CredoSense User Resources

User Manual [Ver 1.2.3]

CSL-SERIES LOGGERS

Please use this Manual for best user's experience

This manual covers up to:

CredoWare Version: 2.0.0 CreDock Firmware Version: 2.0.4 CSL-Series Loggers Firmware Version: 2.3.3

Last Updated: November 14, 2022

CredoSense Inc. (Ltd.) support@credosense.com www.credosense.com CredoSense User Resources

Disclaimer

CSL-Series Loggers are designed only to monitor temperature, relative humidity, and barometric pressure; they do not monitor the quality of the accompanying products, goods, or commodities. Similarly, the CSL Reader (CreDock) assists Loggers with monitoring temperature, relative humidity, barometric pressure, etc., but does not monitor CSL-Series Loggers' quality.

Copyright

©2022 by CredoSense Inc. (Ltd.). All rights reserved. No part of this user guide may be reproduced, distributed or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of CredoSense Inc. (Ltd.). This document is intended as a guide, not to improve the performance of the products. Information presented in this manual is subjected to change without any notice to the users. To get a updated copy of this User Manual, please visit: https://credosense.com.

Colophon

This User Manual was typeset using the KOMA-Script and LATEX using the kaobook class. The source code of kaobook is available at:https://github.com/fmarotta/kaobook.

Publisher

First Published in October 2020 by CredoSense Inc. (Ltd.) support@credosense.com www.credosense.com We dedicate this resource to the people who keep on trying when there appeared to be no hope at all and working hard to make our world a better place.

CredoSense – Resilient, Accurate, Affordable

Contents

Co	Contents		
G	ieral Information	1	
1	ntroduction1What this manual is about?2Areas of application3Update software and get used to the Logger ecosystem	2 2 3 4	
Tı	Logger Ecosystem	5	
2	CSL-Series Loggers .1 Key features .2 Unique features	6 6 6	
3	Comperature Loggers .1 Description .2 Specifications .3 Estimated battery life of CSL-T0.5 .4 Accuracy of CSL-T0.5 over the operating temperature range	8 8 9 9 9	
4	Comperature and Relative Humidity Loggers 1 Description .2 Specifications .3 Estimated battery life of CSL-H2 T0.2 .4 Accuracy of CSL-H2 T0.2 over the operating temperature range	10 10 10 11 11	
5	Comperature, Relative Humidity, and Barometric Pressure Loggers.1Description.2Specifications.3Estimated battery life of CSL-H2 P1 T0.2.4Accuracy of CSL-H2 P1 T0.2 over the operating temperature range	12 12 12 13 13	
6	oil Moisture Logger .1 Description .2 Specifications .3 Estimated battery life of CSL-SM2	14 14 14 15	

7	CreDock	16
	7.1 Description	16
	7.2 Specifications	16
8	CredoWare	17
	8.1 Installing the CredoWare	17
	8.2 CredoWare User Interface	19
	8.3 Checking version number	20
	8.4 Updating CredoWare	21
	8.5 CreDock Firmware Update	21
9	LED Light Guide	23
	9.1 LED guide for CSL-Series Loggers	23
C	ANONG BATTERIES AND CONFIGURING LOCCERS	25
C	ANGING DATTERIES AND CONFIGURING LOGGERS	20
10	Changing Logger Batteries	26
	10.1 Changing the battery	26
	10.2 Changing the clock battery (CR1025)	27
11	Connecting CSL-Series Loggers to a Computer	29
	11.1 Connecting the CreDock to a computer	29
	11.2 Connecting the Logger to the CreDock	29
12	Configuring CSL-Series Loggers	30
	12.1 How to configure Loggers	30
	Setting date and time	32
	Setting start/stop conditions	33
	Setting logging intervals	34
	Setting alarms	34
	12.2 Configuring CSL-SM2	35
	12.3 Initiating the Logging Mode	36
	12.4 Real-time monitoring	37
	12.5 Reading/downloading the logged data	41
	12.6 Generating a summary report and conducting basic analyses	43
	Generating report	43
	12.7 Erase Data	46
	12.8 Factory Reset	46
A	od-Ons	47
12	Display Unit	49
10	131 Description	48
	13.2 Key features	49
14	Mini Solar Panel	50
11	14.1 Description	50
	14.2 Kev features	50
	,	0

General Troubleshooting	51
15 Troubleshooting: CSL-Series Loggers	52
16 Troubleshooting: Readers/CreDocks 16.1 Device issues	53 53
17 Troubleshooting: Display Units	54
18 Troubleshooting: Solar Power Delivery	55
WARRANTY AND CONTACT INFORMATION	56
19 Warranty Information	57
19.1 What warranty covers?	57
19.2 What warranty does not cover?	57
20 Contact Details	58
20.1 Contact details in Canada	58

General Information

Introduction

1.1 What this manual is about?

This document has been written as a User Manual and knowledge-base resource* for the CSL-Series Loggers. The CSL-Series Logger is a logging ecosystem comprising of Logger(s), CreDock (reader/programmer), CredoWare (software to handle communication between Loggers and CredoWare), Display Unit (optional, can be purchased separately), and solar panel (optional power source, can be purchased separately). We have provided a detailed description of these products in this User Manual. We also have demonstrated how CSL-Series Loggers should be used to get the best user experience. Upon careful reading of this manual, a user should be able to:

- ► Connect the Logger to a computer.
- ► Configure/program the Logger using the CreDock.
- Read live data from the Logger using the Display Unit or on a computer (via CreDock + CredoWare).
- Retrieve recorded data on a computer.
- Generate summary reports, graphs, and do some basic analyses of the recorded data.

1.1 What this manual is about?... 21.2 Areas of application 31.3 Update software and get used to

the Logger ecosystem 4

^{*} We have provided detailed information on working principles, calibration, and important scientific references related to the micro-climatic variables our loggers measure. We believe in quality data and hope that this will help our users to take educated measurements of their variables of interest.



Figure 1.1: Components of the CSL-Series Logger ecosystem.

1.2 Areas of application

The CSL-Series Loggers have been designed to suit a wide array of applications (Figure 1.2). For example, they can be used in pharmaceutical industries, cold chains, storage facilities, and various research projects. These Loggers can operate in a tough controlled environment (indoors) and in the harsh outdoors. CredoSense also builds customized Loggers to suit user-specific needs. Please get in touch with us for assistance with a particular application.



Figure 1.2: General areas of application.

1.3 Update software and get used to the Logger ecosystem

Before using CredoWare, please ensure the latest version (different for Mac and Windows) is installed on the computer. Details on how to find CredoWare version number and update it are presented in section 8.3. If a feature described in the Manual is missing, CredoWare is using an older version of the CredoWare. The latest version of CredoWare can be downloaded from the CredoSense Website.

This User Manual offers all the relevant information needed to install CredoWare and use CSL-Series Loggers manufactured by CredoSense Inc. (Ltd.). However, the user is expected to be familiar with using a computer and the Windows/macOS operating system.

The Logger Ecosystem

CSL-Series Loggers

This chapter highlights some key features of the CSL-Series Loggers and compares their features with other commercially available loggers at a similar price point.

2.1 Key features 6 2.2 Unique features 6

2.1 Key features

- Sensors are thermally isolated from the Logger's main circuitry to offer maximum measurement accuracy.
- ► Small footprint sensors for high accuracy. Reduced thermal mass ensures faster sensor response, which is particularly important in a rapidly changing environment.
- ► Battery life (main battery): 6 7 months (at a 5-minute logging interval).
- ► Dedicated ports for batteries allow multiple smooth uses.
- ► Minimum sampling time: 60 seconds (CredoWare programmable to different rates ≥ 60 seconds).
- CredoWare programmable HIGH/LOW alarms (RGB LED indicator for different alarms. See Chapter 9 (LED Light Guide) on page 23 for an explanation of LED alarms.
- ► Can be started/stopped by pressing the Start/Stop button (see **Figure 9.5** for a photo of the button) or programmed to start/stop at a specific time.
- Water-resistant and rugged polycarbonate casing- ready for harsh environments.
- ► Lightweight and small-footprint devices.
- ▶ Requires no external wiring and is ready to use out-of-the-box.

