

## Air Quality 11 Click



PID: MIKROE-6063

**Air Quality 11 Click** is a compact add-on board for monitoring and analyzing indoor air quality. This board features the ENS161, a multi-gas sensor from [ScioSense](#) based on metal oxide (MOX) technology, to detect a range of volatile organic compounds with high sensitivity. The board supports I2C and SPI communication protocols, allowing flexible integration with various MCU platforms. It can calculate equivalent CO<sub>2</sub> and TVOC levels and provide standardized air quality indices directly on-chip. This solution is ideal for developing IoT devices, wearables, smart home systems, and HVAC technology applications, where accurate and reliable air quality monitoring is crucial.

Air Quality 11 Click is fully compatible with the mikroBUS™ socket and can be used on any host system supporting the [mikroBUS™](#) standard. It comes with the [mikroSDK](#) open-source libraries, offering unparalleled flexibility for evaluation and customization. What sets this [Click board™](#) apart is the groundbreaking [ClickID](#) feature, enabling your host system to seamlessly and automatically detect and identify this add-on board.

### How does it work?

Air Quality 11 Click is based on the ENS161, a multi-gas sensor from ScioSense based on metal oxide (MOX) technology. It features four sensor elements that support both isothermal and low-power modes. This advanced sensor offers a unique capability of independently controlling the hotplate to detect a wide range of volatile organic compounds (VOCs) like ethanol, toluene, hydrogen, and oxidizing gases with enhanced sensitivity. Equipped with intelligent on-chip algorithms, the ENS161 processes raw sensor data to calculate various air quality metrics, such as TVOC- and CO<sub>2</sub>-equivalents and different air quality indices, and performs compensations for humidity and temperature.

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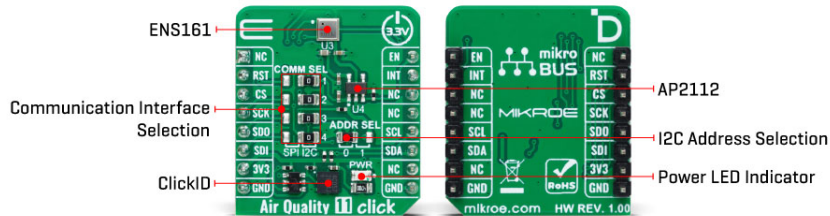
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A key feature of the ENS161 is its TrueVOC® air quality detection, which adheres to global Indoor Air Quality (IAQ) standards. It measures equivalent CO<sub>2</sub> (eCO<sub>2</sub>) from 0 to 65,000 ppb, meeting HVAC requirements, and equivalent Total Volatile Organic Compounds (eTVOC) ranging from 400 to 65,000 ppm CO<sub>2</sub>-equivalent. Additionally, it supports both the German Federal Environmental Agency's (UBA) Air Quality Index (AQI-U) from 1 to 5 and a relative Air Quality Index (AQI-S) from 0 to 500. This solution finds applications in IoT devices, wearables, energy-sensitive building automation, HVAC systems, home appliances, and more.

This Click board™ allows for flexible communication options, supporting both I2C and SPI interfaces. These interfaces enable communication speeds up to 1MHz for I2C and 10MHz for SPI. Users can select their preferred communication protocol by adjusting the SMD jumpers in the COMM SEL section. The jumpers must be aligned on the same side to avoid potential issues. An additional SMD jumper, labeled ADDR SEL, enables the adjustment of the I2C slave address.

The ENS161 sensor operates using a 3.3V supply from the mikroBUS™ socket for its logic-level side and uses a 1.8V as a main power supply, which is converted from the 3.3V mikroBUS™ power rail through an AP2112 CMOS LDO regulator. This LDO is enabled via the EN pin from the mikroBUS™ socket, which can also function as a global enable for the entire device. Besides the communication pins for SPI and I2C, the ENS161 also uses an interrupt (INT) pin to alert the host MCU when new output data is available.

