

Instruction Manual

for

gSKIN® Digital Sensor Datalogger (DSDL) Kit

For heat flux & surface temperature
measurements with XO-Temp

Status: Version 1.1
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WARNINGS / REMARKS

- Do **NOT** pull at the XO-Temp's cable during removal from a measurement surface! This could break the cable-sensor connection.
- Do **NOT** pry off the XO-Temp sensor via lever action with a hard object. The bending force on the sensor will damage the internal electronics.
- Consult greenTEG's Mounting Recommendations manual for the gO Measurement-System® for further information on (dis)mounting techniques
- Please check that all equipment is operational immediately upon unpackaging

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1. Introduction

This manual provides key information regarding the use of the gSKIN® Digital Sensor Datalogger (DSDL) Kit, a simple and efficient tool for digitally measuring and recording heat flux and temperature measurement values.

It consists of one calibrated gSKIN® XO-Temp Sensor, one gSKIN® MultiLog Logger and a readout software that allows recorded measurement data to be downloaded to a PC via USB link.

2. Intended Use

The DSDL kit is the ideal sensor and datalogger package for R&D applications in various fields. Typical application areas include measuring the insulation quality of building elements, optimizing Phase Change Material (PCM) development and performing thermal and heat flux measurements in general.

3. Important Precautions

To ensure the XO-Temp sensor operates to its specifications, certain precautions must be taken during unpacking, usage and storage. Therefore, please read the following instructions carefully.

- Upon receipt of the DSDL kit, please inspect the hardware for any signs of shipping damage.
- Any exposure to mineral spirits must be avoided. These chemicals attack the sensor embedding material.
- Do not use acids or bases to clean the sensor.
- Conditions adverse to the DSDL components are known to occur in manufacturing environments and/or during storage. Therefore, please ensure the DSDL kit is stored under ambient conditions in sufficiently impact protective packaging.
- Do not immerse any component of this kit into water. The XO-Temp sensor is water resistant to an IP-44 rating but is not designed for prolonged immersion in water.

4. Components Overview

Hardware:

- One gSKIN® XO-Temp sensor with cable (Figure 1a)
- One gSKIN® MultiLog Logger (Figure 1b)
- One micro-USB cable



Figure 1a: XO-Temp Sensor



Figure 1b: gSKIN® MultiLog Logger

Software:

- gSKIN® Download Tool (for downloading data from MultiLog to PC)

5. Measurement Preparation Steps

General Overview

1. Charge and setup the MultiLog
2. Connect the sensor to the MultiLog
3. Setup sensor on desired measurement surface
4. Perform measurement
5. Download and install gSKIN® Download Tool
6. Download data to PC

Step 1: Setting up the MultiLog Logger

Please charge the MultiLog through the micro-USB connection before starting any measurements.

To start up the MultiLog, disconnect any cables and simultaneously press all the buttons for 4 seconds.

Press the SET button 1-2 times to start up the logger.

Use the ▲ (up), ▼ (down), SET and BACK buttons to navigate through the menus. SET confirms a selection and BACK brings you back to the previous menu level.

Main menu:

- **Standby** Puts the logger into sleep mode.
- **Info** Information about the firmware version.

- **Start** Starts data recording.
- **Settings** General logger settings (date, time, clear memory)

Before recording data, check and/or update the date and time settings (**Settings >> Set Date and Settings >> Set Time**).

Step 2: Connect sensor(s) to the logger

The gSKIN® MultiLog Logger can read up to three different sensors. Plug a sensor into the logger ports (labelled 1, 2 and 3). Make sure to align the connector to a position as shown in Fig. 2 before plugging it into the MultiLog. (Only one position is possible due to an alignment key and slot present). Secure the connector by rotating the metal ring.



Figure 2: Connection of the XO-Temp sensor to the MultiLog Logger

Step 3: Mounting Instructions

- 1) Clean and remove all grease and dust residues from the contact surface such that it is clean and dry.
- 2) Either
 - a. Mount the XO-Temp with the appropriate thermally conductive double-sided adhesive tape (sold separately). Note that the sensor side of the tape is colored red, while the contact surface side is colored black. Important: Ensure that the removal tabs of the adhesive tapes point towards the sides (left or right) of the sensor as seen in Fig. 3 (left). Do not attach the adhesive tapes in the same direction as the cable of the sensor as shown in Fig. 3 (right).

Or

 - b. Sandwich the sensor between the two contact areas using a suitable mounting aid substance. It is recommended to use thermally conductive paste or thermally conductive glue to improve the quality of thermal contact between the surfaces and the sensor.

Caution: Do not use excessive paste or glue as it increases the risk of thermal short-cuts between the two contact surfaces. Ensure that no air is trapped between the surface and the sensor. Air gaps are thermally insulating and heavily distort measurement results.

