# GQ Air Quality Monitor
# User Guide for
# GQ Air-700 Series


*GQ Electronics LLC* Seattle
WA, USA
Revision 1.00
Aug-2021

Document Revision History:
Re.1.00, Aug-2021, Initial release.

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## Overview

The GQ Air-Series professional air quality monitors are designed and developed by GQ Electronics, Seattle, USA. It is designed to be a portable and convenient device. It can be used as regular air quality monitoring, such as CO2, HCHO, PM1 PM2.5, PM10, Temperature, Air Pressure etc. Readings are measured every second and is displayed in the screen. Measurements are stored in storage and can be viewed later in history mode. 1 minute average readings are saved every minute to view later either on device or with GQ AIRPRO software.

## USB port/Battery Charging

The GQ Air-Series devices are equipped with a USB port, utilized for communication and charging of the internal rechargeable Li-Ion 3.6V/3.7V battery. The battery can be charged by connecting unit with a USB port. Such as cell phone charger, computer USB port etc.
The GQ Air-700 series internal rechargeable battery can be charged with a standard USB charger or with a computer USB port. Using external power, continuous data monitoring is possible. Using an external power source, you will not have to worry about the battery's charge condition or any data loss.
When the device is connected to a PC, in addition to charging, the free companion PC software can be used to:

- Monitor the measurements on the computer screen
- Download the history data recorded through the Air-Series data logging feature and convert it into a standard .csv file for further analysis.

## Specifications

- PM1, PM2.5, PM10
  - Particle Range Measurement: 0.3 ~ 1.0, 1.0 ~ 2.5, 2.5 ~ 10.0 Micrometer (µm)
  - Particle Counting Efficiency: 50% @ 0.3 µm 98% @ 0.5 µm
  - Particle Maximum Range: ≥ 1000 µg/$m^3$
  - Particle resolution: 1 µg/$m^3$
  - Measurement update: Every second
- $CO_2$
  - Range: 0 – 5000 parts per million (ppm)
  - Accuracy: 400 – 5000 ppm ± 74 ppm or 10% of reading whichever is greater
  - Measurement update: Every 5 seconds
- HCHO (Formaldehyde)
  - Range: 0 – 1000 parts per billion (ppb)
  - Accuracy: ±30 ppb or ±10% whichever is greater
- Temperature
  - -40 to 85 °C
- Pressure
  - 300 to 1100 hPa

## Model Selection Table

| | Air-700 | Air-710 | Air-720 | Air-730 | Air-740 |
|---|---|---|---|---|---|
| PM1, PM2.5, PM10 | Yes | No | No | No | Yes |
| $CO_2$ | Yes | No | Yes | Yes | No |
| HCHO | Yes | Yes | No | Yes | Yes |
| Temperature | Yes | Yes | Yes | Yes | Yes |
| Pressure | Yes | Yes | Yes | Yes | Yes |

## Package List

1. GQ Air-Series main unit.
2. USB cable for battery charge and USB communication
3. Quick start guide
4. Download link for a complete user guide in PDF version.

## Caution

1. Avoid measuring when battery is low. (The unit will stop working if the battery voltage falls below 3.3V, which may happen before the battery level shows 0%) Do not get the meter wet. Use a sealed plastic bag if measuring in the rain.
2. Turn off the unit when not in use in order to conserve the battery.
3. When the unit is not in use, store it in a dry place or box. This will avoid oxidation of the mechanical parts, such as the button or battery contacts.

## Hardware setup

1. Pressing the power key (S4) for 1 second will show the battery level. Charge the battery fully before the first use. It may take a few hours to get the battery fully charged. Check the battery icon on the display, a fully charged battery icon will be filled with solid color, without flashing.
2. Power up the unit. Pressing the power key (S4) for 2 seconds will turn on the unit.
3. Set the backlight timeout (in seconds), in order to minimize the power consumption.
4. You can hand hold and meter or place to the location to measure. The sensors should always point to the source. See above diagram.
5. Now the unit is ready to use. You should see the background measurements.

