TREL30-16

Ultra-Low Temperature Recorder with Display

Product User Guide

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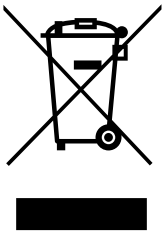
Contents

Safety Information



The TREL30-16 temperature logger contains a Lithium Battery. When the battery indicates "LOW", you can replace it as per the instructions in Battery Replacement on page 42.

The empty battery should be recycled or disposed of according to your local regulations.

Do not expose the logger to extreme temperatures as it may lead to the destruction of the battery and may cause injuries.

Keep out of the reach of children.

Liability

LogTag Recorders' standard warranty terms apply. A copy can be requested by emailing support@logtagrecorders.com. In addition, LogTag Recorders shall not be held liable:-

- if the device was used beyond LogTag Recorders' 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 a low battery
- for consequential loss

Battery Life

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

- the device was not stored for more than 12 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 recording interval is not shorter than 5 minutes
- the acoustic alarm is not active over long periods
- the device is stored and operated according to LogTag Recorders' recommendations

Disclaimer

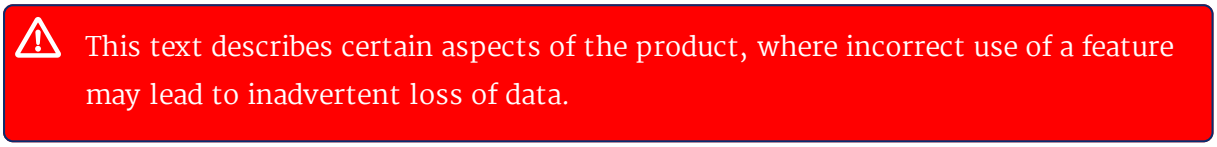
The TREL30-16 monitors temperature exposure and not the quality of the goods it accompanies. Its purpose is to signal if product quality evaluation/testing is required.

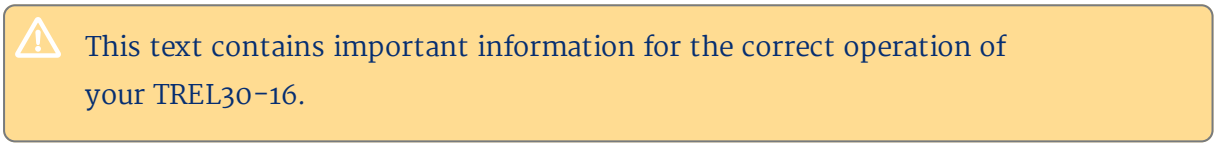
Typographical Conventions

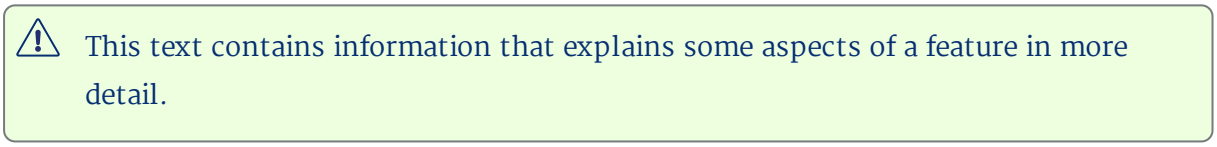
Text **in this font** refers to buttons on the TREL30-16.

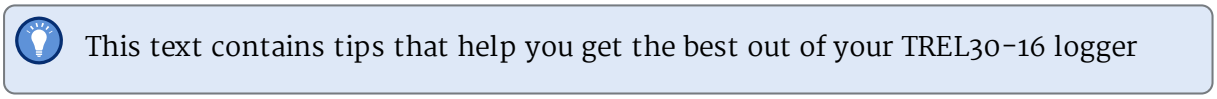
Text in this font refers to option settings, dialogue boxes or actions to be taken in LogTag® Analyzer.

Text in this font describes features of the product.









Introduction

The LogTag® TREL30-16 low temperature logger features a data logging memory storing up to 15,905 temperature readings and a separate statistical memory, storing maximum and minimum reading as well as alarm duration for each of the last 30 days.

During recording the display shows the temperature of the most recent reading, whether or not this is within or outside the acceptance range, an alarm trigger summary of the last 30 days (today and 29 days previous), the current time and battery status.

Alarm events can be triggered when a number of readings are outside preset Alarm thresholds and a "day alarm indicator" appears on the display.

Logged temperature data can be downloaded via a standard LogTag® Interface 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.

Features

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

Figure 1: *TREL30-16 features*

Case

- Mounting lug for secure fastening of logger to fixtures
- Gold-plated, high-quality temperature external probe socket
- Robust polycarbonate case, IP61
- Durable communications contacts

Buttons

- **START/CLEAR/STOP** button; can be used to start and stop the unit or to clear an alarm. It is also used to exit the statistics review.
- **REVIEW/MARK** button; can be used to enter the statistics review and to scroll through the statistical data directly on the display. It is also used to place an inspection mark in the data listing.

Display

The display shows ‘at a glance’ if alarm events have occurred for both the current day and up to 29 days in the past. Details of any alarm event can be checked directly on the unit by inspecting the statistics history on the logger's display or in more detail by downloading the logged data.

