

Indoor air quality meter demonstrator

User's guide

GTC INTERNAL CODE:

DEPARTMENT : Sensors for Application and Processes

DOCUMENT NUMBER: v02

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| | DATE | NAME | POSITION |
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I. Sensor part

The list of sensors which are used:

| Parameter | Sensor | Manufacturer | Description |
|-------------------|-----------------------------|-----------------------|--|
| Temperature | Si7013 | Silicon Labs | Capacitive humidity sensor with I2C interface |
| Relative humidity | Si7013 | Silicon Labs | |
| PM2.5/10 | SDS021 | Nova Fitness | Optical laser diode-based sensor with UART interface |
| VOCs | MiCS-5524 ^{*1} | SGX Sensortech | Analog MOX-based resistive sensor |
| CO2 | Cozir Ambient | Gas sensing solutions | NDIR-based sensor with UART interface |
| Ambient light | TSL2561T ^{*2} | AMS | Light sensor with I2C interface |
| Noise | SPM0404HE5H-T ^{*3} | Knowles | MEMS microphone with electronics developed by GTC |

Comments:

1. Sensor signal isn't calibrated. The readings in arbitrary units are proportional to the total level of VOCs.
2. Sensor signal isn't calibrated. The readings in arbitrary units are proportional to the lighting level on the sensor sensitive surface.
3. Sensor signal isn't calibrated. The readings in arbitrary units are proportional to an average noise level in space around the microphone.

II. Short description of the demonstrator

Firmware running on the arduino yun board requests the readings from each sensor by turn. All readings are joined to one string after a measurement cycle. Each cycle takes approx. 3 seconds.

The Yun board works as wireless access point. If there is a client connected to the Yun's WLAN the TCP server running on the board will send the joined string with data after each cycle of measurements. The structure of the string:

V 3.25 T 28.7 H 42.3 CO2 1200 PM25 5.2 PM10 6.3 L 27 N 0.12 0

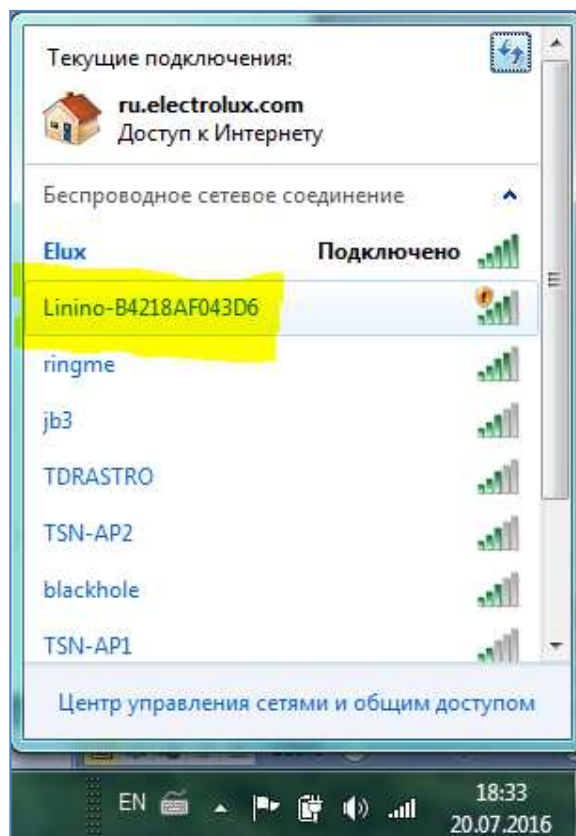
Where:

- V **X.XX** – data in arbitrary units from the VOCs sensor ranged from **2** to 5 a.u.
- T **XX.X** – data from the temperature sensor in °C
- H **XX.X** – data from the humidity sensor in %RH
- CO2 **XXX** – data from the carbon dioxide sensor in ppm
- PM25 **X.X** – data about PM2.5 from the particulate matters sensor in $\mu\text{g}/\text{m}^3$
- PM10 **X.X** – data about PM10 from the particulate matters sensor in $\mu\text{g}/\text{m}^3$
- L **XX** – data from the ambient light sensor in a.u. ranged from 0 to 5047
- N **X.XX** – data from the noise sensor in a.u. ranged from 0 to **2**
- **X** – the last symbol of the string is the fan state. 1 means the fan is working, 0 – powered off