- 3) A clamping force of 10N - 100N per cm² is recommended to optimize the thermal contact. The maximum clamping force of 100N per cm² should not be exceeded at any time.
- 4) After the measurement is complete, detach the XO-Temp carefully by pinching the adhesive tape by its removal tab and slowly pulling it off in a direction parallel along the contact surface as shown in Fig. 4 (left). Do NOT pry off the sensor, pull by its cable (Fig.4 right) or by the removal tabs in the same direction as its cable (Fig. 4 center).
If the removal tab is torn off, please refer to additional instructions in the 'Mounting Recommendations Manual for the gO-Measurement System', which is available for download online at greenTEG's website.

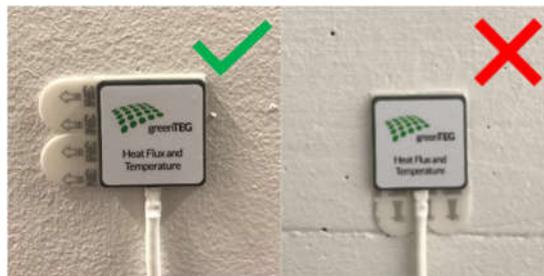


Figure 3: How to mount the the sensor correctly (left) and incorrectly (right).

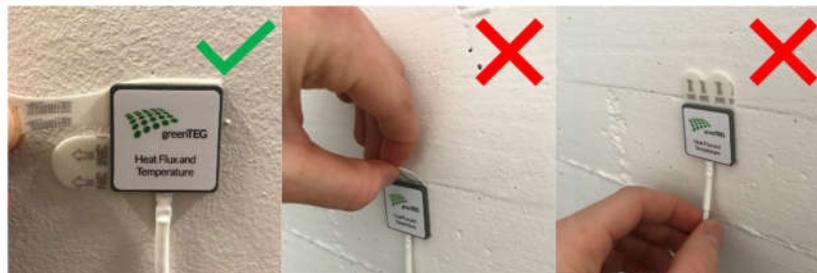


Figure 4: How to remove the nodes/sensors correctly (left) and incorrectly (center and right)

Mounting Aid Substances

To obtain meaningful measurement data, the XO-Temp Sensor should be mounted with the appropriate mounting aid substances. Characteristics of good mounting aids include high thermal conductivity and low thickness. The following types of mounting aids are suitable: adhesive tape, thermally conductive paste or putty, and thermally conductive glue.

The appropriate mounting substance should be chosen based on the measurement setup. greenTEG offers each of these mounting aids through its online webshop: <https://shop.greenteg.com/>

Contact Surface Materials

Materials	Preparation	Installation
Metal	<u>Smooth surface:</u> Degrease with organic solvent	Use adhesive tape Use thermally conductive glue
	<u>Rough surface:</u> Make the surface smooth	Use thermally conductive paste
Concrete	Select a flat surface	Use thermally conductive glue Use thermally conductive paste or putty Embed into the concrete
Glass, tiles	Degrease with organic solvent	Use adhesive tape
Wood	Remove any splinters	Use thermally conductive glue Use thermally conductive paste or putty
Perlite board	Clean off any dust particles	Use thermally conductive glue Use thermally conductive paste

Step 4: Start the measurement

Go to **Start** and press **SET**. The recording will start immediately. The XO-Temp sensor will automatically be recognized by the logger. If no sensor is plugged in, the logger will display an error message and the recording will not start.

Surface Temperature (Ts) and Heat Flux (hf) are displayed live on the MultiLog. Each measurement is stored in a separate file. The logger supports up to a maximum of 15 logging files.

Step 5: Stop the measurement

To stop the recording, press the **BACK** button. The display will display the instructions of slowly pressing **SET** three times. This prevents the unintentional interruption of the measurement. If **SET** is not pressed again (or pressed too quickly) during the following few seconds, the logger returns to normal recording mode.

The end of the data recording is confirmed by a message (*End logging*).

Step 6: Install the software and download the data

Before connecting the MultiLog to the computer, please do the following:

- Download gSKIN® Download Tool software from the greenTEG server through the link provided on the front of this manual
- Unpack the zip file to your preferred directory on your local hard disk. You will find the files as shown in Fig. 5

