

Quick-Start Guide

Revision 2.3

March 2026

Home Health Box

Version 2.0

Sensor and Sampling Platform for Indoor Air Quality



**ACCESS SENSOR
TECHNOLOGIES**

Sampling made simple.®

No part of this document may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Access Sensor Technologies as governed by U.S. and international copyright laws.

CAUTION! Air pollutant measurements from the Home Health Box are for informational purposes only. The Home Health Box is not a safety alarm. Always keep regular home smoke and carbon monoxide alarms installed and operational.

Contents

Abbreviations	3
1 Unpack your Home Health Box.....	4
Accessories	6
Size-selective inlets	6
Filter cartridges.....	7
Filter inlet flow check adapter	7
Filter inlet tool.....	7
Sorbent inlet block flow adapter.....	7
Sorbent block lifting tool.....	8
2 Prepare the HHB to Sample.....	8
Step 1: Install a microSD card.....	8
Step 2: Install filter cartridges and size-selective PM inlets	8
Step 3: Install sorbent tubes or cartridges for VOC sampling.....	9
Step 4: Program sample settings	10
Step 5: Set the Home Health Box on a flat surface.....	10
Step 6: Plug the Home Health Box into a wall outlet	10
Step 7: Turn the Home Health Box on.....	11
Step 8: Interpret the main indicator light	11
3 Program Sample Settings	12
Using the “HHBv2 Configurator” desktop software.....	12
Installing the desktop software.....	12
Running the desktop software.....	12
Connecting to the Home Health Box.....	13
Overview of the graphical user interface	13
Mainboard	14
Gas sensors.....	16
Alphasense electrochemical gas sensors	18
Filter samples.....	19
Gas samples	21
Write configuration	22
4 Download Log Data.....	23

Abbreviations

Abbreviations used throughout this manual are defined below in alphabetical order:

AE	auxiliary electrode
AST	Access Sensor Technologies
BC	black carbon
CO	carbon monoxide
CO ₂	carbon dioxide
CS	cross section
GUI	graphical user interface
HHB	Home Health Box
ID	inner diameter (when referring to an O-ring)
ID	identifier (when referring to samples and sample media)
ISB	Individual Sensor Board
MCE	mixed cellulose ester
MO _x	metal oxide
NO	nitric oxide
NO ₂	nitrogen dioxide
NO _x	nitrogen oxides
O ₃	ozone
OD	outer diameter
PM	particulate matter
PM _{2.5}	refers to a particle size fraction, defined by the U.S. EPA, that generally consists of particles with aerodynamic diameters smaller than 2.5 μm; often called “fine particulate matter”
PM ₁₀	refers to a particle size fraction, defined by the U.S. EPA, that generally consists of particles with aerodynamic diameters smaller than 10 μm
PTFE	polytetrafluoroethylene (Teflon™)
PVC	polyvinyl chloride
RPM	revolutions per minute
RTC	real-time clock
S/N	serial number
tVOCs	total volatile organic compounds
UPAS	Ultrasonic Personal Air Sampler
UTC	Coordinated Universal Time
VOC	volatile organic compound
WE	working electrode
XRF	X-ray fluorescence

1 Unpack your Home Health Box

The Home Health Box (HHB) allows users to sample indoor air pollution. The HHB can be configured with up to two particulate matter (PM) samplers. PM can be sampled onto user-supplied 37- or 25-mm-diameter filters at 1 L min^{-1} (using our black $\text{PM}_{2.5}$ inlet) or at 2 L min^{-1} (using our green $\text{PM}_{2.5}$ inlet, our purple respirable PM inlet, or our gold PM_{10} inlet). The HHB can also be configured with up to two gas samplers, which can be operated at 3 to 30 mL min^{-1} . The HHB is designed primarily for use with 6.35-mm-diameter sorbent tubes but can accommodate most other common sorbent tubes and cartridges. The HHB is equipped with time-resolved sensors for fine PM and CO_2 and can also be configured with up to five electrochemical sensors (e.g., for NO_2 and CO).

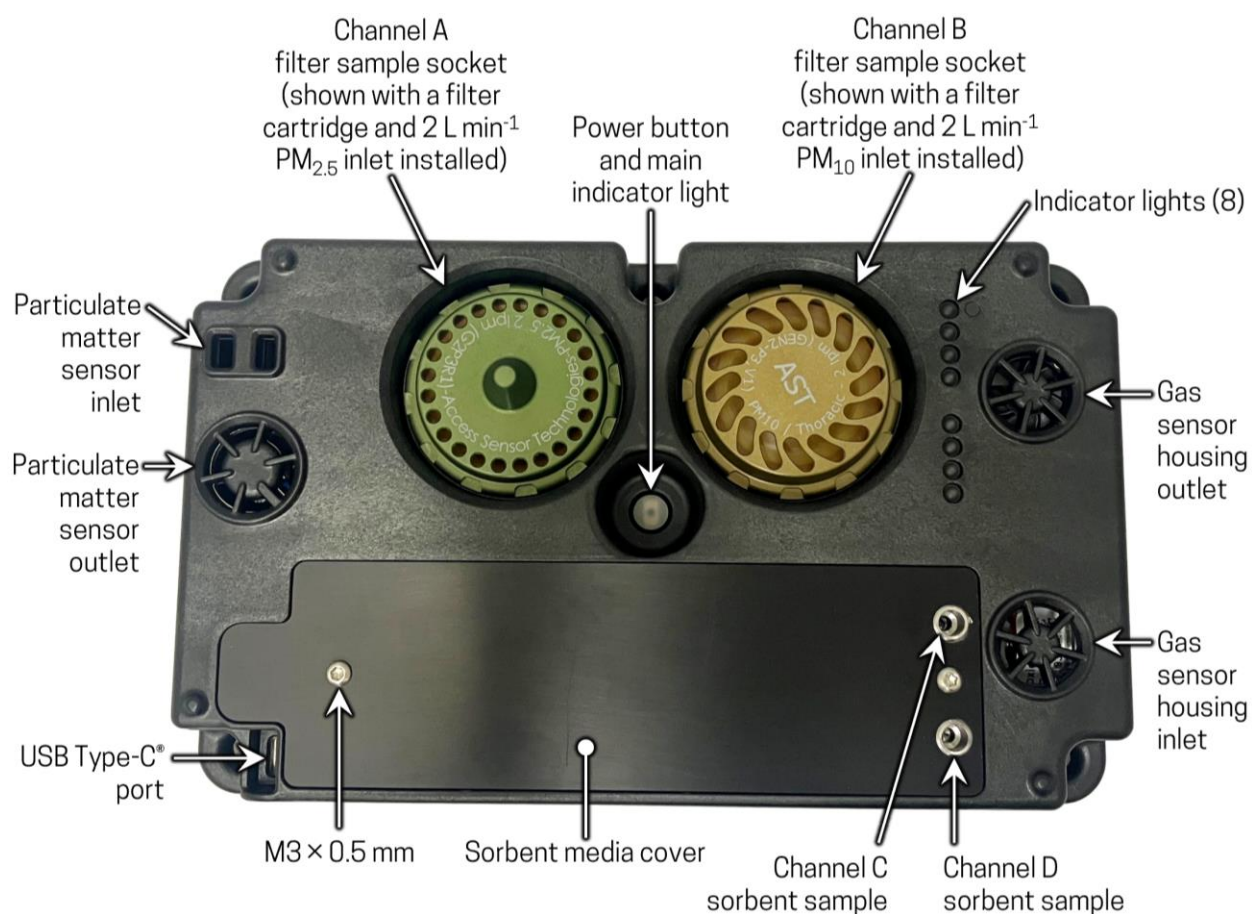


Figure 1. A fully-assembled HHB. GEN2P3 $\text{PM}_{2.5}$ 2 L min^{-1} and PM_{10} 2 L min^{-1} inlets are shown here as examples, but any AST GEN2P3 size-selective inlets can be used with the HHB. The face shown here—with the filter sample, sorbent sample, PM sensor, and gas sensor housing inlets—is the “front” of the HHB.



CAUTION: The Home Health Box is designed for indoor use only. The HHB enclosure is not waterproof. Shield the HHB from water, water spray, precipitation, etc.