External Probes

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

What You Need

Required Equipment

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

- A USB interface for communication to the PC
- An external probe of the ST10 series
- For configuration - a PC running Windows 7 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 TREL30-16 to the side of a cabinet

- A silica sand temperature buffer, which simulates environmental behaviour of a vaccine vial

Configuring the TREL30-16 for logging

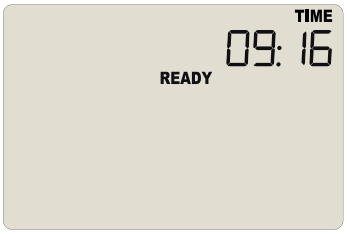
Before a TREL30-16 logger can be deployed, it must be configured with the parameters required for starting and recording temperature values.

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

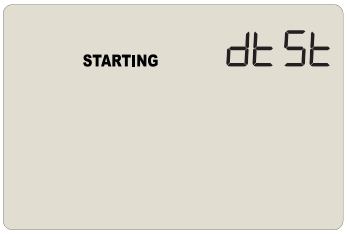
You can check if your logger is already configured or not by briefly pressing the **REVIEW/MARK** button.

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

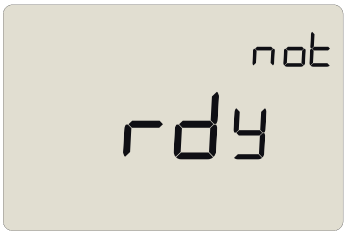


if the logger was pre-configured for a Date/Time start.

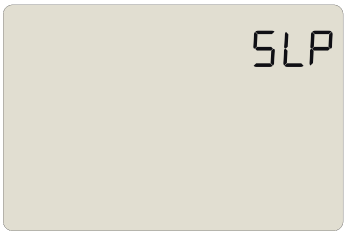
If your logger shows one of these screens you may skip the configuration process.

The logger is unconfigured

An unconfigured TREL30-16 logger is delivered to you hibernated (i.e. in a state of low power consumption), and pressing the **REVIEW/MARK** shows:



and then



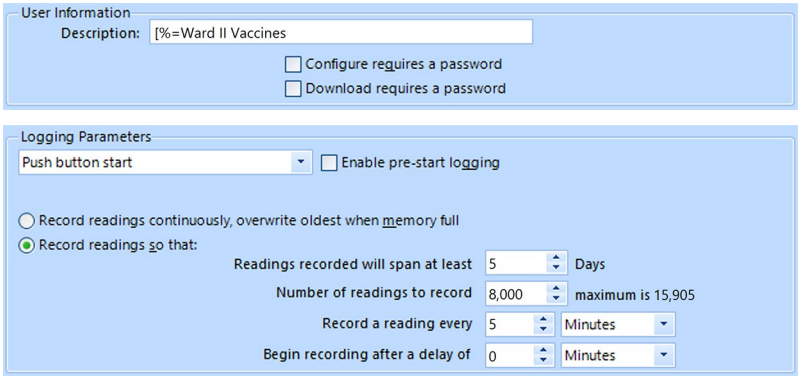
If your logger is unconfigured you must set it up with the parameters required for:

- starting and recording temperature values
- triggering alarms

This is done using LogTag® Analyzer software, which can also be used for downloading and analyzing data.

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.

TREL30-16 Start Options

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

Push button start

The logger will start taking temperature readings as soon as you have pressed the **START/CLEAR/STOP** button (see Starting the Logger on page 19).

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 TREL30-16 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. 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 TREL30-16 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 TREL30-16 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 Advanced Settings when configuring the logger with LogTag® Analyzer.

⚠ Please note, that continual activation of the audible alarm will reduce the working life of the battery. 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.

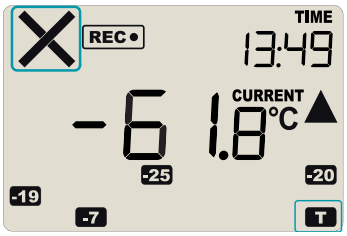
⚠ Note: The interval will increase, even if the alarm is re-triggered!
Please see more information about re-triggering alarms in

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 TREL30-16 can display an alarm if either of the configured alarm trigger conditions have been met. This is indicated on the display by showing the Alarm Indicator (×) and the Day Alarm Marker for
today (T).



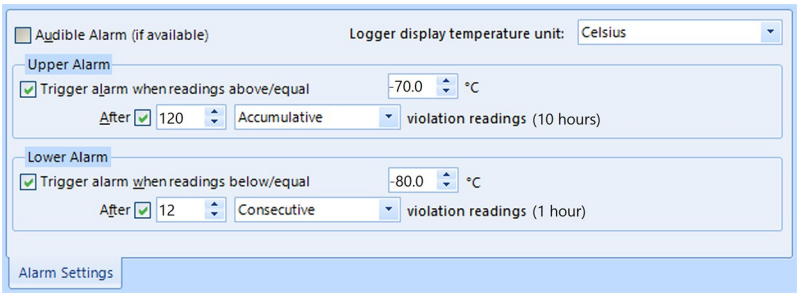
Each alarm trigger condition consists of a threshold temperature value, an activation type (which can be instant, consecutive or accumulative[2]) and a delay time, if it is not an instant alarm.

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 configured in the Alarm Settings tab during configuration of the logger with LogTag® Analyzer.

The screen shows an example where:

- the upper alarm is triggered when the temperature is -70.0 °C or above for an accumulative time of 10 hours.
- the lower alarm is triggered when the temperature is -80.0 °C or below continuously for 1 hour.



Once an alarm has triggered, the alarm indicator (×) remains shown until the alarm is cleared (see Clearing an Alarm on page 25) or the unit is reconfigured. The day alarm marker T remains shown until midnight, then it turns off and the marker for the

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

previous day is shown (-1) to indicate the alarm was registered against what is now the previous day. When midnight passes next, this marker will move to -2 and so on.

