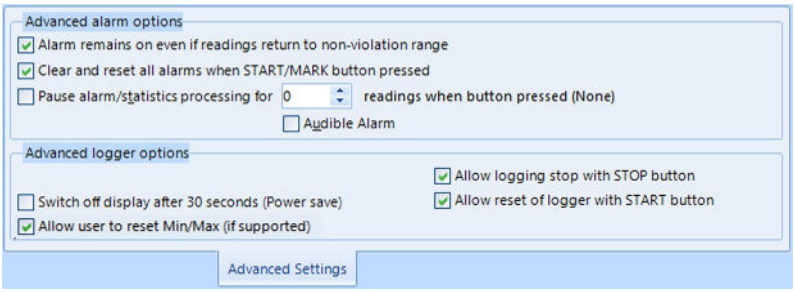


Figure 6: TREL30-16U advanced configuration screen in LogTag Analyzer 3

These parameters influence what appears on the display:

- Pausing alarm/statistics processing (see Paused Readings on page 37)
- Temperature display units (see Display Overview on page 26)
- Switching off the display after 30 seconds (Power save, see Power Save on page 40)
- Allowing a user to reset the trip's minimum and maximum values on the display during recording (see Resetting the Trip Minimum/Maximum Temperatures on page 36)

Following parameters influence specific behavior of the TREL30-16U:

- Clearing and resetting alarms when the **START/CLEAR/STOP** button is pressed
- Leaving the alarm turned on, even if readings return to the normal temperature range again
- Allowing the user to stop the logger with the **START/CLEAR/STOP** button
- Allowing the user to reset the logger with the **START/CLEAR/STOP** button
- Enabling the buzzer for the audible alarm

For detailed information about each parameter please read the section about **Configuring a LogTag® for logging** in LogTag Analyzer's User Guide or press F1 for help.

File Settings

Click the **File Settings** tab, select which files are generated when the TREL30-16U is plugged into a computer's USB port, and what information these files contain. Select as many file formats as you wish to generate.

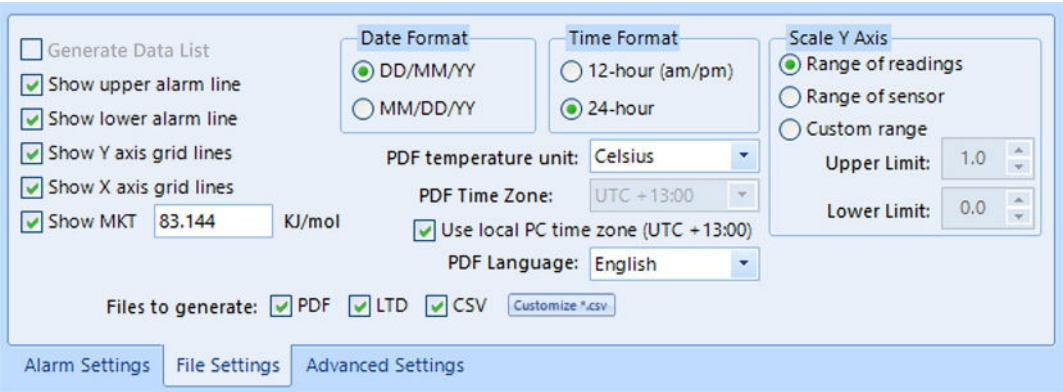


Figure 7: TREL30-16U File settings screen in LogTag Analyzer 3

These parameters influence the appearance of all files:

- Date and time format
- MKT values

Following specifically influences the appearance of the PDF file:

- Scaling parameters for the chart
- Showing or hiding grid lines
- Showing or hiding alarm threshold lines
- Display language
- Generating the data list

> ⚠ When you generate a CSV file, the data list is automatically disabled and cannot be enabled. The combined size of data list and CSV file could exceed the size of the internal logger memory, and as a result the CSV file would not be generated.

For detailed information about each parameter please read the section about **Configuring a LogTag® for logging** in LogTag Analyzer's User Guide or press F1 for help.

You can also customize the data shown in the CSV file generated directly in the logger. Click Customize *.csv to open a new window:

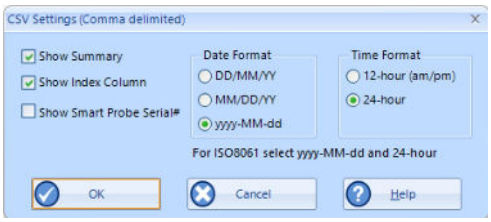


Figure 8: Logger CSV options

In this window, adjust the options to suit and click OK to save your selection. Click Cancel if you wish to discard any changes you have made.

- Show Summary

  If enabled, a trip summary is added to the first rows of the CSV, followed by the header row, followed by a row for each reading. If disabled, the first row of the file is the header row, followed by the readings.
- Show Index Column

  If enabled, an extra column is added to the CSV file, showing the index of the reading. This is required for some formats used for automatic uploading to Health Providers.
- Show Smart Probe Serial#

  If enabled, the serial number field in the CSV shows added text with the serial number of the smart probe that was used for the trip.
- Date and time format

  You can select a combination of date and time formats.

  To use dates and times in ISO8061 format, select yyyy-MM-dd date format and 24-hour time format.

  > ⚠ When you open a CSV file with Microsoft Excel you may not see these date and time formats as entered. Excel formats any strings resembling date and time using its own date/time format, which is typically based on the regional settings of your operating system.

> Not only can you view the PDF file in a PDF viewer, you can also open this file directly with LogTag Analyzer, as it contains an embedded *.ltd file. For this reason, you may disable the *.ltd file generation if you allow a PDF to be generated.

Additional Features

In this tab you can enable additional features for this product:

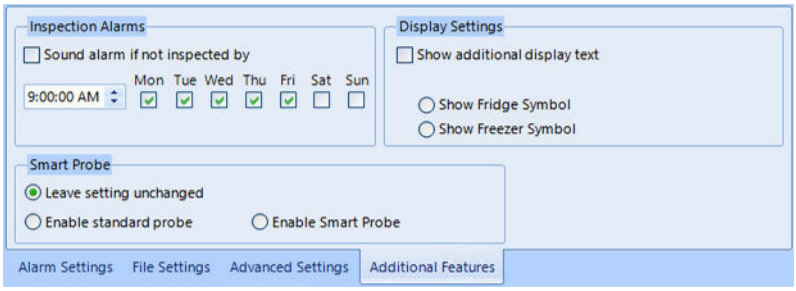


Figure 9: Inspection alarms, fridge/freezer symbols and probe selection

Inspection Reminder Alarm

You can enable a special inspection reminder alarm by selecting Sound alarm if not inspected by, entering a time and selecting any combination of days.

When enabled, this alarm triggers when the logger's **REVIEW/MARK** button was not pressed between midnight and the time entered, on the selected days. Once triggered, the buzzer will sound and the time digits will blink until the alarm is cleared by pressing **REVIEW/MARK**. If the **REVIEW/MARK** button was pressed, no alarm will occur for that day.

In the screenshot above the alarm would be activated if the **REVIEW/MARK** button has not been pressed by 9:00am on weekdays. The alarm would not trigger on weekends as it has not been enabled in the configuration.

If the feature is disabled, an Inspection Reminder Alarm will not trigger.

The feature is also available in the advanced options for a configuration profile and is carried forward during quick-reconfigure.

Fridge/Freezer Indicator

On the display you can show a symbol, indicating if the logger should be placed in a fridge (**FRIDGE**) or a freezer (**FREEZER**).

To enable this feature, select Show additional display text and select one of the options.

> ⚠ Simply selecting the display of the fridge or freezer symbol does not change any temperature alarm levels. Please make sure you have selected appropriate temperature alarm trigger conditions that correspond to the symbol you have selected to avoid incorrectly placed loggers.

If you disable this feature, no text will be shown on the recording display.

The Show total summary days collected feature is not available in this product due to the different display layout. The number of days for which statistics were recorded can be seen during Review.

> ⚠ You will require LogTag Analyzer version 3.2r4 or later to configure and download loggers with these features.

Enabling Smart Probes

TREL30-16U loggers now support the new CP110 Smart Probes. Unlike the UTRED30-WiFi and UTRED30-16 models, you must select which probe you will use with the logger during configuration.

If your probe features a small case as shown below, it is one of the new Smart Probes. You must enable the Smart Probe feature so your logger records temperature data.

Figure 10: *LogTag® Smart Probe CP11*

Figure 11: *CP11 Smart Probe for TREL30-16CPLoggers*

If your probe does not have such a case, it is a standard analogue probe, and you must enable the standard probe.

> ⚠ If you enable the feature without using a Smart Probe, or vice versa, you will not record the correct temperature readings.

How is my calibration affected when swapping probes?

Probes of the same type can be swapped during recording, however, you will need to observe some rules if you wish to maintain a calibrated system:

- You can swap one Smart Probe with a different one without re-configuring the unit. If the new probe is calibrated, the complete logger and probe system will remain calibrated.
- You can also swap one standard probe with a different standard probe, however, to maintain system calibration the logger and probe will have to be re-calibrated as a system.
- If you swap a Smart Probe with a standard probe you will need to re-configure the logger, select "Standard Probe" during configuration and also re-calibrate the system if required.

- If you swap a standard probe with a Smart Probe you will need to re-configure the logger and select "Smart Probe" during configuration. If the probe itself is calibrated, re-calibration of the system is not required.

Finalizing the configuration

Click **Configure** to upload the configuration data to the TREL30-16U.

When the configuration is complete, remove the logger from the interface.

If you wish to configure more TREL30-16U units with the same configuration, insert the next logger into the interface and click **Repeat Configure**.

You can upload new configuration settings to a TREL30-16U logger as often as required.

Take the logger to the place of its deployment, add the probe and start the logger, as described in Starting the Logger on page 30.