2.2 Unique features

The CSL-Series Loggers are packed with features at a very affordable price. However, not to be confused, low price does not mean low quality. CredoSense proudly offers the best logger features available on the market for a similar price point. The following table will help the user to understand why the CredoSense Logger System is unique compared to others in the market:

Parameters	CSL-Series Loggers	Loggers with a similar price
Memory	Depending on the Logger type, 38,000 to 229,000 data points can be stored	A logger normally stores 8000 – 16,000 data points.
Display Unit	Dedicated, cost-effective, and ad- vanced — the same Display Unit can be used for all CSL-Series Log- gers. It is equipped with advanced functionalities such as displaying current values, unit conversion, min-max values, memory status, and many more. It can also pro- vide power to the CSL-Series Log- gers, which allows the user to use the Loggers without a battery in- stalled. *** Please check Chapter 13 for detailed functionalities of Display Unit.	Mostly built-in, which makes it expensive and is able to perform basic operations only (e.g., displays current measurement values).
Relative Humidity Logger	CSL-H2 T0.2 offers similar (2%) accuracy at a much lower price point. The sensor has a small ther- mal mass and is thermally isolated from the main Logger circuitry to guarantee maximum achievable accuracy. Moreover, the unique de- sign of the Logger's casing ensures a uniform and continuous ambi- ent airflow and homogeneous mix- ing around the sensor headspace; this ensures the system is monitor- ing the actual ambient conditions.	A Relative Humidity Logger with 2% accuracy is usually expensive — costs more than \$100 (USD).
Live monitoring	CSL-Series Loggers offer unique live monitoring features at an af- fordable cost.	Live monitoring features are usu- ally scarce at this price point, and are usually found in high-end sys- tems.

Table 2.1: Unique features of CSL-Series Loggers compared to other commercially available loggers

Temperature Loggers

3.1 Description

The Temperature Loggers (CSL-T0.5) (Figure 3.1) use small footprint thermistors to offer highly accurate temperature measurements at a very affordable price compared to its market competitors. They are calibrated with extreme care and tested extensively in different environments under various stresses. The logger system is built with industry-grade materials, which ensures it can be used both in scientific and industrial applications. The thin and lightweight design with an easy-to-attach feature allows CSL-T0.5 Loggers to be used in various conditions for environmental monitoring, transporting, and storing foods and medicines. It can also be used to measure temperature gradients if the sensors are positioned carefully in the desired direction.

The CSL-T0.5 uses a CreDock/Reader (a USB dongle, sold separately) to communicate with a computer via a software interface (CredoWare, freely downloadable). The software can be used on any platform (Mac, Windows), which allows the user to set the sampling rate, time/date, self-start time/date, high/low alarms, live data monitoring, and many more. It can also be used to download time-stamped temperature data and view them in graphical and tabular forms and generate PDF reports.

CSL-T0.5 loggers use the commonly available CR2450 batteries, which are replaceable via a dedicated battery port. This allows the user to use the Logger unit multiple times. The system uses an RGB LED, which changes color depending on what the device is indicating/doing. For example, it blinks green every 60 seconds when it measures temperatures within the alarm limit (if the alarm is on). It flashes red every 60 seconds when the temperature exceeds the upper range of the alarm. Similarly, it blinks blue every 60 seconds when the temperature goes below the lower limit of the alarm. However, the LED alarm can be turned off using CredoWare to minimize battery consumption.



Figure 3.1: Temperature Logger (CSL-T0.5).

3.1 Description	8
3.2 Specifications	9
3.3 Estimated battery life of CS	SL-
T0.5	9
3.4 Accuracy of CSL-T0.5 over the c	p-
erating temperature range	9

3.2 Specifications

Temperature range	-40 to +70 °C
Memory	229,326 data points
Resolution	±0.03 °C
Accuracy	$\pm 0.5 ^{\circ}\text{C} (\pm 0.1 \text{to} \pm 0.5 ^{\circ}\text{C}); \text{see} (\text{Figure 3.2})$
Display unit	Supported add-on Display Module avail-
	able from CreodoSense
LEDs	RGB LED to indicate active alarm, battery
	and other statuses
Size & weight	55x47x20 mm; ~ 33 g
Operating voltage	3 V
USB	Type C (Female)
Casing material	Polycarbonate
Battery	CR2450 (main) and CR1025 (optional
	backup clock battery)
Warranty	18 months

3.3 Estimated battery life of CSL-T0.5

Table 3.1 shows a conservative estimate of battery life at different logging intervals for CSL-T0.5 Loggers using branded (e.g., Panasonic, Energizer, Duracell) CR2450 batteries at room temperature.

Logging interval (mins)	Average consumption (µA)	Battery life (approx.)
1	193.17	45 Days
5	46.63	7 Months
30	16.106	19 Months
60	13.052	24 Months

3.4 Accuracy of CSL-T0.5 over the operating temperature range



Figure 3.2: The accuracy of CSL-T0.5 at different temperatures

Temperature and Relative Humidity Loggers

4

4.1 Description

The relative humidity (RH) and temperature Loggers (CSL-H2 T0.2) (Figure 4.1) use a small-footprint sensor to offer highly accurate relative humidity and temperature measurements at a very affordable price compared to its market competitors. CSL-H2 T0.2 loggers are calibrated with extreme care and tested extensively in different environments under various stresses. The system is built with industry-grade materials, which ensures it can be used both in scientific and industrial applications. The thin and lightweight design with an easy-to-attach handle allows the CSL-H2 T0.2 to be used in various conditions for environmental monitoring, transporting, and storing foods and medicines. It can also be used in weather stations to measure temperature and relative humidity very accurately.

4.1 Description	. 1	0
4.2 Specifications	. 1	0
4.3 Estimated battery life of CS	L-H	2
Τ0.2	1	11
4.4 Accuracy of CSL-H2 T0.2	ove	er
the energting temperature ran		11



Figure 4.1: Relative humidity and temperature Logger (CSL H2 T0.2).

4.2 Specifications

0-100% (RH) (non-condensing); -40 to +85
°C (temperature)
57,332 data points
0.01 °C (temperature) & 0.01% (RH)
Temperature: ± 0.2 °C; see (Figure 4.2)
RH: $\pm 2\%$ (10-80%), otherwise $\pm 3\%$
Supported add-on Display Module available
from CreodoSense
RGB LED to indicate active alarm, battery
and other statuses
55x47x20 mm; ~ 33 g
3 V
Type C (Female)
Polycarbonate
CR2450 (main) and CR1025 (optional backup
clock battery)
18 months

4.3 Estimated battery life of CSL-H2 T0.2

Table 4.1 shows a conservative estimate of battery life at different logging intervals for CSL-H2 T0.2 Loggers using branded (e.g., Panasonic, Energizer, Duracell) CR2450 batteries at room temperature.

Logging interval (mins)	Average consumption (µA)	Battery life (approx.)
1	195.13	45 Days
5	48.63	6 Months
30	18.104	17 Months
60	15.05	20 Months

Table 4.1: Battery life of CSL-H2 T0.2 at different logging intervals.