⚠ 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 (×) and the Day Alarm Marker (T) 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 TREL30-16.

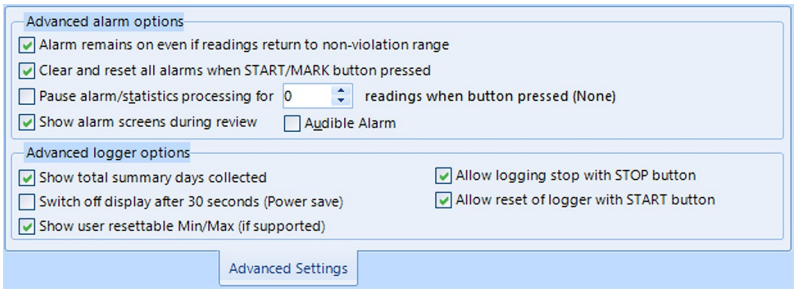


Figure 2: *TREL30-16 advanced configuration screen in LogTag® Analyzer 3*

Parameters that influence the appearance of the display are:

- Pause alarm/statistics processing (see Paused Readings on page 25)
- Temperature display unit (see Display Overview on page 16)
- Switch off display after 30 seconds (Power save, see Power Save on page 27)
- showing the number of days on the display, for which statistics were collected (see Total Number of Days Statistics Collected on page 28)
- 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 33)

Parameters influencing specific behavior of the TREL30-16 are:

- clearing and resetting alarms when the **START/CLEAR/STOP** button is pressed (see Clearing an Alarm on page 25)

- leaving the alarm turned on, even if readings return to the normal temperature range again
- allowing the user to stop the logger with the **REVIEW/MARK** 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.

Display Overview

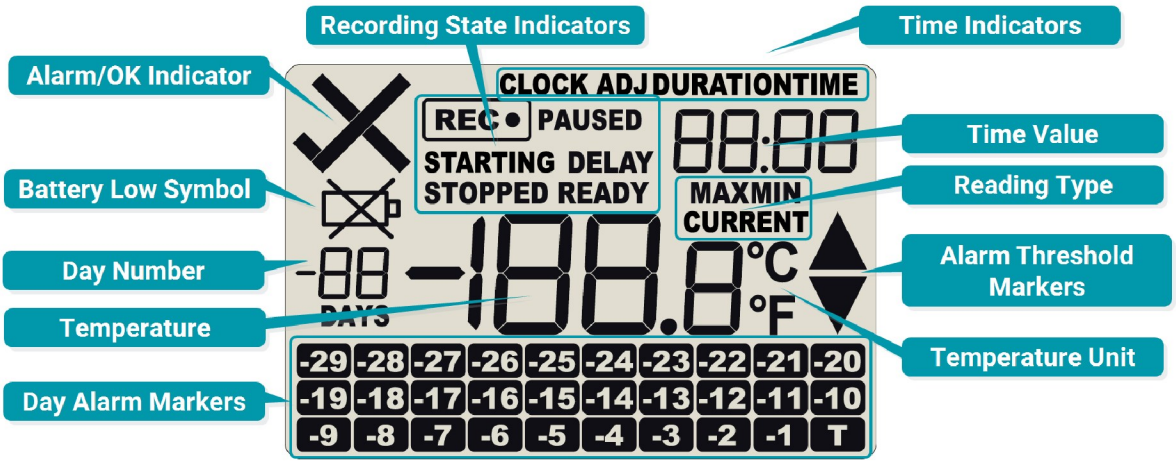


Figure 3: Display Overview with all segments turned on

Day Alarm Markers

This grid shows 3 rows of 10 markers, named *Today* (T) to *Day -29* (-29), which are switched on when an alarm event occurred on that day.

Temperature Value

This shows the most recently recorded temperature while the TREL30-16 is recording. Once the logger has stopped, nothing will be displayed. During review, this will show minimum or maximum temperatures.

Day Number

During Review, this shows the day number of the currently displayed day statistic. Today is 00 **DAYS**, days in the past are represented between yesterday -01 **DAYS** and -29 **DAYS**. During configuration of the logger in LogTag® Analyzer you can also enable this to show the total number of days for which statistics are available.

Battery Low

A battery test is performed hourly. The battery low symbol will appear if the TREL30-16's battery is low and requires changing. Please follow the instructions provided in Battery Replacement on page 42. If the symbol is not shown while the display is turned on, the battery is still OK.

ALARM/OK indicator

The ✕ symbol is shown as soon as the TREL30-16 has registered an alarm event. While there are no alarms, the ✓ symbol is shown.

Recording indicators

The recording indicators show what the TREL30-16 is currently recording.

- If **READY** is shown, the TREL30-16 is ready to be started with the **START/CLEAR/STOP** button. Depending on the configuration it may already record pre-start readings.
- If **STARTING** is shown, the logger has been started, and a start delay is active. The word **DELAY** is also shown, together with the time in hours and minutes until the start.
- If **REC** is shown, the TREL30-16 is recording temperature at the sample interval defined during configuration.
- If **REC** is shown together with the word **PAUSED**, the product is also recording, but the recorded values are not taken into account when calculating alarm events and durations.
- If the word **STOPPED** is shown, the TREL30-16 has finished recording temperature data.

Time Value and Time Indicators

The time value display is used to show one of the following:

- The current time
- The time remaining until the logger starts recording (for a delayed start)
- A duration, for example of an alarm

The time indicators identify which of those is displayed as follows:

- If **TIME** is shown, the time value represents the current time in hours and minutes (24- hour format).
- If **DELAY** is shown, the time value represents a start delay, or the time remaining until a date/time start will occur.
- If **DURATION** is shown, the time value represents the duration, for example the time above the upper alarm limit.