Display Overview

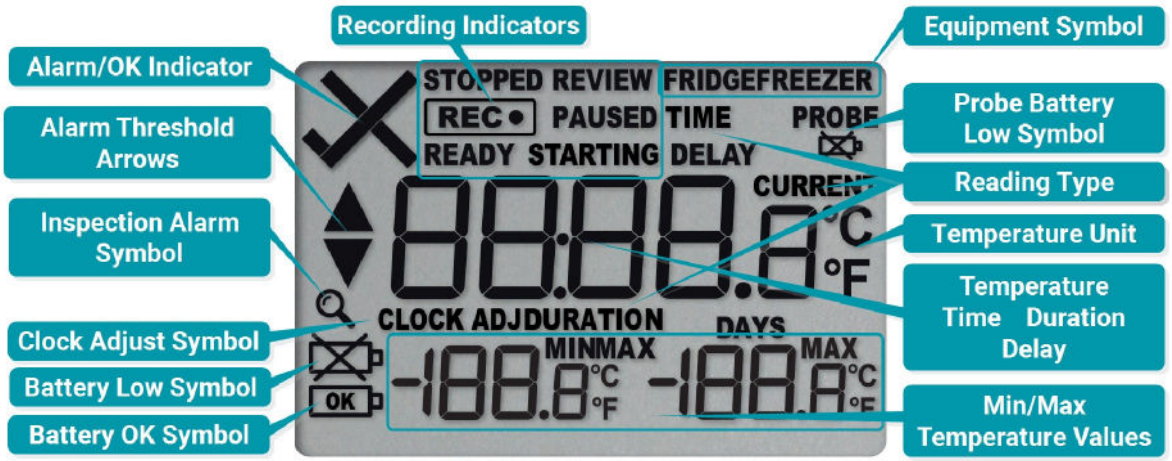


Figure 12: Display Overview with all segments turned on

Main Temperature Value

This shows the most recently recorded temperature while the TREL30-16U is recording. Once the logger has stopped, nothing will be displayed. It will show time and duration values during review, or a start delay value when configured for a delayed start.

Equipment Symbol

The **FRIDGE** or **FREEZER** symbol will be shown if this option is selected during configuration.

Battery Low Status

The battery low symbol will appear if the TREL30-16U's battery is low and requires changing. Please follow the instructions provided in Battery Replacement on page 63. If the OK symbol is shown, the battery is still OK.

ALARM/OK Indicator

The ✕ symbol is shown as soon as the TREL30-16U has registered an alarm event. While there are no alarms, or if a previous alarm has been cleared, the ✓ symbol is shown.

Probe Battery Low Symbol

The symbols **PROBE** and will be shown if you are using the logger with a Smart Probe that has a low battery. These symbols will not be shown if you are using an analogue ST10 probe.

Clock Adjust Symbol

The **CLOCKADJ** symbol is shown to indicate the clock adjustment process has been initiated.

Recording Indicators

The recording indicators show what the TREL30-16U is currently recording:

- If **READY** is shown, the TREL30-16U is ready to be started with the **START/CLEAR/STOP** button.
- If **DELAY** is shown, the logger has been started, and a start delay is active. The time in hours and minutes until the start is also shown.
- If is shown, together with the letters dtSt, the logger was configured for a date/time start, but has not yet started recording temperatures.
- If REC● is shown, the TREL30-16U is recording temperature at the sample interval defined.
- If the word **STOPPED** is shown, the TREL30-16U has finished recording temperature data.

Inspection Alarm

The 🔍 symbol shows when the logger's inspection alarm has triggered. Please see Additional Features (on page 23)for more information about this feature.

Reading Type

The word **CURRENT** is shown when the temperature on the display represents the last recorded temperature.

The word **TIME** is shown when the value on the display represents the current time.

The word **DURATION** is shown when the value on the display represents a duration value.

MIN and **MAX** are also shown next to the minimum and maximum values during recording, if these are enabled.

Above/Below Threshold Arrows

The up-arrow ▲ is shown when the temperature displayed (i.e. last recorded) is above the primary upper temperature threshold. The down-arrow ▼ is shown when the temperature displayed is below the primary lower temperature threshold.

Inspection Alarm

The 🔍 symbol shows when the logger's inspection alarm has triggered. Please see Additional Features (on page 23)for more information about this feature.

MIN/MAX Temperature Values

These two temperatures represent the minimum and maximum since the recording started, or since the values were last manually cleared.

Temperature Units

Depending on the selected PDF temperature units, this shows either °F or °C.

Real-Time Clock vs Display Clock

The TREL30-16U contains an internal real-time clock, which is always set to UTC[1].

When a logger's screen shows time, it shows the display clock. This is linked to the internal real-time clock, but may be offset to allow for time zones or when a user has adjusted the clock.

A day change occurs when the display clock passes midnight (i.e. 00:00). This triggers the statistical data to be finalized for the day, and a new day to be started when the next reading is taken.

Each time the logger is configured with LogTag Analyzer the internal real-time clock is set to UTC (which is calculated from the PC's internal clock), and the display clock is set to the PC's current local time (or timezone).

> ⚠ Note that the logger’s internal real time clock value is only updated when the recorder is configured with LogTag Analyzer. Adjusting the display clock does not adjust the internal real-time clock.

LogTag Analyzer can display the logged readings in a number of different time zones, regardless of where it was configured. Please note, however, that the PDF's time zone has to be set at configuration and cannot be changed after the logger has been downloaded.

Unlike earlier models, the main recording screen of the TREL30-16U does not show the display clock. You can view the display clock during Review, or before you start the logger. You can also adjust the display clock as described in Adjusting the Display Clock (on the next page).

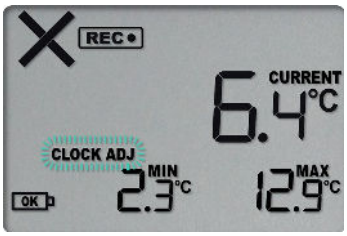
1 UTC = Coordinated Universal Time

Adjusting the Display Clock

The display clock of the logger can be set to the current local time, either by using LogTag Analyzer software or directly on the unit, using the buttons.

To set the clock, press and hold the **START/CLEAR/STOP** button, then immediately press and hold the **REVIEW/MARK** button. Keep holding both buttons together continuously for a period of 8 seconds. ***Press the buttons firmly!***

During this period the **CLOCKADJ** icon flashes.



Release the buttons when the flashing stops. The clock can now be adjusted.

Initially, the minutes digits flash.

Press the button to increment the minutes digit (once it reaches 59 it rolls back to 00 on the next press). Holding the button down will increase the speed at which the digits change

Accept the minutes value by pressing. The hours value now flashes.

Press the button to increment the hours digits (once it reaches 23 it rolls back to 00 on the next press). Holding the button down will increase the speed at which the digits change.

Accept the hours value by pressing. The new clock value is now stored, and the display shows the normal screen.

Accept the hours value by pressing. The display now changes to show the current year, month and day. The day digits flash.

Press the button to change the day. You can only adjust the data to one day ahead, the current day or one day before. Month and year fields are not offered for adjustment

Accept the day value by pressing. The new clock

value is now stored, and the display shows the normal screen.

> ⚠ NOTE: It is advised that the real time clock is only adjusted when the product is not recording (**STOPPED** or **READY**). This ensures that days reported in the statistics always cover a 24-hour period.

> If a display clock adjustment is made while recording data, the next log taken will be identified in the downloaded statistics data with a time change mark.

Changes to the display clock do not affect the internal real time clock value, so the logged data does not show time gaps.

Starting the Logger

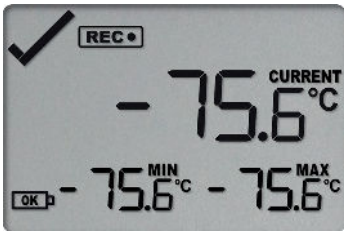
Push button start

The logger's display must show **READY** for it to be started. The current time is also shown.

Press and hold the **START/CLEAR/STOP** button. First, **STARTING** is shown in addition to **READY**:

Then **READY** disappears:

Once **READY** disappears, release the button within two seconds. **STARTING** will also disappear, and the REC• symbol will be shown. The TREL30-16U now records temperature data.



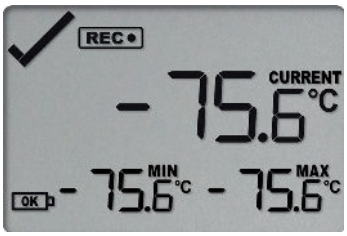
The logger will ***not*** start if you:

- Release the button before **READY** disappears

Push Button Start with Start Delay

If the logger was configured for a push button start with a start delay , the word **DELAY** is shown instead of the REC• symbol once the start procedure has been completed.

The delay time is shown in hours and minutes. The time counts down and the TREL30-16U starts recording when it reaches 0:00.



Automatic date/time start

If you configured the TREL30-16U for a date/time start, it will start recording temperature values as soon as the entered start time is reached. The logger will display the following if a Date/Time Start has been chosen:

> ⚠ Hibernating the logger using LogTag Analyzer will abort any previously configured Date/Time start.

During Recording

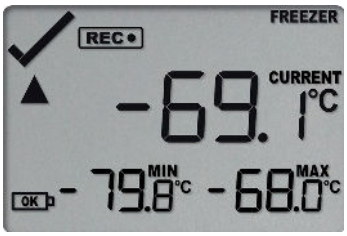
During normal operation the display shows the most recently recorded temperature. This temperature is updated each time the logger records a reading. A tick symbol ✓ is shown as long as no alarm event has occurred. As soon as an alarm event is registered, a cross symbol ✕ is shown instead of the tick.

At the bottom of the screen you can see the minimum and maximum temperatures recorded since the trip began (or since they were last reset, if this option is enabled during configuration). Please also see additional information in Resetting the Trip Minimum/Maximum Temperatures (on page 36).

