TEMPSEN

USER MANUAL

TempSen® Tempod® USB Data Loggers

UM-PDUB-181030 REV.A

TEMPSEN ELECTRONICS COMPANY

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TEMPOD DATA LOGGERS

Product Overview

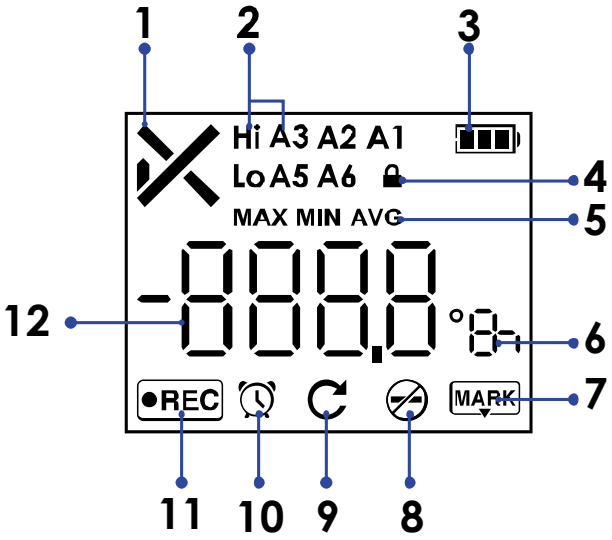
Overview

Tempod Data Loggers are innovative environment monitoring devices designed for cold chain logistics, storage monitoring, in terms of different data communication technology used, Tempod data loggers has two ranges, Tempod USB loggers and Tempod USB + Bluetooth (BLE 4.0) loggers.

Specifications - Tempod USB Data Loggers

Model	Tempod 30	Tempod 50X	Tempod 100X	Tempod 200X
Sensor	Temperature: Internal NTC sensor	Temperature: External NTC sensor probe (1m)	Temperature: External RTD sensor (1m)	Temperature: External RTD sensor (1m)
Memory Capacity	28800 readings	28800 readings	28800 readings	28800 readings
Measurement Range	-30°C...70°C	-50°C...70°C	-100°C…70°C	-200°C…70°C
Accuracy	±0.3°C (-20°C...20°C), ±0.5°C (other range)	±0.3°C (-20°C...20°C), ±0.5°C (other range)	±0.5°C	±0.5°C (-100°C...70°C) ±1.0°C (-200°C...-100°C)
Resolution	0.1°C			
Battery Life	18 months			
Connection	USB 2.0			
Automatic Data File	Encrypted PDF report with embedded raw data			
Protection Class	IP65			

LCD Overview - Tempod USB Data Loggers



1. **Overall alarm status**
   - √ Ok
   - × Alarm
   - Empty, no alarm setting
2. **Triggered Alarm Zones**
   - Hi (High)
   - Lo (Low)
   - A1
   - A2

   …
3. **Remaining Battery Indicator**
4. **AccessKey (Password) protected**
5. **Statistics**
6. **Unit °C / °F / d (day) / h (hour) / m (minute) / s (second)**
7. **Time Mark**
8. **Stop button disabled**
9. **Repeat start enabled**
10. **Clock**
11. **Recording**
12. **Reading (Max, Min, Avg)**

Certifications & Standards

CE (non-BLE)

Test Standards: EN 61326-1:2013

FCC (non-BLE)

Test Standards: 47 CFR Part 15, Subpart B

CE

Test Standards: EN 301 489-1 V2.1.1, EN 301 489-17 V3.1.1, EN 300 328 V2.1.1, EN 62479:2010

FCC

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

Attention that changes or modification not expressly approved by the party responsible for compliance could void the user's authority to ope rate the equipment.

Note: This product has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. T hese limits are designed to provide reasonable protection against harmful interference in a residential installation. This product generates, u ses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interferen ce to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this product does c ause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encoura ged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

Please take attention that changes, or modification not expressly approved by the party responsible for compliance could void the user's aut hority to operate the equipment.

Configure Tempod

Configure Tempod with TempCentre Software

Connect Tempod data logger to USB port of PC, open TempCentre software, select **Configure Device** in tool bar, software would automatically start searching and connecting devices, then user could start programming of this data logger.

LCD displays "USB" when logger connected to PC.

See TempCentre Data Management Software about download, installation and operation of TempCentre software.

Configure Tempod with Online Utility

Connect data logger to USB port of PC, open Internet Browser, go to www.tempodlogger.com, the online configuration utility for Tempod data loggers, input and select configuration parameters you need, then download the configuration profile (.cfg format file) and save it into the logger created removable storage device "TempSenDisk", configuration is done.