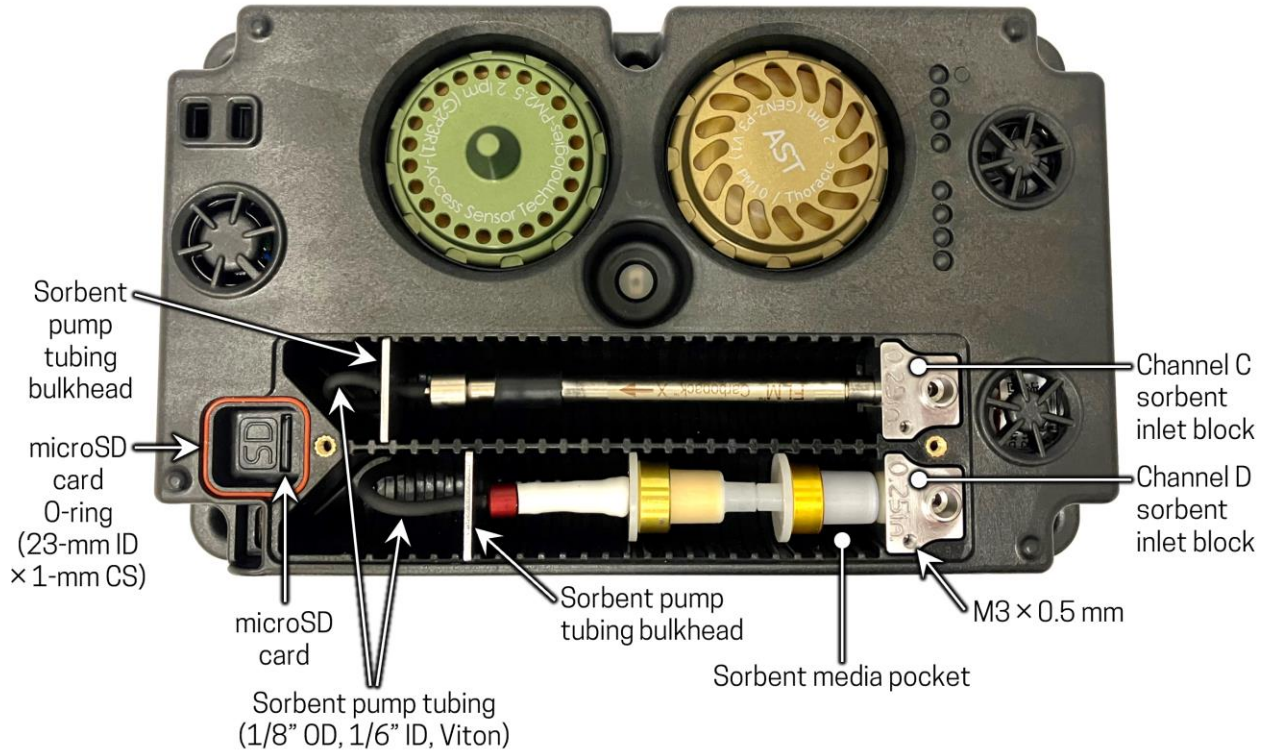


Figure 2. An HHB with the sorbent media cover removed. The thermal desorption tube in Channel C and Waters™ ozone scrubber/DNPH cartridge combination in Channel D are shown as example sorbent media. No sorbent media are included with the HHB. Sorbent media must be supplied and installed by the user.



Figure 3. An HHB with the size-selective inlets, filter cartridges, sorbent media, and sorbent inlet blocks removed to show the Channel A, B, C, and D labels.

The Home Health Box comes with a kit containing the following items:

Description	Qty	Replacement part specifications
Power supply	1	15 W, 5 V USB Type-C® adapter
USB Type-C® to USB Type-C® cable	1	Anker A8753, 60 W
Sorbent inlet blocks	2	Blocks for ¼" (6.35 mm) diameter sorbent media are included; blocks for other diameters are available upon request
microSD™ card	1	SanDisk Industrial 8 GB SDSDQAF3-008G-I
Filter socket O-ring	2	35-mm ID × 1-mm CS, Buna-N
Sorbent inlet block O-ring	2	6-mm ID × 1-mm CS, Viton™
microSD™ card O-ring	1	23-mm ID × 1-mm CS, Buna-N
Replacement sorbent cover screws	2	M3 × 0.5 mm, 6-mm long
T8 security Torx® driver	1	Wiha 36271
Sorbent cover plugs	4	Nylon locking panel plugs, for 5/16" diameter hole and 0.016" to 0.062" panel thickness

Accessories

The following accessories are purchased separately from the HHB.

Size-selective inlets

A size-selective inlet is required to collect a particulate matter sample. All Access Sensor Technologies GEN inlets can be used with the HHB. The following inlets are available: PM_{2.5} @ 1 L min⁻¹, PM_{2.5} @ 2 L min⁻¹, respirable PM @ 2 L min⁻¹, and PM₁₀ @ 2 L min⁻¹.



(a) PM_{2.5} @ 1 L min⁻¹ (b) PM_{2.5} @ 2 L min⁻¹ (c) Respirable PM @ 2 L min⁻¹ (d) PM₁₀ @ 2 L min⁻¹

Figure 4. Access Sensor Technologies GEN2 size-selective particulate matter inlets that can be used with the Home Health Box.

Filter cartridges

A filter cartridge must be installed downstream of the size-selective inlet to collect a PM sample. The HHB is designed to be used primarily with 37-mm-diameter filters, which can be installed in the yellow cartridge, but a blue cartridge for 25-mm-diameter filters is also available (**Figure 5**). Install the sample filter in the cartridge *without* a filter backing pad.



(a) Yellow cartridge for 37-mm-diameter filter



(b) Blue cartridge for 25-mm-diameter filter

Figure 5. Filter cartridges used to collect particulate matter samples with the HHB.

Filter inlet flow check adapter

The filter inlet flow check adapter seals over a size-selective inlet to allow the inlet of the filter sampling channel to be connected to an external flow meter. This adapter can also be used to install and remove size-selective inlets. The bottom edge of the adapter features the interface needed to tighten or loosen the GEN2 inlets shown in **Figure 4**.



Figure 6. Filter inlet flow check adapter.

Filter inlet tool

The filter inlet tool is used to install and remove size-selective inlets from the HHB filter sockets. The larger-diameter end of this tool is the handle and the opposite end features the interface needed to tighten or loosen the GEN2 size-selective inlets shown in **Figure 4**.



Figure 7. Filter inlet tool.

Sorbent inlet block flow adapter

To check a gas flow rate against an external flow meter, insert the end with the O-ring into the inlet of the sorbent inlet block. Then, connect the barbed end of the adapter to a flow meter.



Figure 8. Sorbent inlet block flow adapter.

Sorbent block lifting tool

The sorbent block lifting tool is a shoulder screw with a knurled head and a 4-mm-long M3 x 0.5 mm thread. To remove a sorbent inlet block from the HHB, thread the lifting tool into the M3 x 0.5 mm thread on the front of the block. Then, hold the head of the tool and lift the block straight out of the sorbent media pocket.



Figure 9. Sorbent block lifting tool.

2 Prepare the HHB to Sample

Step 1: Install a microSD card

HHB data are written to .csv files on a microSD™ card that is installed behind the sorbent media cover (see **Figure 1** and **Figure 2**). To install a microSD™ card, you must first remove the sorbent media cover by using the T8 security Torx® driver to unscrew the two M3 screws that hold the cover in place. Then, insert a microSD™ card into the microSD™ card slot with the pins on the card facing the “SD” label in the HHB enclosure. Press down on the microSD™ card until it bottoms out.

Step 2: Install filter cartridges and size-selective PM inlets

Install a filter cartridge and size-selective inlet in each filter socket that will be used to collect a PM sample. Before installing an inlet and filter cartridge in a socket, confirm that the socket O-ring is in place and in good condition (**Figure 3**). If the O-ring is damaged or missing, replace it with an O-ring has a 23-mm inner diameter (ID) and a 1-mm round cross section (CS) **before** collecting a sample.