The word boot appears in place of the clock if new firmware is being uploaded to the TREL30-16.

The word USb appears when the unit is plugged into a USB port.

The word dtSt appears in place of a time value if the logger is configured for a date/time start, and the start time has not yet passed.

Reading Type

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

The word **MAX** is shown in Review mode, when the temperature on the display represents the maximum recorded temperature for the day displayed.

The word **MIN** is shown in Review mode, when the temperature on the display represents the minimum recorded temperature for the day displayed.

Above/Below Threshold Arrows

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

Temperature Units

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

Real Time Clock

The time shown on the recording display is linked to the logger's internal real time clock. A day change occurs when the display time rolls through midnight (i.e. 00:00), which 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 display clock value 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. This prevents the data logging becoming discontinuous, which would be the case if the real time clock were to be changed together with the display clock.

LogTag® Analyzer can display the logged readings in a number of different time zones, regardless of where it was configured.

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!***

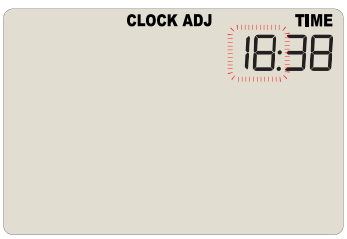
During this period the **CLOCKADJ** icon flashes. Release the buttons when the flashing stops. The clock can now be adjusted.

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).

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).



Accept the hours 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**) to avoid large shifts in day boundary data.

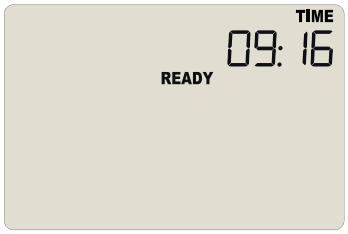
> If a display clock adjustment is made while recording data, the next log taken will be identified in the downloaded data with a time change mark.

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

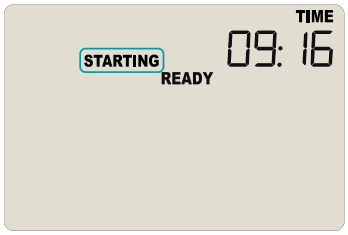
Starting the Logger

Push button start

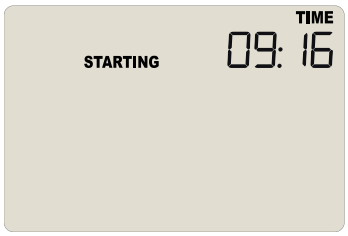
The logger's display must show **READY** for it to be started. The current time is also shown.



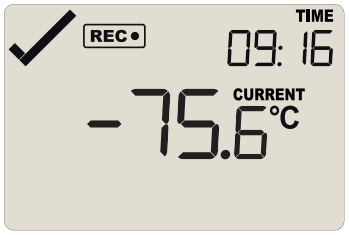
Press and hold the **START/CLEAR/STOP** button. First, **STARTING** is shown in addition to **READY**:



Then **READY** disappears:



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

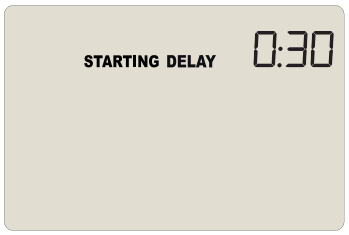


The logger will ***not*** start if you:

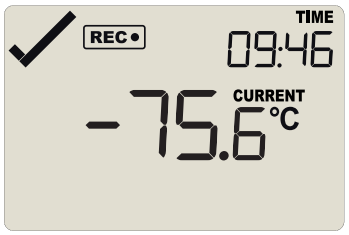
- Release the button before **READY** disappears
- Keep holding the button for more than 2 seconds after **READY** disappears

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 TREL30-16 starts recording when it reaches *0:00*.



The timer can be cancelled and the logger reset to **READY**.

While **STARTING** and **DELAY** are shown, press and hold the **START/CLEAR/STOP** button. **STOPPED** will now show. Release the button when **STARTING** disappears.

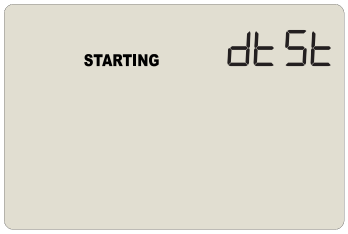
STOPPED and **DELAY** will both disappear, and **READY** will show, together with the current time, and the logger can now be started again as normal.

The TREL30-16 will ***not*** be reset if you:

- Release the button before **STARTING** disappears
- Keep holding the button until **STOPPED** disappears

Automatic date/time start

If you configured the TREL30-16 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.

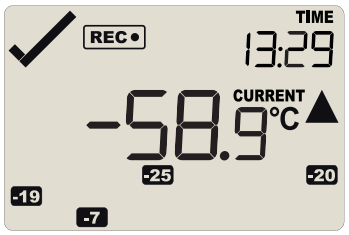
During Recording

During normal operation the display shows the most recently recorded temperature. This temperature is updated each time the logger records a reading. The current time is also displayed (in 24 hour format). A tick symbol ✓ is shown as long as no alarm event has occurred. If an alarm event is registered, a cross symbol ✕ is shown instead of the tick.

At the bottom of the display you can see an alarm day summary, where any days on which an alarm was recorded are highlighted.