4.4 Accuracy of CSL-H2 T0.2 over the operating temperature range



Temperature, Relative Humidity, and Barometric Pressure Loggers

5

5.1 Description

CSL-H2 P1 T0.2 (Figure 5.1) is a cost-effective choice for recording and optionally visually monitoring environmental conditions. CSL-H2 P1 T0.2 is a mini weather station that allows a user to monitor temperature, relative humidity (RH), and barometric pressure (BMP) simultaneously. When connected to the CredoSense Display Module, it enables the user to real-time monitor the microclimatic variables. Simply plug in the Logger to a CreDock, and using the CredoWare, it can be configured to suit the user's needs. CredoWare can be downloaded from CredoSense Website.



Figure 5.1: Relative humidity, temperature, and barometric pressure Logger (CSL-H2 P1 T0.2).

5.2 Specifications

RH range Temperature range BMP range Memory Resolution Accuracy	0-100% (non-condensing) -40 to +85 °C 300-1200 mbar 38,221 data points 0.01 °C (temp.), 0.01% (RH), 0.01 mbar (BMP) Temperature: ±0.2 °C; see (Figure 5.2)
	RH: $\pm 2\%$ (10-80%), otherwise $\pm 3\%$
Display unit	Supported add-on Display Module available from CreodoSense
LEDs	RGB LED to indicate active alarm, battery and other statuses
Size & weight	$55x47x20 \text{ mm}; \sim 33 \text{ g}$
Operating voltage	3 V
USB	Type C (Female)
Casing material	Polycarbonate
Battery	CR2450 (main) and CR1025 (optional backup clock battery)
Warranty	18 months

5.1 Description	12
5.2 Specifications	12
5.3 Estimated battery life of CSL	-H2
P1 T0.2	13
5.4 Accuracy of CSL-H2 P1 T0.2 of	over
the operating temperature range	e 13

5.3 Estimated battery life of CSL-H2 P1 T0.2

Table 5.1 shows a conservative estimate of battery life at different logging intervals for CSL-H2 T0.2 Loggers using branded (e.g., Panasonic, Energizer, Duracell) CR2450 batteries at room temperature.

Logging interval (mins)	Average consumption (μA)	Battery life (approx.)
1	195.13	45 Days
5	48.63	6 Months
30	18.104	17 Months
60	15.05	20 Months

Table 5.1: Battery life of CSL-H2 P1 T0.2 at different logging intervals.

5.4 Accuracy of CSL-H2 P1 T0.2 over the operating temperature range



Figure 5.2: The accuracy of CSL-H2 P1 T0.2 at different temperature.

Soil Moisture Logger 6

6.1 Description

CSL-SM2 is the self-logging system for CredoSense CS-SM2 soil moisture sensors (Figure 6.1). This small footprint Logger uses the same infrastructure as other CSL-Series Loggers while enabling users to reliably record soil moisture and temperature data locally. This Logger is placed inside a waterproof (IP67) and UV-resistant casing (Figure 6.1), with a 1 m cable, allowing users to leave the Logger near the sensor (CS-SM2).

This unique low-power Logger operates on a coin cell battery and connects a single soil moisture sensor via a 3.5 mm female jack. It can be connected to a CreDock similar to other CSL-Series Loggers and configured using CredoWare. CredoWare can be downloaded freely from CredoSense Website.



Figure 6.1: Soil Moisture Sensor Logger (CSL-SM2)

6.2 Specifications

-40 to +85 °C (however, when soil/substrate
freezes, measurements can be unreliable)
3.22 mv (eqv. volumetric water content)
Supported add-on Display Module available
from CreodoSense
RGB LED to indicate active alarm, battery and
other statuses
$55x47x20 \text{ mm}; \sim 42 \text{ g}$
Read data without battery, add on solar power
module
Type C (Female)
Polycarbonate
CR2450 (main) and CR1025 (optional backup
clock battery)
18 months

6.1	Description	14
6.2	Specifications	14
6.3	Estimated battery life of CS	5L-
SN	<i>A</i> 2	15

6.3 Estimated battery life of CSL-SM2

Table 5.1 shows a conservative estimate of battery life at different logging intervals for CSL-H2 T0.2 Loggers using branded (e.g., Panasonic, Energizer, Duracell) CR2450 batteries at room temperature.

Logging interval (mins)	Average consumption (µA)	Battery life (approx.)
1	197.10	45 Days
5	50.62	6 Months
30	20.10	15 Months
60	17.05	18 Months

Table 6.1: Battery life of CSL-SM2 at different logging intervals.

CreDock 7

The CreDock (Figure 7.1) allows users to configure and download data from all CSL-Series Loggers. It is an essential part of the CSL-Series Logger ecosystem that works in tandem with CredoWare to seamlessly communicate with all CSL-Series Loggers. Users will need only one Cre-Dock to configure their CSL-Series Loggers. CreDocks can be purchased separately from CredoSense Website.

7.1 Description

The CreDock includes a USB cable for connecting to a computer via a USB-A female port. A USB-type C male port is provided to connect to the CSL-Series Logger (Figure 7.1). A red LED lights up while connected to a computer, and a blue LED will light up if the CreDock tries connecting to a Logger.



Figure 7.1: CreDock—the reader for all CSL-Series Loggers.

7.2 Specifications

Operating voltage	5 V (DC)
Operating temperature	0 to 85 °C
Weight	125 g
Dimensions	20x57x93 mm
Casing material	Aluminium
Data download speed	10,000 data points/6 seconds
Warranty	18 months

CredoWare

CredoWare (software) allows users to program all CSL-Series Loggers and download and analyze logged data. It also allows users to live-stream the measurements on the software interface. CredoWare is available for Windows and Mac operating systems. It is freely available for download from the CredoSense Website. The user is expected to be familiar with a computer and its operating system before using CredoWare.

- 8.1 Installing the CredoWare . . . 17
- 8.2 CredoWare User Interface . 19
- 8.3 Checking version number . 20
- 8.4 Updating CredoWare 21
- 8.5 CreDock Firmware Update . 21

8.1 Installing the CredoWare

After downloading CredoWare from CredoSense Website, double click on the .exe (Windows)/.pkg (Mac) file and then agree to the License Agreement (as shown in Figure 8.1) to install CredoWare on the computer.



Figure 8.1: The user needs to accept the License Agreement to complete the installation of CredoWare. This is the first Window of the CredoWare installation/setup.

Check the **'I accept the agreement'** radio button on the left bottom corner of the window (as shown in Figure 8.1); then, click "Next" to go to the next window.

☆ Setup - CredoWare version 1.2.0	-		×
Select Destination Location Where should CredoWare be installed?			
Setup will install CredoWare into the following folder.			
To continue, click Next. If you would like to select a different folder, click Browse.			
C:\Users\CredoSense Desktop 2\AppData\Local\Programs\CredoWare	I	Browse	
At least 192.5 MB of free disk space is required.			
Back Ne	ext	Ca	ancel

Figure 8.2: The user can select an installation directory on the computer depending on their preference.

Installation directory can be customized using the **"Browse"** button. You can however leave as it is. Click "Next" to proceed to the next window (Figure 8.2).



Figure 8.3: A desktop shortcut of the CredoWare can be created by checking 'Create a desktop shortcut' button.

Users can create a Desktop shortcut of CredoWare for convenience by checking the **"Create a desktop shortcut"** button. Then click **"Next"**.



Figure 8.4: One click away of starting installation.

Now, it is time for installation. Click the 'Install' button (Figure 8.4) and allow some time to finish installation.

Setup - CredoWare version 1.2.0	- 🗆 ×
	Completing the CredoWare Setup Wizard Setup has finished installing CredoWare on your computer. The application may be launched by selecting the installed shortcuts. Click Finish to exit Setup. Click Aunch CredoWare
	Finish

Figure 8.5: Showing installation is completed and CredoWare can be run directly from this window by checking 'Launch CredoWare' button.

If the user wants to run CredoWare immediately after installation, check the **"Launch CredoWare"** button before clicking **"Finish"**. CredoWare now should be ready for use. For any difficulties, please reach us out at support@credosense.com.