For technical questions and support, please use the forum at the following link:
http://www.GQElectronicsLLC.com/forum
For the latest version user guide, please visit our software download page:
http://www.gqelectronicsllc.com/comersus/store/download.asp

## GQ Air-Series Multi-Function Keys

The multi-function keys S1, S2, S3 and S4 explained:



**Vertical Display Mode** **Horizontal Display Mode**

These keys' function will be reassigned dynamically based on the context of the current screen displayed.

## Pop-up Windows

The Popup Windows will show the current status/value of selected features. The current status/value can be changed only when it is displayed in the Popup Window and the currently displayed status/value will be stored when the Popup Window has timed out after 3 seconds if no key has been pressed.


## Display Modes Following are some of the display modes of different models

AllInOne $CO_2$, HCHO PM1, PM2.5, PM10 PM, HCHO $CO_2$/HCHO

To change display mode, follow these steps:

1. Press S1 to bring up the display mode selection screen.
2. Press S2 or S3 to navigate through the options.
3. Press S4 to select the mode or Press S1 to cancel switching screens.


Display mode screen.
The options varies between different models.

## History Mode

The Air-Series saves data every minute. It gathers measurements every second then calculates the average every minute and logs the data to the device storage to view in History mode.

History Data



History Data Selection


History Duration


In History Mode, the screen has a graph of the history from few hours ago or up to a week depending on duration. The inverted triangle is where the current reading is. In the sample image on the left, the temperature value 32.3 °C was recorded on 07/23/2021 17:29 or 5:29 PM. The recorded value is the average reading in a 1 minute period.

Button functions in History Mode:

S1: Main menu

S2, S3: Change to position of the inverted triangle
to change the date and data displayed.

S4: Mode selection

Hold S2 for 2 seconds: History data selection screen.

Hold S3 for 2 seconds: History duration selection screen.

## Main Menu


In any display mode, press S4 to enter the menu mode.

Navigation keys:

S1: Back S2: Up S3: Down S4: Select/Enter

## User Options


Navigation keys:

S1: Back S2: Up S3: Down S4: Select/Enter

Here you can set your personal preferences for your Air-Series device:

1. Speaker ON/OFF for all audio alarms.
2. Alarm Settings.
3. Temperature Unit.
4. Exit to previous menu or main screen

## Alarm Settings


Navigation keys:

S1: Back S2: Up S3: Down S4: Select/Enter

Settings are model dependent.

1. PM1, PM2.5, PM10 alarm On/Off
2. PM alarm threshold
3. $CO_2$ alarm ON/OFF
4. $CO_2$ alarm threshold
5. HCHO alarm On/Off
6. HCHO alarm threshold
7. Exit

## Display Option


Navigation keys:

S1: Back S2: Up S3: Down S4: Select/Enter

1. Backlight Level: Set the level for the backlight.
2. Contrast: Set the contrast for the backlight.

## Save Data Menu List


Navigation keys:

S1: Back S2: Up S3: Down S4: Select/Enter

1. Available Storage: displays percentage of free space for saving data
2. Erase Saved Data: Clears saved data to start a new one

## Initial Setup

### 1. Date and Time setting


Navigation keys:

S1: Back/Exit

S2: Increase value by 1 (or hold the key down)

S3: Decrease value by 1 (or hold the key down)

S4: Select setting mode between Year, Month, Date, Hour, Minute, and Second. Each key press will change the mode to be set.

**NOTE: Setting of Date and Time is important, all history data use Date and Time as a timestamp reference.**
**NOTE: You can also synchronize the time with your PC with the use of the companion software.**


## Factory Reset

Select Factory Reset to reset the unit to the factory default settings.