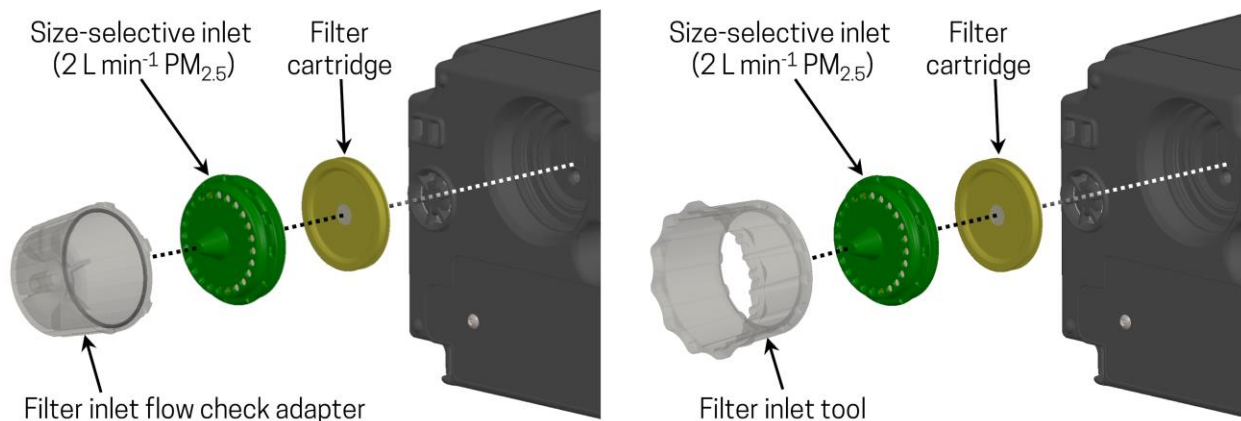


Figure 10. A diagram illustrating how the size-selective inlet and filter cartridge should be installed in the HHB filter socket. The 2 L min⁻¹ PM_{2.5} inlet is shown here as an example. Use either the filter inlet flow check adapter (left) or the filter inlet tool (right) to screw down and tighten the size-selective inlet.

The easiest way to install a GEN2P3 inlet and filter cartridge in a socket is to start by placing the inlet into the filter inlet flow check adapter (**Figure 6**) or the filter inlet tool (**Figure 7**). Next, set the filter cartridge in the inlet so that the 8-mm-diameter hole in the top of the cartridge is facing the inlet. Then, use the tool to align the inlet and filter cartridge with the filter socket. Finally, screw the inlet into the socket and tighten it all the way.

Step 3: Install sorbent tubes or cartridges for VOC sampling

- 1 Remove the sorbent media cover (see **Figure 1**) by using the T8 security Torx® driver to unscrew the two M3 screws.
- 2 Pull the sorbent inlet block and the sorbent pump tubing bulkhead (see **Figure 2**) up out of the sorbent media pocket.

IMPORTANT! Do not disconnect the 1/8" OD, 1/16" ID sorbent pump tubing from the HHB. If the left end of the sorbent pump tubing is pulled out of the HHB enclosure, the HHB will need to be returned to AST so that the tubing can be reconnected to the pump.

- 3 Insert the inlet end of the sorbent tube or cartridge into the hole on the left side of the sorbent inlet block (see **Figure 2** and **Figure 11**).

IMPORTANT! Make sure there is an O-ring installed in this hole and confirm that the O-ring is in good condition so that the inlet of the sorbent tube or cartridge will seal to the block.

- 4 On the outlet end of the sorbent tube or cartridge, connect whatever tubing and fittings are needed to adapt the outlet to the 1/8" OD, 1/16" ID sorbent pump tubing.
- 5 Slide the completed assembly (consisting of the inlet block, the tube or cartridge, the sorbent pump tubing, and the tubing bulkhead) down into the grooved sorbent media pocket as shown in **Figure 2**.
- 6 Reinstall the sorbent media cover using the T8 security Torx® driver and two M3 screws.



CAUTION: Never run a HHB filter sample channel without a filter cartridge and filter in place. Never run a HHB sorbent sample channel without sorbent media in place. If these channels are run without sample media in place, dust and other particulate matter can damage the pumping elements.

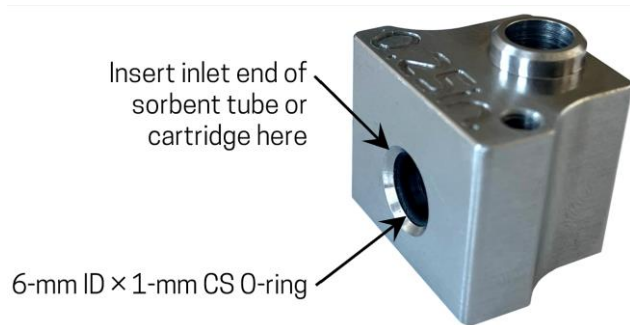


Figure 11. Sorbent inlet block.

Step 4: Program sample settings

Follow the instructions in [3Program Sample Settings](#) to program your desired sample settings.

Step 5: Set the Home Health Box on a flat surface



Figure 12. The Home Health Box is designed to be set down on a flat surface, as shown here, with the inlets facing the room (i.e., not facing towards a wall or up against any other vertical surface), during sampling.

Step 6: Plug the Home Health Box into a wall outlet

To connect the HHB to line power, insert the USB Type-C® end of the 5V DC power adapter into the USB Type-C® port on the front of the HHB (see **Figure 1**). Then, plug the other end of the power adapter into a wall outlet.

IMPORTANT! The HHB comes with a 5 V USB Type-C® wall adapter that is rated for 15 W. Using a different wall adapter with a lower power rating could cause the HHB to fail to operate correctly. Always use the HHB with the power adapter that was supplied by AST.

The HHB contains a Li-ion battery to prevent sample loss during a short-term interruption of line power. The HHB will run for several hours on a fully-charged battery, but we do not recommend relying on battery for long-duration HHB operation. Plug the HHB into a wall outlet during sampling.

Step 7: Turn the Home Health Box on

To turn the HHB on, press the power button firmly until you feel a click. Continue holding the button down until the button light turns on (about five seconds). Release the button. The pushbutton requires an uninterrupted hold down of at least five seconds. If the pushbutton is released before the light turns on, the HHB does not power on; repeat the process.

To turn the HHB off, press the power button firmly until you feel a click. Continue holding the button down until the button light turns off (about five seconds). Release the button. If the HHB has been successfully powered down, the button light will remain off. If the HHB fails to shut down, try again with a fresh five-second button hold.

Step 8: Interpret the main indicator light

The main indicator light is the light behind the HHB power button. See **Table 1** for descriptions of what the colors and the solid vs. flashing status of this light indicate about HHB operation.

Table 1. Interpreting the color and solid/flashing status of the main indicator light behind the power button.

Light color	Solid or flashing?	Home Health Box status
Red	Solid	Starting up.
Blue	*Flashing*	Waiting; this could mean: <ul style="list-style-type: none"> a) The HHB is programmed to start a sample on this power-up, but the microSD™ card is not installed; reinstall the microSD™ card and power cycle the HHB to start the sample. b) The HHB is programmed to start a sample at a specific UTC date and time, but that date and time has not yet been reached. c) The HHB is not programmed to start a sample on this power up; it is waiting to connect to the Configurator software to be programmed
Green	*Flashing*	The HHB is waiting for the time to reach HH:MM:00 before starting the sample.
Green	Solid	Sampling, all volumetric flow rates within 4% of targets, HHB is plugged in and receiving power.
Orange	Solid	Sampling, all volumetric flow rates within 4% of targets, HHB is not plugged in or not receiving power from the outlet; restore line power to HHB to ensure continued operation.
Orange	*Flashing*	Sampling, all volumetric flow rates within 4% of targets, HHB is not plugged in or not receiving power from the outlet, battery is very low; restore line power to HHB immediately to prevent shutdown.

3 Program Sample Settings

Using the “HHBv2 Configurator” desktop software

Installing the desktop software

On a 64-Bit Windows PC

Download the “HHBv2 Configurator VX.XRX-executable.zip” folder (preferably to a folder on your hard drive, i.e., not a cloud-based location). Then, extract the files by right-clicking on the .zip folder and selecting “Extract All...” When the “Extract Compressed (Zipped) Folders” pop-up menu appears, confirm the folder to which the files will be extracted and then click the “Extract” button.

Running the desktop software

On a 64-Bit Windows PC

Open the “HHBv2 Configurator VX.XRX-executable” folder to which the software files were extracted. Double click the “HHB_Configurator.exe” executable file to open the software application. When the application opens, you should see the window shown in **Figure 13**.