You can also see a **FREEZER** or **FRIDGE** icon in the top right corner. Which of the icons appears can be selected during configuration[2].

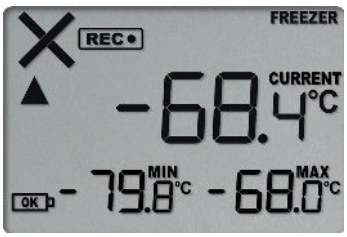
Following are some sample display screens:

At 1:29 pm the display shows the following:



- The current temperature is over the upper alarm threshold, as indicated by the upper alarm marker (▲).
- The duration, however, of this temperature excursion has not yet triggered an alarm.

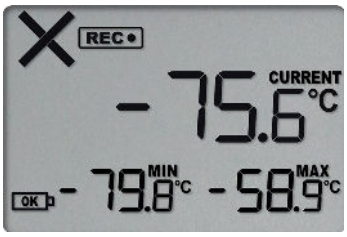
At 1:49pm (20 minutes later) the display shows the following:



- The temperature has remained above the upper alarm threshold and has now triggered an alarm event.
- The alarm symbol × is shown to indicate an alarm event occurred.
- The current temperature is still over the upper alarm threshold, as indicated by the upper alarm marker (▲).

2 The symbol is independent of the alarm parameters. For example, selecting **FRIDGE** does not set any of the alarm thresholds.

At 1:49am on the next day the display shows the following:



- The temperature has returned to within the accepted range (none of the alarm markers are visible), but the alarm remains present, as it has not been inspected and cleared.

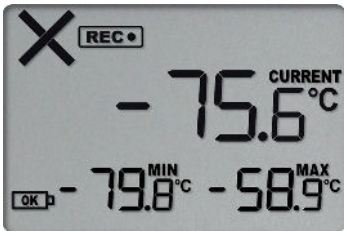
Marking a reading with an inspection mark

When you press the **REVIEW/MARK** button while the TREL30-16U is recording, the next reading taken will be identified in the downloaded data and on the PDF report with an inspection mark.

Clearing an Alarm

During configuration with LogTag Analyzer, you can allow users to clear an active alarm on the display. This is a useful function for an inspector, so repeated alarms can be recognized easier.

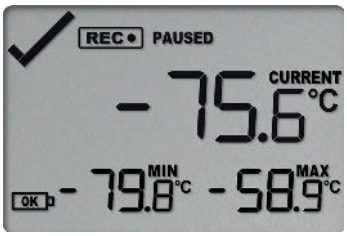
This display screen shows an existing alarm that occurred yesterday, but has not yet been cleared. To clear an alarm, press and hold the **START/CLEAR/STOP** button.



The alarm will ***not*** be cleared if you

- release the button before the ✓ appears;
- keep holding the button after the ✓ appears until the ×appears again;

In this example the paused function was activated, and the paused symbol is shown on the display. For more information about paused readings please see the section about Paused Readings on page 37.



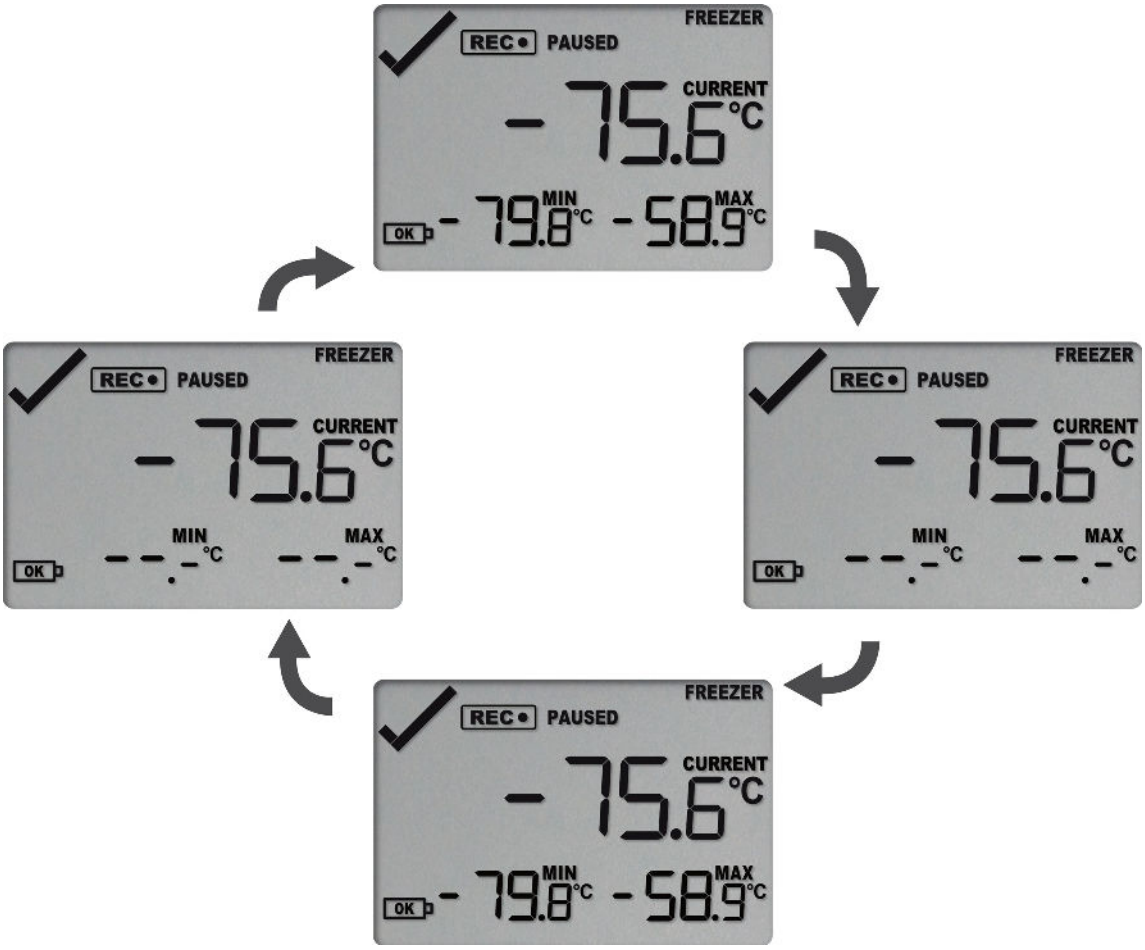
⚠ Note: Only the Alarm Indicator (×) can be cleared! Alarms cannot be cleared from the statistics summary. Clearing an alarm also does not reset any of the delay values. Please see Alarm Configuration for additional information.

Resetting the Trip Minimum/Maximum Temperatures

The currently stored Min/Max temperature values can be reset at any time while the unit is recording, but not once the unit has been stopped.

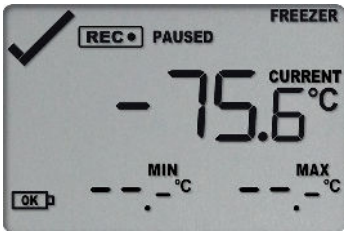
To reset the values, follow this procedure:

- Press and hold **REVIEW/MARK**. After 1 second the following screen sequence will show, and then repeat once:



During the cycle, the buzzer will sound a series of short beeps.

- After approx. 5 seconds, following screen will show:



Release the **REVIEW/MARK** button when the screens no longer alternate. The values will be reset, and the normal recording screen will be shown.

- If you keep holding the **REVIEW/MARK** button, the currently stored min/max values will be retained.
- Releasing the button while the screen still alternates switches to the first review screen.

A min/max reset mark will be recorded in the logged data. The logger will now track new min/max values, with the first update shown as soon as the next reading is taken.

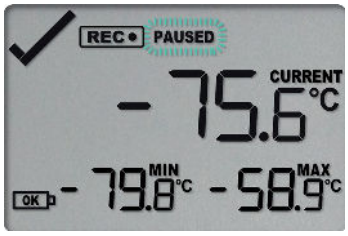
You will be able to see in the chart in both LogTag Analyzer and the PDF report when the min/max values were cleared, but you will not be able to review previous min/max values on screen once they have been cleared.

> ⚠ If the option "Allow user to reset Min/Max" is enabled, the values you see on the display represent the MIN/MAX temperatures since they were last reset, or since the trip was started if they have not yet been manually reset.
> If this option is disabled, MIN/MAX temperatures are automatically reset at midnight.

Paused Readings

During configuration of the TREL30-16U you can set the option to ignore up to 15 readings for alarm and statistics calculations after either button is pressed. The readings are still shown on the graph and in the data listing, but they are marked as paused, and their value is ignored when determining alarm trigger conditions, minimum/maximum values and other statistical calculations.

> The Paused Readings feature is useful, for example, when you need to temporarily remove the probe from the monitored location to inspect goods, but you do not wish to trigger an alarm as a result of you handling the probe.



It allows the logger to acclimatize to the environment again, before further readings are processed.

After a button press the display shows **PAUSED** next to the symbol. **PAUSED** will turn off as soon as the last ignored reading has been recorded.

The option is set in the Advanced Settings tab during configuration with LogTag Analyzer and is expressed in number of readings after the last button press.

Paused readings are specially marked in the graph and data listings.

How long **PAUSED** is displayed depends on when between readings you press the button. It will show longer, if the button is pressed just after the logger takes a reading, but shorter if you press the button just before. For example, if you configure a logging interval of 10 minutes and 2 paused readings, the time **PAUSED** is shown could be as short as 10 minutes, but as long as 20 minutes.

