



**CARBON CLEANING MACHINE
C-300 / C-600 / C-900
PRODUCT FAMILY
(and their derivative models)**

USER MANUAL

by ANTISMOG new eco technologies (NET SAS)

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Version control

Version	Issued	Comments
04	26/11/2021	Control panel update
03	14/05/2021	WiFi config section, formatting
02	28/09/2020	Structure, formatting.
01	14/10/2019	Official User Manual release.

Safety Warning



Attention! Hydrogen is a highly flammable gas. Ensure that no sparks, ashes, naked flame, or hot surfaces are present in the proximity of the electrolyser cell, gas delivery hoses, or gas dryer (bubbler), when installing, configuring, testing, or operating the equipment.



Any modifications, alternations, or other work on the combustion engine, whether mobile in case of vehicles or mechanisms, or stationary in case of power generators, must be carried out by a qualified mechanic, using appropriate tools and consumables.

Purpose

The Carbon-cleaning machine is used for controlled, stable, and safe continuous production of hydrogen-oxygen mix, often called HHO gas, or Brown gas. The HHO gas is used in such application as carbon cleaning of combustion engine and exhaust internal components, and precision welding. The HHO gas is produced via electrolysis of a water, with small quantities of potassium hydroxide (KOH) added to ensure electrical conductivity.

Benefits of carbon-cleaning

Regular carbon-cleaning of the engine and the exhaust components is part of the good-practice preventive maintenance strategy. Some of the benefits of the regular carbon-cleaning are reduced emissions, reduced maintenance costs, and reduced fuel consumption.



Tip. For best results, it is recommended to perform the carbon-cleaning maintenance operation every 25,000 km or once per year, or at each oil change, whichever comes first. For vehicles operating in non-favourable conditions, e.g. prolonged idling, lack of diesel particulate filter regeneration, frequent start-stop, short journey, cold starts, variable fuel quality, etc. the carbon cleaning is recommended at much shorter intervals, or on as-needed basis.

Working principle

During electrolysis, hydrogen and oxygen are released when the direct electric current passes between electrodes through water, in which the electrodes are submerged. By controlling the electric current, and other parameters of the electrolyser cell, the quantity of the HHO has production can be regulated.

For HHO gas production, the electrolyser uses an external power source. The HHO gas generator is powered by 220 Vac mains electricity source. Some portable or embedded

models of the HHO gas generators are power from 12/24 Vdc on-board vehicle alternator, depending on the model.

Once the HHO gas is produced in the electrolyser cell, it is then cooled, dried, and dispatched according to the application. Some of the examples of the applications are carbon-cleaning and precision welding.

The main consumable in the electrolysis process is the electrolyte. The electrolyte consumption rate varies depending on the model, HHO gas production rates, loss of electrolyte due to evaporation, etc. A regular top-up of electrolyte is required for safe operation of the equipment.

Appearance

The machine is designed to withstand regular use in typical industrial environments, such as an automotive service garage, or a welding shop, or similar. The steel chassis is mounted on lockable wheels. The slanted top front surface hosts the operator control panel. The vertical front panel can be customised according to customer requirements, i.e. customer logo, company name and contacts, or similar. Robust handles are located on both sides of the operator control panel, for ease of rolling the machine. The side panels have openings for cooling fans and the power supply cord. The back panel has a small swivel lockable door which provides access to gas dryer(s) and the HHO gas supply hose. An electrolyte cell drain valve is located at the very bottom of the back panel.



Visual presentation of the carbon-cleaning machine

Operator Control Panel

The visual representation of the Operator Control panel is shown below.



Control Panel variant in English



Control Panel variant in French

The main On/Off switch is located on the left of the control panel. During the normal operation, the machine is turned on and off by means of operating the switch.

The mushroom-type red emergency stop button is located to the right of the main On/Off switch. The emergency pushbutton cuts the power to the entire system and should be used exclusively in emergency situations when a fast shutdown of all subsystems of the machine is required.

The HHO gas production quantity regulator is located to the right of the red On/Off switch. The HHO gas regulator is a black potentiometer with an index mark. By rotating the gas regulator, the HHO gas production volume could be increased (clockwise rotation) or decreased (counterclockwise rotation).