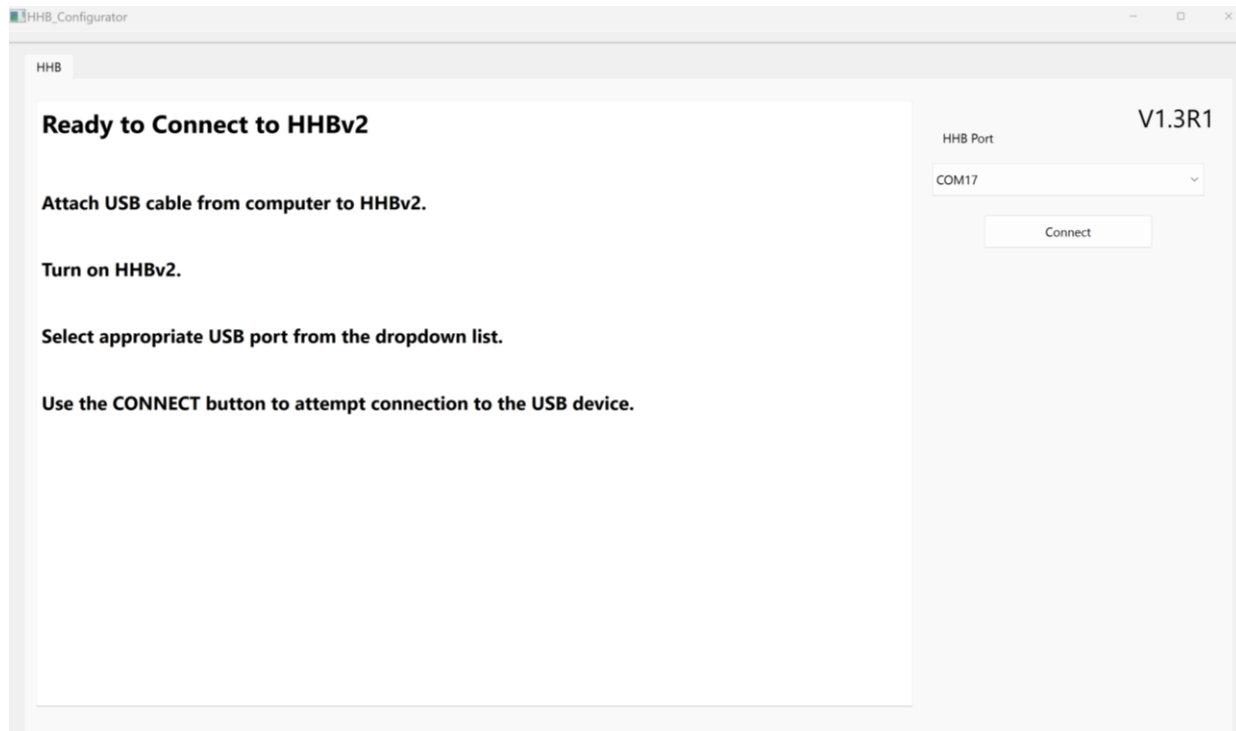


Figure 13. The window displayed when the HHBv2 Configurator software is opened. Follow these instructions to connect to the Home Health Box.

Connecting to the Home Health Box

Follow the instructions displayed in the HHBv2 Configurator graphical user interface (GUI) to connect to a HHB (**Figure 13**):

- 1 Connect the HHB to a Thunderbolt™ port on your computer. A Thunderbolt™ port is a USB Type-C® receptacle marked with this symbol: ⚡
- 2 Turn the HHB on. Press the power button down until you feel a click and then continue to hold the button down until the button LED light turns on (approximately five seconds). When the HHB turns on, the button LED should blink blue.
- 3 Go to the “HHB Port” drop-down menu in the upper-right corner of the GUI and select the COM port associated with the HHB.
- 4 Hit the “Connect” button below the “HHB Port” drop-down menu.

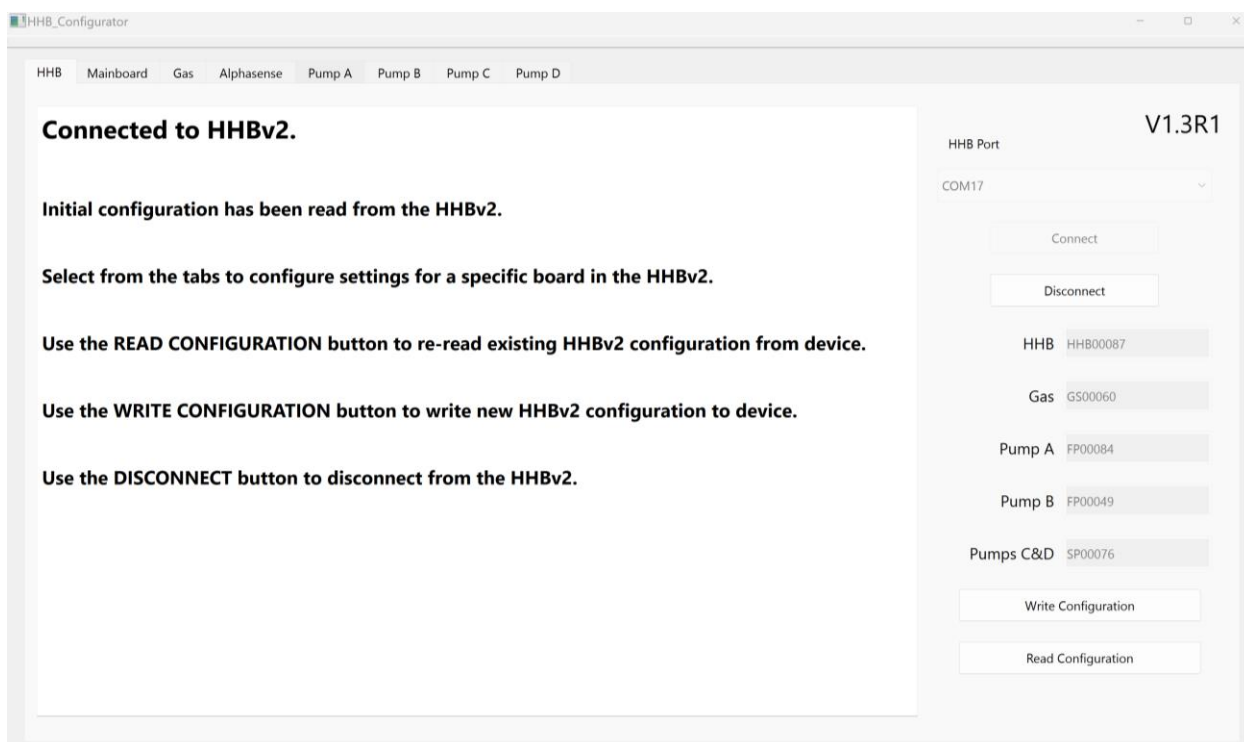


Figure 14. The display shown when the HHBv2 Configurator software has connected to the HHB.

Overview of the graphical user interface

There are eight tabs in the HHBv2 Configurator GUI—HHB, Mainboard, Gas, Alphasense, Pump A, Pump B, Pump C, and Pump D—where you can enter different settings and select variables that you want written to the log file (see **Figure 14**). Each tab includes settings related to the following:

- **Mainboard:** The HHB as a whole and the time-resolved PM sensor.
- **Gas:** Time-resolved gas sensors that are *not* Alphasense B-series electrochemical sensors.
- **Alphasense:** Alphasense B-series electrochemical sensors.
- **Pump A** and **Pump B:** Particulate matter samples.
- **Pump C** and **Pump D:** Gas samples.

When the Configurator software connects to an HHB, all fields in the Mainboard, Gas, Alphasense, Pump A, Pump B, Pump C, and Pump D tabs will populate with the most recent sample settings.

The next five sections contain the following information for each tab: (a) an image of the tab, (b) descriptions of the settings that can be adjusted in that tab, and (c) descriptions of the log variables that can be selected in that tab.

Mainboard

The Mainboard tab is shown in **Figure 15**. There are four settings displayed in the top-right corner:

- **UTC Offset:** All HHB data are logged in Coordinated Universal Time (UTC). This box can be used to specify the offset, in hours, between UTC and the local time zone in the location where the HHB sample will be collected. The value specified here will be written to the header in the HHB log file and might be useful for displaying HHB log data with local timestamps. Changing this value does *not* affect the timestamp associated with the HHB log data; HHB data will be logged in UTC regardless of the value entered here.
- **Logging Interval [seconds]:** The interval, in seconds, at which HHB data will be logged. Options include 5, 15, 30, and 60 s.
- **Action After Sampling Ends:** What should the HHB do once the sample is complete? If “Shutdown” is selected, the HHB will turn off completely. If “Idle” is selected, the HHB will remain on, but air will no longer be sampled through the filters or sorbent media and data will no longer be written to the log file.
- **Sample ID:** Allows the user to enter a name that can be used to identify the sample. This name will be written in the HHB log file header.