Using the TREL30-16U with Smart Probes

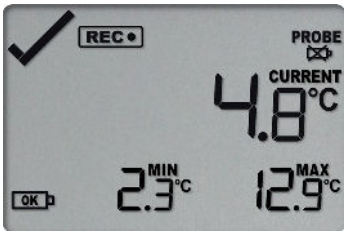
The TREL30-16U works with the new Smart Probes offered by LogTag®. Each Smart Probe contains its own electronics for measuring temperature. Calibrated temperature data is then transmitted to the logger to which the probe is connected. The logger acts only as a display and storage device. This means, the Smart Probe can be calibrated independent of the logger it is used with, and the logger itself requires no additional calibration[3].

Figure 13: LogTag® Smart Probe CP10

When a Smart Probe is connected to a TREL30-16U logger, and the logger is recording temperatures, you will not see any changes to the logger's basic operation. You may, however, notice that taking a reading will take longer, due to the communication that is taking place between logger and probe. As a result, you may also not see a temperature immediately after the you have started the logger.

Each Smart Probe contains a $LiMnO_2$ lithium battery, which is not user replaceable. Your calibration laboratory will change this battery as part of the routine recalibration.

If the battery in your CP10CP11 Smart Probe nears the end of its life, the logger's display shows the battery low screen to alert you that the battery requires replacement. This screen is shown alternating with the recorded temperature, for the channel the probe is connected to. From now on, you still have a few weeks of operation left before the probe can no longer record temperatures. At this time, we recommend you return the Smart Probe to your calibration provider or reseller for a battery replacement.



3 This is only true if the logger is used with a Smart Probe (models). If the logger is used with an Analogue Probe such as the ST10 models, the internal calibration table will still be used.

Figure 14: Probe Low Battery screen

> ⚠ Note: As long as the screen is not showing the error screen, the accuracy of the recorded readings is not affected.

If the probe's battery is so low that temperature recording is no longer possible, the "Probe is disconnected" below will be shown during the entire time the temperature would normally be displayed.

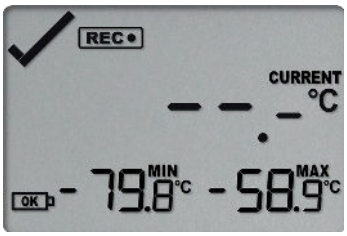
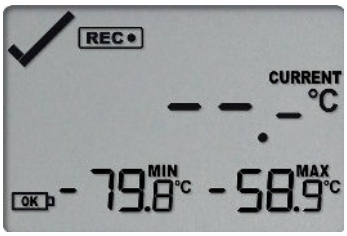


Figure 15: Probe error screen

During this time, no temperature readings are recorded.

Probe is disconnected

The display shows - -.- instead of a temperature value if the logger's remote temperature probe is disconnected, regardless of whether a standard temperature probe or a Smart Probe is connected. This function is useful if the probe is permanently mounted, but you wish to take the TREL30-16U to a computer for downloading its data.



Any values recorded during this time will not be taken into account when calculating statistics values or alarms.

If, for example, the temperature was above -70 °C for 12 hours (which would normally trigger an alarm event), but the probe was disconnected for 3 hours during this time, no alarm would be generated.

When evaluating data, any readings taken while the probe is disconnected are shown as --.- in the data list. The chart in LogTag Analyzer will show a gap during this period.

If the probe was disconnected for a complete day, the minimum and maximum statistics for that day will show - -.- on the display and --- in the list.

Power Save

When Power Save is enabled, the display will automatically switch off if neither button has been pressed for 30 seconds.

This function is appropriate in applications where you don't need to look at the display frequently, such as in transit monitoring applications, as the logger uses less battery power when the display is not turned on.

Pressing any button will re-activate the display.

Power save is enabled or disabled when configuring the TREL30-16U via LogTag Analyzer in the Advanced Settings tab.

> ⚠ Note: The display will turn off, even if there is a pending alarm! The Red Alert LED will still blink.

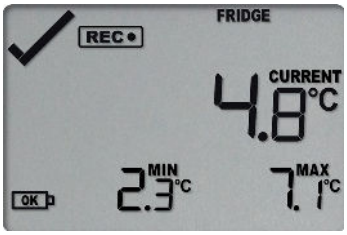
Fridge and Freezer Display

The logger can be configured to show a **FRIDGE** or **FREEZER** symbol in the top right corner of the display, which can help identify where a logger's probe should be placed. This is configured during the initial setup of the logger with LogTag Analyzer and can be located in the **Additional Features** tab (see Additional Features on page 23).

Note that these symbols and the actual alarm parameters are configured independent of each other. For example, selecting the **FRIDGE** symbol does not guarantee that the alarm parameters are suitable for fridge monitoring. Vice versa, selecting alarm parameters suitable for a fridge will not automatically make the **FRIDGE** symbol appear. Care must be taken during configuration that the symbols and alarm parameters match, so users are not led astray.

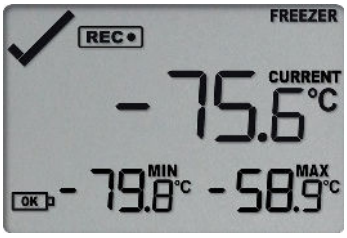
Fridge location

The **FRIDGE** symbol will be shown if this option is selected during configuration:



Freezer Location

The **FREEZER** symbol will be shown if this option is selected during configuration:



Unlike with previous models of the TRED30-16 family, showing the total number of days for which statistics were collected on the main display is not available for this product. You can, however, see this number on the initial review screen.

Reviewing Day Statistics directly on the TREL30-16U

The logger collects statistics data for up to 60 days, which can be accessed by pressing the **REVIEW/MARK** button .

You can review the data regardless of whether the logger is still recording, or has already stopped.

While you are reviewing data, the **REVIEW** symbol shows. The alarm tick or cross represent whether an alarm was recorded on the day you are viewing[4], not the overall alarm status of the logger. The **PAUSED** symbol only shows while the TREL30-16U is logging, and only if this feature is activated during configuration.

Following are some sample display screens you might see during a statistics review. All display screens are based on the alarm settings made in Alarm Configuration Options on page 19 as they would be used for a freezer setting:

Overview Screen

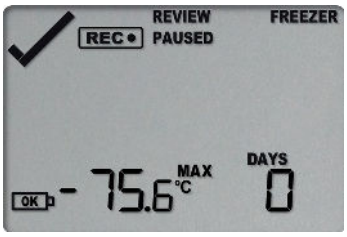
The initial review screen shows the current time and how many days of statistics are stored in memory:

- The review was initiated at 1:15 pm.
- The logger is not currently in alarm (✓), although there may be alarms that were previously cleared.
- The logger has stored 27 days of data in its statistics memory.

Up to 60 more screens are available for viewing, depending on how many days of data were recorded.

Today's data

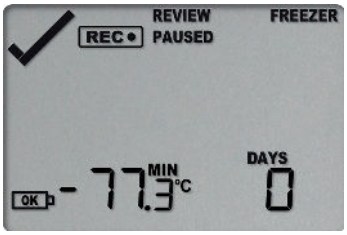
Pressing the button again displays the current day's maximum statistic:



4 As an exception, the initial review screen shows the overall logger alarm state.

- 00 **DAYS** is shown to indicate that today's data is being displayed.
- Today, no temperature values were recorded above the upper alarm threshold, and no alarm event was generated (✓).
- The maximum temperature recorded today was -75.6 °C.
- The paused function is enabled.

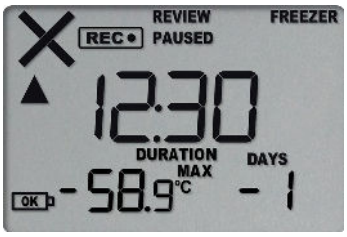
Pressing the button again displays the current day's minimum statistic:



- 00 **DAYS** is still shown, as the same day's data (today) is being displayed.
- Today, no temperature values were recorded below the lower alarm threshold, and no alarm event was generated (✓).
- The minimum temperature recorded today was -77.3 °C.

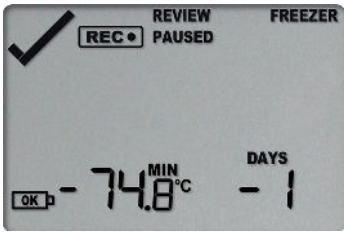
Yesterday's data

Pressing the button now displays yesterday's maximum statistic:



- -01 **DAYS** is shown to indicate that yesterday's data is being displayed.
- Yesterday, recordings above the upper threshold were recorded, indicated by the upper alarm threshold marker ▲.
- The duration value shows the amount of time recorded above the limit yesterday, which was 12 hours 30 minutes.
- An alarm was triggered, indicated by the ×, as this duration was longer than the allowed time above the threshold.
- The maximum temperature recorded yesterday was -58.9 °C.

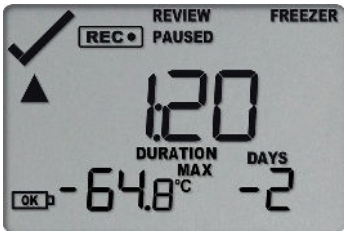
Pressing the button now displays yesterday's minimum statistic:



- -01 **DAYS** still shows, as we are still looking at yesterday's data.
- Yesterday, no temperature values were recorded below the lower alarm threshold. The alarm for the day was generated by the upper alarm, not by the lower alarm, so a ✓ is displayed in the minimum statistics.
- The minimum temperature recorded yesterday was -74.8 °C.

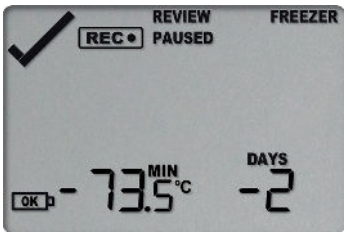
Data from the day before yesterday

Pressing the button now displays the maximum statistic from two days ago:



- -02 **DAYS** is shown to indicate that the data being displayed is from two days ago.
- Two days ago recordings above the upper threshold were recorded, indicated by the upper alarm threshold marker ▲.
- The duration was 1 hour 20 minutes, which was shorter than the allowed period, so no alarm event was generated.
- The maximum temperature recorded on the day before yesterday was -64.8 °C.

