

## AQS1

### AIR QUALITY SENSOR

*The AQS1 is a temperature / air quality measuring device which is used to create and control individual heating and/or ventilation zones.*

*The AQS1 comes in 2 different variants:*

*The AQS1\_TH with temperature & humidity sensors and the AQS1\_THV with temperature, humidity and air quality (VOC volatile organic compounds) sensors.*

*The sensor has a local control interface for the Muonio HR-1 heat recovery ventilators where you can change the mode of work, speed and check for a filter alarm.*

*The AQS1 Sensor is responsible for creating a comfortable and healthy living environment within your building.*

*The AQS1 connects wirelessly to the Muonio G1 gateway. Each gateway can connect to up to 4 sensors, and multiple gateways can be joined together in one system if needed.*

*The AQS1 Sensor requires 3xAA batteries to operate.*

*The MUONIO system is a network of devices for heating and ventilation that brings comfort to your home.*

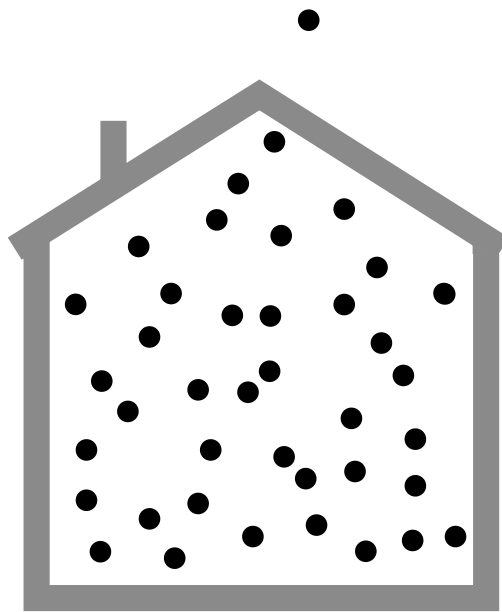
*Package contents:*

- Air quality sensor*
- Operating instructions*

**INFORMATION BOOKLET**

# Why Indoor Air Quality matters

**THE AIR QUALITY INSIDE YOUR HOME OR BUILDING IS 2 TO 5 TIMES MORE TOXIC THAN OUTSIDE**



*People spend 90% of their time indoors but outdoor air quality is far superior to indoor air quality.*



*Sick building syndrome (SBS) is used to describe a situation in which the occupants of a building experience acute health or comfort-related effects that seem to be directly linked to the time spent in the building.*

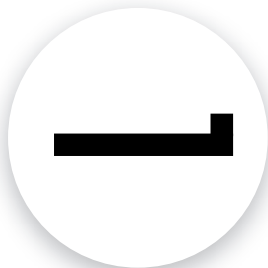


*The better insulated a building is, the more energy-efficient it is but at the same time air quality is drastically reduced. The most visible signs of bad air quality are moulds and condensation.*

# Why Indoor Air Quality matters



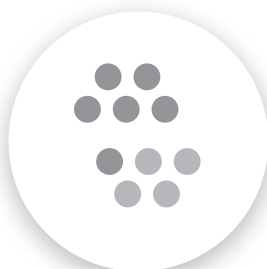
*In Europe, an estimated 10–50% (depending on the country) of indoor environments where we live, work and play have substandard air quality levels, resulting in symptoms such as dampness which nearly doubles the risk of asthma and other respiratory diseases(WHO - Damp and mould brochure).*



*In the 20 years to 2012, there was a 615% increase in the rate of hospital admissions for anaphylaxis in the UK (Turner, Paul J., et al, 2015).*



*More than 150 million Europeans suffer from chronic allergic diseases and the current prediction is that by 2025 half of the entire EU population will be affected (EAACI, 2016).*



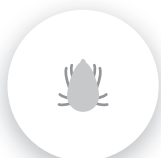
*25% of houses in Europe have mould growth in at least one room, (WHO - Large Analysis and Review of European Housing and Health Status).*