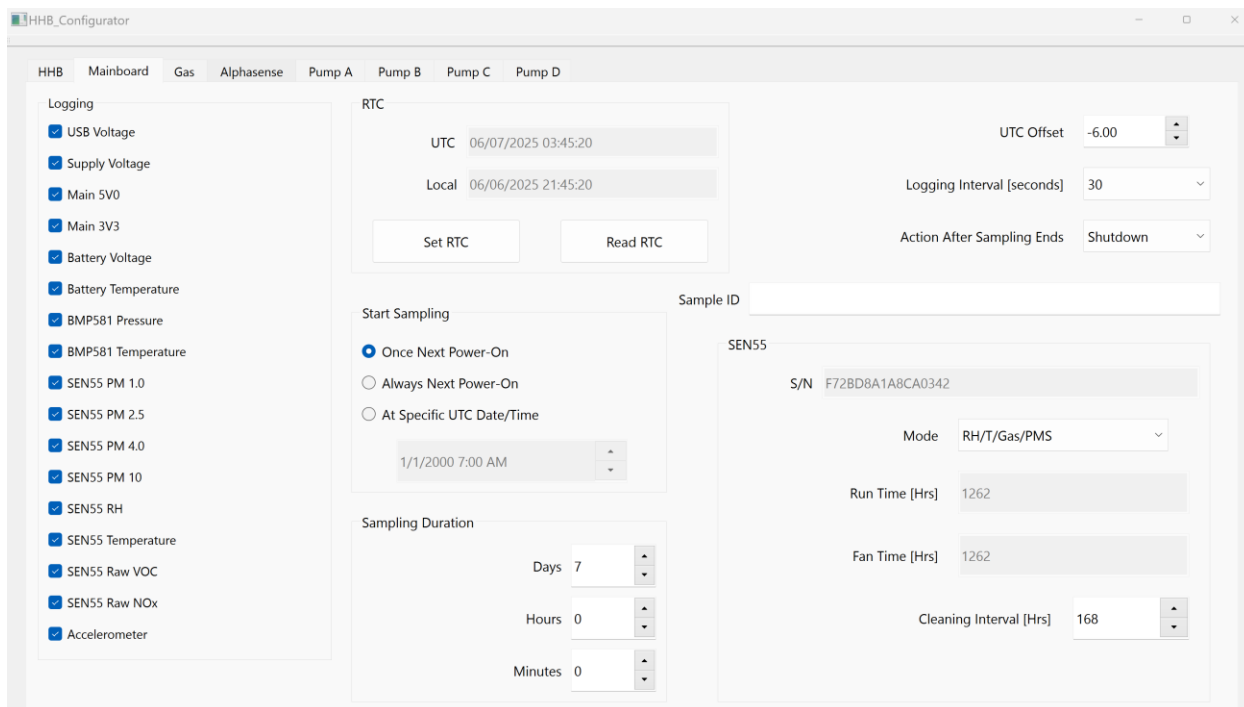


Figure 15. The mainboard sample settings in the HHBv2 Configurator software.

Logging

On the left side of the Mainboard tab, a list of variables is displayed. If the box next to the variable is checked, that variable will be logged. There is no limit to how many variables can be logged. Logging all variables will only result in a slightly larger log file. At a minimum, we recommend logging Battery Voltage, BMP581 Pressure, BMP581 Temperature, SEN55 PM1.0, SEN55 PM2.5, SEN55 RH, SEN55 Temperature, and Accelerometer. See our HHB v2 User Guide for a description of each variable.

RTC

The “RTC” box is used to set the timestamp on the real-time clock (RTC) inside the Home Health Box. When the software initially connects to the HHB, it will read the Coordinated Universal Time (UTC) from the HHB and display that time on the line labeled “UTC.” The line labeled “Local” will display the local time in the time zone to which the PC clock is set.

Clicking the “Set RTC” button will send the timestamp from the computer to the RTC in the HHB. Using the “Set RTC” button to update the time on the HHB regularly can help minimize clock drift and maintain accurate timestamps in the log file.

IMPORTANT! To ensure that the RTC gets set to the correct UTC time, make sure your computer has the correct timestamp and is set to the correct local time zone.

Clicking the “Read RTC” button will read the UTC time from the HHB and display it on the line labeled “UTC.” Additionally, the line labeled “Local” will update with local time in the time zone to which the PC clock is set. You can also confirm that the RTC is set to the correct UTC time and that the clock is advancing by clicking the “Read RTC” button and confirming that the correct times are displayed next to “UTC” and “Local.”

Start Sampling

When should the HHB start the *overall* sample? In other words, when should the HHB start logging data from the time-resolved sensors?

- **Once Next Power-On:** The next time the HHB is powered on, it will start a sample using the settings specified here. When the HHB is turned on again after the sample has been completed, it will wait to connect to the Configurator to receive new sample settings.
- **Always Next Power-On:** Each time the HHB is powered on, it will start a sample automatically using the settings specified here. To exit this start mode and program new sample settings, remove the microSD™ card and connect the HHB to the Configurator.
- **At Specific UTC Date/Time:** The HHB will start sampling at the specified UTC time, assuming that the HHB is on at that time. If the HHB is powered off at the specified time, the HHB will start sampling immediately the next time it is powered on. The HHB will stop once the specified sample duration has elapsed since the actual sample start time. Format the specified UTC time as mm/dd/YYYY HH:MM AM/PM.

Sampling Duration

Specify the duration for which the HHB should sample, in days + hours + minutes.

This is the *overall* duration for which all time-resolved sensors will run and log data. Any PM and gas samples must also start and run within this duration—although each individual PM and gas sample

can start after the beginning of the overall sample and stop before the end of the overall sample.

If the HHB turns off before the specified sample duration is complete and is then turned back on later, it will resume the sample until the specified duration has been reached. The resumed sample will append data to the original log file. To prevent the HHB from resuming a sample the did not run to completion, remove the microSD™ card before turning the HHB back on; then, connect the HHB to the Configurator to program a new sample.

SEN55

These are settings related to the Sensirion SEN55 time-resolved PM sensor installed in the HHB:

- **S/N:** This line displays the serial number of the SEN55 sensor installed in the HHB.
- **Mode:** Use the drop-down menu to select the SEN55 operating mode.
 - **Idle:** The SEN55 sensor will go into a low-power mode. The fan will remain off. No measurements will be made, and no data will be logged from the sensor.
 - **RH/T/Gas:** The fan in the SEN55 will remain off. The sensor will measure RH and temperature as well as qualitative, relative levels of total volatile organic compounds (tVOCs) and nitrogen oxides (NO_x).
 - **RH/T/Gas/PMS:** The fan in the SEN55 will run. The sensor will measure RH, temperature, particulate matter (PM) concentrations, as well as qualitative, relative levels of tVOCs and NO_x.
- **Run Time [Hrs]:** The number of hours for which this sensor has run.
- **Fan Time [Hrs]:** The number of hours for which the fan in this sensor has run.
- **Cleaning Interval [Hrs]:** The interval, in hours, at which the SEN55 fan-cleaning procedure should run. Sensirion recommends running the cleaning procedure once every 168 hours. The cleaning procedure will run every time the SEN55 sensor is powered on. If the sensor is still running after the cleaning interval has elapsed, the cleaning procedure will run again.

Gas sensors

On the Gas tab shown in **Figure 16**, settings can be programmed for time-resolved gas sensors that are *not* Alphasense B-series electrochemical sensors. If a given sensor is not installed, all settings within the box corresponding to that sensor, and the associated log variables, will be grayed out.

Logging

A list of variables is displayed on the left side of the Gas tab. If the box next to the variable is checked, that variable will be logged. At a minimum, we recommend logging BMP581 Pressure, BMP581 Temperature, SCD30 CO₂, SCD30 Temperature, and SCD30 RH. See our HHB v2 User Guide for a description of each variable.

Gas Housing Fan

There is a fan installed on the outlet of the gas sensor housing that pulls air through the inlet of the gas sensor housing and past the CO₂ and electrochemical sensors (see **Figure 1**). When the “Enable” box is checked, the gas housing fan will turn on when the “Write Configuration” button on the “HHB” tab is pressed and will also turn on during any subsequent samples. **We recommend**

enabling the gas housing fan during sampling to minimize the response time associated with measurements from the CO₂ and electrochemical gas sensors inside the HHB.