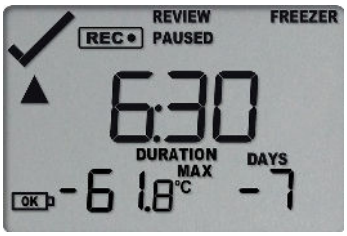
Pressing the button now displays the minimum statistic from two days ago:



- Yesterday, no temperature values were recorded below the lower alarm threshold, and no alarm event was generated.
- The minimum temperature recorded on the day before yesterday was -73.5 °C.

Data from 7 days ago

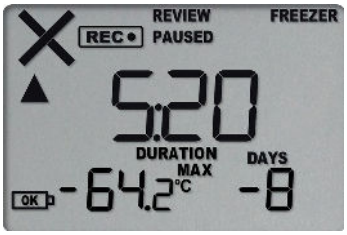
After pressing the button for a few times (skipping days -3 to -6) the maximum statistic from seven days ago is displayed:



- **-07 DAYS** is shown to indicate that the data being displayed is from seven days ago.
- Seven days ago recordings above the upper threshold were recorded, indicated by the upper alarm threshold marker ▲.
- The duration was 6 hour 30 minutes, which was shorter than the allowed period, so no alarm event was generated (✓).
- The maximum temperature recorded seven days ago was -61.8 °C.

Data from 8 days ago

After pressing the button twice (skipping the minimum statistics for day -7) the maximum statistic from eight days ago is displayed:



- **-08 DAYS** is shown to indicate that the data being displayed is from eight days ago.
- Eight days ago recordings above the upper threshold were recorded, indicated by the upper alarm threshold marker ▲.
- The duration was 5 hour 30 minutes.
- An alarm event was generated ×. Neither duration from day -7 or -8 by itself would cause an alarm event, however the combined duration is 10 hours 50 minutes, which is more than the allowed 10 accumulative hours.
- The maximum temperature recorded eight days ago was -64.2 °C.

> Tip: Pressing and holding the button while you are viewing any of the review screens will step back to the previous screen, rather than advancing one screen.

Stopping the TREL30-16U

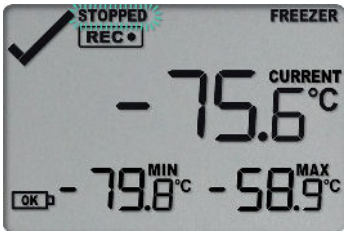
Automatically

The TREL30-16U automatically stops recording temperature when the maximum number of readings specified during configuration has been reached. Your unit can also be set up to stop automatically when it is downloaded. This option needs to be set up at the factory and cannot be changed during configuration with LogTag Analyzer. Your distributor can supply more information about this option.

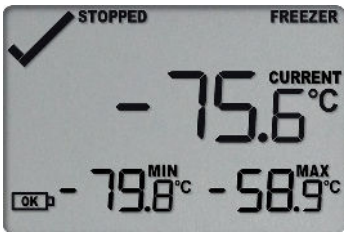
Push-button stop

You can configure a TREL30-16U so it can be stopped with the **START/CLEAR/STOP** button. This feature is useful when you take the logger out of a shipment and don't want to falsify the statistics with readings taken after the shipment completion. The stop function is enabled in the Advanced Options dialogue during configuration. When enabled, following will stop the unit:

Press and hold the **START/CLEAR/STOP** button. The **STOPPED** symbol shows.



After approx 2 seconds the REC symbol turns off.



Release the button within 2 seconds. The logger will now stop taking readings.

The logger will ***not*** stop if you:

- Release the button before the **STOPPED** symbol remains permanently on
- Keep holding the button for more than 2 seconds after the **STOPPED** symbol remains permanently on

⚠ If an ALARM is present (×) and the **Clear alarm by pressing STOP button** function is enabled, you will need to clear the alarm first before you can stop the logger. Please see Clearing an Alarm on page 35 for more information on how to clear an alarm.

Plugging the TREL30-16U into a USB port

As soon as you plug the TREL30-16U into a USB port, the word USb appears.

If you have configured the logger to generate files, USb remains turned on until all files have been generated.

During the file generation a small animation will play on the display.

As soon as the file generation is finished, USb will blink every second to indicate these files can now be accessed.

> ⚠ The files are generated each time you plug the logger into the USB port, regardless of whether the logger is still recording readings or not.

What happens on your computer depends on the operating system of the computer, the settings made during configuration and whether or not LogTag Analyzer is running.

Microsoft Windows

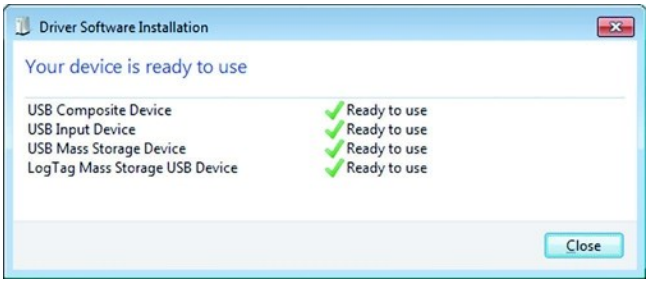
Up to four drivers will now be installed, depending on the TREL30-16U's configuration. All drivers are part of the operating system and will typically not require administrator privileges for your computer.

1. Mass Storage Device
2. LogTag Mass Storage USB Device

   These two devices are required so you can access the data files in the same way as a USB memory stick. These drivers will not be installed if the TREL30-16U does not generate files.
3. USB Input Device (HID)

   This device is used for communication to LogTag Analyzer and its driver will always be installed, even if LogTag Analyzer is not present on the computer.

4. USB Composite Device



macOS and Linux

Typically, in these operating systems a new drive will be mounted, from which you can open the PDF file. You will not be able to configure the TREL30-16U using either of these operating systems, unless you use virtualization software such as Parallels, Fusion or VirtualBox to create a hosted Windows environment. You need to discuss these options with your network administrator.

> ⚠ While a TREL30-16U is plugged into USB, no temperature readings are taken. The graph will display a gap and the data list will show `---` followed by the **#** symbol.

Accessing the files

If the logger was configured to generate files, a new drive letter or mounted device will appear. The device name will be created from the serial number of the TREL30-16U. You can access the files by browsing to the newly created drive and double-clicking the PDF, CSV or LTD files:

- If you have selected PDF as one of the files to be generated, you will find a single file with the .pdf extension. For PDF files, you need Adobe Acrobat Reader or a similar PDF viewer.
- If you have selected LTD as one of the file types, you will find a single file with the ltd extension. To open the LTD file you need to install the free LogTag Analyzer software.
- If you have selected CSV as one of the file types, you will find a single file with the *.csv extension. CSV files can be opened with a text editor, or imported into a spreadsheet program such as Microsoft® Excel.

To retain the logger-generated files, copy them to a permanent storage location on your computer, such as the **Documents** folder, as they are not automatically copied.
The data on the logger is retained, until is re-configured. Each time you plug the TREL30-16U back into the computer, the files are re-generated. Once the battery is exhausted, the real time clock on the unit stops and dates and times for the retained data may no longer be accurate. You will, however, still be able to access the last trip's data.

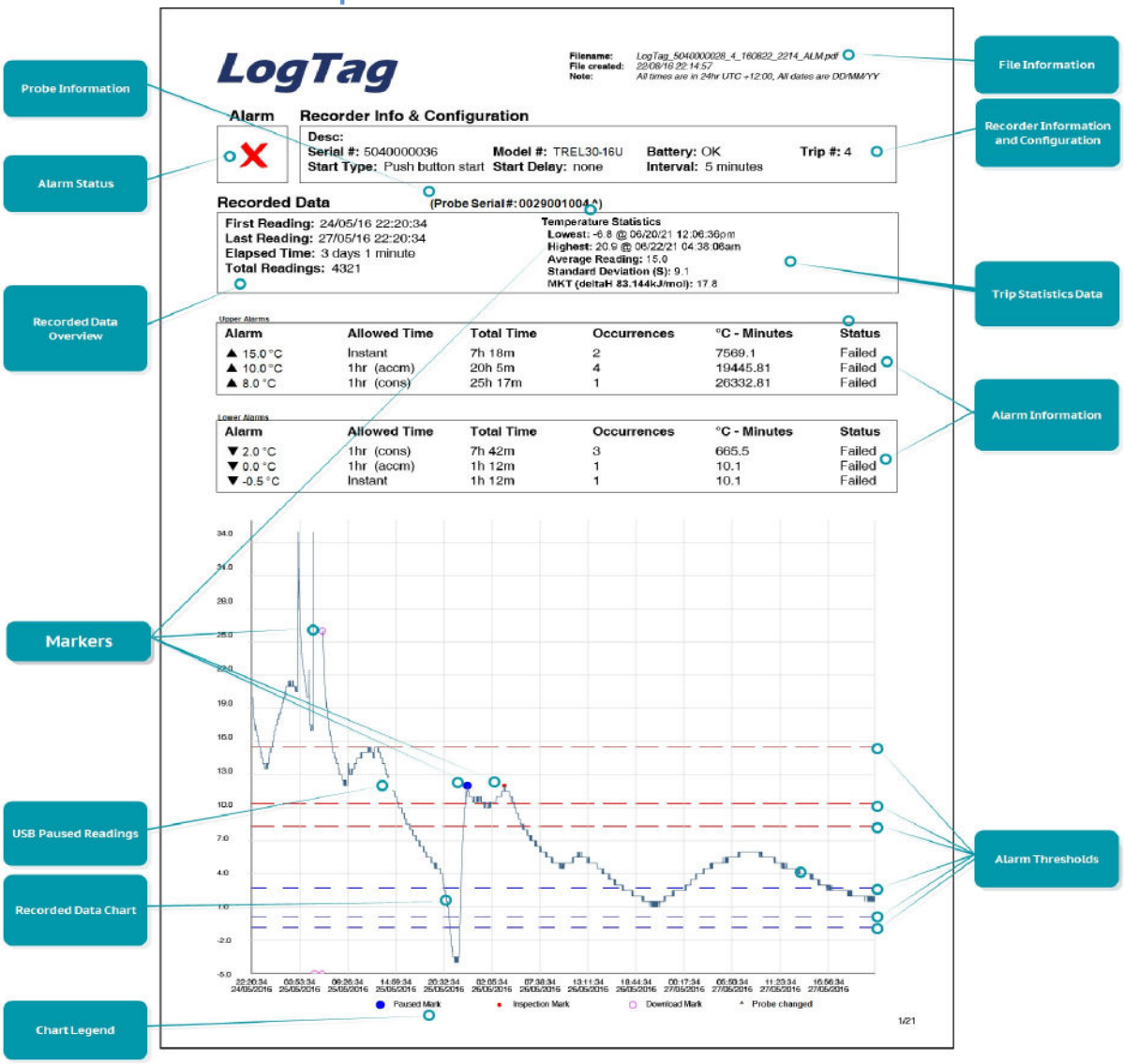
The latest version of Adobe Acrobat and Adobe Acrobat Reader will show an error when accessing the files directly from the logger. To avoid this, either copy the file to a location on your hard disk and open it from that location instead, or open the file with a different PDF reader, such as your browser.