This Click board™ can be operated only with a 3.3V logic voltage level. The board must perform appropriate logic voltage level conversion before using MCUs with different logic levels. Also, it comes equipped with a library containing functions and an example code that can be used as a reference for further development.

## Specifications

Type	Environmental, Gas
Applications	Ideal for developing IoT devices, wearables, smart home systems, and HVAC technology applications
On-board modules	ENS161 - multi-gas sensor from ScioSense
Key Features	Based on Metal Oxide (MOX) sensor technology, can detect a wide range of VOCs

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	with high sensitivity, communication interface selection, I2C address selection, provides AQI calculations compliant with global standards, including UBA and relative AQI, intelligent algorithms for raw sensor data processing, interrupt for new data notification, and more
Interface	I2C,SPI
ClickID	Yes
Compatibility	mikroBUS™
Click board size	S (28.6 x 25.4 mm)
Input Voltage	3.3V

## Pinout diagram

This table shows how the pinout on Air Quality 11 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS™				Pin	Notes
	NC	1	AN	PWM	16	<b>EN</b>	Device Enable
ID SEL	<b>RST</b>	2	RST	INT	15	<b>INT</b>	Interrupt
SPI Select / ID COMM	<b>CS</b>	3	CS	RX	14	NC	
SPI Clock	<b>SCK</b>	4	SCK	TX	13	NC	
SPI Data OUT	<b>SDO</b>	5	MISO	SCL	12	<b>SCL</b>	I2C Clock
SPI Data IN	<b>SDI</b>	6	MOSI	SDA	11	<b>SDA</b>	I2C Data
Power Supply	<b>3.3V</b>	7	3.3V	5V	10	NC	
Ground	<b>GND</b>	8	GND	GND	9	<b>GND</b>	Ground

## Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1-JP4	COMM SEL	Right	Communication Interface Selection SPI/I2C: Left position SPI, Right position I2C
JP5	ADDR SEL	Left	I2C Address Selection 0/1: Left position 0, Right position 1

## Air Quality 11 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Equivalent Total Volatile Organic Compounds (eTVOC)	0	-	65.000	ppb
Equivalent CO2 (eCO2)	400	-	65.000	ppm
Air Quality Index according to UBA (AQI-UBA)	1	-	5	/
Relative Air Quality Index according to ScioSense (AQI-S)	0	-	500	/

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## Software Support

We provide a library for the Air Quality 11 Click as well as a demo application (example), developed using MIKROE [compilers](#). The demo can run on all the main MIKROE [development boards](#).

Package can be downloaded/installed directly from NECTO Studio Package Manager(recommended), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

## Library Description

This library contains API for Air Quality 11 Click driver.

Key functions

- `airquality11_get_aqi_uba` This function reads the calculated Air Quality Index according to the UBA.
- `airquality11_get_tvoc` This function reads the calculated equivalent TVOC concentration in ppb.
- `airquality11_get_aqi_s` This function reads the calculated relative Air Quality Index proprietary to ScioSense.

## Example Description

This example demonstrates the use of the Air Quality 11 Click board by reading and displaying the calculated Air Quality Index according to the UBA and ScioSense, and equivalent TVOC and CO2 concentration.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager(recommended), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.AirQuality11

## Additional notes and informations

Depending on the development board you are using, you may need [USB UART click](#), [USB UART 2 Click](#) or [RS232 Click](#) to connect to your PC, for development systems with no UART to USB interface available on the board. UART terminal is available in all MIKROE [compilers](#).

## mikroSDK

This Click board™ is supported with [mikroSDK](#) - MIKROE Software Development Kit. To ensure proper operation of mikroSDK compliant Click board™ demo applications, mikroSDK should be downloaded from the [LibStock](#) and installed for the compiler you are using.

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For more information about mikroSDK, visit the [official page](#).

## Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click Boards™](#)

[ClickID](#)

## Downloads

[AP2112 datasheet](#)

[Air Quality 11 click example on Libstock](#)

[Air Quality 11 click 2D and 3D files v100](#)

[ENS161 datasheet](#)

[Air Quality 11 click schematic v100](#)

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