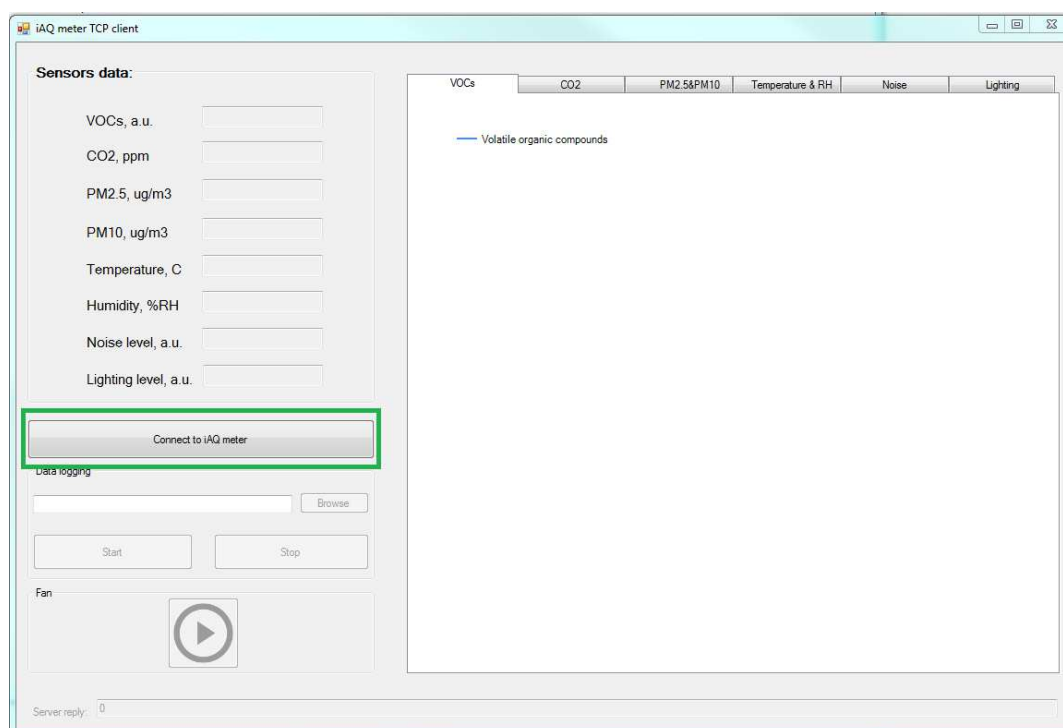
The demonstrator is equipped with a small fan. By default the fan is turned off. The fan can be turned on by using the PC application.

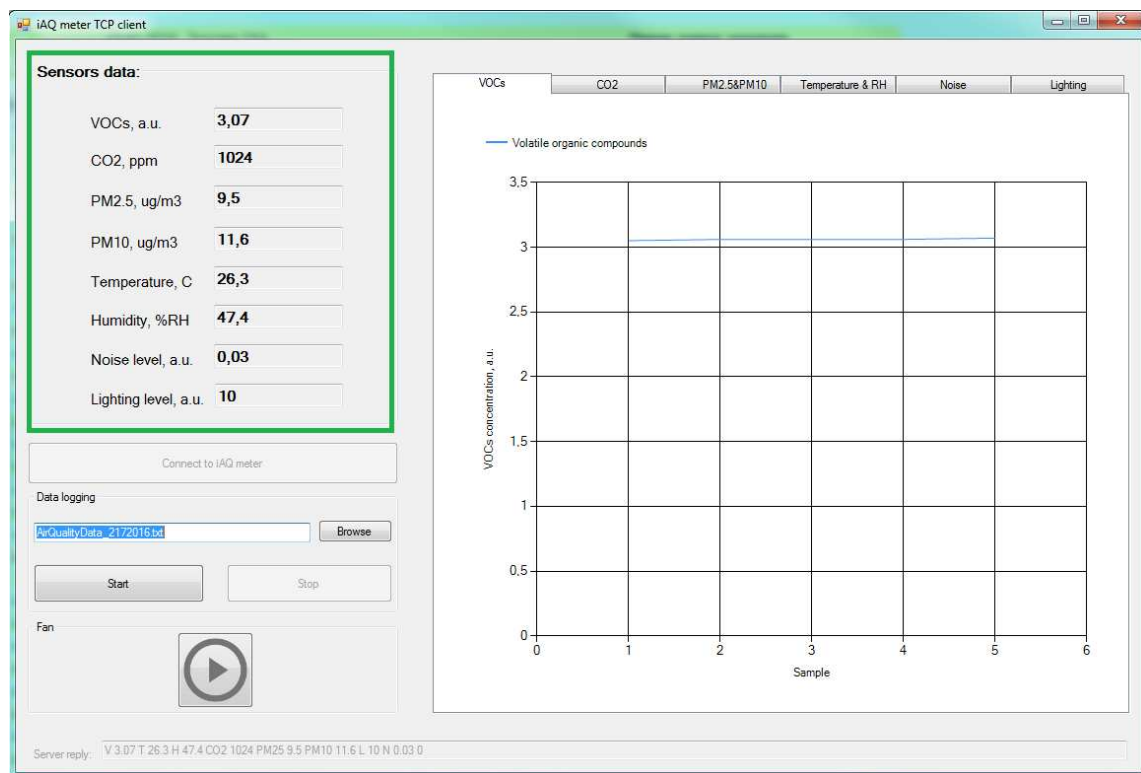
III. Getting started with GTC app

1. Connect the iAQ meter to power
2. Wait for the Arduino board starts WLAN. It may take a minute. Then in the list of available connections you will see a new wireless connection with SSID like Linino-XXXXXXXXXX. Connect your PC to that WLAN. There is no password protection.