Interpreting the Data

The PDF contains the combined information for both channels. You will find

- a report page with a chart;
- a single list (if configured); and
- a day summary page.

Data Evaluation - Report



Alarm Status

This shows at a glance if the TREL30-16U recorded alarm conditions during the trip (showing a red ✘) or if no alarms were recorded (showing a green ✔).

File Information

This section shows general information about the PDF file, such as generation time, date and time formats used in the chart and the data list as well as the file name, which is compiled from information about the data it contains:

LogTag_[serial_number]_[trip number]_[file creation date]_file creation time]_[OK or ALM].pdf

Other files that may be generated have the extensions *.csv and *.ltd.

Logger Information and Configuration

This section shows general information such as serial number, model number, trip number, battery status and description. It shows how the logger was started, if a start delay was active and the interval used for taking readings.

Recorded Data Overview

This section shows at what time the logger started to record data, when it finished, how many readings were recorded and how long that took.

Logger Statistics Overview

This section gives a brief overview of the temperature data collected during the trip. It shows minimum and maximum values, when these occurred and also shows average, standard deviation and MKT values.

Upper and Lower Alarm Information

These two sections summarize the alarm trigger conditions and occurrences during the trip:

- Alarm threshold temperature value
- Any delay value for consecutive or accumulative alarms
- The total time above or below a threshold
- How often an alarm occurred
- Whether or not an alarm was generated for this alarm trigger

You may see up to three alarms for each direction, depending on the logger's configuration.

Recorded Data Chart

The chart shows a graphical representation of the data during the trip. As part of the TREL30-16U configuration process you set the parameters that influence how the chart is presented.

Markers

On the chart, special symbols will mark the readings at which certain events took place:

- A ° symbol will be shown, if the TREL30-16U was downloaded with LogTag Analyzer.

- A • symbol will be shown if an inspection mark was placed with the **REVIEW/MARK** button.
- A • symbol will be shown when the Paused feature was enabled, and any button was pressed during recording.
- A • symbol will be shown where the logger was plugged into a USB port at the time it would otherwise have taken a reading.
- A • symbol will be shown when the min/max readings were reset.
- A ^ symbol next to the probe serial number denotes that a probe was changed during this trip. This could mean that one Smart Probe was switched to a different Smart Probe, or an analogue probe to a Smart Probe or a Smart Probe to an analogue probe.[5]Note that the TREL30-16U can only detect when one Smart Probe is exchanged for another. It cannot detect a change from an analogue probe to another analogue probe.

USB Paused Readings

USB loggers cannot take a reading while plugged into a USB port. A gap is shown in the graph where the TREL30-16U was plugged in at the time it would otherwise have taken a reading. The list shows --- instead of the reading.

Probe Disconnected

A gap is shown in the graph where the TREL30-16U's probe was not plugged in at the time it took a reading. The list shows --- instead of the reading.

Alarm Thresholds

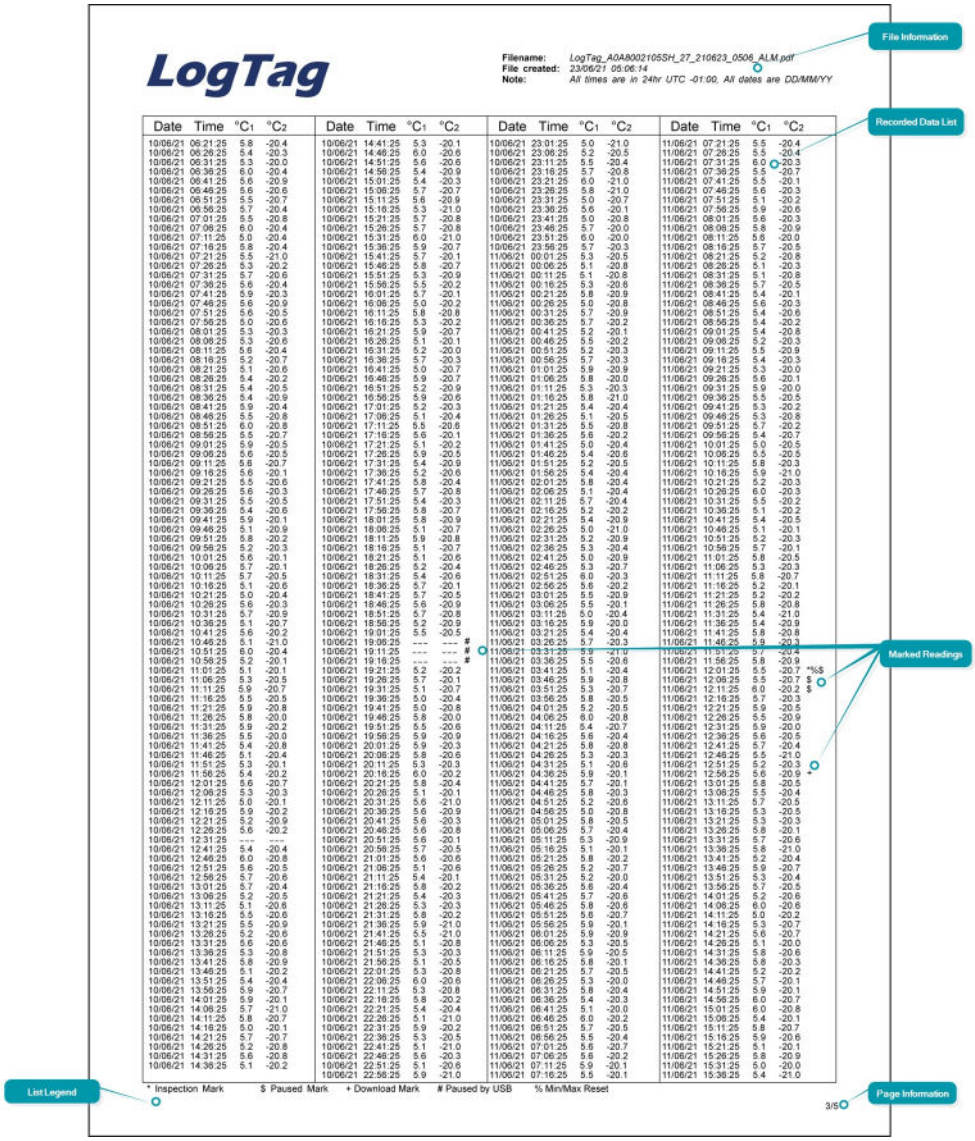
The alarm thresholds are shown with red and blue dashed lines (---- for upper, ---- for lower) so you can see at a glance where temperatures went outside these limits.

Legend

Shows the symbols for download marks, inspections marks,paused marks

5 Please note that the TREL30-16U cannot detect a change from an analogue probe to another analogue probe.

Data Evaluation - Data List



File Information

The information from the report page is repeated here.

Recorded Data list

The Data list shows a single row for each recorded reading, along with the date, time and temperature values, plus any special events that were recorded against this reading.

Marked readings

In the data list, each entry may be marked with one or more of the following symbols:

- A **+** symbol will be shown, if the TREL30-16U was downloaded with LogTag Analyzer.
- A ***** symbol will be shown if an inspection mark was placed with the **REVIEW/MARK** button.
- A **$** symbol will be shown when the Paused feature was enabled, and any button was pressed during recording.
- A **#** symbol will be shown where the logger was plugged into a USB port at the time it would otherwise have taken a reading.
- A % symbol will be shown when the min/max readings were reset.

Symbols are shown against the reading following the event.