8.2 CredoWare User Interface

CredoWare User Interface is divided into five sections as shown in **Figure 8.6**: device information and status, set up time, logging options, alarm

	Ũ	, ,			L	
	🖤 CredoWare			- 🗆	×	
	File Tools Help				_	
	Connectivity Status: Co	nnected		Disconnect		
	Device Information					tatus
	Device Model	: CSL-H2 T0.2				1 & SI
	Erase or Reset	: Erase Data	Factory Reset]		ation
	Device Type	: Temperature and Relativ	e Humidity Logger			L L
	Main Battery Voltage	: 2.82 V				info
	Data Points	: 57332 points available (6 years 198 days 20 ho	urs)		/ice
	Device Name	: CSL_Series_Logger		Rename		De
	Timekeeping Options					
9	Logger's Time	: 29 Jan 2022, 17:04:25				
set	Computer's Time	: 29 Jan 2022, 17:04:26		Sync Time		
	Logging Options					
-	Interval	: 60	Minute (s)	Set Logging Inter	val	'val
	Logging interval is currently s	set to 60 minute(s)				otior ntei
	Button Start V			Sat Start/Stop Op	tion	g op op, i
	Button Stop \sim			Set Starb Stop Op		jgin t/st
	Alarm Options					Log
Г	Alarm Enable/Disable					
Ins		High	Low			
sta	Temperature (C)	: 50	-20]		
E	Relative humidity (%)	: 80	30	Set Alarm Value	s	
Ā	Barometric pressure (mbar)	: 1200	600			g
L	Alarm is enabled. Temp High:	50 Low: -20 RH High: 80 Lo	ow: 30		7	J & J dat
			Real-time Data	Read Logged Da	ita	ecking alyzing
						Che ane

status, and checking and analyzing data.

Figure 8.6: CredoWare User Interface.

8.3 Checking version number

To check the version number, click Help » About (Figure 8.7) on the main menu of CredoWare. A separate window (Figure 8.8) will appear showing the current version number and licensing information.



Figure 8.7: Checking version number.

🖤 About					×
	Crede	Ware			
	2.	0.0			
CredoWare is a so	ftware <mark>for con</mark> figuri	ng CSL-Series	Loggers u	ising a Cr	eDock.
	CredoWare is	developed b	у		
	CredoSen	se Inc. (Ltd.)			
	Copyright © 2	022 CredoSen	ise		
	support@cre	edosense.com	1		
	Check fo	or <mark>Updat</mark> e			

Figure 8.8: Version number of the CredoWare.

8.4 Updating CredoWare

We are consistently updating CredoWare. It is important to use the latest version of CredoWare to get the most out of the CSL-Series Loggers. To update the CredoWare, please uninstall the old version, download the latest version, and install it.

[IMPORTANT: On Windows (10) and Macs in general, there might be errors related to some safety issues while downloading and installing CredoWare. This is simply because we have not registered CredoWare with Microsoft/Apple as a developer (in other words, we have not given them the money, they want!)]

8.5 CreDock Firmware Update

CreDock firmware can be updated via CredoWare. When a CreDock firmware update is available, the user will see the pop-up message shown in **Figure 8.9** after opening the CredoWare (and CreDock is connected) on a computer. Click on the 'Update Now' button to update the CreDock firmware.

Another window will appear showing the current CreDock firmware version number (Figure 8.10). Click to update firmware.

Please note that some of the CredoWare features may not work correctly if the CreDock firmware is not updated. In some instances, they (CreDock + CredoWare + Logger) might not work at all. So, please update the firmware if there is an update available.

🔮 CredoWare		- 🗆 X
File Tools Help		
Connectivity Status:	Connected	Disconnect
Device Information		
Device Model	: CSL-SM2 ()	
Erase or Reset	: Erase Data Factory Reset	
Device Type	: Soil Moisture Logger	
Battery Voltage	: 2.75 V	
Data Points	: 114176 points available (1 years 31 days 10 hou	urs 40 minutes)
Device Name	: CSL_Series_Logger	Rename
Soil T	mware Update	×
i A ne CreE	w CreDock firmware is available! Please update the firm lock may not work properly.	ware, otherwise
Timel	Update	Now Close _
Logge	. 10 001 L0LL, 10.10.00	Sync Time
Computer's Time	: 18 Jul 2022, 10:46:58	
Logging Options		
	· 5 Minute (c)	Set Legging Interval
Interval	. 5 minute (s)	Set Logging Interval
Button Start v	Tenuy set to 5 minute(s)	
Button Stop		Set Start/Stop Option
	Real-time Data	Read Logged Data
	Rear-time Data	Read Logged Data
Figure 8.9: A pop	p-up window showing a CredoWare firmware	e update is available.
👻 CreDock Firm	nware Update —	
Current Firmwar	e Version: 2.0.0-beta220630	
F	irmware update available. Click to upda	ite.

Figure 8.10: Click to update the CreDock firmware.

LED Light Guide

9.1 LED guide for CSL-Series Loggers

White LED

White LED lights up when the Logger is powered up or exit Programming Mode.

Configuration

Open CredoWare and connect the Logger to a CreDock; the Logger goes to Programming Mode automatically. A Blue LED light will light up.



Figure 9.5: Start/stop button.

Once the configuring is done, disconnect the Logger using CredoWare. Now, the Logger is in Idle Mode and ready to use.

Logging Start/Stop

This process of starting/stopping works if start/stop option for the logger (in CredoWare) is set to "Button Start/Stop".

Press and hold the Logger start/stop (Figure 9.5) button until green LED lights up and then release, the device is in Logging Mode. If the user intends to check whether the Logger is genuinely in Logging Mode, the user needs to single press (short) start/stop button; a green LED will light up, indicating the device is in Logging Mode.

To stop the logging action, the user needs to press and hold the start/stop button until the red LED lights up and then release, indicating the Logger has stopped logging. To further confirm whether the Logger has actually stopped logging, single press (short) the start/stop button and a red LED lights up.

Forced Start/Stop

If the logging start/stop option is set at a specific time and the user needs to force start for a particular reason, press and hold the start/stop button until the green LED starts blinking. In case of force stop, press and hold the start/stop button until the red LED starts blinking.

9.1 LED guide for CSL-Series Log-



Figure 9.1: Blinking red.



Figure 9.2: Blinking green.



Figure 9.3: Blinking red.



Figure 9.4: Blinking white.

To switch from Idle Mode to Programming, and Logging Mode, the user can follow the **Figure 9.6** for ease of the Logger operation.



Figure 9.6: Shows way of switching to different modes and their indicator LED to check mode status.

The user can exit from the programming mode without the CredoWare by two ways: auto exit after three minutes of inactivity of the Logger or long-press the Start/Stop button until the Blue LED turns off.

Table 9.1: Button-press actions and subsequent LED indications.

Button-press	Indicator LED color	Function
	WHITE: when the battery is installed RED : Blinks 3 times during startup.	The device is powered up Clock malfunction
	RED: Continuous blinking during startup. BLUE (continuous):	Low battery (please change the battery) Device is in Programing Mode
	PURPLE: blinks in every 8 seconds. YELLOW: blinks in every 8 seconds.	sensor/memory error memory full
No press	RED: blinks in every 8 seconds. RED: blink once, when the device is operational BLUE: blink once, when the device is operational GREEN: blink once when the device is operational	Battery low Alarm: value > max limit Alarm: value < min limit Alarm: min ≤ value ≤ max
Single press	RED: blink once GREEN: blink once	Check logging status (OFF) [Idle Mode] Check logging status (ON)
Press & hold	GREEN RED RED: Blinks 3 times during logging startup.	Toggle logging ON/OFF Toggle logging ON/OFF Clock malfunction ^a]

^{*a*} If the memory is full, please clear the memory. Change the battery when the battery is low. In case of the clock malfunctioning, make sure the battery (responsible for the clock) is present and then synced time via CredoWare.