**Note: The reset will erase all user settings and recorded history data.**

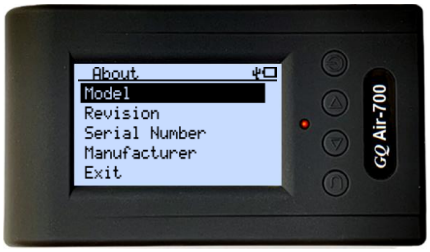

Select Factory Reset menu item and change the popup Windows message to Yes. Then press the Select/Enter/S4 button to execute a factory reset. S1 key to cancel.

## Battery


The battery submenu shows the information about the battery level: percentage and the voltage.

## About

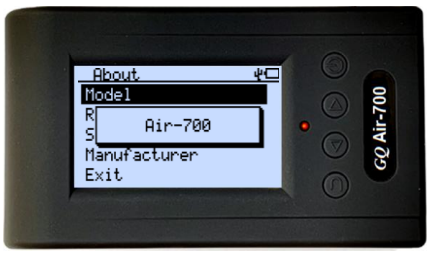
This menu item is used to gather information about the instruments model number, firmware revision and serial number.



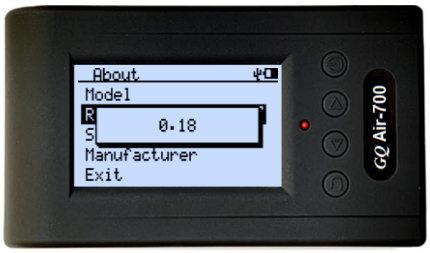
Navigation keys:

S1: Back  S2: Up  S3: Down  S4: Select/Enter

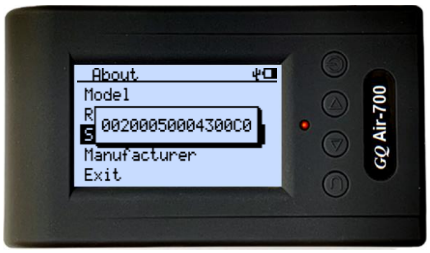
**Model Information**




**Revision**




**Unit serial number**



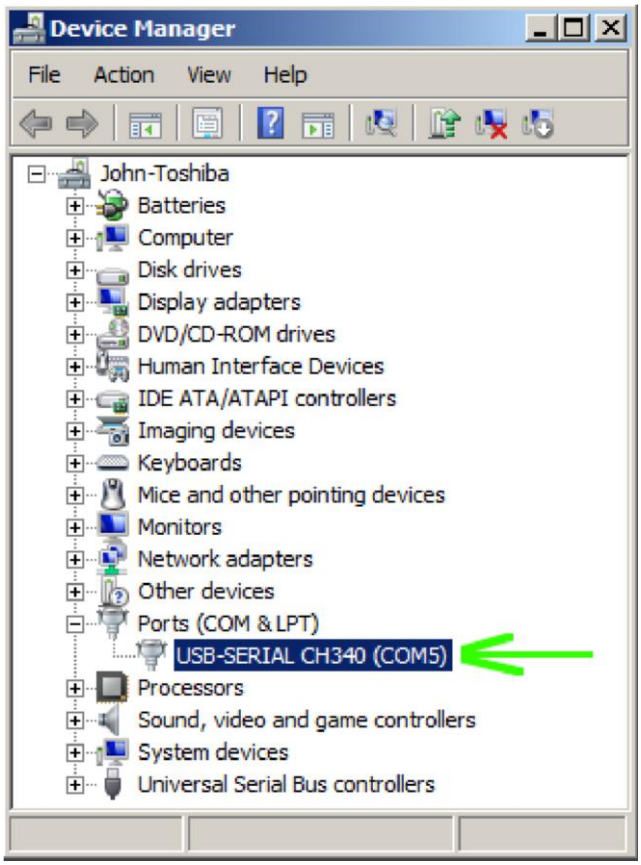

**Manufacturer**


# USB Driver

## Windows

1. The Air-Series needs a USB driver in order to communicate with Windows software.  Most of Win8 or later Windows does not need to install the USB driver.  For other Windows version you need to download and install the Windows USB driver. You can download the USB driver from GQ Electronics website download page.  OR from following link:
   http://www.gqelectronicsllc.com/download/CH341SER.EXE