*LCD displays "**ConF**" for configuration success when connection with PC remains. (Only applicable to non-software configuration).*

IMPORTANT	• Please only apply configuration profile to the same product model on which configuration file is created based, otherwise configuration fails and error code E102 appears on LCD. • Do not alter the configuration profile downloaded to avoid configuration error and damage to your data logger. • Configuration profile contains time zone information, so please do not use this file in areas of different time zones, or it will result in incorrect time base. • Configuration to data logger would erase all data recorded, so please make sure you have save the data before configuration. • Do not remove data logger from PC before you are prompted of configuration success.

Configuration Options

Trip Number

A unique 10 digits alphanumeric number automatically created for identifying each monitoring task.

Trip Description (Note)

A brief note entered by user for describing monitoring task an it will be shown on data report.

Logging Interval

The sampling and recording interval, optional from 1 minute to 2 hours.

Startup Mode

Manual Start

Device needs to be started by pressing **Start/Stop** button for **3** seconds.

Start Delay

Option of manual start, time to wait before recording begins after logger was manually activated, optional from 1 minute to 30 days.

Temperature Conditions

Option of manual start, pre-set temperature conditions for triggering recording after logger was manually activated, recording begins when actual temperature meets previously determined temperature conditions.

Auto Start

Device automatically starts recording on the specific date/time preset, no need to press **Start/Stop** button after configuration to device.

Alarm Settings

Alarm Mode

- No alarm setting
- High & Low alarm, 2 alarm ranges determined by 2 alarm limits.
- Multiple Alarm ranges, 5 alarm ranges determined by 5 alarm limits.
  - High alarm zones: A1 (H3), A2 (H2), A3 (H1)
  - Ideal range: A4 (No alarm will be triggered when data falls within this range)
  - Low alarm zone: A5 (L1), A6 (L2)

Alarm Type

Alarm type is to define the way to calculate violation durations.

- **Single Event**
  Alarm could only be triggered when data outside of any specific alarm limit continuously for time not less than the pre-set alarm delay time.
- **Cumulative Event**
  Alarm could be triggered once the cumulative total time that data outside of any specific alarm limit is not less than the pre-set alarm delay time.

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PDF Report Settings

PDF Report Title

This report title would be used for PDF report created automatically by data logger.

Time Base

Select Time Zone and enable/disable Day Light Saving time (DST) for PDF report.

Show Data List

Data list (tabular data) will be included in PDF report is this option was enabled, please note it will take up to around 1 minute to create a PDF report with tabular data pages.

Language

Select language for PDF report.

Button Settings

Disable Stop Button

This option is used to avoid mistaken Stop Button action, once enabled, device could not be stopped by pressing **Start/Stop** button, recording stops when logging cycle completes, however, you are still allowed to stop recording through TempCentre or TempSen Go APP.

appears on LCD after Stop Button was disabled on current data logger.

Advanced Options

Repeat Start

Once enabled, user could press Start/Stop button to start logger recording again after last recording task ended, no need to re-configure data logger. The new recording all use the same configuration as last one.

appears on LCD after Repeat Start was enabled.

AccessKey

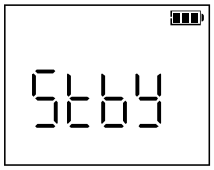
AccessKey is a 6-digit numeric password used to protect data logger from manipulation, once applied, user needs to enter correct AccessKey before programing data logger.

appears on LCD indicates AccessKey was applied to current device.

Online Configuration

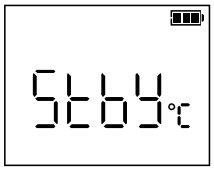
If you are going to program an AccessKey protected data logger using configuration file (.cfg format file) downloaded from online utility (see Configure Tempod with Online Utility), please make sure enter correct ***AccessKey for Verification*** during selecting configuration options, otherwise configuration will fail, LCD will show "E105" if AccessKey is incorrect or not included in configuration file (.cfg format file) applied to AccessKey protected data logger,

LCD Screens after Configured



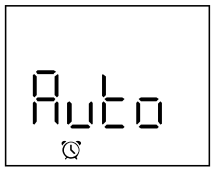
Manual Start –Start Delay

*LCD displays "**Stby**" after configured. Logger was set to start option of start deley.*