A 3-digit display showing the current HHO gas production setpoint is located above the gas regulator dial. The HHO gas production value is shown in litres per minute.

A mini-display is located in the middle of the control panel. The mini-display continuously circles across preconfigured screens, while each display is shown for approximately 8 seconds, to present the following information to the operator:

- Current time (hours : minutes : seconds)
- Daily cumulative work hours value (hours : minutes : seconds)
- Cell temperature value (deg C)
- Machine connection status, Wi-Fi signal information, server connection information
- Wi-Fi access point information



Mini-display

The normal stop of HHO gas production is performed by pressing the black – or red lit in some variants – STOP button, located immediately to the right of the HHO gas regulator potentiometer. To minimise the electrical and thermal stress on the system during the normal shutdown, it is recommended that the HHO gas production is reduced to zero by turning the HHO gas regulator fully counterclockwise, and only then pressing the Stop button.

The START button is located to the right of the Stop button. Pressing the START button commences the production of HHO gas, provided the gas production setpoint is set to a value greater than zero, and all safety conditions are cleared.

Similarly to the normal Stop procedure described above, to minimise the electrical and thermal stress on the system during the normal start, it is recommended that the HHO gas production regulator is initially set to zero by turning the HHO gas regulator fully counterclockwise, then the Start button is pressed, and only then the HHO gas production regulator is turned clockwise to reach the desired value.

The Timer set dial is located to the right of the Start button. The desired HHO gas production time interval is set by rotating the dial. The time interval is set in minutes. The available timer range is 0-99 minutes.

The block of signal LEDs is located on the right-hand side end of the Control Panel.

Continuous and Timed production modes

Depending on the requirements, the HHO machine can be operated in Continuous or Timed production mode. The continuous production mode is useful when the gas needs to be produced for prolonged time periods without interruption, such as for boiler gas co-combustion, burner, or welding applications.

To start the machine in the Continuous production mode, set the timer value to zero, and press the Start button to commence production. Set the desired gas volume by adjusting the HHO gas volume regulator. The gas production is stopped by reducing the gas production volume setting to zero, then pressing the Stop button.

Attention! Risk of overheating!



In continuous gas production mode, at the gas production rate set at maximum value, in the hot environment on under direct sunlight, monitor closely the cell temperature. If the cell temperature value approaches 65 degrees C, lower the gas production rate and/or relocate the machine to cooler surroundings. If the machine tripped on overtemperature protection, let the machine on stand-by, with main switch on and no gas production, for 30 minutes. In any case, do not exceed the continuous production time of 99 minutes (approximately 1.5 hours) on maximum gas production setting.

To start the machine in the Timed production mode, set the timer value to the required value (between 1-99), and press the Start button to commence production. Set the desired gas volume by adjusting the HHO gas volume regulator. The gas production can be stopped at any time by reducing the gas production volume setting to zero, then pressing the Stop button.

In Timed mode, when the set time period has elapsed, an audible alert informs the operator about the end of the procedure, and the timer display shows zero. Turn the gas production dial to zero, then press the Stop button, to complete the sequence. The last selected timer setting will be shown on the Timer display.

Operating sequence

The standard operating sequence for the vehicle engine carbon cleaning treatment is the following. Adjustments can be made by the operator depending on specific client's requirements.

Ensure that the target vehicle does not have obvious mechanical problems, such as low engine oil level, low cooling liquid level, engine warning indicator On, DPF warning indicator On, etc. Apply vehicle's parking brake.

Position the carbon-cleaning machine in proximity of the vehicle. Apply both wheel brakes on the carbon-cleaning machine.

Connect the machine to a suitable, reliable, suitably fused power source.

Electrical standard for 50 Hertz countries:

220-240 Volt single-phase 16 Amp 3-pin ECEEC power socket.

Electrical standard for 60 Hertz countries

220-240 Volt two-phase 20 Amp 3-pin NEMA 6-20 power socket.