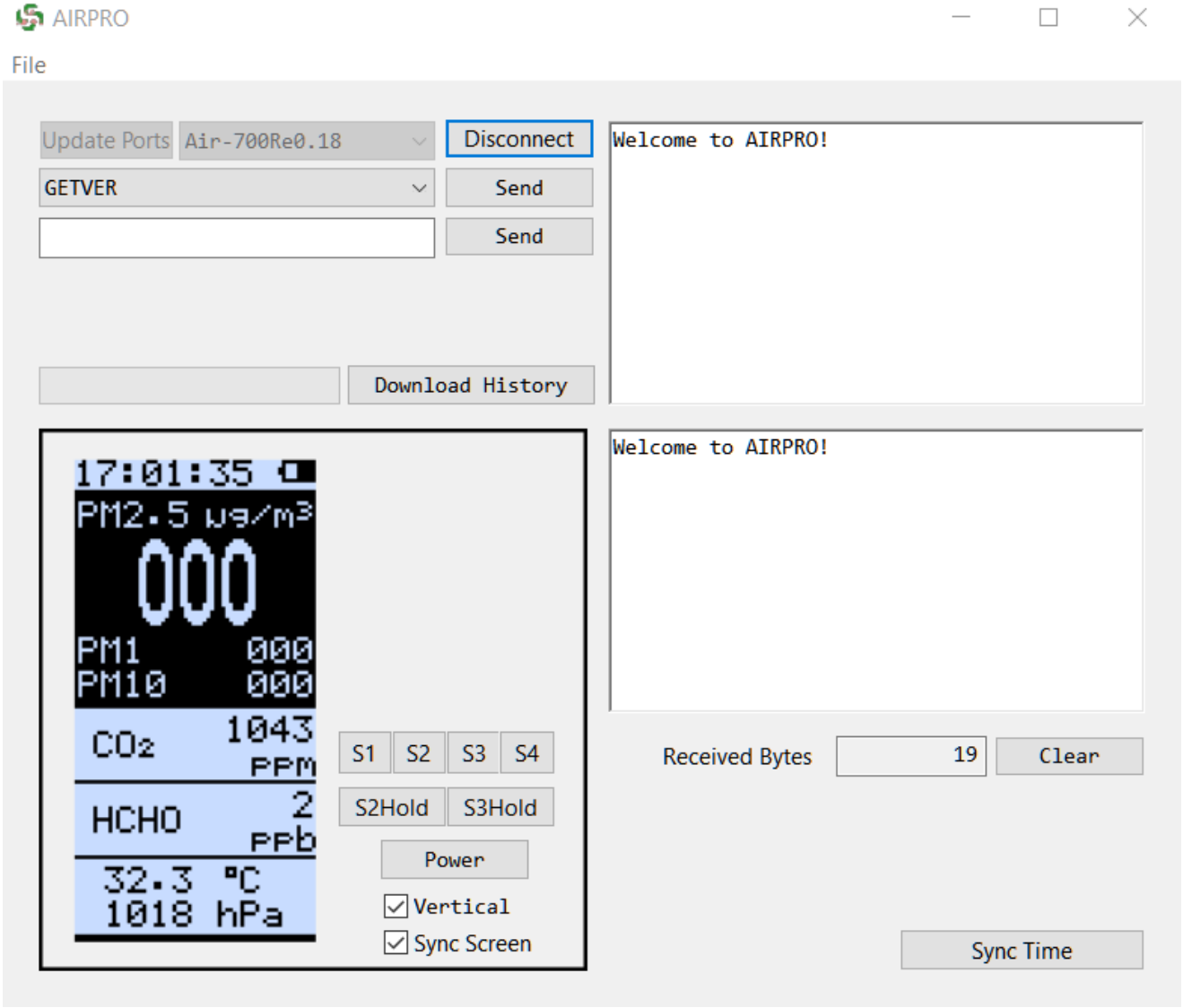
2. Connect the Air-Series to computer and you make sure your Windows has loaded USB driver correctly.  You can verify the USB driver has been loaded correctly from device manager.  See:

3. 