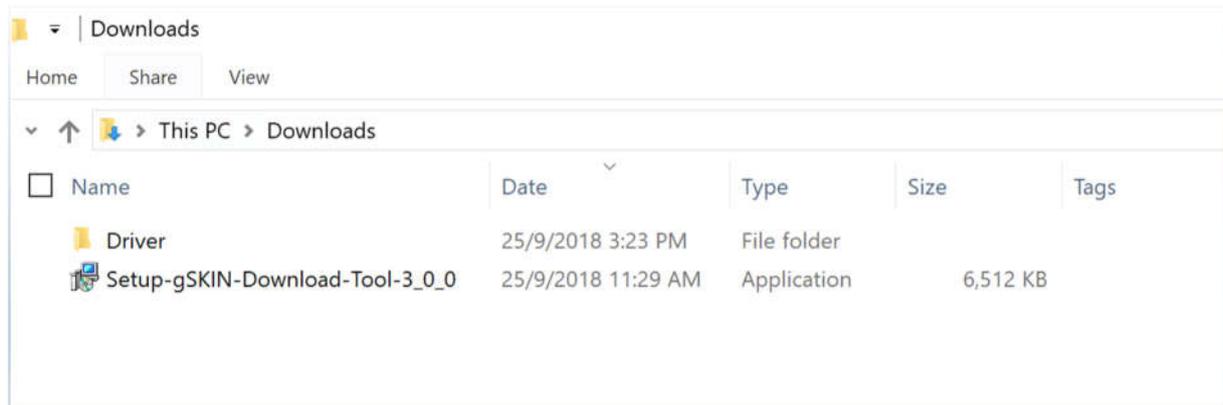


Figure 5. Components of the zip file

- Run the gSKIN® Download Tool installation file (Setup-gSKIN-Download-Tool-3_0_0.exe) and follow the instructions
- **Driver Installation for Windows 7 only:**
 - **WARNING:** You must install the driver before connecting the logger to the computer!
 - For 64bit-Windows, open Driver/Win7/x64 and run 'dpinst_amd64'
 - For 32bit-Windows, open Driver/Win7/x86 and run 'dpinst_x86'
- Driver installation for windows 8, 8.1 and 10:
 - Drivers will be automatically installed from Windows Update server.
- Turn on the logger and connect the logger with the computer while it is turned on.
 - **WARNING:** If the logger is not turned on while connecting to the computer, it might lead to errors even when the logger is turned on later.
 - **WARNING:** Plug and unplug the micro-USB cable carefully. Do not bend the USB connector while connected to the USB port. The resulting leverage forces could damage the logger's micro-USB port.

After software installation the recorded data can be retrieved from the logger and saved as a CSV file. Proceed as follows:

- Switch on the MultiLog.
- Connect the MultiLog to the PC via the provided micro-USB cable.
- It might take a few moments for Windows to recognize the logger.
- Open the gSKIN Download Tool

In the main window (Figure 6), select the correct **COM port** (usually the highest number) and click on **Connect** button. (Note: If the MultiLog does not establish a link to the PC on the first attempt, please attempt to reinitiate the connection by disconnecting and reconnecting the USB connection. For further troubleshooting solutions, please refer to Section 7. Troubleshooting.)

All measurement files on the logger will appear in the list below, in the order the measurements were stored, with the most recent measurements listed on top. (Note: the order might not match the measurement date of each file if the date and time on the logger was not set up properly and changed between measurements).

Files should be easily recognizable by 'Start time', 'Start date' and 'Duration'. Select the file to be downloaded and press the button "Save as CSV...".

Choose a directory other than the default folder to save the CSV file. The data download will start immediately and will take a few seconds to minutes, depending on the size of the file.

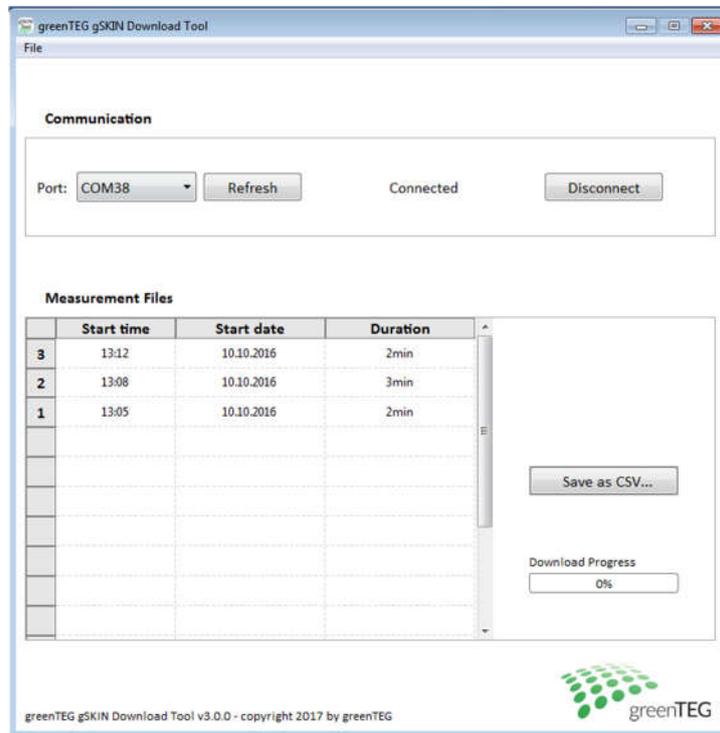


Figure 6. Main window of the gSKIN Download Tool

The CSV file

For each test, the CSV file will contain the following information arranged in columns:
(Please use 'Semicolon' as the CSV delimiter.)