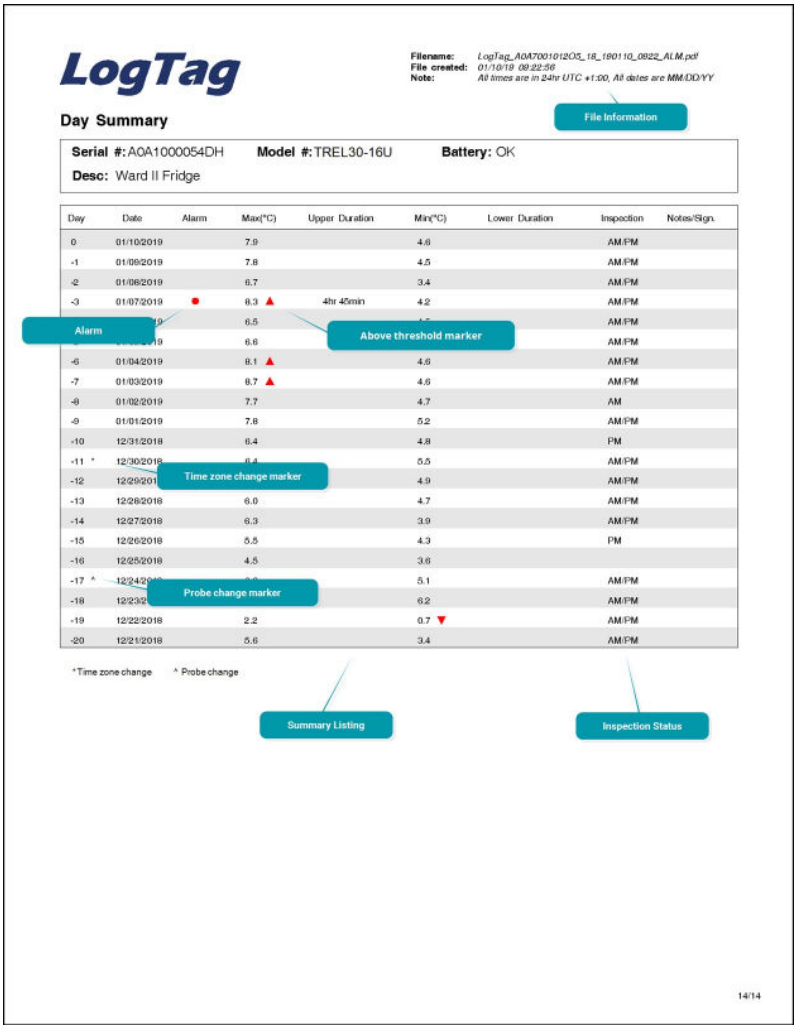
Legend

Shows the symbols for download marks, inspections marks,paused marks

Page information

The current page number and the total number of pages appear on every page.

Data Evaluation - Day Summary



File Information

The information from the report page is repeated here.

Day Summary

The Day summary shows a single row for each day for which readings were recorded. Each row contains the following information:

- Minimum and maximum for the day
- Whether or not an alarm was recorded for that day
- If the minimum and maximum temperatures were above or below the thresholds
- How long temperatures were outside the specifications (even if no alarm was recorded)
- If the logger was inspected in the morning and in the afternoon

If the clock was adjusted on one of the days, a special marker (*) will be displayed for that day.

If during the trip a Probe was changed, this will be shown with a ^ marker for the day the change was made.

Page information

The current page number and the total number of pages appear on every page.

Resetting (Rearming) the Logger

You can reset a TREL30-16U back to its original **READY** state. Once reset, recording can be started again.

> ⚠ When performing this procedure all recordings and statistics stored in the logger are irrevocably deleted and cannot be recovered. Please ensure your data has been saved!
>
> All configuration settings in the logger are retained.

For this process to work, the logger must be **STOPPED**.

Press and hold the **START/CLEAR/STOP** button. The **READY** symbol will turn on.

When the **STOPPED** symbol turns off, release the button within 2 seconds. The logger is now ready to be started again. Follow the normal starting procedure (Starting the Logger on page 30).

If the button is released while **STOPPED** is still on, or you wait until the **READY** symbol disappears, the display shows **STOPPED** again, and the logger remains stopped. This means, the data from the previous trip is still accessible.

The ability to reset a logger is enabled or disabled in the Advanced Settings tab when configuring the TREL30-16U via LogTag Analyzer.

Hibernating a TREL30-16U

When hibernated, the logger's power consumption is near zero and the life of the battery is greatly extended.

This is useful for conserving battery life when the logger is not used for extended periods.

TREL30-16U loggers are placed into Hibernation using LogTag Analyzer by clicking **Hibernate** on the **LogTag** menu.

The buzzer will sound briefly to indicate the unit has entered hibernation.

A hibernated logger has no active display; however, a button press will wake the logger up briefly. The display will show:

- the battery OK symbol OK
- the low battery symbol if the battery requires replacing

A hibernated TREL30-16U can also be activated again by pressing and holding the and buttons together for a period of 4 seconds. During this time the **READY** symbol flashes. Release the buttons when the flashing stops.

You can re-activate a logger with a low battery, however it is not recommended to commence another trip.

> ⚠ Note: The real time clock is not running in a hibernated logger and must be set up if the logger is manually activated. Therefore, the **CLOCKADJ** procedure is automatically invoked (see Adjusting the Display Clock on page 29).

Once the clock has been set, the logger is ready to be started again.

Technical Specifications

Model Number	TREL30-16U
Temperature Sensor Measurement Range	-90 °C to +40 °C (-130 °F to +104 °F)
Logger Operating Temperature Range	-30 °C to +60 °C (-22 °F to +140 °F)
Storage Temperature Range	-10 °C to +40 °C (+14 °F to +104 °F)
Ambient humidity range during transport, storage and use	0 to 95 %RH
Rated Temperature Resolution[6]	0.1 °C (0.2 °F) for measurements -85 °C to 0 °C (-121 °F to +32 °F) 0.2 °C (0.4 °F) for measurements 0 °C to +18 °C (+32 °F to +64 °F) and -90 °C to -85 °C (-130 °F to -121 °F) 0.3 °C (0.5 °F) for measurements +18 °C to +30 °C (+64 °F to +86 °F) 0.5 °C (0.9 °F) for measurements +30 °C to +40 °C (+86 °F to +104 °F) Please see resolution chart in Accuracy and Resolution
Rated Temperature Accuracy (standard Analogue Probe)[7]	Better than ±0.5 °C (±0.9 °F) for -20 °C to +10 °C (-4 °F to 50 °F) Better than ±0.7 °C (±1.3 °F) for -50 °C to -20 °C (-58 °F to -4 °F) and +10 °C to +30 °C (+50 °F to +86 °F) Better than ±1.0 °C (±1.8 °F) for -85 °C to -50 °C (-121 °F +-58 °F) and +30 °C to +40 °C (+86 °F to +104 °F) Better than ±1.8 °C (±3.2 °F) for -90 °C to -85 °C (-130 °F to -121 °F) Please see accuracy chart in Accuracy and Resolution
Probe Compatibility	All ST10 precision thermistor external probes can be interchangeably connected to the TREL30-16U. The CP10 Smart Probe with precision thermistor can also be used on TREL30-16U loggers.[8] For more information, resolution and accuracy charts please refer to the dedicated external probe page on the LogTag North America website.
Sensor Technology	Precision electronic thermistor
Sensor Reaction Time	According to Probe tip
Clock accuracy	Quartz crystal-locked real time clock, typical accuracy ±25ppm @ 25 °C (equiv to 2.5 seconds/day) Temperature coefficient is -0.034±0.006ppm/°C (i.e. typically +/-0.00294seconds/day/°C)
Recording Capacity	Up to 17,526 real time temperature values[9], giving • 66 days @ 5 min logging; • 112 days @ 10 min logging; or • 168 days @ 15 min logging Supports continuous logging ("wrap-around") or specific recording period
Statistics memory	For displaying statistics on the LCD • Trip min/max values • Max/Min values for the past 60 days • Alarm duration values for the past 60 days • Total time above/below alarm thresholds
Memory type	Non volatile
Sampling Interval	Configurable from 30 seconds to 18 hours
Start options	• Push button start with optional configurable start delay from 1 minute to 72 hours • Push button start after hibernation and clock adjust. • Date/time start up to 180 days in the future
Alarm functions	• one configurable upper alarm • one configurable lower alarm • four additional, freely configurable alarms • Alarm arrows linked to thresholds • OK tick and Alarm cross on display, linked to alarms • Audible alarm

6 Resolution is specified for using the TREL30-16U with analogue probes. For resolution data when using Smart Probes please refer to the CP10 data sheet.

7 Accuracy is specified for using the TREL30-16U with analogue probes. For accuracy data when using Smart Probes please refer to the CP10 data sheet.

8 Unlike other loggers that support Smart Probes, the requires configuration settings to be changed, if a different probe type is to be used.

9 The memory for Loggers with a Smart Probe is reduced by 127 readings to store the Smart Probe calibration information.

Vibration	Withstands vibration specification as detailed in EN12830:2018
Shock	• Withstands shock specification as detailed in EN12830:2018 • Withstands 5 drops from 1m onto smooth concrete floor without loss of function or calibration
EMC compliance	Directives: • RoHS2 Directive 2011/65/EU • Electromagnetic Compatibility Directive 2014/30/EU Applicable relevant standards: • EN 61000-6-3: 2007 + Amendment 1:2011 • Section 6: Generic Emission Standard, Part 3: Emissions for Domestic and Light Industrial Environments • EN 61000-4:2001 Section 4 : Electromagnetic compatibility (EMC): Generic Immunity
Environmental	IP61
Case Material	Polycarbonate with Lexan label
Power source	CR2032 3V Li-MnO_2 battery – User replaceable, non-rechargeable
Battery life	Typically 1 year of operation with normal use (5 minute logging, statistics reviewed on the display no more than once daily for no longer than 30 seconds each time, download data monthly) provided recorder is kept within the storage temperature range when not in use.
Size	93mm(H) x 54.5mm (W) x 8.6mm (T) (excluding probe)
Weight (without probe)	43 g (excluding probe)
Calibration	Factory calibration using instruments traceable to an ISO/IEC 17025 accredited testing laboratory
Download time	• Typically (17,526 readings) less than 30 seconds from time of insertion to availability of PDF report. • With full memory, typically less than 10 seconds from time of insertion to availability of LTD file in LogTag Analyzer (if configured)
Software requirements	
Accessories	• Wall holder • Standard (analogue) probes • Smart Probes • Silica sand buffer • Interface cradle