*Low Rate of Natural Ventilation due to Air-Tight House.*



*Allergy is the most common chronic disease in Europe (EAACI, 2016).*



*Indoor air can be full of viruses, mites, odours, moulds, humidity and CO2 which could cause a number of diseases like asthma, breathing problems, flu, headache and depression.*

# What are Volatile Organic Compounds?



*According to the U.S. Environmental Protection Agency (EPA), VOCs are toxic chemicals emitted as gases from certain solids or liquids, some of which may have short and long-term adverse health effects.*



*Volatile Organic Compounds are found in many products we use to build and maintain our homes. The risk of health effects from inhaling any chemical depends on how much is in the air, how long and how often a person breathes it in.*



*World Health Organization (WHO) categorizes indoor organic pollutants as:*  
*Very volatile organic compounds (VVOCs)*  
*Volatile organic compounds (VOCs)*  
*Semi-volatile organic compounds (SVOCs)*



*Like the lungs, buildings need to breathe to make sure that fresh air comes in and stale air goes out. Air typically enters buildings and leaves by three different ways:*

*Doors and windows (Vents), whenever they are opened, Ventilation or Joints, cracks and openings where parts of the building connect.*



*According to the American Lung Association VOCs can irritate the eyes, nose and throat, can cause difficulty breathing and nausea, and can damage the central nervous system as well as other organs. Some VOCs can cause cancer. Not all VOCs have all of these health effects, though many have several.*

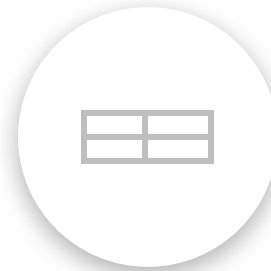


*Modern buildings are air tight and made of new materials and many of those materials can be sources of VOC (especially valid for new or renovated houses).*

# Volatile organic compounds (VOC)



VOCs originate from a number of different possible sources: cigarettes, solvents, paints and thinners, adhesives, hobby and craft supplies, dry cleaning fluids, glues, wood preservatives, cleaners and disinfectants, moth repellants, air fresheners, building materials and furnishings, copy machines and printers, pesticides, cooking, cosmetics, carpets.



Guidelines for TVOC\*s according to the German Health Department are given in table 1.

Table 1: Air Quality Levels

Level	Hygienic Rating	Recommendation	Exposure Limit	TVOC [ppb**]
Unhealthy	Situation not acceptable	Intense ventilation necessary Use only if unavoidable /	hours	2200 and more
Poor	Major objections	Intensified ventilation / airing necessary, search for sources	< 1 month	660 – 2200
Moderate	Some objections	Intensified ventilation / airing recommended, search for sources	< 12 months	220 – 660
Good	No relevant objections	Ventilation / airing recommended	no limit	65 – 220
Excellent	No objections	Target value	no limit	0 – 65

\*TVOC stands for TOTAL VOLATILE ORGANIC COMPOUND.

\*\*Translation from mass concentration [ $\mu\text{g}/\text{m}^3$ ] to particle concentration [ppb] is based on an average molar mass of TVOC molecules, according to the TVOC mix proposed by Mølhave (Ref.: Mølhave L, Clausen G, Berglund B, et al. (1997) Total Volatile Organic Compounds (TVOC) in Indoor Air Quality Investigations. *Indoor Air* 7:225-240). Thereby  $4.9 \mu\text{g}/\text{m}^3$  corresponds to 1 ppb TVOC concentration.

Some sources for further readings:

German Committee on Indoor Guide Values (<https://www.umweltbundesamt.de/en/topics/health/commissions-working-groups/german-committee-on-indoor-guide-values#german-committeeon-indoor-guide-values>),

