

Guide to Accessing Raw Blood Sugar Data

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***This guide is a work-in-progress. Please feel free to suggest modifications and improvements!**

Either leave a comment directly in the document or send an email to sensingsugar@gmail.com.

This guide has been developed to help you see and hear your blood sugar data through the [Sensing Sugar](#) project.

You will need your raw data in a Comma Separated Values (.csv) or JavaScript Object Notation (.json) file format to be able to do this.

This guide provides instructions for accessing the CSV raw data file format (.csv) using several different widely-available devices and platforms. It also provides information on how you can make sure that your CSV file will work properly with Sensing Sugar.

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Understanding CSV files

You can generate CSV files whether you track your blood sugar using a Continuous Glucose Monitor (CGM) or intermittent finger-stick testing with a Blood Glucose Meter (BGM).

CSV files can be opened and edited in many different applications, such as spreadsheet applications like GoogleSheets and Excel, and text editors like TextEdit (Mac) or NotePad (PC).

A very simple CSV file looks something like this in a text editor:

Date and Time, Glucose (mmol/L)

05/16/2023 06:07,3.6

05/16/2023 08:44,8.5

05/16/2023 10:28,6.7

05/16/2023 12:53,5.1

05/16/2023 17:11,5.9

05/16/2023 21:40,9.1

- It starts with a line of headings separated by a comma: 'Date and Time' and 'Glucose (mmol/L)'
- The following lines provide the data corresponding to those headings. For example, on the second line, '05/16/2023 06:07' corresponds to 'Date and Time', and '3.6' corresponds to 'Glucose (mmol/L)'.
- Like the headings, the data values are separated by a comma, hence **Comma-Separated-Values (CSV)**.
- In the example file, we have 6 different blood glucose measurements taken at different times on May 16, 2023.

If you opened the same file in a spreadsheet application like Excel, it would look like this:

	A	B	C	D
1	Date and Time	Glucose (mmol/L)		
2	05/16/2023 06:07	3.6		
3	05/16/2023 08:44	8.5		
4	05/16/2023 10:28	6.7		
5	05/16/2023 12:53	5.1		
6	05/16/2023 17:11	5.9		
7	05/16/2023 21:40	9.1		
8				

Making Your CSV File Work with Sensing Sugar

Some files provided from blood sugar monitoring devices and platforms may work with Sensing Sugar with no editing.

If your file does not work, you might need to make a small modification to the file.

Both text editors and spreadsheet applications allow you to make changes to CSV files.

To make your CSV file work with Sensing Sugar, you will need to identify the blood sugar data in the file and change the corresponding heading to **glucose**.

Here's how this would look in the previous example (with the change highlighted):

text editor:

```
Date and Time, glucose
05/16/2023 06:07,3.6
05/16/2023 08:44,8.5
05/16/2023 10:28,6.7
05/16/2023 12:53,5.1
05/16/2023 17:11,5.9
05/16/2023 21:40,9.1
```

spreadsheet:

	A	B	C	D
1	Date and Time	glucose		
2	05/16/2023 06:07	3.6		
3	05/16/2023 08:44	8.5		
4	05/16/2023 10:28	6.7		
5	05/16/2023 12:53	5.1		
6	05/16/2023 17:11	5.9		
7	05/16/2023 21:40	9.1		
8				

*Often, the CSV file you get from your diabetes management system will have many other headings. That's fine. Just look for where the blood sugar data is, and change that heading to **glucose**.

Once you've made the change, you can save your file to be used with Sensing Sugar.

When you save your file, make sure that it has the extension ".csv".

*** Some files might require other modifications. These are listed in the platform/device instructions below.

Getting CSV files from common Diabetes Devices and Systems:

Dexcom/Clarity

If you use a Dexcom Continuous Glucose Monitor to track your blood sugar, you can use the **Clarity web app** to retrieve your data as a CSV file. *Note that the Clarity smartphone app does not allow direct CSV export, but your data is available as a CSV file through the web app.

The following instructions are general. If you encounter specific problems you can find more help [here](#).