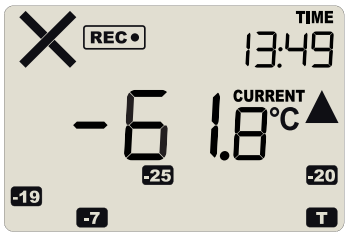
Following are some sample display screens:

At 1:29 pm the display shows the following:



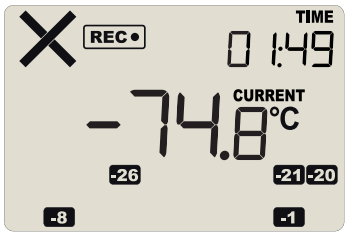
- Alarm events were recorded 7, 19, 20 & 25 days ago.
- These alarms were cleared by an inspector, as the display currently shows the OK tick (✓).
- The current temperature is over the upper alarm threshold, as indicated by the upper alarm marker (▲).
- The duration, however, of this temperature excursion 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 (▲).
- The day marker for the current day (T) is shown.

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 threshold markers are visible), but the alarm remains present, as it has not been inspected and cleared.
- The day summary has shifted by 1 day as the display time has passed through midnight (00:00).

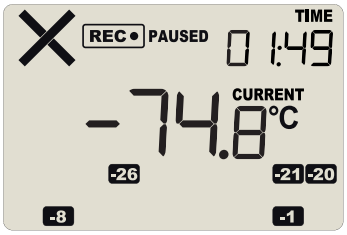
Marking a reading with an inspection mark

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

If the Allow stopping with the Stop button feature is enabled, a mark will also be registered when you press the **REVIEW/MARK** button, but do not complete the process of stopping the logger. An inspection mark will also be recorded if you clear an alarm.

Clearing an Alarm

During configuration with LogTag® Analyzer you can allow users to clear an 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.

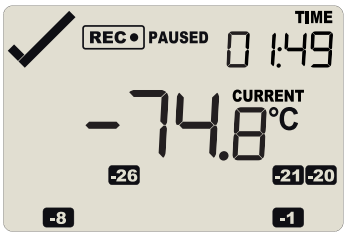
To clear an alarm, press and hold the **REVIEW/MARK** button.

After approx. 2 seconds the cross ✕ will be replaced with the tick ✓.

Release the button when the tick appears. The normal recording display is shown.

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

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



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 below.

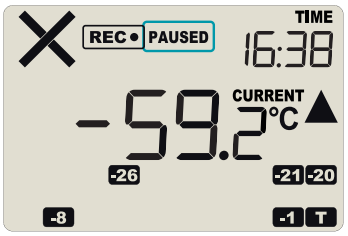
⚠ Note: Only the Alarm Indicator (×) can be cleared! The day alarm marker (-1 in the above example) remains shown, as it is part of the statistic summary. Clearing an alarm also does not reset any of the delay values. Please see Alarm Configuration for additional information.

Paused Readings

During configuration of the TREL30-16 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 labelled 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 REC symbol. **PAUSED** will turn off as soon as the last ignored reading has been recorded.

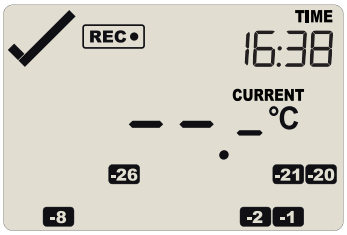
The option is set in the Advanced Settings tab during configuration with LogTag® Analyzer and is expressed in number of readings after the last button press.

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.

Probe is disconnected

The display shows ---.- instead of a temperature value if the logger's remote temperature probe is disconnected. This function is useful if the probe is permanently mounted, but you wish to take the TREL30-16 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 0 °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.

After downloading the TREL30-16 with LogTag® Analyzer, 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 none of the buttons have 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 TREL30-16 via LogTag® Analyzer in the Advanced Settings tab.

Total Number of Days Statistics Collected

The logger can be configured to show the total number of days for which statistics were collected. This feature is enabled when configuring the TREL30-16 via LogTag® Analyzer and can be located in the **Advanced Options** dialogue (see Advanced Configuration Settings on page 14).

When enabled, the total number of days for which statistics were collected are shown on both the **Recording Display** and the **Stopped Display**.

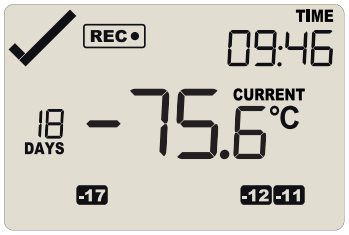


Figure 4: *TREL30-16 recording, showing '18' days of data has been collected.*

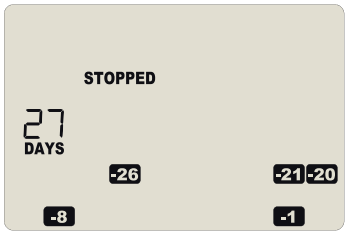


Figure 5: *TREL30-16 stopped, showing '27' days of data has been collected.*

> ⚠ Note, this is not always the number of days the logger has collected data. Depending on the sampling interval the logger can hold more than 30 days of temperature readings, but since the maximum number of days for which statistics can be collected is 30, the highest number that can be shown here is 30.

Reviewing Day Statistics directly on the TREL30-16

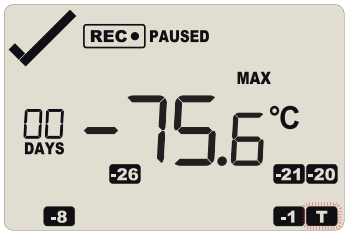
Historic statistics data can be accessed by pressing the **REVIEW/MARK** button .