## Mac

1. For Mac users please download the software in the GQ software download page. It contains readme.pdf and the package. First, try to install the package. If it didn't work, there are steps in the readme file to follow.
   Download Link: https://www.gqelectronicsllc.com/comersus/store/download.asp

## GQ AIRPRO Software




The GQ AIRPRO software is utility software comes with the Air-Series device package.
You are able to use software request the real-time data from device and then log it into a data file in .csv format.
You can plug in the Air-Series unit and press the “Update Ports” button to scan the COM port and find the device. Try again couple of times if the first try does not work. It can also be selected in the drop down. Once selected correctly, press connect to connect to the unit.
Main features:

- Download the history data from Air-Series. Save the history data in .csv (MS Excel format) and .bin.
- Simulated keys (same as the key settings on the unit).
- Send commands to get serial numbers, version info, factory reset, etc.

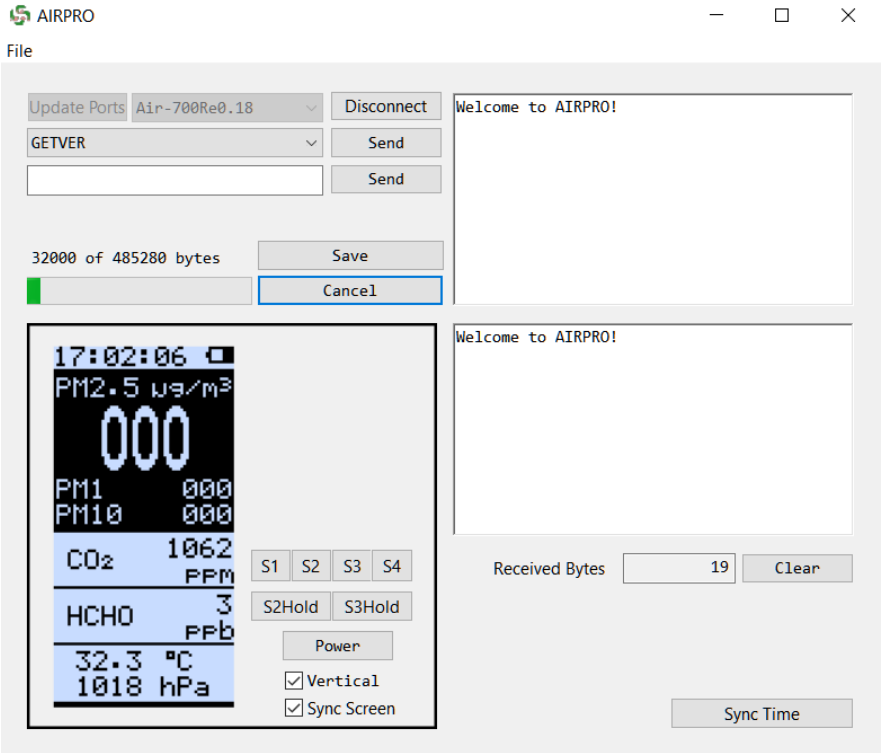
## Troubleshooting

1. Remember to press the “Update Ports” button to make sure the COM port is detected. Then press connect
2. Check if the screen is synced with the device.
3. If COM port is not detected, refer to “USB Driver” Section.

# Download History Data

1. Connect the device to the software.
2. Press ‘Download History’ and a window will pop-up for saving the file.
3. After naming the file and hitting ‘Save’, the software will start to download and will show a pop-up when downloading is finished.

