

# Air quality 9 Click



PID: MIKROE-5060

Air quality 9 Click is a compact add-on board containing a best-in-class air-quality sensing solution. This board features the ENS160, a digital multi-gas sensor solution based on metal oxide (MOX) technology with four MOx sensor elements from ScioSense. Each sensor element has independent hotplate control to detect a wide range of gases. The ENS160 series features TrueVOC™ air quality detection and supports intelligent algorithms, which calculate CO2 equivalents, TVOC, air quality index (AQI), and perform humidity and temperature compensation. This Click board™ is interface-configurable and characterized by outstanding long-term stability and lifetime. This Click board™ makes an excellent choice for detecting unhealthy air conditions, such as personal air-quality monitors, HVAC, smart thermostats, and other air quality-related applications.

Air quality 9 Click is supported by a [mikroSDK](#) compliant library, which includes functions that simplify software development. This [Click board™](#) comes as a fully tested product, ready to be used on a system equipped with the [mikroBUS™](#) socket.

## How does it work?

Air quality 9 Click as its foundation uses the ENS160, an indoor air quality sensor based on metal oxide (MOX) technology with four MOx sensor elements from ScioSense. This sensor comes with sophisticated sensor fusion algorithms to produce measurement outputs that are better tuned to the natural response of human occupants. The multi-element TrueVOC™ technology, on which the ENS160 is based, is sensitive to oxidizing gases such as ozone which affect the quality of indoor air, as well as to a wide range of volatile organic compounds (VOCs) such as ethanol, toluene, as well as hydrogen and nitrogen dioxide with superior selectivity and accuracy. The ENS160 complies with worldwide Indoor Air quality (IAQ) signal standards and is

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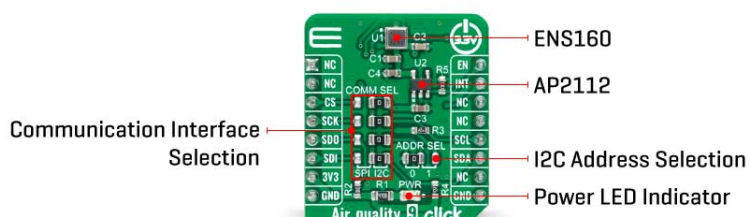


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designed for high volume and reliability.



For best performance, the sensor needs to be operated in normal indoor air in the range -5 to 60°C (typical: 25°C), while relative humidity ranges from 20 to 80%RH (typical: 50%RH), non-condensing with no aggressive or poisonous gases present. Prolonged exposure to environments outside these conditions can affect the performance and lifetime of the sensor.

This Click board™ allows using both I2C and SPI interfaces with a maximum frequency of 1MHz for I2C and 10MHz for SPI communication. The selection can be made by positioning SMD jumpers labeled as COMM SEL to an appropriate position. Note that all the jumpers' positions must be on the same side, or the Click board™ may become unresponsive. While the I2C interface is selected, the ENS160 allows choosing the least significant bit (LSB) of its I2C slave address using the SMD jumper labeled ADDR SEL. This Click board™ also possesses an additional interrupt signal, routed on the INT pin of the mikroBUS™ socket labeled as INT, indicating the status of the measurement process itself.

The ENS160 also requires a supply voltage of 1.8V to work regularly. Therefore, a small LDO regulator, [AP2112](#) from Diodes Incorporated, provides a 1.8V out of mikroBUS™ 3V3 power rail. This LDO can be enabled or disabled through the EN pin routed to the PWM pin of the mikroBUS™ socket; hence, offering a switch operation to turn ON/OFF power delivery to the ENS160.

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. However, the Click board™ comes equipped with a library containing functions and an example code that can be used, as a reference, for further development.

## Specifications

Type	Air Quality ,Environmental,Gas
Applications	Can be used for detecting unhealthy air conditions, such as personal air-quality monitors, HVAC, smart thermostats, and other air quality-related applications
On-board modules	ENS160 - indoor air quality sensor based on metal oxide (MOX) technology from ScioSense

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Key Features	Low power consumption, support for up to 4 independent MOX gas sensors, integrated sensor measurement and heater drive control, multiple IAQ outputs (TVOC, eCO <sub>2</sub> , AQI), selectable interface, immunity to humidity and ozone, and more
Interface	I2C,SPI
ClickID	No
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 9 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
	NC	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	<b>INT</b>	Interrupt
SPI Chip Select	<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	<b>5V</b>	Power Supply
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 9 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
TVOC	0	-	65.000	ppb
eCO <sub>2</sub>	400	-	65.000	ppm CO <sub>2</sub>
Operating Humidity Range	-5	50	85	%RH
Operating Temperature Range	-40	+25	+85	°C

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## Software Support

We provide a library for the Air quality 9 Click as well as a demo application (example), developed using MikroElektronika [compilers](#). The demo can run on all the main MikroElektronika [development boards](#).

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

## Library Description

This library contains API for Air quality 9 Click driver.

Key functions

- `airquality9_read_aqi_uba` This function reads the Air quality Index per UBA (AQI-UBA).
- `airquality9_read_tvoc` This function reads the calculated Total Volatile Organic Compounds (TVOC) concentration per ppb.
- `airquality9_read_eco2` This function reads the calculated Equivalent CO2 (eCO2) concentration per ppm.

## Example Description

This example demonstrates the use of Air quality 9 Click board™ by reading and displaying outputs such as eCO2, TVOC and AQI in compliance with worldwide IAQ standards.

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

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.AirQuality9

## 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 MikroElektronika [compilers](#).

## mikroSDK

This Click board™ is supported with [mikroSDK](#) - MikroElektronika 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™](#)

## Downloads

[Air quality 9 click example on Libstock](#)

[ENS160 datasheet](#)

[AP2112 datasheet](#)

[Air quality 9 click 2D and 3D files](#)

[Air quality 9 click schematic](#)

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