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

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 13:

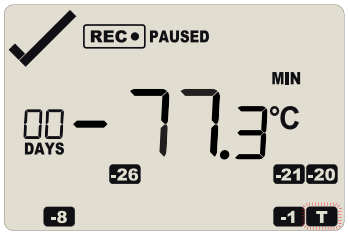
Today's data

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



- The Today marker **T** flashes and **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.

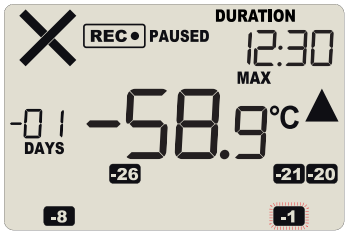
Pressing the button again displays the current day's minimum statistic:



- **T** still flashes and **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.

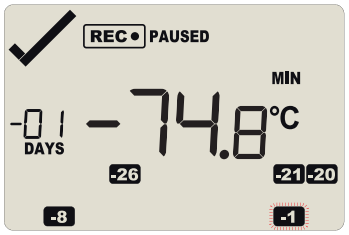
Yesterday's data

Pressing the button now displays yesterday's maximum statistic:



- The -1 marker -1 flashes and **-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.

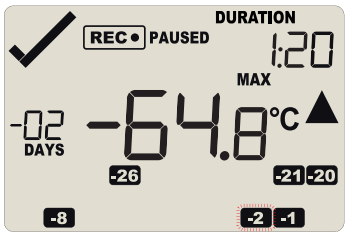
Pressing the button now displays yesterday's minimum statistic:



- -1 still flashes and **-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 -1 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

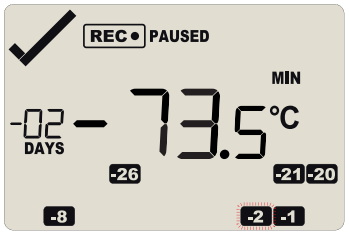
Pressing the button now displays the maximum statistic from two days ago:



- The -2 flashes and **-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 ℃.

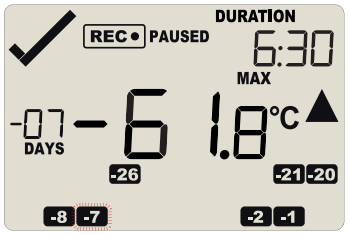
Pressing the button now displays the minimum statistic from two days ago:



- -2 still flashes and -02 **DAYS** still shows, as we are still looking at the data from 2 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 ℃.

Data from 7 days ago

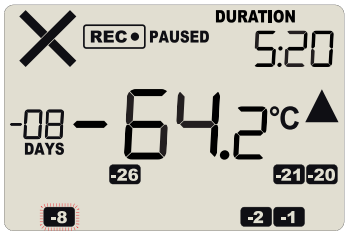
After pressing the button for a few times (skipping days -3 to -6) the maximum statistic from seven days ago is displayed:



- The -7 flashes and -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 ℃.

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:



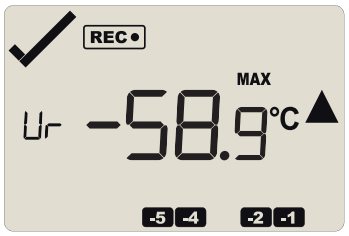
- The -8 flashes and -08 **DAYS** is shown to indicate that the data being displayed is from eight days ago.
- Eight days ago recordings above the upper threshold were recorded, indicated by the upper alarm threshold marker ▲.
- The duration was 5 hour 30 minutes.
- An alarm event was generated ×. Neither 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 ℃.

Tip: Pressing and holding the button will get you back to the previous screen, rather than advancing one screen.

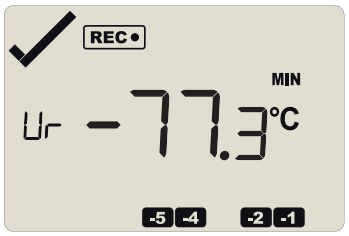
Trip Minimum/Maximum Temperatures

You can configure the TREL30-16 so it tracks the minimum and maximum temperatures since it started logging. This feature needs to be enabled during configuration of the logger in the Advanced Configuration Settings on page 14. Once enabled, the minimum and maximum values will be shown when the statistics are reviewed on the display, before any of the day statistic are shown.

Press the **REVIEW/MARK** button. Instead of today's statistic data, the first screen shows the maximum temperature recorded during the trip to date, identified by the symbol Ur (**U**ser **r**esettable):



Pressing the **REVIEW/MARK** button again shows a screen with the minimum temperature recorded during the trip to date.



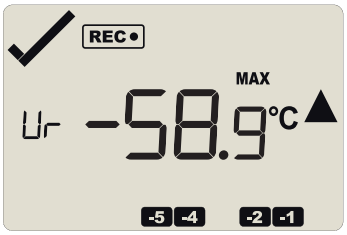
Pressing the **REVIEW/MARK** button again will then show the first day summary screen, and you can continue to review the remaining screens.

Resetting the Trip Minimum/Maximum Temperatures

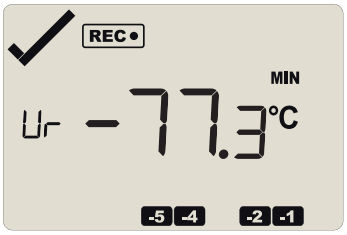
The currently stored Min/Max temperature values can be reset at any time while the unit is recording, but not once the unit has been stopped.

To reset the values, follow this procedure:

- Press **REVIEW/MARK** to display the trip maximum temperature value.