1. Log in to the Clarity web app:
 - a. Go to: <https://clarity.dexcom.eu/>. If you live in the US, go to <https://clarity.dexcom.com/>
*Accounts are based on geographic region. You may get a notification that you should switch websites to the one appropriate for your location.
 - b. Click “Dexcom Clarity for Home Users”
 - c. If you already have a Dexcom Account, click log in.
*If you use your smartphone to track your blood sugar with a Dexcom app, such as Dexcom G6, you already have a Dexcom account. If you use a Dexcom Receiver instead of an app, you may not already have a Dexcom account and will need to create a new one. In that case, click sign-up and follow the steps to create an account.
 - d. Log in with the Username and Password for your Dexcom account.
 - e. If you use a Dexcom app to track your blood sugar skip to step 3. If you use a Dexcom receiver go to step 2.
2. Upload your Data (for Dexcom Receivers only): *This step is only necessary if you use a Dexcom Receiver instead of a smartphone app.
 - a. Near the top of your Dexcom Clarity user account page, click on “Upload”
 - b. Follow the on-screen steps to upload your data
3. Export your Data
 - a. Near the top of your Dexcom Clarity user account page, click on “Reports”
 - b. On the right side of the page, near the top, under your name, click on the Export icon.



- c. On the pop-up, under the “Export your data” heading, you will see a number of days and a date range. You can click here to modify the number of days and/or date range.
- d. Click “Export”. Your data will be downloaded as a CSV file.

4. Prepare the Data for Sensing Sugar

- a. Your exported CSV file should work with the “Sensing your Sugar” page of Sensing Sugar. If it doesn’t, you might need to make some small changes. Your CSV file when opened in a spreadsheet application will likely look like the image below.

- i. If your file doesn’t work:

1. Make sure the headings start on the first line. If there is any information on lines before the headings, delete those lines.
2. Change the heading corresponding to the measured glucose values (currently “Glucose Value (mmol/L)” in the example below) to **glucose**.
3. Save your file, making sure it has the extension “.csv”, and your file should now work with Sensing Sugar.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Index	Timestamp	Event Type	Event Subtyp	Patient Info	Device Info	Source Devic	Glucose Value (mmol/L)	Insulin Value	Carb Value (g)	Duration (hh)	Glucose Rate	Transmitter	Transmitter I
2	1		FirstName		Samuel									
3	2		LastName		Thulin									
4	3		Device			Dexcom G6 f	iPhone G6							
5	4		Alert	Fall			iPhone G6					0.2		
6	5		Alert	High			iPhone G6	17.9						
7	6		Alert	Low			iPhone G6	3.3						
8	7		Alert	Signal Loss			iPhone G6			0:20:00				
9	8		Alert	Rise			iPhone G6					0.2		
10	9		Alert	Urgent Low			iPhone G6	3.1						
11	10		Alert	Urgent Low Soon			iPhone G6	3.1						
12	11	2022-09-26T	EGV				iPhone G6	4.7					8774	8PURP8
13	12	2022-09-26T	EGV				iPhone G6	4.7					9074	8PURP8
14	13	2022-09-26T	EGV				iPhone G6	4.7					9374	8PURP8
15	14	2022-09-26T	EGV				iPhone G6	5.4					9674	8PURP8
16	15	2022-09-26T	EGV				iPhone G6	5.4					9974	8PURP8
17	16	2022-09-26T	EGV				iPhone G6	5.1					10274	8PURP8
18	17	2022-09-26T	EGV				iPhone G6	4.8					10574	8PURP8
19	18	2022-09-26T	EGV				iPhone G6	4.7					10874	8PURP8
20	19	2022-09-26T	EGV				iPhone G6	6					11174	8PURP8
21	20	2022-09-26T	EGV				iPhone G6	6.7					11474	8PURP8
22	21	2022-09-26T	Insulin	Fast-Acting			iPhone G6		3					
23	22	2022-09-26T	EGV				iPhone G6	6.3					11774	8PURP8
24	23	2022-09-26T	Carbs				iPhone G6			60				
25	24	2022-09-26T	EGV				iPhone G6	6.1					12074	8PURP8
26	25	2022-09-26T	EGV				iPhone G6	6.3					12374	8PURP8

Example export from Clarity web app.

FreeStyle Libre (2, 3 etc)

If you use an Abbott Continuous Glucose Monitor (FreeStyle, FreeStyle 2, FreeStyle 3) to track your blood sugar, you can use the **LibreView web app** to retrieve your data as a CSV file. *Note that FreeStyle smartphone app does not allow direct CSV export, but your data is available as a CSV file through the web app.

The following instructions are general. If you encounter specific problems you can find more help [here](#).

1. Log in to the LibreView web app:

- a. Go to: <https://libreview.com/>. You will be asked to select your geographic region.
- b. You will then be taken to the Log-in page.