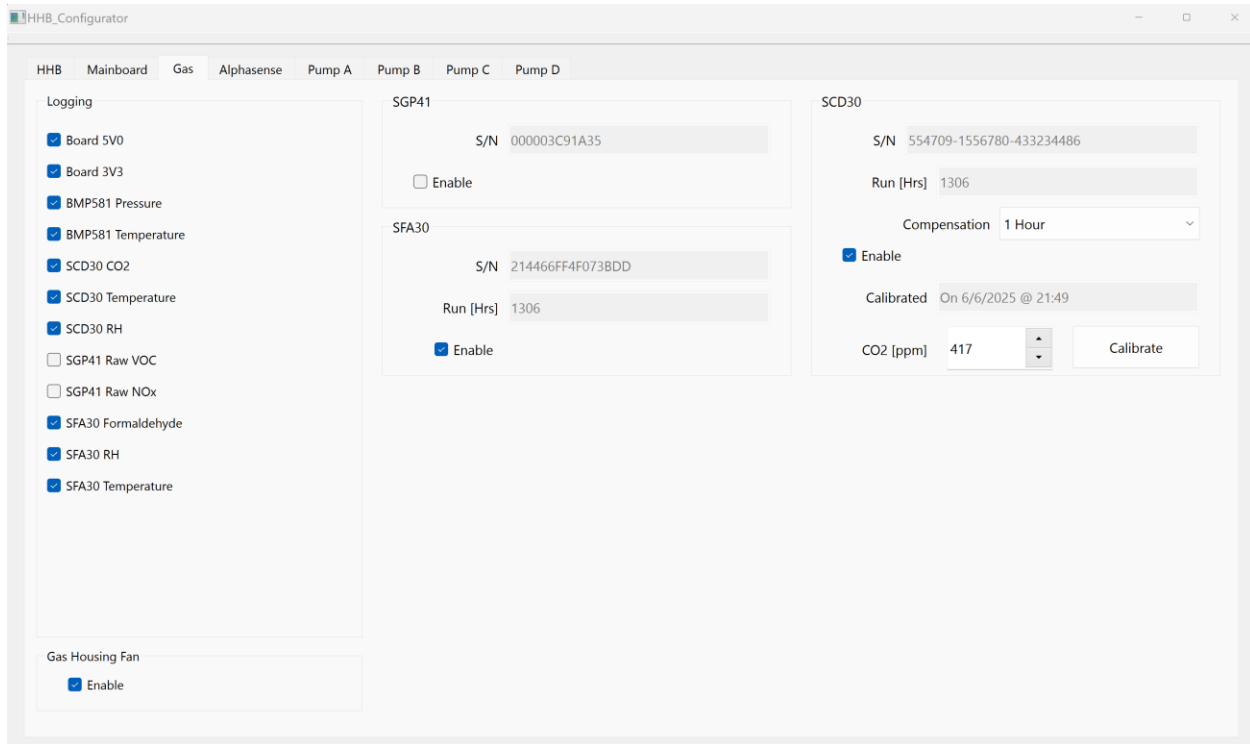


Figure 16. The gas sensor settings that can be programmed using the HHBv2 Configurator software.

SGP41

If the HHB has a Sensirion SGP41 sensor installed on the gas sensor PCB (i.e., in addition to the SGP41 sensor in the SEN55 sensor), the serial number of this sensor will be displayed next to the “S/N” label. If the “Enable” box is checked, the sensor will operate normally and raw VOC and NO_x values from the sensor will be written to the log file (unless those variables are manually unchecked in the “Logging” box on the left side of the Gas tab). If the “Enable” box is unchecked, the sensor will go into a low-power mode and no data from the sensor will be written to the log file.

SCD30

These are settings related to the Sensirion SCD30 NDIR CO₂ sensor installed in the HHB:

- **S/N:** This line displays the serial number of the SCD30 sensor installed in the HHB.
- **Run [Hrs]:** The number of hours for which this sensor has run.
- **Compensation:** CO₂ readings from the SCD30 sensor should be corrected for temperature, humidity, and pressure. In the HHB, CO₂ readings are compensated using the temperature and RH values read by the SCD30 sensor as well as the pressure measured by a Bosch BMP581 sensor in the gas sensor housing (the SCD30 sensor is also inside the gas sensor housing). Use this drop-down menu to select the frequency at which the temperature, RH, and pressure values used for compensation are updated.
 - None: Readings will not be corrected for temperature or air density.
 - 1 Minute: The values used for compensation will be updated every minute.

- 1 Hour: The values used for compensation will be updated every hour. This is the default selection.
- 1 Day: The values used for compensation will be updated every 24 hours.
- **Enable:** If this box is checked, the sensor will operate normally and CO₂, temperature, as well as RH readings from the sensor will be written to the log file (unless those variables are manually unchecked in the “Logging” box on the left side of the Gas tab). If this box is unchecked, the sensor will be put into a low-power mode and no data from the sensor will be written to the log file.
- **Calibrated:** This line displays the local date and time (mm/dd/yyyy @ HH:MM) when the sensor was last calibrated to a known CO₂ concentration. If the sensor has never been manually calibrated, this line will say “None” instead of displaying a date and time.
- **CO₂ [ppm] and Calibrate button:** The SCD30 sensor can be calibrated by placing the HHB in an environment where the CO₂ concentration is known, entering the known concentration in the box labeled “CO₂ [ppm],” and clicking the “Calibrate” button. The sensor must run for at least 2 minutes before it can be calibrated. Write a configuration with the SCD30 enabled to the HHB and then let the HHB run with the SCD30 enabled for at least 2 minutes (the HHB can remain connected to the configurator during this time; a formal sample need not be started). Then, enter the known CO₂ concentration and press the “Calibrate” button to recalibrate the sensor instantaneously.

Note: If the sensor is being recalibrated using outdoor air, the CO₂ concentration in outdoor air is approximately 420 ppm.

SFA30 [obsolete]

This box corresponded to the Sensirion SFA30 electrochemical formaldehyde sensor that could have been installed in the HHB before Sensirion discontinued the SFA30. If this sensor was installed, the serial number of the sensor was displayed next to the “S/N” label and the total number of hours for which the sensor had been powered on was displayed next to the “Run [Hrs]” label. If the “Enable” box was checked, the sensor operated normally and the formaldehyde concentration, RH, and temperature measured by the sensor were written to the log file (unless those variables were manually unchecked in the “Logging” box on the left side of the Gas tab). If the “Enable” box was unchecked, the sensor was put into a low-power mode and no data from the sensor was written to the log file.

Alphasense electrochemical gas sensors

Settings related to any Alphasense B-series electrochemical gas sensors installed in the HHB are controlled on the Alphasense tab (**Figure 17**). Up to four such sensors can be installed in the HHB. The boxes labeled Alphasense #1–#4 correspond to positions where these sensors can be installed. The box associated with a position will be grayed out if there is no sensor installed there.

If a sensor is installed in a given position, the serial number of the sensor will be displayed next to the “S/N” label and the model of the sensor (e.g., NO₂-B43F, CO-B4) will be displayed next to “Type.” If the “Enable” box is checked, the sensor will be powered on. If the “Enable” box is unchecked, the sensor will *not* be powered on and no data from the sensor will be written to the log file.