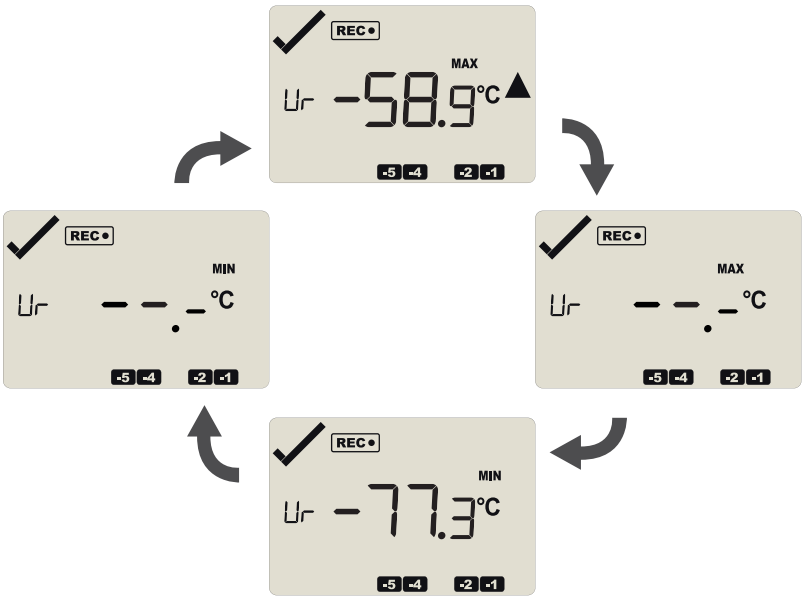


- Press **REVIEW/MARK** again to display the trip minimum temperature value.



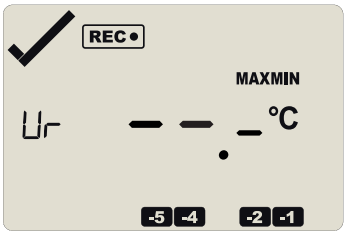
> ⚠ You can only complete the next steps if you are viewing the Minimum temperature screen!

- 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. 6 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 within the 6-second period after the initial press 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 LogTag® Analyzer 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.

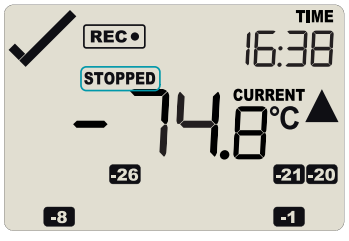
Stopping the TREL30-16

Automatically

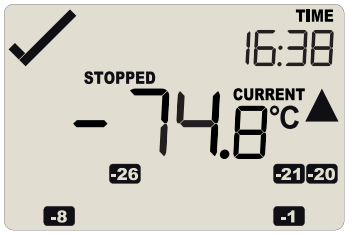
The TREL30-16 automatically stops recording temperature when the maximum number of readings specified during configuration has been reached. Your unit can also be set up to stop automatically when it is downloaded. This option needs to be set up at the factory and cannot be changed during configuration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

Push-button stop

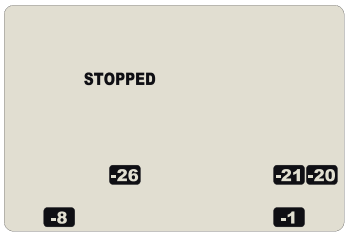
You can configure a TREL30-16 so it can be stopped with the **REVIEW/MARK** button. This feature is useful when you take the logger out of a shipment and don't want to falsify the statistics with readings taken after the shipment completion. The stop function is enabled in the Advanced Options dialogue during configuration. When enabled, following will stop the unit:
Press and hold the **REVIEW/MARK** 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 25 for more information on how to clear an alarm.

⚠ Once the logger has stopped, the alarm status will no longer be indicated with a cross or a tick symbol, and the audible alarm will turn off.

Resetting the Logger

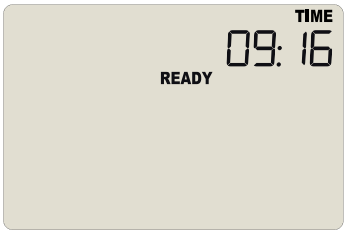
You can reset a TREL30-16 back to its original **READY** state. Once reset, recording can be started again.

> ⚠ 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 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 flash.

When the **READY** symbol remains permanently on, release the button within 2 seconds. The logger is now ready to be started again.



If the button is released while **STOPPED** is still blinking, 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 TREL30-16 via LogTag® Analyzer.

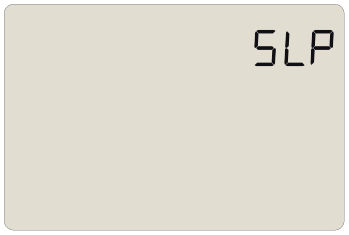
Hibernating a TREL30-16

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.

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

The display shows **SLP** for a few seconds, before turning itself off.



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

- the low battery symbol ⌧ if the battery requires replacing
- the text **not rdy** if the battery is OK, and the logger can be re-activated at a later point

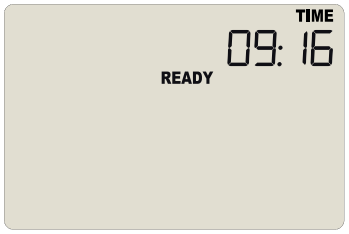
To use the logger again for recording data, it must be re-configured with LogTag® Analyzer.

A hibernated TREL30-16 can also be activated again by pressing and holding the  and  buttons together for a period of 6 seconds. During this time the text **not rdy** appears and 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 18).