- c. If you already use a compatible Abbott mobile phone app (such as the FreeStyle Libre 2 app) to track your blood sugar, you can log-in to LibreView using the same username and password as you do for the app.
*If you use a FreeStyle Reader/Receiver instead of an app, you may not already have a username and password and will need to create a new LibreView account. In that case, click “Sign Up” and follow the steps to create an account.
 - d. Log into LibreView with your Username and Password.
 - e. If you use an Abbott app to track your blood sugar (such as the FreeStyle Libre 2 app) skip to step 3. If you use a FreeStyle Reader/Receiver go to step 2.
2. Upload your Data (for FreeStyle Reader/Receivers): *This step is only necessary if you use a FreeStyle Reader/Receiver instead of a smartphone app.
- a. At the top left of your LibreView user account page, click on the icon that looks like a glucose monitor.



- b. Follow the on-screen directions to upload your data.
3. Export your Data
- a. At the top left of your LibreView user account page, click on the icon that looks like a line graph.



- b. Just underneath, where it says “Glucose History”, you can select an amount of time for which you will view and export the data (ex. 1 week, 2 weeks, etc).
 - c. At the top right of your LibreView user account page, click on the tab that says “Download Glucose Data”.
 - d. In the pop-up, verify that you are not a robot and click “Download” to download your CSV file.
4. Prepare your Data for Sensing Sugar
- a. Your CSV file when opened in a spreadsheet application will likely look like the image below. There are a few simple steps to prepare it for use with the “Sensing your Sugar” page of [Sensing Sugar](#).
 - i. Delete the first row entirely. Your CSV file should begin with the row of headings that are currently on Row 2. Deleting the first row will move these headings to Row 1, where they belong.
 - ii. Save your file, making sure it has the extension “.csv”, and your file should now work with Sensing Sugar.
 - 1. *Note: by default, Sensing Sugar will use the data from the “Historic Glucose mmol/L” column. If you scroll down in the CSV file you might also find that values begin to appear in the “Scan Glucose mmol/L” column. These are the values from when you scanned your sensor. If you would like to use those values instead:
 - a. Delete the “Historic Glucose mmol/L” column.

- b. Change the heading “Scan Glucose mmol/L” to **glucose**.
- c. Save your file, making sure it has the extension “.csv”, and your file should now work with Sensing Sugar.

	A	B	C	D	E	F	G	H	I	J	K
1	Glucose Data	Generated on 24-06-2023	Generated by Samuel Thulin								
2	Device	Serial Number	Device Time	Record Type	Historic Glucose mmol/L	Scan Glucose mmol/L	Non-numeric	Rapid-Acting	Non-numeric	Carbohydrate	Carbohydrate
3	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	10.7						
4	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	10.1						
5	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	9.6						
6	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	8.9						
7	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	8.7						
8	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	8.8						
9	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	8.4						
10	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	7.6						
11	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	7						
12	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	6.8						
13	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	6.7						
14	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	6.6						
15	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	5.2						
16	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	4						
17	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	4.8						
18	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	5.1						
19	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	5.6						
20	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	6.3						
21	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	6.6						
22	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	6.9						
23	FreeStyle Libre 2	B244E573-EF	13-06-2023	0	7.1						

Example export from LibreView web app

Contour

If you use a CONTOUR NEXT GEN or CONTOUR NEXT ONE blood glucose meter from Ascensia you can track your blood sugar using the Contour smartphone app.

You can find a series of instructional videos for using the app [here](#).

This is how to export a CSV file from the app:

1. Open the app on your smartphone and click the menu (3 horizontal bars) at the top left of the screen.
2. Click “My Care”.
3. Click “Reports” (under My Team).
4. Click “Raw Data File (CSV)”
5. Click “Agree” to consent to continuing with the export.
6. A CSV file will be generated and displayed on your phone.
7. You can now email yourself the CSV file to get it on your computer.
8. Prepare your Data for Sensing Sugar:
 - a. Your exported CSV file should work with the “Sensing your Sugar” page of Sensing Sugar. If it doesn’t, you might need to make some small changes. Your CSV file when opened in a spreadsheet application will likely look like the image below.
 - i. If your file doesn’t work:
 1. Make sure the headings start on the first line. If there is any information on lines before the headings, delete those lines.

2. Change the heading corresponding to the measured glucose values (currently “BGValue[mmol/L]” in the example below) to **glucose**.
3. Save your file, making sure it has the extension “.csv”, and your file should now work with Sensing Sugar.