Manual Start – Temperature Conditions

*LCD displays "**Stby**" and **Temperature Unit** after configured. Logger was set to start option of Temperature Conditions.*



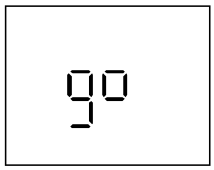
Auto Start

*LCD displays "**Auto**" and a **Clock** after configured, logger is waiting for **automatic start** on pre-set time.*

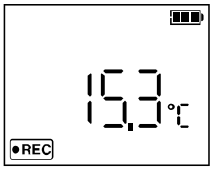
Start Recording

Manual Start & Stop

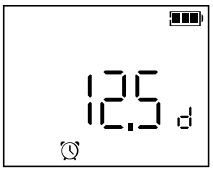
Press and hold **Start/Stop** button for **3** seconds to manually activate data logger and start recording, if logger was set to start option of Start Delay, then recording would only begin after **Start Delay** time passes.



"go" flashes on LCD reminding you to keep current button action.

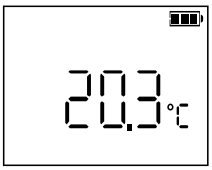


"REC" appears on down left corner of LCD indicating recording already begins.



Manual Start with Start Delay

*Start delay time and a **Clock** appear on LCD and logger begins countdown after logger was manually activated, recording begins after start delay time passed.*



Manual Start with Temperature Conditions

Logger begins to measure temperature and returns readings to LCD after logger was manually activated, recording begins when temperature meets pre-set temperature condition(s).

You could also start recording using TempSen Go App on mobile device, see TempSen Go APP

Auto Start

If logger was set to ***Start Mode > Auto Start,*** then logger would start recording automatically on pre-set date & time.

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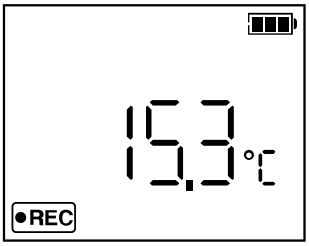
LCD Screens

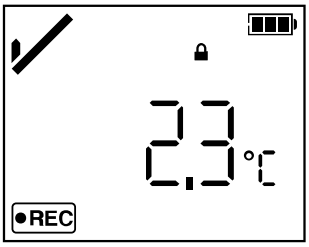
Home Screens



No Alarm Setting

Current Reading: 15.3°C

Status: Recording

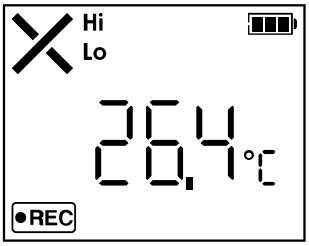


No Alarm triggered

Current Reading: 15.3°C

AccessKey enabled

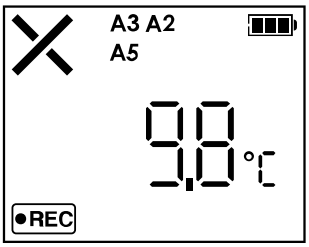
Status: Recording



Alarm triggered at alarm zones: Hi, Lo

Current Reading: 26.4°C

Status: Recording



Alarmed triggered at alarm zones: A3, A2, A5

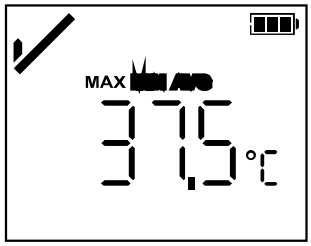
Current Reading: 9.8°C

Status: Recording

Statistics

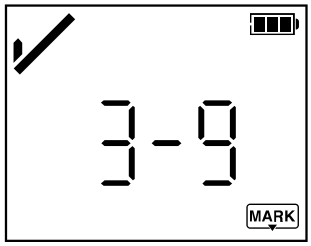
Press View/Mark button on data logger to view recording statistics.

- Max: Maximum value
- Min: Minimum value
- Avg: Average value



Max Value: 37.5°C

Time Marks

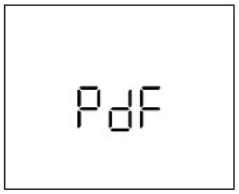


3 of 9 marks placed.

Download Data

Download Auto PDF Report

Connect Tempod logger to USB port of computer, LCD on logger shows “USB” after data logger was successfully connected and then changes to “PdF” later, which means logger is currently creating the PDF report inside logger, it may take a couple of seconds to complete, a report with tabular data pages and of 28800 readings will need 30 seconds to complete.