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


TIME
09: 16
READY

Technical Specifications

Model Number	TREL30-16
Temperature sensor measurement range	-90 °C to +40 °C (-130 °F to +104 °F)
Operating temperature range	-30 °C to +60 °C (-22 °F to +140 °F)
Ambient temperature range during transport and storage	-10 °C to +40 °C (14 °F to +104 °F)
Ambient humidity range during transport and use	0 to 95 %RH
Rated temperature resolution	0.1 °C (0.2 °F) for measurements from -90 °C to 0 °C (-130 °F to 32 °F) 0.2 °C (0.4 °F) for measurements from 0 °C to+18 °C (32 °F to 64.4 °F) 0.3 °C (0.5 °F) for measurements from +18 °C to +30 °C (64.4 °F to 86 °F) 0.5 °C (0.9 °F) for measurements from +30 °C to +40 °C (86 °F to 104 °F)
Rated temperature accuracy	Better than ±0.5 °C (±0.9 °F) for -20 °C to +10 °C (-4 °F to +50 °F) Better than ±0.7 °C (±1.4 °F) for -50 °C to -20 °C (-40 °F to -4 °F) and +10 °C to +30 °C (50 °F to 86 °F) Better than ±1.0 °C (±1.8 °F) for -80 °C to -50 °C (-112 °F to -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 -80 °C (-130 °F to -112 °F) For more detailed information please refer to the published accuracy charts
Sensor type	Precision electronic thermistor
Probe Compatibility	All ST10 precision thermistor remote probes can be interchangeably connected. Please refer to the dedicated page for external probes on the LogTag Recorders website.
Sensor reaction time	Typically less than 2 minutes (T90) in moving air (1m/s), method as detailed in EN12830:2018
Clock accuracy	Quartz crystal-locked real time clock, rated accuracy ±25ppm @ 25 °C (equiv to 2.5 seconds/day) Rated temperature coefficient is -0.034±0.006ppm/°C (i.e. typically +/- 0.00294seconds/day/°C)
Recording capacity	15,905real time temperature values • 33 days @ 6 min logging or • 55 days @ 10 min logging or • 82 days @ 15 min logging Supports continuous logging ("wrap-around") or specific recording period.
Statistics memory	For displaying statistics on LCD • Min/Max temperature values for the past 30 days • Alarm duration values for the past 30 days • Display of Min/Max trip temperature
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 • Date/time start (up to 180 days in the future)
Alarm functions	• one configurable upper alarm threshold • one configurable lower alarm threshold • OK tick and Alarm cross on display, linked to alarms • threshold indicators, linked to alarms • Audible alarm
Vibration	• Withstands vibration specification as detailed in EN12830:2018
Shock	• Withstands shock specification as detailed in EN12830:2018 • Withstands 5 drops from 1 m onto smooth concrete floor without loss of function or calibration
EMC compliance	• EC EMC directives (EN 61000-6-1:2005 & EN 61000-6-3:2006) • Includes electrostatic discharge as prescribed in EN 61000-4-2 • Complies with FCC Part 15 Subparts A and B

Environmental	IEC 60529: IP61
Case material	Polycarbonate
Power source	CR2032 3V Li-MnO_2 coin cell, user-replaceable, non-rechargeable
Battery life	Typically 1 year of storage, followed by 1 year of operation Battery life based on: • 6 minute logging • statistics reviewed on the display no more than once daily, for no longer than 30 seconds each time • display activation no more than once a day for battery check • data download no more than once a month • keeping the logger within the storage temperature range when not in use Battery low indicator Continual activation of the audible alarm will reduce the working life of the battery. When an alarm is triggered, the alarm should be cleared and reset as soon as possible.
Size	93mm(H) x 54.5mm (W) x 8.6mm (T)
Weight	43 g excluding probe
Calibration	Factory calibration using instruments traceable to an ISO/IEC 17025 accredited testing laboratory
Download time	Typically with full memory (15,905 readings) less than 10 seconds from time of insertion into interface to availability of LTD file in LogTag® Analyzer (if configured)
Software requirements	• LogTag® Analyzer version 3.1r10 or later to configure and download • PDF reader software to access onboard PDF files
USB compatibility	USB 2.0, type A plug
Warranty	12 months
Serviceability, disposal and recycling	This device contains no serviceable parts, please recycle or dispose according to local regulations
Accessories	• Wall holder 200-000010 • LTI/USB Interface Cradle • Temperature Buffer Bottle

Appendix 1 - 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.

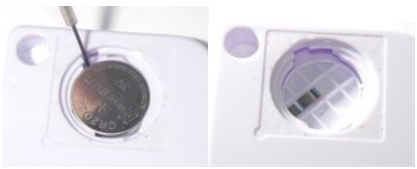
Remove the old battery

- 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 TREL30-16.

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

- 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).

- Cover the battery door with either a new label (Part # 100-000502) or reuse the old one.

- Re-configure the logger with LogTag® Analyzer.

⚠ Please recycle or dispose of the old battery according to your local environmental regulations.

Appendix 2 - 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.

Alarm
An alarm typically means environmental conditions are unacceptable for the monitored location. Alarms are typically configured with several alarm trigger conditions, such as thresholds, direction and delay. If one of the alarm trigger conditions has been 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 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
Combination of recorded temperature or humidity conditions that causes an alarm. This requires a threshold value, an activation type and a delay value.

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

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.

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 Alert
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

N

Non-Alarm Range
Target temperature/humidity range where the readings are regarded as acceptable

Non-Alert Range
Target temperature/humidity range where the device does not trigger an alert

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

T

Tertiary Alarm
The alarm threshold third closest to the non-alarm range

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 humidiy value is equal to or above this value it is regarded to be an alarm reading