Properties	Description
DateTime [DD.MM.YYYY HH:MM:SS]	Start date and time of the measurement as set in MultiLog.
Sample#	Sequential numbering of the measurement points. Useful during data evaluation
p1_HF	Heat flux measured by Port 1's XO-Temp sensor.
p1_Tambient	Surface temperature measured by Port 1's XO-Temp sensor
[...]	[Same for Port 2 and Port 3]

6. Disposal

This system should be disposed in accordance with local law and regulations regarding electronic devices, or sent back to greenTEG AG in Technoparkstrasse 1, CH-8005, Zürich, Switzerland.

7. Troubleshooting

Table 1 details potential problems along with their possible causes and solutions.

Table 1. Troubleshooting chart

Problem	Possible cause	Solutions
Complete freeze of MultiLog	-	Reset the logger by pressing all four buttons at the same time for 10s. The logger needs to be unplugged. This action will NOT delete measurement data stored on the logger but might reset the time and date.
The COM port of the MultiLog logger is not found by the gSKIN Download Tool	MultiLog drivers not successfully installed Broken USB cable or USB connector	Check that an "STMicroelectronics Virtual COM Port (COMXX)" is assigned to the XO-Temp logger (see Fig. 7). (Control panel>> Device Manager>> Ports (COM & LPT). If the proposed solution does not work, please contact greenTEG AG for further instructions.
MultiLog does not switch on	The MultiLog is being charged The battery is not sufficiently charged to power the MultiLog	During charging, the MultiLog will not turn on until the charging cable is disconnected. Ensure that the device has been charging for at least 2 hours. If the proposed solution does not work, please contact greenTEG AG for further instructions.
Saved CSV file is not appearing in destination folder	CSV is saved to default folder	Save the CSV file in a destination other than the default folder

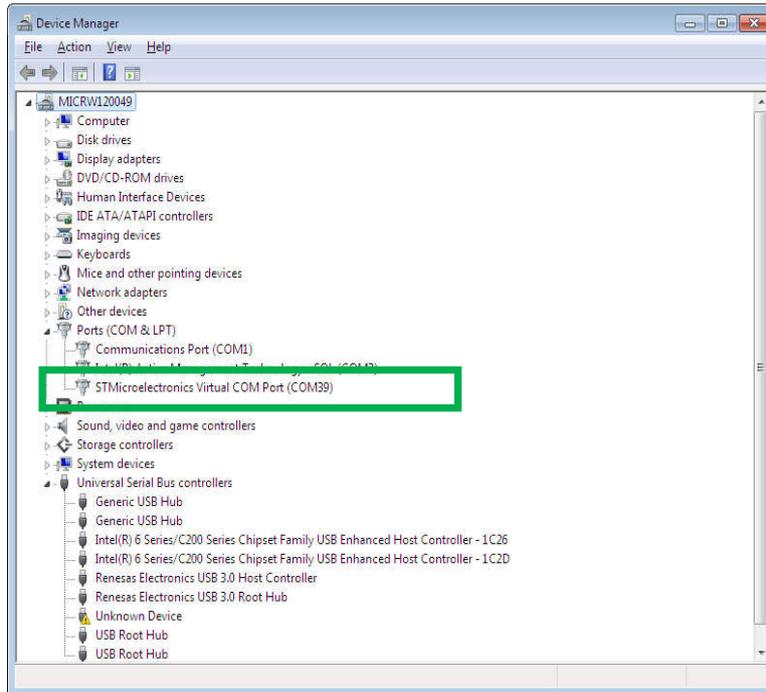


Figure 7. Screenshot of the Device Manager (list of the assigned COM ports)

8. Warranty

One year guarantee in accordance with greenTEG's general terms.

9. Technical assistance

Please contact greenTEG AG at +41446320420 for technical assistance (Monday to Friday 9am to 5pm (Switzerland) or upon request), or by email: info@greenTEG.com.

Disclaimer

The restrictions, recommendations, materials, etc. described above do not cover all possible cases and contact surfaces. This document is not considered exhaustive and final and may be modified at any time without prior notice. greenTEG does not accept any liability for possible damage caused to sensors or contact surface due to (un)mounting of the sensor.

Revision History

Date	Revision	Changes
12.08.2018	0.1	Initial revision
03.09.2018	1.0	First final version
25.09.2018	1.1	Updated hardware and software naming