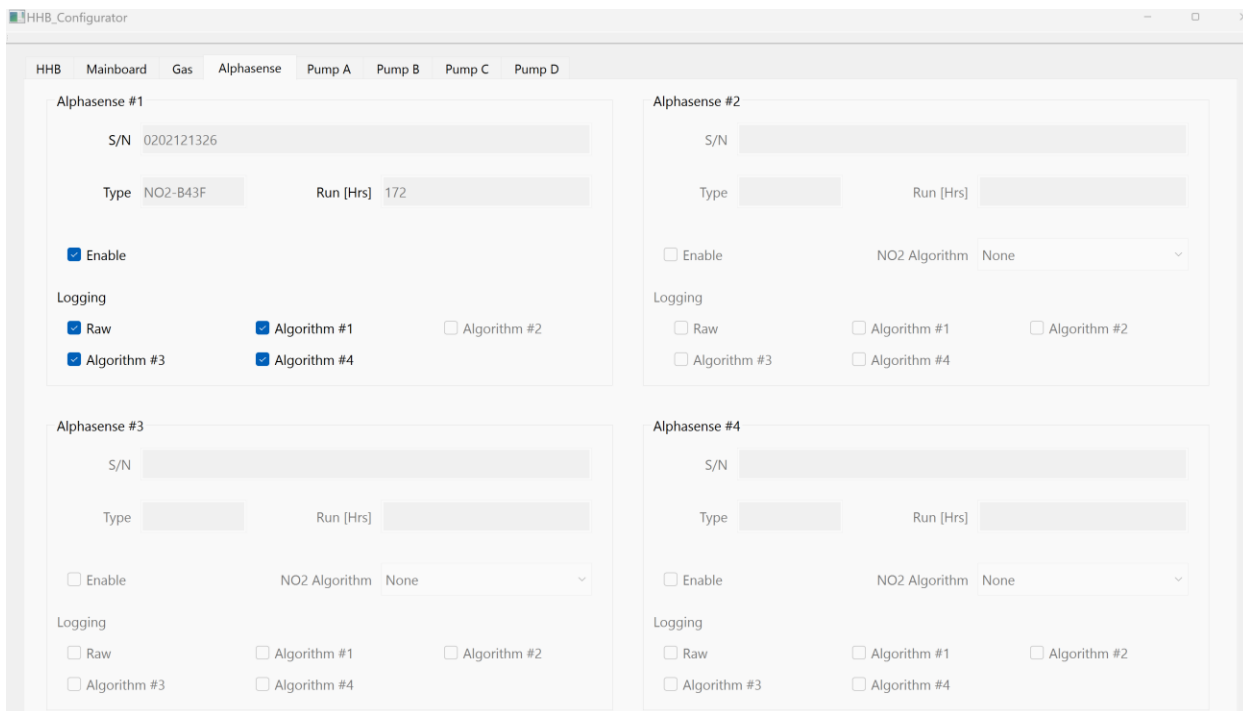


Figure 17. Settings for the Alphasense B-series electrochemical gas sensors that can be programmed using the HHBv2 Configurator software.

Below the “Enable” box for each sensor, the following variables are listed under “Logging:” Raw, Algorithm #1, Algorithm #2, Algorithm #3, and Algorithm #4. If the check box next to one of these variables is selected, that variable will be logged. If the sensor auxiliary electrode output in zero air (AE_0) is equal to zero, Algorithm 2 cannot be used and this checkbox will be grayed out. At a minimum, you must log the Raw data from each sensor that is enabled. We also recommend logging the data from each algorithm that is not grayed out.

If there is an NO2-B43F sensor installed in one position *and* an OX-B431 sensor installed in another position, a drop-down menu labeled “NO2 Algorithm” will appear to the right of the “Enable” box for the OX-B431 sensor. The OX-B431 sensor responds to both O_3 and NO_2 ; so, to estimate an O_3 concentration in ppb, data output from the OX-B431 sensor must be corrected to account for the NO_2 concentration. Use the “NO2 Algorithm” drop-down menu to choose an algorithm to be used to estimate the NO_2 concentration (from the NO2-B43F sensor WE and AE voltages) that will be used for this correction. Up to five options may appear in this drop-down menu: None, Algorithm #1, Algorithm #2, Algorithm #3, and Algorithm #4. If the NO2-B43F sensor’s auxiliary electrode output in zero air (AE_0) is equal to zero, the “Algorithm 2” option will *not* be available. Alphasense recommends using Algorithm #1 to estimate NO_2 concentrations from NO2-B43F sensor data.

Filter samples

The Pump A and Pump B tabs are identical. The Pump A tab (**Figure 18**) is used to set up the Channel A filter sample, which corresponds to the filter cartridge/inlet socket on the left side of the HHB. The Pump B tab is used to set up the Channel B filter sample, which corresponds to the filter cartridge/inlet socket on the right side of the HHB.

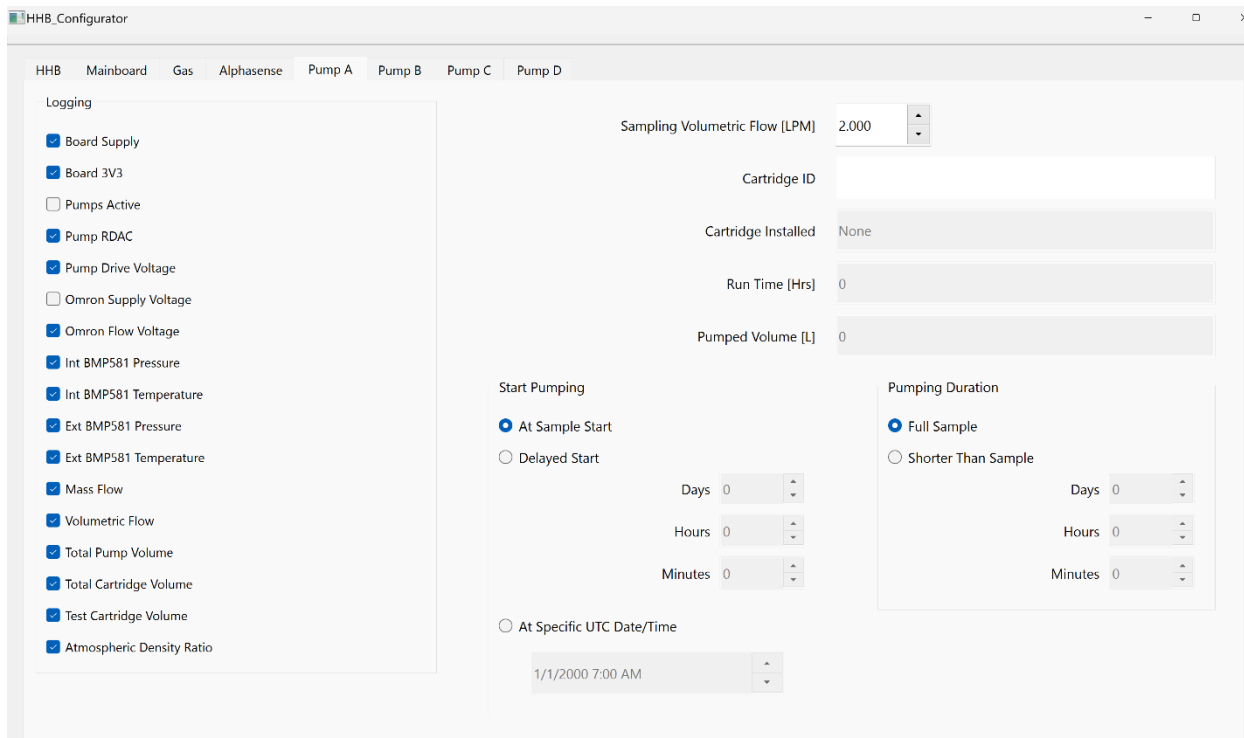


Figure 18. The filter sample pump settings that can be programmed using the HHBv2 Configurator software.

On the left side of the Pump A and Pump B tabs, a list of variables is displayed. If the check box next to the variable is selected, that variable will be logged. At a minimum, we recommend logging Pump Drive Voltage, Int BMP581 Pressure, Ext BMP581 Pressure, Mass Flow, Volumetric Flow, Total Cartridge Volume, Test Cartridge Volume, and Atmospheric Density Ratio. See our HHB v2 User Guide for a description of each variable.

There are two settings and three informational lines displayed on the top right side of each tab:

- **Sampling Volumetric Flow [LPM]:** Enter the volumetric flow rate at which you want the filter sample to be collected. This flow rate should correspond to the flow rate for which the size-selective inlet was designed (either 1 L min⁻¹ or 2 L min⁻¹; this value will be etched on the front of the inlet). **If you want the pump to remain off during the sample, enter zero.**
- **Cartridge ID:** Enter the identifier for the filter cartridge that will be used to collect the sample. Updating this value will reset the “FilterCartridgeStartingVolume,” “FilterCartridgeStartingRuntime,” and “TotalCartridgeVol” variables in the log file to zero.
- **Cartridge Installed:** Date and time when the cartridge identifier for this channel was last updated.
- **Run Time [Hrs]:** Displays the duration for which air has been sampled through the filter cartridge since the cartridge identifier for this channel was last updated.

Pumped Volume [L]: Displays the cumulative volume of air that has been sampled through the cartridge since the cartridge identifier for this channel was last updated.

Start Pumping

When should the HHB start this filter sample?