*LCD displays **“PdF”** indicating logger is currently generating PDF report, then changes to “**USb**” after PDF report is successfully created.*

After PDF report is created, find and open the removable storage device “**TempSenDisk”** in computer, copy the PDF report to your computer, then open and view it with PDF reader software.

The PDF report automatically created in logger is protected and encrypted from tamper, with the embedded raw data embedded, user could upload it to TempSen Cloud™ online cold chain data management platform, www.tempsencloud.com for further analysis.

IMPORTANT	Please **DO NOT** save the PDF report that you copied from logger as a new file. Please do not perform any “Save” action through PDF reader software. Otherwise, content inside PDF file will be reorganized by PDF reader software and cause raw data embedded unrecognizable. Please **DO NOT** remove data logger from USB port while it’s still in the process of creating PDF report (“PDF” on LCD indicates that logger is creating PDF report), Otherwise logger would be seriously damaged.

Logger would be ready for USB communication with TempCentre software only after PDF report is completely created.

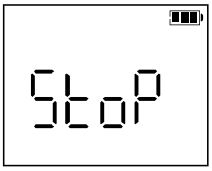
Download Data via TempCentre Software

Connect Tempod logger to USB port of computer, open TempCentre program, TempSen will start searching USB ports and find device in couple of seconds, once device was found, TempCentre will begin to download data automatically, you could click on **Save** button to save data to your local data base.

Stop Recording

Press **Start/Stop** button and hold for at least **3** seconds to stop recording. Logger would stop recording either after logging cycle completes

(memory full). “StoP” flashes on LCD reminding user that current button action is effective and please keep unit recording stops.



Recording Stops

“StoP” displays after recording stopped.

Time Mark

Press **View/Mark** button on data logger to place a time stamped mark, up to 9 time marks available.

You could also place time mark using TempSen Go APP, please see TempSen Go APP > Control Data Logger > Time Mark

Battery

Tempod data logger contains one user replaceable Panasonic CR2450 lithium battery.

Remaining Battery Indicator

	3 bars - Full
	2 bars - Good
	1 bar – Medium
	0 bar – Low, please replace battery **NOW**

Please note battery indicator may not accurately indicate the actual remaining power in battery in device, and the value of battery indicator may vary in environment of different temperature.

Replace Battery

- Please insert a coin in the groove on battery compartment cover to spin it in the direction of OPEN to open battery cover, and take battery out, then **press "View/Mark" or "Start/stop" button several times until LCD changes to blank, otherwise volume of new battery would probably not be correctly recognized within one hour after battery replacement.**
- Place a new **Panasonic CR2450** battery into battery compartment with positive side upward.
- Put cover back to compartment in the position where triangle on cover points to the triangle on logger, then spin cover in the direction of CLOSE to close battery cover

If you found logger could not correctly recognize the remaining battery after installation, please remove the battery an try above steps again.

IATA Compliance

Battery supplied with Tempod passed the Part III, SubSection 38.3 of the UN Manual of Tests and Criteria. Tempod® data logger is also certified to meet requirements in General Requirements and Section II of Packaging Instruction 970, IATA Dangerous Goods Regulations 58th Edition. Tempod® complies with RTCA-DO160G Environmental Conditions and Test Procedures for Airborne Equipment, it's allowed to used in air freight in active status.

WARNING	• Please DO NOT try to recharge or heat the battery • Please DO NOT use data logger (excluding external probe) in environment outside of -30…70°C to avoid damage to battery.

Data Results Explanations

Device Information

Serial Number

Unique identification number of data logger

Current Status

Current running status of logger

Logging Summary

Start Time

The time the first data point is recorded at.

Stop Time

The time the last data point was recorded at or recording was manually stopped at.

Trip Length

Total recording duration time, which is calculated from the first point to the last point.

MKT

MKT (Mean Kinetic Temperature) is a simplified way of expressing the overall effect of temperature fluctuations during storage or transit of perishable goods. Calculation,

$$Tmkt = \frac{\Delta E/R}{-\ln\left(\frac{e^{-\frac{\Delta E}{RT1}} + e^{-\frac{\Delta E}{RT2}} + \cdots + e^{-\frac{\Delta E}{RTn}}}{n}\right)}$$

Δ E = activation energy (standard value: 83.144 kJ/mol)

R = 8.314472 J/mol (universal gas constant)

T = temperature in degrees K

n = the number of sample periods over which data is collected

Note: ln is the natural log and ex is the natural log base.