[[]IMPORTANT: Please note, our latest loggers use the main battery (CR2450) for timekeeping. However, the old versions of CSL-Series Logger may use a CR1015 battery for timekeeping. If the clock time is not synced, the device goes to default time (1 August 2019) right after the battery installation. When the device LED blinks yellow, purple, and red for memory full, sensor error, and battery low issues, the normal function of the device may stop. To make the device functional again connect the device to CreDock or replace (in case of low battery)/re-install the battery.

Changing Batteries and Configuring Loggers

Changing Logger Batteries _

CSL-Series Loggers use two lithium batteries: one for the main power (CR2450) and one for the real-time clock (CR1025) as a backup. CredoSense usually provides batteries but depending on international shipping restrictions, users might have to buy batteries.

The Logger can also function properly with the main battery. But the timekeeping resets if the main battery is dead or removed from the Logger. In that case, the user can use the CR1025 battery for timekeeping. However, using the CR1025 battery slightly increases the current consumption of the main battery, meaning the battery life decreases over time. Therefore, it is up to the user to choose which option best suits their needs.

10.1 Changing the battery

One of CSL-Series Logger's key features is that a user can change the battery without hampering the warranty. Unlike many loggers in the market, a user can change CSL-Series Loggers' batteries to ensure multiple smooth uses. The main battery is conveniently placed at the back of the Logger which can be easily replaced as shown in the following steps:

- ► In most cases, a CR2450 battery is provided with each Logger. In case there is not one, due to international shipping restrictions, please purchase it locally from a well-known brand.
- ► To place/replace CR2450 batteries of CSL-Series Loggers, unscrew the three screws at the back of the Logger unit as shown in Figure 10.1.



Figure 10.1: Unscrewing Logger.

► Once unscrewed, the user should find a holder for CR2450 batteries. Place the battery, as shown in Figure 10.2.

 10.1 Changing the battery
 26

 10.2 Changing the clock battery
 (CR1025)

 27

 Once the battery is installed, put the back cover on and put the screws back in. Please note, if a user try to screw too hard, screw holders might crack.



Figure 10.2: Showing how to place/replace the main battery after opening the back cover of the of the logger. Press the battery gently until you hear a click sound.

10.2 Changing the clock battery (CR1025)

A CR1025 (smaller than CR2450 batteries) battery will be supplied in most cases with each unit. In case there is none or need to replace (a replacement should not be necessary within 3-4 years) the battery, please unscrew the circuit board from the casing (Figure 10.3), flip the board without touching anything on the board as much as possible; the user now should find a battery holder. Please insert a fresh CR1025 battery into the holder in the proper orientation (polarity), as shown in Figure 10.4.



Figure 10.3: Unscrewing before taking out the circuit board.



Figure 10.4: Showing how to insert the clock battery after unscrewing the circuit board. Slide and insert the CR1025 battery with the plus (+) sign up.

The Logger goes into Idle Mode after installing the battery.

If the user does not install the clock battery (CR1024), which is not a requirement for the CSL-Series Loggers to operate smoothly, the user might find a warning as shown in Figure 10.5. Please ignore this warning.

Main Battery Voltage	: No battery	
Data Points	: 38187 points available (4 years 131 days 3 hours)	
Device Name	🖤 Message 🛛 🗙	Rename
Timekeeping Options	Logger timekeeping failed. Please change/insert battery before syncing time	
Logger's Time		Come Time
Computer's Time	ОК	Sync Time
Logging Options]
Interval	: 60 Minute (s)	Set Logging Interval

Figure 10.5: Showing a warning related to clock/time keeping.

[IMPORTANT: Replacing batteries during logging operation may cause data corruption. Please make sure to switch to Idle mode before replacing batteries]

Connecting CSL-Series Loggers to a Computer **11**

11.1 Connecting the CreDock to a computer

A user will need to connect the CreDock (reader) to a computer to communicate with Loggers for tasks, such as live streaming, data downloading, configuring, and report generating. Once the CredoWare is installed on a computer, CSL-Series Loggers are ready to be connected to a computer via CreDock.



Figure 11.1: A CreDock is connected to a computer via CredoWare.

11.2 Connecting the Logger to the CreDock

Open CredoWare and connect the Logger to a CreDock to enter Programming Mode; blue LED will light up. It indicates that the Logger is genuinely in Programming Mode.

Note: One of the unique features of CSL-Series Loggers that it does not require to have a functional battery to read logged data using CreDock and CredoWare¹. CreDock will automatically supply power to the Logger; simply connect the Logger to a CreDock via CredoWare.



Figure 11.2: A CSL-Series Logger is connected to the CreDock.

11.1 Connecting the CreDock to a
computer2911.2 Connecting the Logger to the Cre-
Dock29

1: Most of the commercially available loggers (even the very high-end loggers) require to have functional batteries to be able to communicate with a reader or a computer.

Configuring CSL-Series Loggers | 12

12.1 How to configure Loggers

A user can easily configure CSL-Series Loggers using CredoWare to suit their needs. After opening the CredoWare, a user will see the User Interface (UI) shown in Figure 12.1. To configure the Logger, the user should connect it via the CreDock. When a CreDock is connected to the computer, the UI will look as shown in Figure 12.2.

🍲 CredoWare				– 🗆 🗙
File Tools Help				
Connectivity Status: Plea		Connect		
Device Information				
Device Model	:			
Erase or Reset	:	Erase Data	Factory Reset	
Device Type	:			
Battery Voltage	:			
Data Points	:			
Device Name	1	CredoSense		Rename
Timekeeping Options				
Logger's Time	:			Que a Time
Computer's Time	:			Sync Time
Logging Options				
Interval	:	1 to 1440 Min	nute (s)	Set Logging Interval
Button Start V				
Button Stop \sim				Set Start/Stop Option
Alarm Options				
Alarm Enable/Disable				
Tomporatura (C)		High	Low	
Deleting humaidity (0()	Ì	400	-40	O at Alasma Values
Relative numidity (%)		100	0	Set Alarm Values
Barometric pressure (mbar)	-	1200	600	
			Real-time Data	Read Logged Data
		_		

Figure 12.1: CredoWare User Interface.

12.1 How to configure Loggers . . 30 Setting date and time 32 Setting start/stop conditions 33 Setting logging intervals . . 34 Setting alarms 34 12.2 Configuring CSL-SM2 35 12.3 Initiating the Logging Mode 36 12.4 Real-time monitoring 37 12.5 Reading/downloading the 12.6 Generating a summary report and conducting basic analyses 43 Generating report 43 12.7 Erase Data 46 12.8 Factory Reset 46

🏆 CredoWare				- 0 X
Connectivity Status:	CreDock	connected Searchin	a for a logger	Connect
Connectivity Status.	gioraloggei	Connect		
Device Information				
Device Model	:			
Erase or Reset	:	Erase Data	Factory Reset	
Device Type	:			
Battery Voltage	:			
Data Points	:			
Device Name	:	CredoSense		Rename
Timekeeping Options				
Logger's Time	:			QuesTime
Computer's Time	:	21 Jul 2022, 09:15:06	Sync Time	
Logging Options				
Interval	:	1 to 1440 Mi	nute (s)	Set Logging Interval
Button Start	×			Cat Ctat/Ctap Option
Button Stop	\sim			Set Start/Stop Option
Alarm Options				
Alarm Enable/Disable	;			
		High	Low	
Temperature (C)	1	85	-45	
Relative humidity (%)	:	100	0	Set Alarm Values
Barometric pressure (m)	oar) :	1200	600	
			Real-time Data	Read Logged Data

Figure 12.2: A CreDock is connected but waiting for a Logger to be connected.