- **At Sample Start:** Start this filter sample when the overall HHB sample starts (i.e., at the time specified in the “Start Sampling” box on the Mainboard tab.
- **Delayed Start:** Start this filter sample the specified number of days, hours, and minutes after the overall HHB sample starts.
- **At Specific UTC Date/Time:** This sample will start at the specified UTC time, assuming that the overall HHB sample is running at that time. Format the specified UTC time as mm/dd/YYYY HH:MM AM/PM. If the overall HHB sample is set to start “Once Next Power-On” or “Always Next Power-On,” this option will not be available.

Pumping Duration

For how long should this filter sample be collected?

- **Full Sample:** The sample will be collected until the overall HHB sample ends.
- **Shorter Than Sample:** Specify the duration for which this sample should be collected in days, hours, and minutes.

Each pump should be programmed to start at the same time or after the overall HHB sample and should be programmed to end before or at the same time as the overall HHB sample.

Gas samples

The Pump C and Pump D tabs are identical. The Pump C tab (**Figure 19**) is used to set up the Channel C gas sample (on the top of the sorbent media pocket) and the Pump D tab is used to set up the Channel D gas sample (on the bottom of the sorbent media pocket).

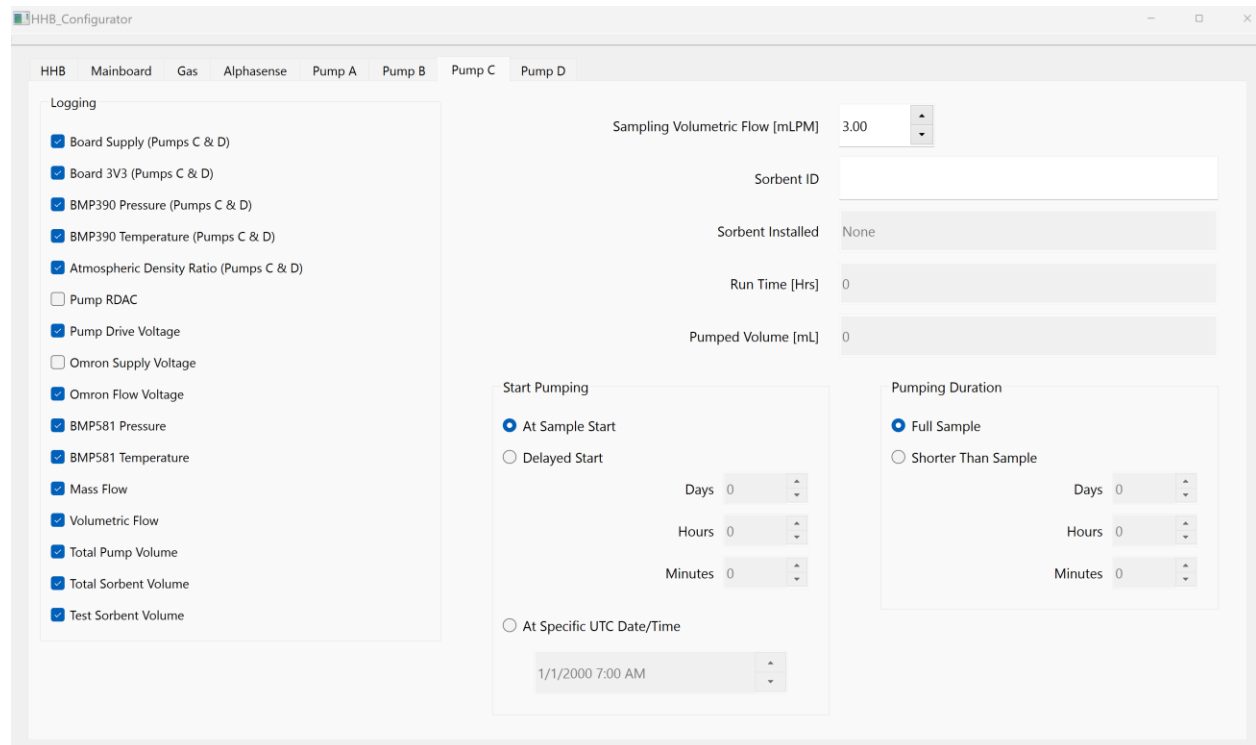


Figure 19. The gas sample settings that can be programmed using the HHBv2 Configurator

On the left side of the Pump C and Pump D tabs, a list of variables is displayed. If the check box next to the variable is selected, that variable will be logged. At a minimum, we recommend logging BMP390 Pressure, BMP390 Temperature, Atmospheric Density Ratio, Pump Drive Voltage, BMP581 Pressure, BMP581 Temperature, Mass Flow, Volumetric Flow, Total Sorbent Volume, and Test Sorbent Volume. See our HHB v2 User Guide for a description of each variable.

There are two settings and three informational lines displayed on the top right side of each tab:

- **Sampling Volumetric Flow [mLPM]:** Enter the volumetric flow rate, in mL min^{-1} , at which you want the sample to be collected. **If you want the pump to remain off during the sample, enter zero.**
- **Sorbent ID:** Enter the identifier for the sorbent tube or cartridge that will be used to collect the sample. Updating this value will reset the “SorbentCartridgeStartingVolume,” “SorbentCartridgeStartingRuntime,” and “TotalSorbentVol” variables in the log file to zero.
- **Sorbent Installed:** Displays the date and time when the sorbent ID was last updated.
- **Run Time [Hrs]:** Displays the duration for which air has been sampled through the sorbent since the sorbent identifier for this channel was last updated.
- **Pumped Volume [mL]:** Displays the cumulative volume of air that has been sampled through the sorbent since the sorbent identifier for this channel was last updated.

Start Pumping

When should the HHB start this gas sample?

- **At Sample Start:** Start this sample when the overall HHB sample starts (i.e., at the time specified in the “Start Sampling” box on the Mainboard tab).
- **Delayed Start:** Start this sample the specified number of days, hours, and minutes after the overall HHB sample starts.
- **At Specific UTC Date/Time:** This sample will start at the specified UTC time, assuming that the overall HHB sample is running at that time. Format the specified UTC time as mm/dd/YYYY HH:MM AM/PM. If the overall HHB sample is set to start “Once Next Power-On” or “Always Next Power-On,” this option will not be available.

Pumping Duration

For how long should this sample be collected?

- **Full Sample:** The sample will be collected until the overall HHB sample ends.
- **Shorter Than Sample:** Specify the duration for which this sample should be collected in days, hours, and minutes.

Each pump should be programmed to start at the same time or after the overall HHB sample and should be programmed to end before or at the same time as the overall HHB sample.

Write configuration

Once you have entered your desired settings on each tab of the Configurator, return to the HHB tab and click the “Write Configuration” button in the lower-right corner (see **Figure 14**). Your new

settings will be sent to the HHB. You can now click the “Disconnect” button to disconnect the HHB from the Configurator. Then, physically disconnect the HHB from the computer. The HHB will need to be power-cycled (i.e., turned off and then turned back on) to start a new sample.

4 Download Log Data

Sample data are stored on the microSD™ card. To access the microSD™ card, remove the sorbent media cover by unscrewing the two M3 screws using a T8 security Torx® driver. Grab the end of the microSD™ card with a pair of tweezers and pull it straight out of the microSD™ card slot.

On a Windows PC, insert the microSD™ card into your computer, navigate to “This PC,” and open the drive associated with the card. You will see a .csv log file for each sample. The filename will be formatted as “MBXXXXX_LOG_YYYY-mm-ddTHH_MMUTC.csv” where “YYYY” is the year, “mm” is the month, “dd” is the day, “HH” is the hour, and “MM” is the minute of the UTC date/time when the sample started and “XXXXX” is the serial number of the Home Health Box. Copy the log file from the microSD™ card to the location where you want to store it for analysis.

For a detailed description of each line in the Home Health Box log file header and each column in the Home Health Box log file sample log, see Tables 8–10 in the Home Health Box User Guide. This document is available on our website: https://www.accsensors.com/indoor_sampling.

AST offers the `astr` package for reading log file data into R. The `astr` package can be installed from our GitHub: <https://github.com/accsensors/astr>

Refer to the README and the function documentation, especially for the `read_ast_header` and `read_ast_log` functions, for information on how to use the package.



**ACCESS SENSOR
TECHNOLOGIES**

Sampling made simple.®

Revision 2.3
March 2026

<https://www.accsensors.com>