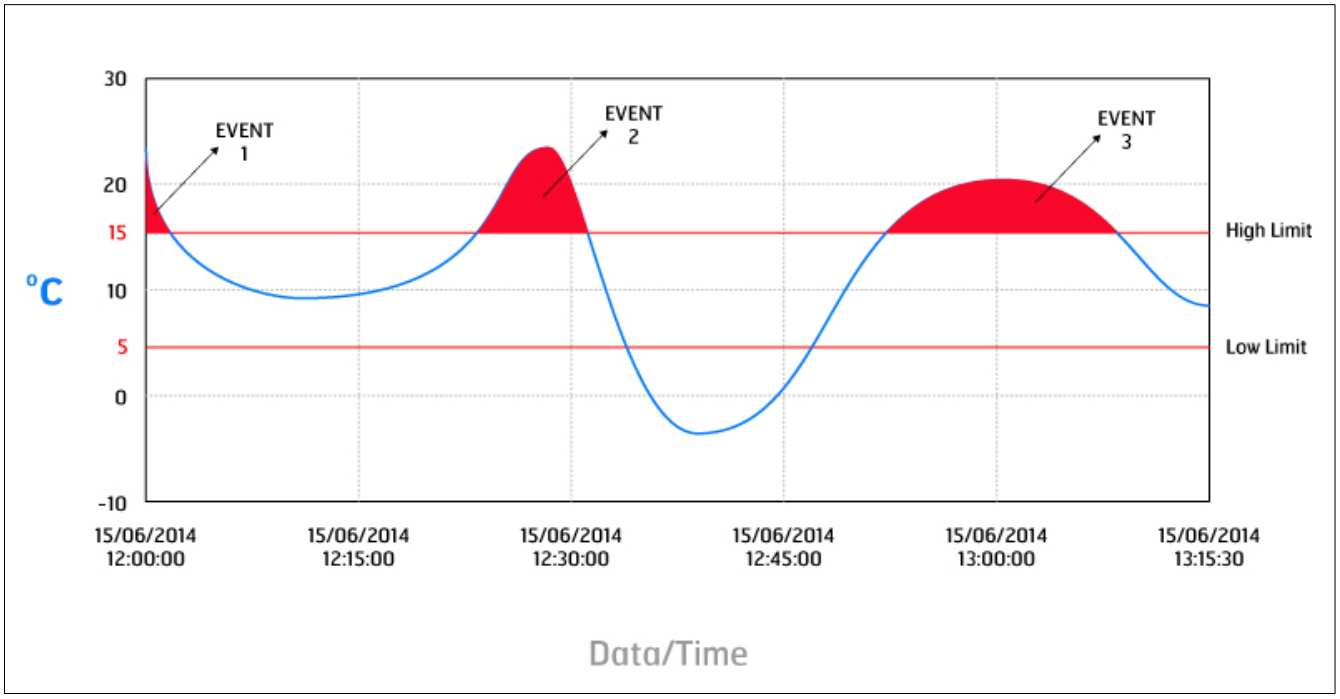
Violations and Alarms

Violation

Any readings outside of any specific alarm limit is a deemed as violation to alarm limit.

Violation Events

A consecutive series of data points outside of any specific alarm limit would be deemed as one violation event. In example below, high alarm zone has three limit violation events.



Number of violation event for each alarm zone shows in “Events” column of alarm statistics in data report.

Violation Time (Duration)

The total time that readings outside of each alarm limit, which equals to number of points out of each limit x logging interval.

Alarm First Triggered Time (First Triggered@)

The time an alarm is first triggered at.

For example, logger is set to logging interval of 1 minute, alarm delay is 5 minutes, logger is started at 09:00, and readings are all over high limit after recording begins, so first alarm will be triggered at 09:05, and this is the Alarm First Triggered Time.

ADDITIONAL INFORMATION

- LCD may function abnormally after taken out from environment down to -20°C to room temperature, please wait for few minutes for it to restore to normal status.
- To avoid damaging your data logger, please do not disconnect it from USB port while it is communicating with the computer.
- Do not use any aggressive cleaning agents or solvents to clean device.
- Data stored in data logger is retrievable even battery runs out.
- Please do not heat, microwave or recharge battery.
- Please follow local regulations when recycling or disposing of data logger.

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TEMPCENTRE DATA MANAGEMENT SOFTARE

Please download and install the latest version of TempCentre software from www.tempsen.com/software/tempcentre

How to download TempCentre software?