In case the machine will be operated in an unsupervised mode, connect the red and black clips to the car battery, strictly observing the polarity.

Loosen the bracket holding the air admission duct of the vehicle, after the air filter, and slip the hard tip of the gas supply hose into the air admission duct by 15-20 cm in the direction of the airflow.



Hydrogen delivery hose placement in the air admission duct

Start the vehicle engine.

Turn on the carbon-cleaning machine by pressing the ON/OFF button on the left of the control panel.

In case the machine will be operating in the Timed Mode, set the required treatment duration by rotating the dial of the timer. The timer setting in minutes is displayed on the monitor above the dial.

Briefly press the START button. Wait for the START button to light up.

Set the required gas volume by rotating the dial labelled HHO gas. The gas production setting in litres per minute is displayed on the monitor above the dial.

In case the machine is operating in the Timed Mode, the timer value will start going down. The display shows the treatment time remaining.

Once the timer value reaches zero, the gas production will stop, and an audible signal is sound to alert the operator.

Press the STOP button to stop the cycle the to reset the timer. The timer value returns to the previously set number.

Switch off the car engine, retract the gas delivery hose from the air admission duct, and tighten the air admission duct holding bracket.



A typical setup for carbon-cleaning of a car

Monitoring, control, and alarm indicators

Electrolyte level

The three LED indicators on the upper right side of the control panel are the electrolyte level indicators. The electrolyte level is indicated as follows.

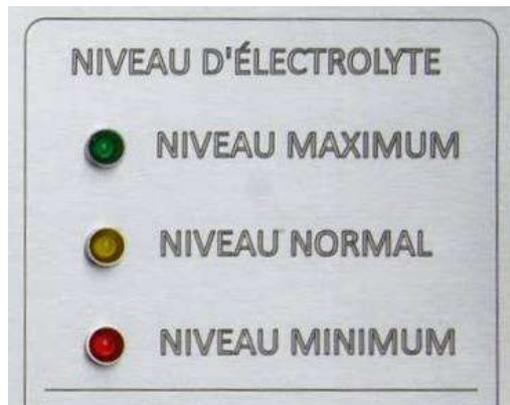
GREEN: The electrolyte is at the maximum level; the machine operates normally. Do not add electrolyte.

YELLOW: The electrolyte is at the nominal working level; the machine operates normally. No need to add electrolyte, but the top-up of electrolyte might be required soon.

RED: The level of electrolyte is low; the machine cannot be operated. Add one (1) litre of operational electrolyte (rose-coloured solution).



Level Indicator block variant in English



Level Indicator block variant in French



Once the low electrolyte level RED indicator is on, add no more than one (1) litre of the operating electrolyte solution. Use the calibrated funnel (included in the kit) to pour electrolyte into the electrolyser cell. Do not exceed the stated volume! Do not overflow!

Maintenance and safety indicators

The three LED indicators on the lower right side of the control panel are the electrolyte quality, high pressure alarm, and engine stopped indicators. The information presented by means of these three indicators can be interpreted as follows.

Electrolyte quality indication

The electrolyte quality red LED indicator is On when the machine is in standby mode. This is normal. Once the machine is in gas production mode, the electrolyte quality LED goes Off immediately or after a few minutes of gas production.

If, after 15 minutes of gas production, the electrolyte quality LED is still On, this is an indication of poor quality of electrolyte. The electrolyser cell needs to be emptied and refilled with fresh electrolyte at the earliest opportunity.



Attention! The electrolyte quality indicator LED must be Off during the normal operation of the machine. Empty the electrolyser cell and refill it with fresh concentrated electrolyte (transparent solution).

Excess gas pressure indication

The high-pressure red LED indicator is Off during the standby and the normal operating of the machine. If the pressure indicator is On, this is an indication of the gas pressure in the electrolyser cell being outside of the safe range due to the inability of the produced gas to exit the electrolyser cell. Switch off the machine and remove the obstacle, e.g. blocked or pinched hose.

As an additional safety measure, an analogue manometer is provided. The manometer is located on the upper left of the operator control panel. The nominal working pressure of the machine is in 1.5-2.0 bar. It is a good practice for the operator to check the manometer readings from time to time, to ensure there is an unobstructed flow of gas from the machine to the vehicle engine.