Appendix 1 - Accuracy and Resolution

Temperature Accuracy

The following graph shows the typical rated temperature accuracy of a TREL30-16U, if using an analogue probe:

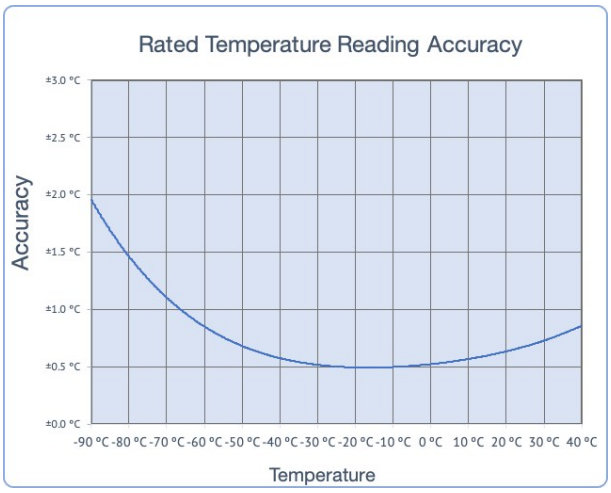


Figure 16: *Rated Temperature Accuracy Chart*

Temperature Resolution

The following graph shows the typical rated native temperature resolution of a TREL30-16U, if using an analogue probe:

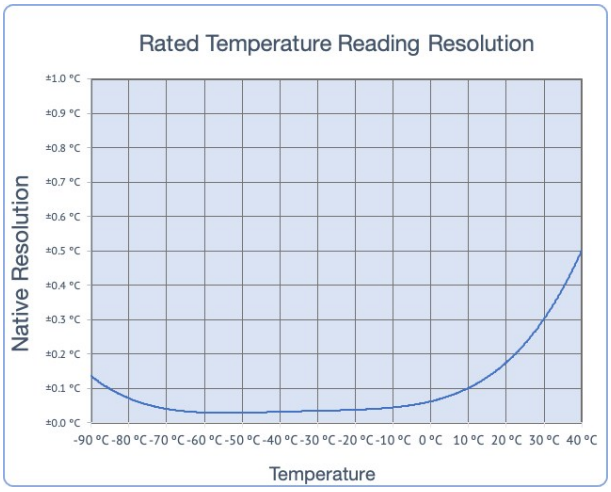


Figure 17: *Rated Temperature Resolution Chart*

Appendix 2 - Battery Replacement

Safety and General Warnings

⚠ WARNING

- **Ingestion Hazard:** This product contains a button cell or coin battery.
- **Death** or serious injury can occur if ingested.
- A swallowed button cell or coin cell battery can cause **Internal Chemical Burns** in as little as **2 hours**.
- **Seek immediate medical attention** if a battery is suspected to be swallowed or inserted inside any part of the body.
- Contains a user-replaceable **CR2032** 3V button cell.
- See below for additional details.

To ensure safe and proper use, please adhere to the following guidelines:

- Do not force discharge, recharge, disassemble, heat above each models published maximum temperature or incinerate. Doing so may result in injury due to venting, leakage or explosion resulting in chemical burns.
- When not in use, store the product and batteries in a cool, dry place according to the storage temperature requirements.
- Remove and immediately recycle or dispose of batteries from equipment not used for an extended period of time according to local regulations.
- Keep batteries out of reach of children. Coin cell batteries pose a choking hazard and can cause severe internal burns if swallowed.
- Note that even used batteries may cause severe injury or death.

⚠ IN CASE OF AN EMERGENCY

If a battery is swallowed, seek medical attention immediately. For information on treatment, call the National Battery Ingestion Hotline at 202-625-3333 (USA) or your local poison control center.

- Inspect the battery compartment regularly for signs of corrosion, leakage, or damage, and if detected, stop using the product.

When the software indicates that a logger's battery is low, it must be replaced.

- Follow the instructions on the next pages.
- Avoid storing batteries in direct sunlight or in environments where temperatures exceed 60 °C (140 °F).
- Do not attempt to recharge the batteries used in these products.

Battery Replacement

Prepare the Logger

- Download the unit in LogTag Analyzer to save any stored data.
- Hibernate the unit.

> ⚠ Failing to hibernate the logger may result in serious memory corruption. As a result you may no longer be able to use this product.

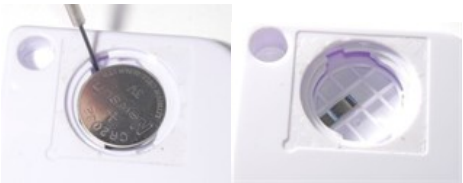
Remove the old battery

- Carefully remove the rear label covering the battery door using a small-bladed screwdriver or knife:

- Turn the battery door anti-clockwise and remove it from the case:

You can use the new battery for this, as it will fit into the slot

- Remove the battery using a small-bladed screwdriver, as shown:



Insert the new battery

> Only use batteries from a reputable manufacturer! Check the temperature range of the battery and make sure it covers the range of the TREL30-16U.

- Place a new CR2032 cell into the battery compartment as shown; the right-hand edge of the battery is inserted first against the contact:

Ensure the battery is installed correctly according to polarity (+ and -) as shown in the image above.

- Press firmly down on the left-hand side of the battery to click the battery into place:

- Replace the battery door; turn clockwise to lock it into place (using the old battery).

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⚠ Always completely secure the battery compartment. If the battery compartment does not close securely, stop using the product, remove the batteries, and keep them away from children.

Replacement battery doors can be obtained from your reseller.

- Cover the battery door with a new label (Part # 100-000502). Do not re-use the old label, as it loses adhesion once removed from the product.

- Re-configure the logger with LogTag Analyzer.

⚠ Remove and immediately recycle or dispose of used batteries according to local regulations and keep away from children. Do NOT dispose of batteries in household trash or incinerate.

Do not mix old and new batteries, different brands or types of batteries, such as alkaline, carbon-zinc, or rechargeable batteries.

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Appendix 3 - Glossary

A

Accumulative alarm

Temperature or humidity readings are above or below the configured threshold for the total of time defined, but readings may not necessarily be sequential.

Active alarm

An alarm/alert that has triggered, but has not been cleared.

Active alert

An alarm/alert that has triggered, but has not been cleared.

Alarm

An alarm is an automatically generated event warning a user that environmental conditions are no longer deemed safe for the monitored location. Alarms are generated by the device based on alarm trigger conditions, such as thresholds, direction and delays. If an alarm trigger condition is met, the device displays an alert and the software reports an alarm event has taken place.

Alarm activation delay

This value is used for consecutive and accumulative alarms and defines the number of recorded values that need to be alarm readings for the trigger condition to be met.

Alarm event

Single occurrence of an alarm

Alarm range

Temperature/humidity range that is outside the -> Non-Alarm range

Alarm reading

Temperature or Humidity value that lies above the upper or below the lower alarm threshold value

Alarm threshold value

The temperature or humidity value at which a reading is regarded as an alarm reading. This can be an upper threshold or a lower threshold

Alarm trigger condition

Set of conditions that cause an alarm to be triggered. This requires a -> threshold value, a -> direction, an -> activation type and a -> delay value.

Alarm trigger time

The time at which all conditions of an alarm were met

Alarm triggered

One of the alarm trigger conditions has been met, the device displays an alert and the software reports an alarm event has taken place.

Alert

Visual or audible representation of an alarm on a device

Analogue Probe

Probe consiting of a precision electronic sensor, cable and connector, without any conditioning electronics (which is located in the logger)

C

Consecutive alarm

Temperature or humidity readings are above or below the configured threshold for the time defined without interruption.

Cumulative alarm

Temperature or humidity readings are above or below the configured threshold for the total of time defined, but readings may not necessarily be sequential.

D

Delay value

Number of logs that have to be in an -> alarm range to trigger an alarm event

Direction

Whether an alarm is a lower or upper alarm

I

Inspection

Pressing the Mark button on a logging device

Inspection event

Pressing the Mark button on a logging device

Instant alarm

One single temperature or humidity reading is above or below the configured threshold

L

Latched alarm

An Alert that remains active even if the alarm trigger conditions are no longer met

Lower alarm

An alarm is called a lower alarm if the alarm trigger condition requires readings to go below a low threshold temperature.

Lower alarm threshold

If a recorded temperature or humidity value is equal to or below this value it is regarded to be an alarm reading.

M

Multi Chart

A Multi Chart is a chart containing graphed data from more than one logger. Use this term without a hyphen, but with a space, unless it specifically refers to the software. Avoid MultiChart, Multi-Chart or Multichart. Capitalize both words.

N

Non-alarm range

Target temperature/humidity range where the readings are regarded as acceptable/within specification

Non-alert range

Target temperature/humidity range where the readings are regarded as acceptable/within specification

P

Primary alarm

The alarm threshold closest to the non-alarm range in a multi-alarm device

S

Secondary alarm

The alarm threshold second closest to the non-alarm range

Single event alarm

Temperature or humidity readings are above or below the configured threshold for the time defined without interruption.

Smart Probe

Probe that includes a precision electronic sensor, cable, socket, and conditioning electronics that can hold its own calibration data and sends calibrated temperature values to a logger

T

Tertiary alarm

The alarm threshold third closest to the non-alarm range

Trip

Readings taken sequentially from starting a unit until it has been re-configured or stopped.

Trip number

The number of times a unit has been started

U

Upper alarm

An alarm is called an Upper Alarm if the alarm trigger condition requires readings to exceed an upper threshold temperature/humidity.

Upper alarm threshold

If a recorded temperature or humidity value is equal to or above this value it is regarded to be an alarm reading.