- If it's your first time to download software from www.tempsen.com, please sign up with the information required prior to downloading, then an email containing download link would be sent to the mail address you left in couple of minutes.
- If you want to download the software from www.tempsen.com again after your successful registration last time, please click "**I already signed up, download now"** button in dialog box, then software would begin to download in couple of minutes.

Installing and using TempCentre software

Please refer to TempCentre User Manual for installation and operation instructions of TempCentre software.

FAQS

Devices

Why sometimes remaining battery of Tempod logger becomes empty very soon?

Sometimes incorrect installation of battery may make logger not able to correctly recognize the remaining battery, you could try steps below to make logger correctly recognize the remaining battery.

1. Remove battery from logger
2. Press the “View/Mark” button for several times until LCD changes to blank
3. Install battery back to the logger
4. Re-program logger if LCD shows error code E009

APPENDIX

Error Codes

Error code shows on LCD (or PDF report) when ant of the following errors occurred.

LCD	PDF Report	Error Code	Description
E004	Error 0004	Error 004	Device Rest
E006		Error 006	Start time error
E009		Error 009	Start failure resulted from low battery
E101		Error 101	CFG file checksum error
E102		Error 102	CFG file error, incorrect device model
E104		Error 104	CFG file error, incompatible device version
E105		Error 105	CFG file error, missing or incorrect AccessKey
E106		Error 106	CFG file error, incorrect auto start time

WARRANTY

TempSen warrants this TempSen-branded hardware product against defects in materials and workmanship under normal use for a period of ONE (1) YEAR from shipment date. If a hardware defect arises and a valid claim within the Warranty Period, as its option and to the extent permitted by law, TempSen will either (1) repair the hardware defect at no charge, using new parts or parts equivalent to new in performance and reliability, (2) exchange the new product with a product is new or equivalent to new in performance and reliability and is at least functionally equivalent to the original product, or (3) refund the purchase price of this product. TempSen may request that you replace defective parts with new or refurbished user-installable parts that TempSen provides in fulfillment of its warranty obligation. A replacement product or parts, including a user-installable part that has been installed in accordance with instructions provided by TempSen, assumes the remaining warranty of the original product or ninety (90) days from the date of replacement or repair, whichever provides longer coverage for you. When a product or part is exchanged, any replacement item becomes your property and the replaced item becomes TempSen's property. Parts provided by TempSen in fulfillment it's warranty obligation must be used in products for which warranty service is claimed. When a refund is given, the product for which the refund is provided must be returned to TempSen and becomes TempSen's property.

EXCLUSIONS AND LIMITATIONS

This Limited Warranty applies only to the hardware product manufactured by or for TempSen that can be identified by the "TempSen" trademark, trade name, or logo affixed to it. The Limited Warranty does not apply to any non-TempSen hardware product or any software, even if packaged or sold with the TempSen hardware. Manufacturers, suppliers, publishers, other than TempSen, may provide their own warranties to the end user purchaser, but TempSen, in so far as permitted by law, provides their products "as is". Software distributed by TempSen with or without the TempSen brand name (including, but not limited to system software) is not covered under this Limited Warranty. Refer to the licensing agreement accompanying the software for details of your rights with respect to its use.

TempSen does not warrant that the operation of product will be uninterrupted or error-free. TempSen is not responsible for the damage arising from failure to follow instructions relating to the product's use.

This warranty does not apply: (a) to consumable parts, such as batteries, unless damage has occurred due to a defect in materials or workmanship; (b) to cosmetic damage, including but not limited to scratches, dents, and broken plastic on ports; (c) to damage caused with non-TempSen products; (d) to damage caused by accident, abuse, misuse, flood, fire, earthquake, or other external causes; (e) to damage caused by operating the product outside the permitted or intended uses described by TempSen; (f) to damage caused by service (including upgrades and expansions) performed by anyone who is not a representative of TempSen or TempSen Authorized Service Provider; (g) to a product or part that has been modified to alter functionality or capability without the written permission of TempSen; or (h) if any TempSen serial number has been removed or defaced.

IMPORTANT: DO NOT OPEN THE HARDWARE PRODUCT. OPENING THE HARDWARE PRODUCT MAY CAUSE DAMAGE THAT IS NOT COVERED BY THIS WARRANTY. ONLY TEMPSEN OR AN AUTHORIZED SERVICE PROVIDER SHOULD PERFORM SERVICE ON THIS HARDWARE PRODUCT.

TEMPSEN

REVISION HISTORY

Revision	Date	Details
A	2018-10-30	First version

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