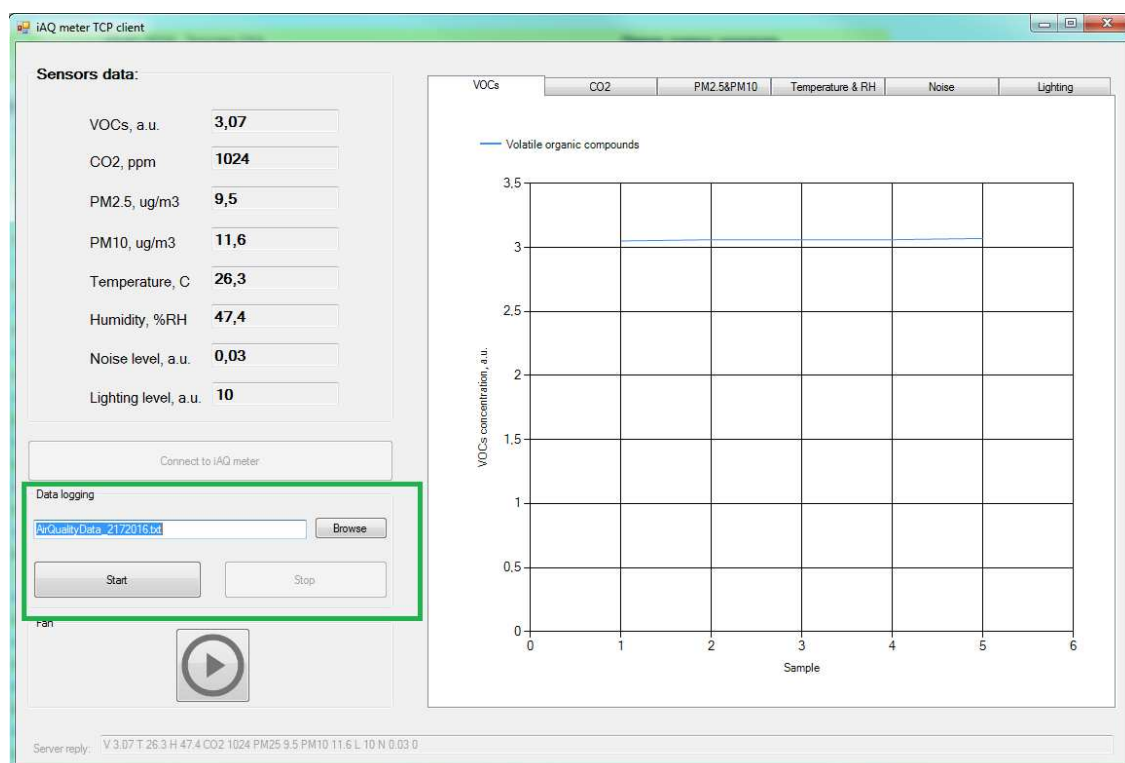


3. After successful connection run the .exe file of the app. Make sure there is App.config file in the same folder as the .exe.
4. Click “Connect to iAQ meter” button. In seconds the app should start displaying sensors data.





- To log sensors data to a text file click "Browse" button in order to choose file directory and type the file name. By default the file name format is AirQualityData_ddmmyyyy.txt. To start data logging click "Start" button. To stop data logging click "Stop" button.



6. A field called as "Fan" is responsible for the fan mode. If the fan is turned off a button is displayed as "Play" icon.