GQ AIRPRO Software




Downloaded History Sample

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | Air-700 Logged History | | | | | | | |
| 2 | | PM1 | PM2.5 | PM10 | CO2 | HCHO | Temperatu | Humidity |
| 3 | Date and Time | ug/m3 | ug/m3 | ug/m3 | ppm | ppb | degrees C | hPa |
| 4 | _2021/07/27 14:19:55 | 0.8 | 0.9 | 1.9 | 510.6 | 12 | 32.2 | 1012.8 |
| 5 | _2021/07/27 14:20:55 | 1.5 | 2 | 2.5 | 511.8 | 11 | 32.3 | 1012.8 |
| 6 | _2021/07/27 14:21:55 | 1.2 | 1.6 | 2.9 | 513 | 12.2 | 32.3 | 1012.8 |
| 7 | _2021/07/27 14:22:55 | 1.2 | 1.3 | 1.7 | 513.5 | 10.7 | 32.3 | 1012.8 |
| 8 | _2021/07/27 14:23:54 | 0.8 | 0.9 | 1.5 | 506.8 | 12.4 | 32.3 | 1012.8 |
| 9 | _2021/07/27 14:24:54 | 1.1 | 1.5 | 1.5 | 506.4 | 12.6 | 32.3 | 1012.7 |
| 10 | _2021/07/27 14:25:54 | 0.9 | 1.2 | 1.2 | 512.6 | 11.9 | 32.4 | 1012.7 |
| 11 | _2021/07/27 14:26:54 | 1.3 | 2 | 3.8 | 510.2 | 9.6 | 32.4 | 1012.7 |
| 12 | _2021/07/27 14:27:54 | 1.1 | 1.7 | 3 | 502.2 | 10.6 | 32.4 | 1012.7 |
| 13 | _2021/07/27 14:28:54 | 1 | 1.4 | 2.4 | 499.2 | 10.1 | 32.4 | 1012.7 |
| 14 | _2021/07/27 14:29:54 | 1.3 | 2.1 | 3.8 | 497.4 | 12.1 | 32.4 | 1012.7 |
| 15 | _2021/07/27 14:30:54 | 1.3 | 1.4 | 1.4 | 501.6 | 11.6 | 32.4 | 1012.7 |
| 16 | _2021/07/27 14:31:54 | 1.1 | 1.6 | 1.7 | 501.6 | 10.1 | 32.4 | 1012.7 |
| 17 | _2021/07/27 14:32:53 | 0.9 | 1.5 | 1.9 | 501.1 | 12 | 32.4 | 1012.7 |
| 18 | _2021/07/27 14:33:53 | 0.6 | 1.1 | 1.1 | 498.9 | 10.9 | 32.4 | 1012.7 |
| 19 | _2021/07/27 14:34:53 | 0.7 | 1.3 | 2.3 | 500.8 | 10.3 | 32.4 | 1012.7 |
| 20 | _2021/07/27 14:35:53 | 0.6 | 1 | 2.4 | 495.5 | 9.2 | 32.4 | 1012.7 |
| 21 | _2021/07/27 14:36:53 | 0.6 | 1.2 | 3.7 | 497.9 | 12 | 32.4 | 1012.7 |
| 22 | _2021/07/27 14:37:53 | 0.7 | 0.9 | 2.7 | 500.8 | 12 | 32.4 | 1012.7 |
| 23 | _2021/07/27 14:38:53 | 1.3 | 1.6 | 3.4 | 505.6 | 26.5 | 32.4 | 1012.7 |
| 24 | _2021/07/27 14:39:53 | 1.6 | 2.6 | 3.6 | 501.3 | 21.8 | 32.4 | 1012.7 |
| 25 | _2021/07/27 14:40:53 | 1.7 | 3.1 | 3.7 | 494.7 | 13.2 | 32.4 | 1012.7 |

air700

# GQ Air-Series Communication Protocol

*Note: The updated protocol **GQ-RFC2101** document can be found from GQ Electronics website download page.*