The overpressure safety trip value is set for 0.25 bar. The machine will stop the production is the gas pressure reaches the value of 0.25 bar. In an unlikely event of a faulty pressure sensor, the machine must be manually stopped if the pressure value indicated by the analogue manometer reaches 0.3 bar.



Attention! Stop the machine immediately if the manometer indication reaches 0.3 bar. Do not restart the operation of the machine until the obstruction to the free gas flow is removed, and the free gas flow is re-established.

Engine stop indication

The machine can be operated in an unsupervised mode, giving the operator the freedom to work on other scope, while the carbon-cleaning is taking place. The engine stop safety feature ensures that the gas production is stopped in case the target vehicle engine is not running.

The switch to the right of the engine stop LED indicator allows the operator to select if the machine is operated in supervised or unsupervised mode. The selector position “0” corresponds to the unsupervised mode. The selector position “1” indicates the supervised mode.



Attention! Always select the unsupervised mode, selector position “0”, if the operator is not physically present during the full duration of the carbon-cleaning service.

General safety guidelines

Hydrogen is a highly flammable gas, therefore some general safety precautions must be observed.

Prior to commencement of work, examine the overall working area and remove any potential sources of flame, heat, or ignition. It is forbidden to operate the machine in a fire-hazardous environment.

While working with the corrosive liquids, such as the electrolyte, it is recommended to wear safety goggles and rubber or silicon gloves adequate for the working environment.

All heavy moving objects should be secured prior to commencement of work. The vehicle parking brake should be applied. Both wheel brakes of the carbon-cleaning machine must be applied.

The nominal operating conditions of the carbon-cleaning machine are 0-40 deg C ambient temperature, up to 90% air humidity.



Attention! Do not operate the machine if the produced gas is not immediately consumed, e.g. by admission into the running engine, or into ignited welding burner. The uncontrolled accumulation of the gas is highly explosive and can cause injury or death.

Prior to commencement of work, examine the length of the gas delivery hose to ensure there are no blockages, knots, or pinches of the gas hose that might prevent or obstruct the gas flow from the machine to the vehicle engine.

Maintenance and consumables

To ensure safe and efficient operation of the machine, and to prolong the life of the machine, it is recommended to follow the following simple maintenance practices.

Electrolyte changes

The machine is delivered either pre-filled with electrolyte, or empty with chemicals for preparation of 15 litres of electrolyte by the user. All machines are fully tested at the factory,

including 3-day continuous gas production stage, therefore small quantity of electrolyte may still be present in the cell, this is normal.

Similarly to the car engine, the new electrolyser cell needs to be “run in”. The first load of electrolyte needs to be drained, properly discharged, and replaced by a fresh electrolyte load, after the initial 1-3 months of operation.

To drain the electrolyte, first connect a suitable hose to the drain nipple at the back of the machine and make arrangements for collecting and disposing of the used electrolyte. The machine might need to be elevated to allow for safe collection of the used electrolyte. Then unscrew the electrolyser cell reservoir cap, located behind the swing door at the back of the machine, to allow pressure equalisation in the reservoir. Finally open the drain valve at the bottom of the back panel.



Drain valve at the back of the machine



Tip. Monitor the colour of the used electrolyte. A light-yellow colour indicates normal operation of the electrolyser cell. A brownish or reddish tint of the used electrolyte indicate the presence of impurities or rust in the electrolyser cell. Rinse the inside of the electrolyser cell with clean tap water 2-3 times, before filling it with fresh electrolyte.

Preparation of electrolyte

To prepare the electrolyte, mix 14.5 litres (3.8 Gallons US) of distilled water with 2 kg of high-purity potassium hydroxide (KOH). Add the KOH to the distilled water slowly while constantly mixing the solution. The resulting solution will heat up.



Attention! Always pour the distilled water in a suitable reservoir FIRST, then add KOH. Reversing the order may cause an uncontrolled violent chemical reaction.