After connecting the Logger to the CreDock, it directly goes to the Programming Mode; a lit up blue LED light indicates the Logger is in Programming Mode. At this stage, the UI window will appear as Figure 12.3.

CredoWare				- 🗆 ×
File Tools Help				
Connectivity Status:	Connect	ted		Disconnect
Device Information				
Device Model	: (CSL-H2 T0.2 (1)		
Erros or Depot	. [Erana Data	Factory Depat	1
Erase of Reset	·	Erase Data	Factory Reset	
Device Type	: 1	emperature and Rela	tive Humidity Logger	
Main Battery Voltage	: 2	2.82 V		
Data Points	: 5	57332 points available	e (6 years 198 days 20 ho	urs)
Device Name	:	CSL_Series_Logger		Rename
Timekeeping Options				
Logger's Time	: 2	29 Jan 2022, 17:04:25	j	
Computer's Time	: 2	29 Jan 2022, 17:04:26	i	Sync Time
Logging Options				
Interval	: [60	Minute (s)	Set Logging Interval
Logging interval is curre	ntly set to	60 minute(s)		
Button Start	\sim			
Button Stop	\sim			Set Start/Stop Option
Alarm Options				
Alarm Enable/Disabl	e			
		High	Low	
Temperature (C)	: [50	-20]
Relative humidity (%)	: [80	30	Set Alarm Values
Barometric pressure (m	bar) :	1200	600	
Alarm is enabled. Temp	High: 50 Lo	ow: -20 RH High: 80	Low: 30	
			Real-time Data	Read Logged Data

Figure 12.3: Logger is connected to Computer and in Programming Mode.

Now a user can configure the Logger according to their needs.

Setting date and time

If the Logger time is not in sync with the connected computer time, the "Sync Time" button will appear red, otherwise it should be green. The Logger time can be easily synced to a computer time simply by pressing the **"Sync Time"** button on the CredoWare User Interface.

Timekeeping Options		
Logger's Time	: 29 Jan 2022, 17:48:16	Sync Time
Computer's Time	: 29 Jan 2022, 17:48:16	

Figure 12.4: Synching Logger's time with that of a computer.

Setting start/stop conditions

A user can set start/stop conditions in two ways: on button press or setting a specific date and time. Follow **Figures 12.5**, **12.6**, **12.7**, and **12.8** to complete the start/stop conditions of CSL-Series Loggers.

Logging Options				
Interval	:	30	Minute (s)	Set Logging Interval
Button Start	\sim			Sat Start/Stap Option
Button Stop	\sim			Set Start/Stop Option

Figure 12.5: Showing how to set star/stop conditions with a button press options.

Logging Options								
Interval :		30		Min	ute (s)			Set Logging Interval
Start At Time 🗸 🗸	14 Oct	t. 2020, 2	2:37	\sim				
Stop At Time 🗸	15 Oct	t. 2020, 2	2:37	~				Set Start/Stop Option
	0		Oct	ober, 2	2020		٢	
	Sun.	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	
Alarm Ontiona	27	28	29	30	1	2	3	
	4	5	6	7	8	9	10	
Alarm Status (check and click	11	12	13	14	15	16	17	
	18	19	20	21	22	23	24	
Temperature (C) :	25	26	27	28	29	30	31	
Humidity (%) :	1	2	3	4	5	6	7	Set Alarm Values

Figure 12.6: Showing how to set star/stop conditions at a specific time.

Logging Options		
Interval	: 30 Minute (s)	Set Logging Interval
Start At Time ~	14 Oct. 2020, 22:37 V	Set Start/Stop Option
Stop At Time V	15 Oct. 2020, 22:37 V	

Figure 12.7: Click 'Set Start/Stop Option' to finalize start/stop conditions.

Main Battery Volta	ge :	No battery		
Data Points	:	38187 points available (4 years 131 days 3 hours)		_
Device Name	🖤 Message	1	×	Rename
Timekeeping Optio	i s	tart date & time cannot be less than current date	e & time.	
Logger's Time	-			Sync Time
Computer's Time			ОК	-,
Logging Options				
Interval	:	60 Minute (s)	Set	Logging Interval
Logging interval is	currently set	to 60 minute(s)		
Start At Time	\sim	5 Jan. 2022, 17:58 🗸 🗸	Cat	Start/Stap Option
Stop At Time	\sim	28 Jan. 2022, 18:30 🗸	Set	Stariv Stop Option

Figure 12.8: Showing a situation where start date/time is set at a previous date/time than the time of configuration. Click **'Ok'** and reset the time.

Setting logging intervals

Logging intervals are fully user-configurable. The minimum and maximum logging intervals are 1 and 1440 minutes, respectively.

Interval	:	30	Minute (s)	Set Logging Interval
Start At Time	\sim	14 Oct. 2020, 22:37	~	
Stop At Time	\sim	15 Oct. 2020, 22:37	~	Set Start/Stop Option

Figure 12.9: Click on 'Set logging interval' after setting up desired logging interval.

Figure 12.10: Confirm logging interval by clicking "OK".

Setting alarms

High and low alarms can be set for different parameters using the alarm options of the User Interface. A user can set alarms for temperature, relative humidity, and barometric pressure. If a user is using a temperature Logger, the User Interface will only allow to set temperature parameters. Similarly, If a user is using temperature and relative humidity Loggers, they can set alarms for temperature and relative humidity.

Click on 'Set Alarm Values' after setting proper alarm values for different parameters (Figure 12.11).

Alarm Options						
Alarm Status (check and click Set Alarm Values to enable alarm)						
	High	Low				
Temperature (C)	: 65	-30				
Humidity (%)	: 90	35	Set Alarm Values			
Pressure (mbar)	: 1200	600				

Figure 12.11: Setting alarm values.

Confirm alarm settings by clicking on 'Ok' (Figure 12.12)

Interval	: 30	Minute (s)	Set Logging Interval				
.ogging interval is currently set to 30 minute(s)							
Start At Time 🗸 🗸	9 🥸 Messag	e X					
Stop At Time \sim	1	Alarm enabled successfully!	Set Start/Stop Option				
Time is in 24-hour format							
Alarm Options		ОК					
Alarm Enable/Disable							
	High	Low					
Temperature (C)	50	-20					
Relative humidity (%)	80	30	Set Alarm Values				
Barometric pressure (mbar)	1200	600					
Alarm is enabled. Temp High: 50 Low: -20 RH High: 80 Low: 30							

Figure 12.12: Confirm alarm settings by clicking on 'Ok'.

12.2 Configuring CSL-SM2

CSL-SM2 can be connected to a computer and configured using the same approach as other CSL-Series Loggers (see **Chapter 11**). After connecting CSL-SM2 to the computer via CreDock, the User Interface will look as shown in (**Figure 12.13**).

🔮 CredoWare		- 🗆 🗙
File Tools Help		
Connectivity Status:	Connected	Disconnect
Device Information		
Device Model	: CSL-SM2 ()	
Frase or Reset	· Frase Data Factory Reset	
	: Soil Moisture Longer	
Battery Voltage	· 2.75.V	
Date Points	11/176 pointe available (1 veare 21 days 10 bours	40 minutos)
Data Points	CSI Series Legger	Receive
Device Name	Cal_Series_Logger	Rename
Soil Type	: Sand V	Change Soil Type
Timekeeping Options		
Logger's Time	: 18 Jul 2022, 10:49:08	
Computer's Time	: 18 Jul 2022, 10:49:08	Sync Time
Logging Options		
Interval	: 5 Minute (s)	Set Logging Interval
Logging interval is cur	ently set to 5 minute(s)	
Button Start 🗸 🗸		Pat Stad/Stan Ontion
Button Stop 🗸 🗸		Set StarbStop Option
	Real-time Data	Read Logged Data

Figure 12.13: A CSL-SM2 Logger connected to a computer in Programming Mode.