## Serial Port configuration

Baud: 115200
Data bit: 8
Parity: None
Stop bit: 1
Control: None

## Command format

A valid command starts with ASCII '<', and ends with ASCII '>>'. Both commands and parameters must be put between '<' and '>>'.
Command is an ASCII string. All parameters of command are true value in hexadecimal.
Direction: All commands are initiated from computer (HOST).
Firmware supported: GQ Air-Series

## Commands

1. Get hardware model and version

Command: **<GETVER>>**
Return: Current model and revision
e.g.: Air-700Re0.18\r\n

2. Key Commands that simulates a key press from the unit

| | | |
|---|---|---|
| Commands: | **<KEY0>>** (back key) | Represents Key S0 from the unit |
| | **<KEY1>> (**down key) | Represents Key S0 from the unit |
| | **<KEY2>>** (up key) | Represents Key S0 from the unit |
| | **<KEY3>>** (select/power key) | Represents Key S0 from the unit |

3. To simulate a KeyHold (for zooming and power) just like pressing and holding a key from the unit

| | | |
|---|---|---|
| Commands: | **<KEYHOLD0>>** (back key) | nothing special same as <KEY0>> |
| | **<KEYHOLD1>>** (down key) | change history mode |
| | **<KEYHOLD2>>** (up key) | change history duration |
| | **<KEYHOLD3>>** (power) | Turn unit on or off |

4. Get all measurements and time.

Command: **<GETDATA>>**
Data measurements are 4bytes floating points. Union float -> unsigned char was used to send the data out.
Example CO2 reading of 544.8 ➔ ($CO_2$_) BYTE0 BYTE1 BYTE2 BYTE3 ➔ 0x44 0x08 0x33 0x33 (Big endian)
Return: 40 bytes of data that are arranged as: * (B = BYTE)

| | | | | |
|---|---|---|---|---|
| B0: 0x55 | B8: PM1_B0 | B16: PM10_B0 | B24: HCHO_B0 | B32: PRES_B0 |
| B1: 0xAA | B9: PM1_B1 | B17: PM10_B1 | B25: HCHO_B1 | B33: PRES_B1 |
| B2: Year | B10: PM1_B2 | B18: PM10_B2 | B26: HCHO_B2 | B34: PRES_B2 |
| B3: Month | B11: PM1_B3 | B19: PM10_B3 | B27: HCHO_B3 | B35: PRES_B3 |
| B4: Day | B12: PM2.5_B0 | B20: $CO_2$_B0 | B28: TEMP_B0 | B36: HUM_B0 |
| B5: Hour | B13: PM2.5_B1 | B21: $CO_2$_B1 | B29: TEMP_B1 | B37: HUM_B1 |
| B6: Minute | B14: PM2.5_B2 | B22: $CO_2$_B2 | B30: TEMP_B2 | B38: HUM_B2 |
| B7: Second | B15: PM2.5_B3 | B23: $CO_2$_B3 | B31: TEMP_B3 | B39: HUM_B3 |

5. Gets the display screen in bitmap

Command: **<GETSCREEN>>**
Return: Returns 1024 bytes of screen data (bitmap of the LCD screen 128x64) PLUS 0xAA total of 1025 bytes

8E 51 59 95 53 51 8E FF 00 ...

6. get serial number
Command: **<GETSERIAL>>**
Return: serial number in 8 bytes.

7. Set real time clock date and time year command: <SETDATETIME[YY] [MM] [DD] [HH] [MN] [SS]>>
e.g. to set date and time to July 28, 2021 12:17:24
send hex values 3c 53 45 54 44 41 54 45 54 49 4d 45 **15 07 1C 0C 11 18** 03e 3e

YY → year value in hexdecimal
MM → month
DD → day
HH → hour
MN → minute
SS → second

Return: 0xAA

8. Reset unit to factory default
command: **<FACTORYRESET>>**
Return: 0xAA

9. Reboot unit command: **<REBOOT>>**
Return: None