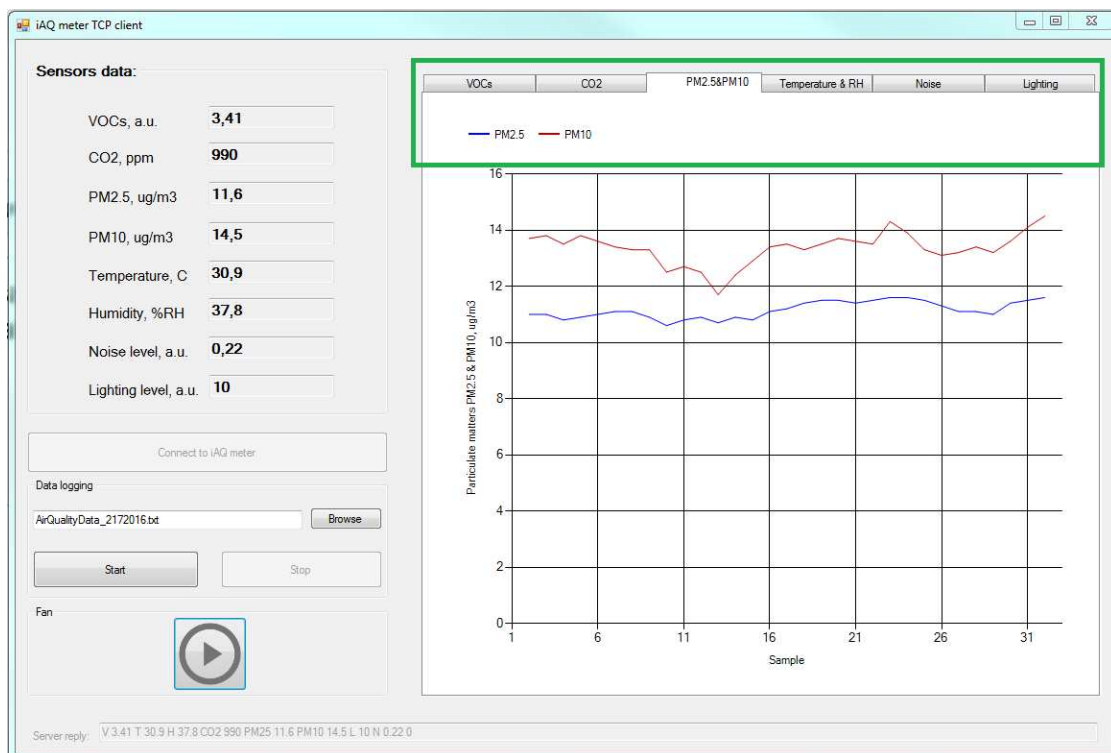


If the fan is working the button is displayed as "Stop" icon.



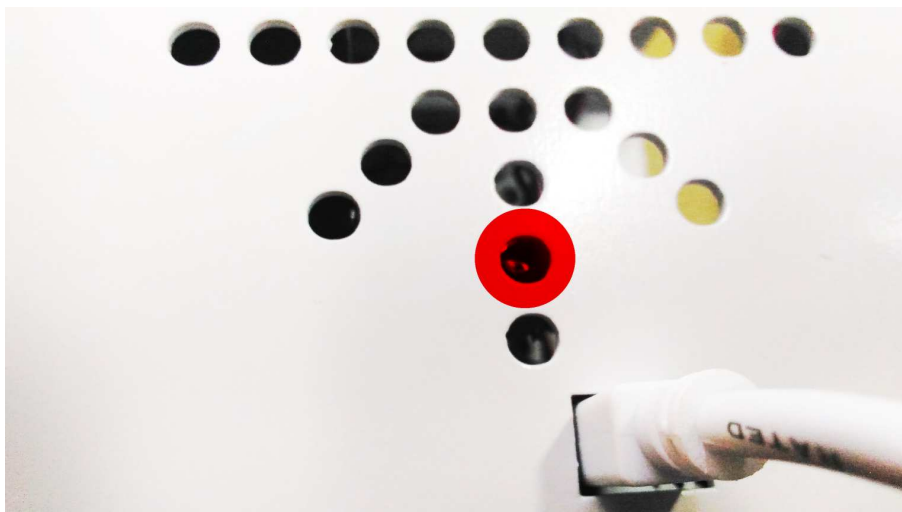
Note that info about fan mode is stored in non-volatile memory. That means after powering on the iAQ meter the fan will be in the same mode as it was before turning off.

7. The app also displays plots of air pollutants and parameters. Switch between tabs to look at specific data over time.



8. Please, note when PC goes to sleep/hibernation mode or switching user mode the PC wireless network adapter is turned off by Windows. That means the connection between PC and the iAQ meter will be broken and the app will crash. Sometimes it may be solved by changing power settings of PC, sometimes not. To be sure during data logging put your PC to active mode.

9. After crash the app may lose a possibility to send commands to the TCP server. In such case, press the reset button (located as in the picture below) on the iAQ meter with a tip of a pen and then reconnect PC to the iAQ meter network.



App error messages:

| Message | Action |
|------------------------------------|---|
| "Can not connect to remote device" | Check WiFi connection to the iAQ meter |
| "File App.config not found" | Make sure the App.config file is in the same folder as .exe file. |

IV. Appendix

Ambient light sensor is located on the wall opposite to USB connector, as well as noise sensor.