When pouring the electrolyte into the hydrogen cell, always use the calibrated funnel, or the calibrated hose, provided in the kit. This will slow down the rate of flow of electrolyte, allowing the air to escape from the cell, and prevent the cell overflow.

Gas dryer water level adjustment

The water level in the gas dryer ("bubbler") needs to be initially set at the level between $\frac{1}{2}$ and $\frac{3}{4}$ of the height of the transparent reservoir tank. As the gas dryer performs its function during the gas production, some of the moisture is absorbed from the raising gas bubbles, and the level of liquid in the tank will rise. Once the liquid level in the gas dryer is visibly above the $\frac{3}{4}$ of the tank height, unscrew the bottom (transparent) part of the gas dryer and safely dispose of some of the liquid.



Gas dryer level settings



Attention! Never allow the liquid level in the gas dryer reservoir raise all the way to the top and touch or cover the output valve. This would block the gas flow and may result in machine tripping on overpressure.

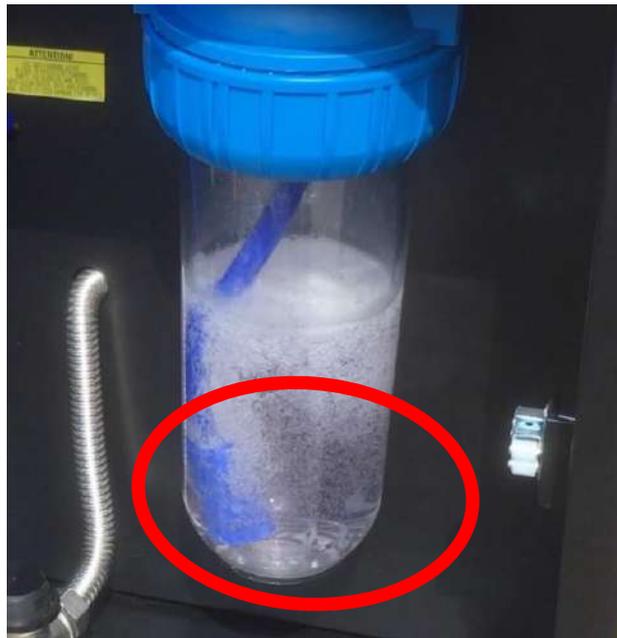


Tip. When replacing the liquid in the gas dryer reservoir, add 3-4 drops of anti-foam agent, provided in the kit, to the distilled water, to prevent foam forming at the top and blocking the gas output opening. Operating electrolyte can also be used to fill the gas dryer tank. The operating electrolyte already contains the required quantity of anti-foam agent.

Gas diffuser replacements

The gas diffuser breaks the gas flow stream into a series of small bubbles, in order to facilitate the moisture absorption in the gas dryer tank. The gas diffusers are consumables. Monitor the state of the gas diffuser regularly. If the surface of the gas diffuser becomes damaged, replace with a new diffuser.

To replace the gas diffuser, unscrew the bottom (transparent) part of the gas dryer and pull the diffuser nipple out of the gas hose. Insert the new gas diffuser into the gas hose and screw the gas dryer reservoir back on.



Gas diffuser placement in the gas dryer

Wi-Fi and Logger configuration

Depending on the model, your carbon-cleaning machine may be equipped with a data logger and a license management system. The Wi-Fi module enables these additional functionalities:

- Usage of the equipment in a pay-per-use contract;
- Remote and local access to machine work schedule and reports;
- Remote equipment diagnostics;
- Over-the-air firmware updates;

The C-600 Wi-Fi module can be configured using a smartphone, tablet, or a laptop computer, by performing the following steps.

Open the 'Wi-Fi' or 'Network' configuration settings applet on the smartphone, tablet, or laptop, to scan for available networks and select the default hotspot network named 'ANTISMOG'.

When prompted for password, enter the default password sequence: '12345678'.

If the configuration applet does not open automatically, open the browsers application and manually enter the machine's IP address: '192.168.4.1'.