A user can select a soil-specific calibration equation for a particular soil type from the drop-down menu (Figure 12.14). The menu has equations for five common soil types, i.e., sand, silt loam, clay, growth media (90% Organic and 10% inorganic), and compost. A general equation for all soil types has also been included in the list. If there is no equation for a specific soil type, please select the "General" equation to calculate volumetric soil moisture content. After choosing the soil type, click on the 'Change Soil Type' button; a new pop-up message will appear (Figure 12.15). Click 'OK' to continue.

Soil Type	: General	✓ Change Soil Type
	Sand	
	Silt Loam	
	Growth Media	
Timekeeping Options	Clay	
	Compost	
Logger's Time	General	
Computer's Time	: 22 Jul 2022, 12:54:39	Sync Time

Figure 12.14: Select soil type for soil-specific calibration equation.



Figure 12.15: A calibration equation is successfully selected.

[**NOTE**: If the user wants to use their own equation (none from the list) to convert the voltage output to volumetric water content, they can get the raw voltage values by downloading the data.]

12.3 Initiating the Logging Mode

Disconnect the Logger using the CredoWare and take it out from CreDock after configuring the Logger (if a user is following the previous steps). The Logger is in Idle Mode. To check if the Logger is genuinely in Idle Mode, single press the button. A red LED will blink once indicating that the Logger is in Idle Mode. Depending on the method of configuration, a Logger can start logging in the following two ways:

Start/ Stop at a specific time: The Logger will start or stop logging automatically at specified time. The user do not need to press any button. Please, place the Logger in the desired location.

Button press to start/stop: If the user chose this option during configuration, the user needs to press and hold the start/stop button until a green LED lights up and upon releasing the button green LED blinks once. The Logger is now in Logging Mode. To double-check if the Logger is in Logging Mode, the user can single press the start/stop button, and a green LED will light-up as an indication. The user can follow single press action whenever they like during the Logging Mode.

To stop logging, the user needs to press and hold the start/stop button until a red LED light-up, and upon releasing the red LED blinks once. The Logger is now in Idle Mode. To confirm whether the Logger has stopped logging data, the user can single press the button, and a red LED will light-up. After the logging operation, the Logger can be connected to a computer as shown in previous sections to download logged data from CSL-Series Loggers.

12.4 Real-time monitoring

Click **'Real-time Data'** tab from the bottom right corner of the main software window (Figure 12.17). This tab aims to provide on-screen measurement as the connected Logger is recording data. This feature is a unique addition to our product. Once the button is clicked, a window (Figure 12.17) will appear with live data.



Figure 12.16: Steps involved in monitoring real-time data.

CredoWa	ire			- 🗆 ×
File Tools	Help			
Connectivity	Status: Con	nected		Disconnect
Device Infor	mation			
Device Mode	el	CSL-H2 P1 T0.2	D	
Erase or Re	set	: Erase Data	Factory Reset	
Device Type	👻 Live Data St	reaming	—	l × _{per}
Main Batter				
Data Points	Temperature (C)			-
Device Nam				iame
Timekeeping	Dealtive Humidity	(%)		_
Logger's Tir	Realive framidicy	(70)		_
Computer's				t ime
Logging Op	Barometric Air Pr	essure (mbar)		-
Interval			<u> </u>	ing Interval
Logging inte				
Start At Tin				Stop Option
Stop At Tin	Re	efresh rate (seconds)		2 🖨
Time is in 24	Start			Stop
Alarm Option	ns			
Alarm Er	nable/Disable			
		High	Low	_
Temperature	e (C)	: 50	-20	
Relative hun	nidity (%)	80	30	Set Alarm Values
Barometric p	oressure (mbar)	: 1100	800	
Alarm is ena	abled. Temp High: 5	0 Low: -20 RH high: 8	0 Low: 30 BMP high: 1100	Low: 800
			Real-time Data	Read Logged Data
				todo coggoo outu

Figure 12.17: Live stream data window appears after clicking 'Real-time Data' button.

Set the Refresh rate (sampling rate) and click the 'Start' button (Figure 12.18) to begin live streaming. A data saving option will also appear on the screen to allow the user save live data on the computer (Figure 12.19). Click on the 'Yes/No' button (live streaming data window). A new window (Figure 12.20) will appear with live data. If the user wants to stop live data monitoring now, and clicks on the "Stop" icon the following two things will happen depending on what was selected as data saving option:

- ► Live streaming will be stopped (For selecting 'No')
- Asking for a saving directory as shown in Figure 12.21 (For selecting 'Yes')

Choose a suitable location and click **'Save'**. A window (Figure 12.22) will appear confirming the data are being saved. Users can save data in *.csv formats. Click cross (x) on the top right corner of the window to exit from Live streaming window.

Device Informatio				_
Device Informatio	🖤 Live Data Streaming			<
Device Model	-			-
Erase or Reset	Temperature (C)		_	
Device Type				
Main Battery Volt				
Data Points				
Device Name	Realtive Humidity (%)		-	ename
Timekeeping Opti				
Logger's Time				nc Time
Computer's Time				
Logging Options				
Interval	Refresh rate (seconds)		5	ging Interval
Logging interval i	Start		Stop	
Start At Time				_
Stop At Time	 28 Feb. 2022, 18:30 	~	Set	Start/Stop Option

Figure 12.18: Set refresh rate and start live data streaming.

Device Model	📽 Live Data Streaming — 🗆 🗙	
Erase or Reset		
Device Type	Temperature (C)	
Main Battery Volt		
Data Points	😻 Message 🛛 🗙	
Device Name	Do you want to save incoming real-time data?	ename
Timekeeping Opti		
Logger's Time	Yes No	nc Time
Computer's Time		
Logging Options		
Interval		ging Interval
Logging interval i	Refresh rate (seconds) 5	
Start At Time	Start Stop	Stop Option
Stop At Time	✓ 10 Feb. 2022, 13:00 ✓	volup Option

Figure 12.19: Real-time data saving option.

							-
Device Model	👻 Live Data	Streaming		_		×	
Erase or Reset							
Device Type	Temperature (0	2)			Ē		
Main Battery Volt						-	
Data Points			Γ				
Device Name	De elline Unerid	÷. (0()		ΕD			ename
Timekeeping Opt	Realtive Humid	ity (%)		בב	. E	I	
Logger's Time							
Computer's Time							ic rime
Logging Options							
Interval							ging Interval
Logging interval i	Refresh rate (seconds)				5 🌩	
Start At Time	Start	REC			Sto	p	VCtop Option
Stop At Time	~	10 Feb. 2022, 13:00	~				Justop Option

Figure 12.20: An example of on-screen real-time data streaming.

🧐 Save File As				×
← → • ↑ <mark> </mark> >	$This\:PC\:\rightarrow\:Desktop\:\rightarrow\:Faik\:\rightarrow\:Saved\:Data$			
Organize 🔻 New	folder		III -	
 ★ Quick access ■ Desktop ↓ Downloads B Documents ■ Pictures ③ CSL_Commons ■ PycharmProject ■ Google Drive (G ■ Common 	∧ Name ∧ * * * * * * * * * * * * * * * * * * *	Date modified Type No items match your search.	Size	
This PC 3D Objects Desktop	v			
File name: S	treaming_data.csv			~
Save as type: 📩	csv			~
∧ Hide Folders			Save Cancel	

Figure 12.21: Select a directory on the computer for saving the data.

🔮 Live Data Streaming	- 🗆 X
Temperature (C)	7E.75
Realtive Humidity (%)	NK
Refresh rate (seconds) Start •REC	5 🖨 Stop

Figure 12.22: Real-time data are being saved in the selected directory.