	A	B	C	D	E	F	G	H	I	J	K
1	#	Date and Time	BGValue[mmol/L]	Meal Marker	Data Source	Notes	Activity	Meal[g]	Medication	Location	
2	1	2023-01-19 7:06	10.1	No mark	Meter			40	Long-acting Insulin (Basal): 9 U, Fast-act		
3	2	2023-01-19 9:46	4.4	No mark	Meter						
4	3	2023-01-19 12:06	7.7	No mark	Meter			50	Fast-acting Insulin (Bolus): 5 U		
5	4	2023-01-19 18:38	7.5	No mark	Meter			70	Fast-acting Insulin (Bolus): 7 U		
6	5	2023-01-19 20:32	9.8	No mark	Meter						
7	6	2023-01-19 21:41			Manual				Long-acting Insulin (Basal): 9 U		
8	7	2023-01-20 5:51	14.3	No mark	Meter			40	Long-acting Insulin (Basal): 9 U, Fast-act		
9	8	2023-01-20 12:15	10.7	Pre-meal	Meter			50	Fast-acting Insulin (Bolus): 5 U		

Example export from Contour smartphone app

Glooko

Glooko is a 3rd party service that allows you to manage your blood sugar and other health data. You can use Glooko with a wide range of BGM and CGM devices. You will first need to download the Glooko app and connect your device or use the Glooko Uploader. Find full instructions for using Glooko [here](#).

Once you have synced your blood sugar data with Glooko, you can use the **Glooko web app** to export your data as a CSV file.

Glooko provides instructions for doing so [here](#).

Here is a summary of the steps:

1. Log in to your Glooko account at my my.glooko.com
2. Click on the option “Export to CSV”



3. In the pop-up window you will see a drop-down menu where you can select the number of days or date range you would like to export. After making a selection, click “Export”
4. Your data will download as a zipped folder. Unzip the folder to access multiple CSV files.
5. If your data came from a Blood Glucose Meter it will be in the file bg_data.csv
If your data came from a Continuous Glucose Meter it will be in the file cgm_data.csv
6. Prepare your Data for Sensing Sugar:
 - a. Your CSV file when opened in a spreadsheet application will likely look like the image below. There are a few simple steps to prepare it for use with the “Sensing your Sugar” page of [Sensing Sugar](#).

- i. Delete the first row entirely. Your CSV file should begin with the row of headings that are currently on Row 2. Deleting the first row will move these headings to Row 1, where they belong.
- ii. Save your file, making sure it has the extension “.csv”, and your file should now work with Sensing Sugar.
- iii. If your file does not work:
 1. Change the heading corresponding to the measured glucose values (currently “Glucose Value (mmol/l)” in the example below) to **glucose**.
 2. Save your file, making sure it has the extension “.csv”, and your file should now work with Sensing Sugar.

	A	B	C	D
1	Name: Samuel Thulin	Date Range: 2023-05-13 -2023-05-26		
2	Timestamp	Glucose Value (mmol/l)	Manual Reading	Serial Number
3	2023-05-26 11:41	4.1	-	7802H7373051
4	2023-05-26 9:56	5.6	-	7802H7373051
5	2023-05-26 8:02	8.4	-	7802H7373051
6	2023-05-25 22:03	12.4	-	7802H7373051
7	2023-05-25 17:25	7.6	-	7802H7373051
8	2023-05-25 12:25	6.3	-	7802H7373051
9	2023-05-25 7:40	11.3	-	7802H7373051
10	2023-05-24 21:56	14.4	-	7802H7373051
11	2023-05-24 18:49	7.8	-	7802H7373051
12	2023-05-24 13:19	7.8	-	7802H7373051

Example export from Glooko web app

Tidepool

Tidepool is a 3rd party service that allows you to manage your blood sugar data and export it. Although you can only export as an Excel file or JSON file, it is easy to convert from the Excel file to a CSV file (see below).

1. Create an account:
 - a. Go to <https://www.tidepool.org/> and select Personal Sign-Up. Follow the instructions to create your Tidepool account.
 - b. If you already have a Tidepool account, skip to step 2.
2. Log in to your Account
3. Upload your Data. The following instructions are general. You can also refer to Tidepool’s [knowledge base for uploading data](#), which includes [guides for specific manufacturers and devices](#).
 - a. Once in your account, under your name in the top centre of the page, you will see an option to “Upload”. Click on it.
 - b. Assuming you have not already installed the Tidepool Uploader application, you will be greeted with a message asking you to do so. Click on the appropriate version of the Uploader for your computer to download the application.
 - c. Install the application on your computer.