The configuration screen appears:

Data Logger Name: **ANTISMOG**
Owner: **ANTISMOG**
Place: **H2 station**
Date: **2021-11-07**
Time: **13:12**

Today's work hours: 0h 54m 2s

Connected through the Access Point: **ANTISMOG**

Server connection: **OK**

Click to [config the wifi connection](#)

Click to [change device settings](#)

Click to [read recent records](#)

Wi-Fi configuration screen – Home page

Click on 'Configure the wifi connection' link.

A list of available wireless networks will be displayed under the heading 'WLAN list (refresh if any missing)'.

Select the required network wireless network by clicking on the name of the network, enter the password in the window below the network name, and click 'Connect/Disconnect' button.

Wifi config

Connected through the Access Point: **ANTISMOG**

SoftAP config

SSID: ANTISMOG

IP: 192.168.4.1

WLAN config

SSID: AndroidAP

IP: 192.168.43.215

WLAN list (refresh if any missing)

[AndroidAP](#) -53

Connect to network:

network
password
<input type="button" value="Connect/Disconnect"/>

You can [return to the home page](#).

Wireless connection configuration

Once the connection with the selected network is established, click 'return to home page'.

A 'Server connection: OK' message confirms that the link between the machine and the server database has been established.

192.168.4.1
Antismog 3

< > **Log In** Cancel

Logger Name	Antismog 3
Device ID	84F3EB8FFBBE (v1.16)
Owner	TIB
Place	TIB Dreux
Date	23.07.2021
Time	19:32
Temperature 1	24.7 °C
WiFi network	Orange-Guest-WIFI
WiFi quality	
Server connection	OK

[configure wifi connection](#)
[change device settings](#)
[read recent records](#)

C-600 configuration home page example

Accessing the electrolyser database records

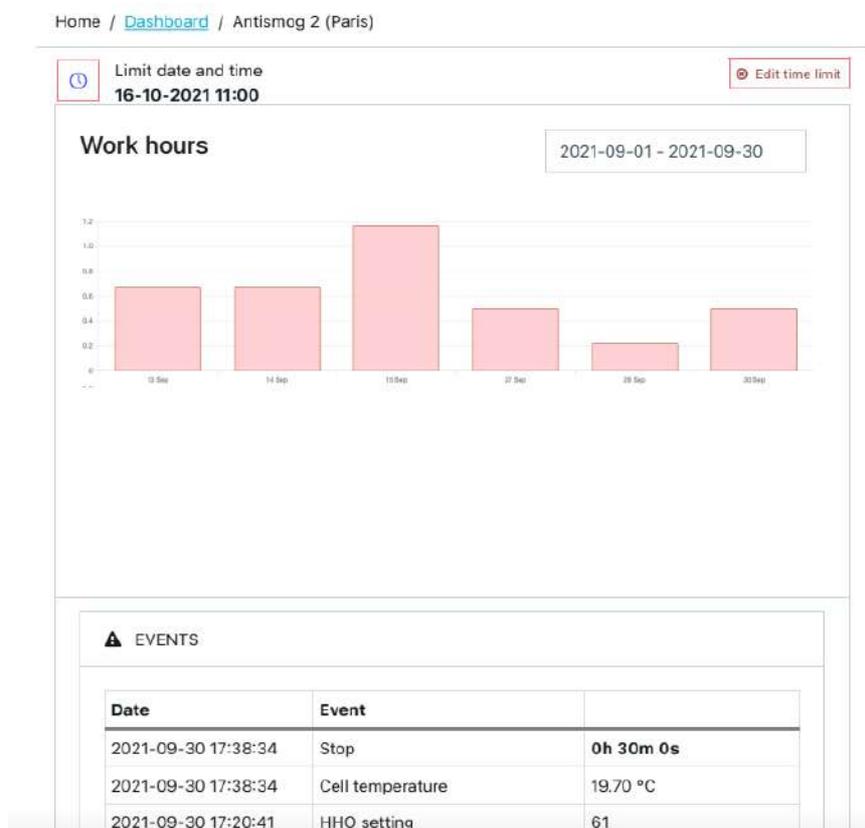
The timestamped data records – such as Start and Stop of gas production, gas production settings, electrolyte level messages, etc. – are stored in a secure database accessible via an authorised user account on our portal called MyDataLogger (www.mydatalogger.eu).