[**NOTE**: The user can get an overall idea of monitoring Real-time Data in (Figure 12.16)]

12.5 Reading/downloading the logged data

Click on the button **'Read Logged Data'** at the bottom right corner of the User Interface window (**Figure 12.23**) to read and visualize logged data on a graph. A window (**Figure 12.24**) will appear that plots the logged data.

 0	Set Alarm Values
600	
Real-time Data	Read Logged Data

Figure 12.23: Clicking on "Read Logged Data" button opens up a window that shows logged data.



Figure 12.24: Logged data are read and plotted.

To download the saved data, the user needs to click on the 'Save Data' button on the bottom right corner of the window (Figure 12.24).The following saving directory will appear on the screen (Figure 12.25).



Figure 12.25: Saving logged data into a computer.

After selecting the desired location, a confirmation message will appear as shown in **Figure 12.26**. Click on the 'OK' icon and the data is saved as .CSV format and it is ready to use.



Figure 12.26: Saving confirmation.

12.6 Generating a summary report and conducting basic analyses

Generating report

If a user wants to generate a summary report (PDF format) of the logged data, clicking on the "Generate Report" button on the bottom right corner of the window (Figure 12.24) will do so.

The following window (Figure 12.27) will appear to choose a specified location for the generated files. Upon selecting the saving directory a confirmation window will pop up on the screen (Figure 12.28).



Figure 12.27: Saving in a computer location.



Figure 12.28: Saving confirmation.

Once the report is downloaded to the computer, the user should see reports like the following **Figures** (12.29, 12.30, and 12.31):



Figure 12.29: Summary report for a single parameter.



Summarized

Summarized statistical analysis Figure 12.30: Summary report for two parameters.



Figure 12.31: Summary report for three parameters.

12.7 Erase Data

A user may need to erase data from the device in the following circumstances:

- Loggers' memory is full. The Logger cannot log data unless there is enough space in the memory.
- Sometimes, the Logger may notify the user that there is no data in the memory, but the amount of data points indicate otherwise. In a case like this, the Logger cannot write any data on its memory. Therefore, the user should erase data before using the Logger.
- ► A user can erase data for a fresh start with a Logger device (only if there is some already existing data in the memory).

12.8 Factory Reset

The user can use the Factory Reset option when the device is malfunctioning such as no real-time data or the device is not writing any data on its memory for some unknown reasons. When exercising this option, the user should carefully select the model number of the device. Failure to select the correct device, may damage the Logger permanently.

Add-Ons

Display Unit | 13

13.1 Description

Some commercially available loggers have a display to show basic Logger information such as current reading, battery condition, memory status, and time. These loggers are generally expensive and not very good for outdoor use, as most display units will not work in temperatures below -20 °C and above 50 °C. A display unit also consumes substantial power, which is another reason they are unsuitable for outdoor use. CSL-Series Loggers allow users to hook up display units as add-ons (Figure 13.1). The add-on Display Unit's philosophy is that users only look at the display unit when they are in front of the unit. So, what is the point of having a display when no one is looking at it? It makes more sense to use the Display Unit when a user needs it: hook it up, see what needs to be seen, and unplug it. Our add-on Display Units save cost, increase battery life, and do not limit outdoor use. Since a display unit is a separate unit, it has a lot more functionality than a traditional onboard display. The large monitor (1.5" LCD) can display Logger's current reading(s), min and max of the values recorded so far, primary and clock battery status, memory status, time and date, and option to adjust Logger's date and time. What is more, it provides power when connected to the Logger.

CredoSense Display Units are affordable and offer various utilities over displays connected to other commercially available loggers. The polycarbonate casing offers extreme durability and allows smooth outdoor use (temperature: -30 °C to 60 °C; dust and splash-proofing: IP65). The ergonomic design and tilted display portion allow a perfect hand-eye orientation for a phenomenal user experience.



Figure 13.1: Display Unit connected to a CSL-Series Logger

13.1 Description .	•	•	•	•	•	•	•	•	•	•	48
13.2 Key features											49

13.2 Key features

- Displays temperature, relative humidity, and barometric pressure from CSL-Series loggers.
- While connected, it can also supply power to the CSL-Series Loggers.
- ► Uses a rechargeable 3.7 V lithium battery.
- High-contrast large display suitable for both indoor and outdoor usages.
- ► Displays additional information such as date/time, min/max readings, etc.
- ► Display min/max reading.

Mini Solar Panel **14**

14.1 Description

A mini-solar panel (sold as add-on by CredoSense) can be used to power a CSL-Series Logger. The user just need to insert the mini solar panel's USB-C male connector to the female connector of the Logger– no battery needs to be inserted. This add-on mini solar panel is particularly handy in remote areas where frequent battery changing is not an option. This also offers a green solution to the users' logging demand.

Τ	Π							Γ	Γ
_		_	_	_	_	_	_	_	
t									
ł									

Figure 14.1: Solar Panel

14.2 Key features

- ► Supply power to CSL-Series Loggers.
- ► Rechargeable lithium battery.
- ► 5 V output.
- ▶ PTFE lamination (waterproof and heat resistant).
- ► Non-sticky surface for dust reduction.
- ▶ Plug and play.
- Robust and light weight.

14.1 Description .	•	•	•	•	•	•	•	•	•	•	50
14.2 Key features											50

General Troubleshooting

Troubleshooting: CSL-Series Loggers 15

[**NOTE**: Issues that require troubleshooting will gradually appear in this section.]

Troubleshooting: Readers/CreDocks **16**

16.1 Device issues

16.1 Device issues 53

Issues that require troubleshoot will gradually appear in this section.

Table 16.1: List of issues an user may encounter while using CreDock.

No.	Issues	Solution
1	Sometimes CredoWare might not be able to find the CreDock. This is due to an issue with the FTDI driver of the operating system.	Please, delete the existing FTDI driver of your operating system and update the driver found from here.

Troubleshooting: Display Units **17**

[**NOTE**: Issues that require troubleshoot will gradually appear in this section.]

Troubleshooting: Solar Power Delivery

[**NOTE**: Issues that require troubleshoot will gradually appear in this section.]

WARRANTY AND CONTACT INFORMATION

Warranty Information 19

19.1 What warranty covers?

CSL-Series Loggers and CreDock carry an eighteen-month warranty against defects in both components and workmanship. If this product should prove to be defective within the warranty period, it will be replaced or repaired free of charge. However, the shipping charge for replacement/repair should be paid by the customer.

19.2 What warranty does not cover?

The followings are not covered by the Warranty from CredoSense:

- ► Loss of use or consequential loss.
- Calibration, if the unit has been subject to environmental conditions outside the specified ones.
- ▶ Wilful damage, mistreatment, misuse or abuse of the product.
- Damage caused by the ingress of moisture, unless ordered with immersion rating.
- Batteries are not covered by this warranty. Please look for battery manufacturer's warranty.
- Circumstances where the unit has been modified from manufacturers specifications.
- ► Damage caused by exposure of the unit outside of the specified environmental conditions.
- Exposure of the Logger to environmental conditions outside the specified ones.

19.1 What warranty covers? 57 19.2 What warranty does not cover?57

Contact Details 20

20.1 Contact details in Canada

30 Charles Street West Toronto, ON, M4Y 1R5, Canada Phone: +1-647-608-0367 (GMT 3:00 PM – 2:00 AM) Email: sales@credosense.ca

20.2 Contact details in Bangladesh

4th floor, Road-03, House-32, Nikunja-2 Khilkhet, Dhaka-1229 Phone: +880-1748-747592 (GMT 4:00 AM – 1:00 PM) Email: sales@credosense.ca 20.1 Contact details in Canada.. 58 20.2 Contact details in Bangladesh 58