- d. Open the application. You may need to sign in, using the same user name and password that you do to log in to your account.
 - e. You will be asked which device(s) you use to monitor your blood sugar. Select all the applicable devices that you want to retrieve data from.
 - f. Connect the device that you want to retrieve data from. The application will offer suggestions on how to connect various devices (i.e. "Plug in meter with micro-USB cable", etc.)
 - g. Click upload (next to the name of the device you have connected). You will see a progress bar indicating that the data is being uploaded.
 - h. Once it is finished, click the "OK" button that appears
4. View your Data
 - a. Go back to the web page where your account is open and refresh the page. Your latest data will appear in the chart on the page.
5. Export your Data
 - a. Click on your name at the top centre of the page
 - b. On the next page, scroll to the bottom where it says "Export My Data"
 - c. Here you can select a range of dates for which you would like to export your data.
 - d. Choose whichever units you want to export your data in.
 - e. Select Excel as the File Type.
 - f. Click "Export". The file will be downloaded to your computer.
6. Convert from Excel to CSV file type
 - a. If you have Excel on your computer:
 - i. Open the downloaded file with Excel
 - ii. Near the bottom of the screen, click on the different tabs to find the spreadsheet where you see your blood sugar values.
 - iii. Once you've found the proper sheet, Go to File -> Save As, and select CSV from the options. Click Save.
 - iv. You may get a message saying that you will lose some aspects of the workbook or the data. Proceed anyway.
 - b. If you do not have Excel on your computer:
 - i. Go to <https://docs.google.com/spreadsheets/> . You will need a Google Account to do this.
 - ii. Start a new blank spreadsheet.
 - iii. Go to File->Open, and select Upload.
 - iv. Browse for, or drag and drop your Excel file.
 - v. Near the bottom of the screen, click on the different tabs to find the spreadsheet where you see your blood sugar values.
 - vi. Once you've found the proper sheet, Go to File -> Download, and select Comma Separated Values (.csv). Your CSV file will be downloaded.
7. Prepare your Data for Sensing Sugar:
 - a. Your exported CSV file should work with the "Sensing your Sugar" page of Sensing Sugar. If it doesn't, you might need to make some small changes. Your

CSV file when opened in a spreadsheet application will likely look like the image below.

- i. If your file doesn't work:
 1. Make sure the headings start on the first line. If there is any information on lines before the headings, delete those lines.
 2. Change the heading corresponding to the measured glucose values (currently "Value" in the example below) to **glucose**.
 3. Save your file, making sure it has the extension ".csv", and your file should now work with Sensing Sugar.

	A	B	C	D	E	F	G	H	
1	Zulu Time	Local Time	Device Time	Tidepool Data Type	Value	Units	Timezone Offset	Conversion Offset	Clock Di
2	2019-11-13 19:41:15	2019-11-13 14:41:15	2019-11-13 14:41:15	cbg	4.7	mmol/L	-300	0	
3	2019-11-13 19:26:15	2019-11-13 14:26:15	2019-11-13 14:26:15	cbg	5.4	mmol/L	-300	0	
4	2019-11-13 19:11:15	2019-11-13 14:11:15	2019-11-13 14:11:15	cbg	5.8	mmol/L	-300	0	
5	2019-11-13 18:56:15	2019-11-13 13:56:15	2019-11-13 13:56:15	cbg	5.3	mmol/L	-300	0	
6	2019-11-13 18:41:21	2019-11-13 13:41:21	2019-11-13 13:41:21	cbg	4.8	mmol/L	-300	0	
7	2019-11-13 18:26:21	2019-11-13 13:26:21	2019-11-13 13:26:21	cbg	5.2	mmol/L	-300	0	
8	2019-11-13 18:11:22	2019-11-13 13:11:22	2019-11-13 13:11:22	cbg	6.3	mmol/L	-300	0	
9	2019-11-13 17:56:22	2019-11-13 12:56:22	2019-11-13 12:56:22	cbg	7.5	mmol/L	-300	0	
10	2019-11-13 17:41:22	2019-11-13 12:41:22	2019-11-13 12:41:22	cbg	8.9	mmol/L	-300	0	
11	2019-11-13 17:26:09	2019-11-13 12:26:09	2019-11-13 12:26:09	cbg	9.5	mmol/L	-300	0	
12	2019-11-13 17:10:42	2019-11-13 12:10:42	2019-11-13 12:10:42	cbg	7.8	mmol/L	-300	0	
13	2019-11-13 16:55:42	2019-11-13 11:55:42	2019-11-13 11:55:42	cbg	6.8	mmol/L	-300	0	

Example export from Tidepool

Manual Entry

If you track your blood sugar manually you can see and hear your data through the Sensing Sugar project by creating a CSV file.

The following resources provide detailed, step-by-step instructions for creating a CSV file:

- <https://www.wikihow.com/Create-a-CSV-File>
- <https://www.computerhope.com/issues/ch001356.htm>

Also refer to the sections of this guide [Understanding CSV files](#) and [Making Your CSV File Work with Sensing Sugar](#) to see an example of a simple CSV file that will work with Sensing Sugar.