In cases when the machine is not connected to a wireless network, the records for a limited time period, usually the last 24 hours on the rolling basis, are available directly from the machine.

Both methods of accessing the data records can be used interchangeably, depending on the needs of the user.

Web access

Using a smartphone, tablet or a computer with an Internet connection, in a browser window type the address of the database – www.mydatalogger.eu – and login to your account using the User_Name and Password provided by the manufacturer.



C-600 web access screen example

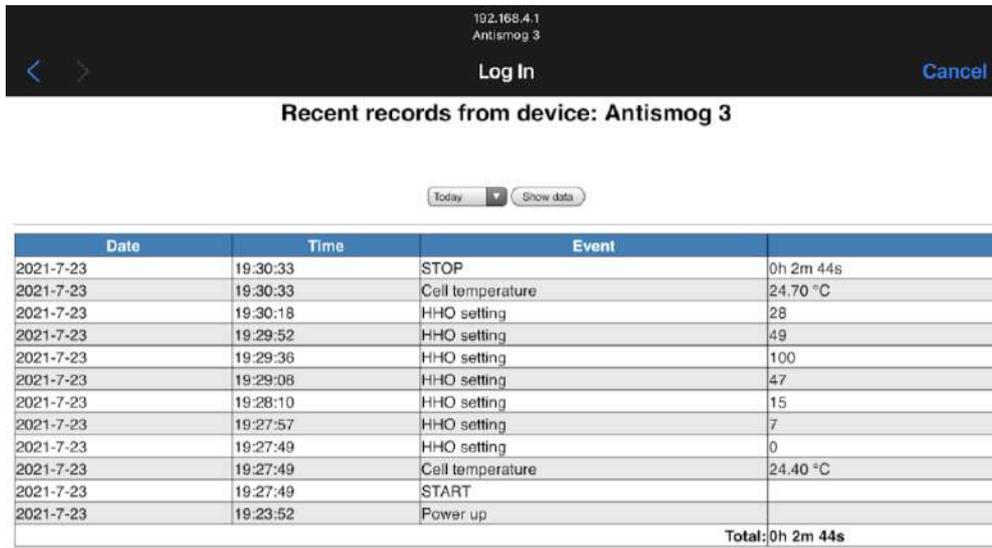
Local access

To access the records stored in the machine's memory, without Internet access, first connect to the machine's access point:

Open the 'Wi-Fi' or 'Network' configuration settings applet on the smartphone, tablet, or laptop, to scan for available networks and select the default hotspot network named 'ANTISMOG'.

When prompted for password, enter the default password sequence: '12345678'.

If the configuration applet does not open automatically, open the browsers application and manually enter the machine's IP address: '192.168.4.1'.



The screenshot shows a mobile application interface for 'Antismog 3' at IP '192.168.4.1'. It features a 'Log In' button and a 'Cancel' button. Below the header, it displays 'Recent records from device: Antismog 3'. There is a filter for 'Today' and a 'Show data' button. A table lists various events with columns for Date, Time, Event, and a numerical value or duration. The total duration is 0h 2m 44s.

Date	Time	Event	
2021-7-23	19:30:33	STOP	0h 2m 44s
2021-7-23	19:30:33	Cell temperature	24.70 °C
2021-7-23	19:30:18	HHO setting	28
2021-7-23	19:29:52	HHO setting	49
2021-7-23	19:29:36	HHO setting	100
2021-7-23	19:29:08	HHO setting	47
2021-7-23	19:28:10	HHO setting	15
2021-7-23	19:27:57	HHO setting	7
2021-7-23	19:27:49	HHO setting	0
2021-7-23	19:27:49	Cell temperature	24.40 °C
2021-7-23	19:27:49	START	
2021-7-23	19:23:52	Power up	
Total:			0h 2m 44s

[return to the home page.](#)

C-600 local access screen example

Contacts

Contact the manufacturer for questions related to warranty, repairs, consumables, or best-practice usage tips.

Via the contact form on our website:

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