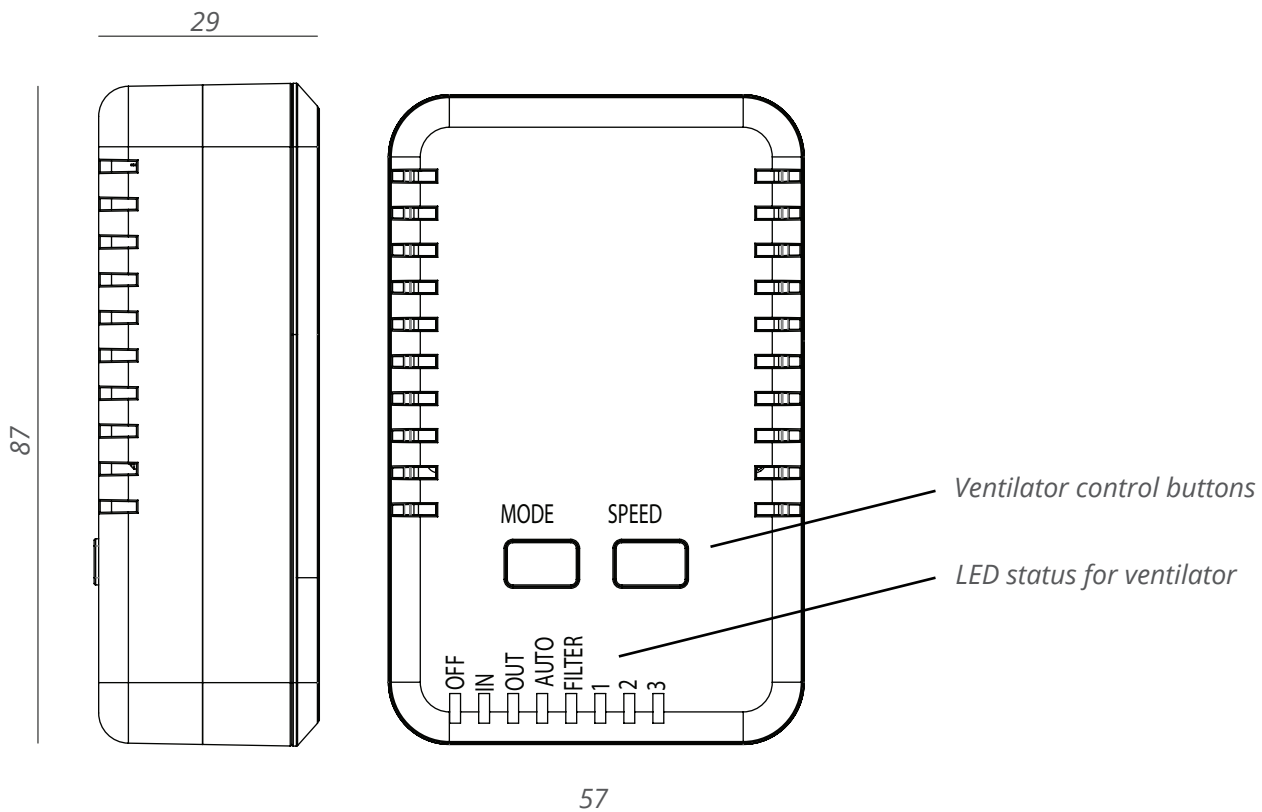
American Lung Association (<https://www.lung.org>),

Prevalence of dampness and mold in European housing stock (<https://www.nature.com/articles/jes201221.pdf?origin=ppub>)

DAMP AND MOULD - WHO ([http://www.euro.who.int/\\_data/assets/pdf\\_file/0003/78636/Damp\\_Mould\\_Brochure.p](http://www.euro.who.int/_data/assets/pdf_file/0003/78636/Damp_Mould_Brochure.p))

# Technical data

## GENERAL OVERVIEW



### TECHNICAL DATA

88 X 57 X 29 mm

Weight 150 g

Powered by 3 x AA batteries, 4.5 Vdc

Local control interface for HR-1 ventilator (speed (OFF, 1,2 and BOOST), mode of work (IN, OUT and AUTO), and filter alarm status).

Two versions:

AQS1\_TH: Temperature and humidity

AQS1\_THV: Temperature, humidity and VOC

Wireless 2.4 GHz

AQS1 does not work as an independent device but as a part of the MUONIO system and needs Gateway as a minimum to work.

### SPECIFICATION

4 sensors (or zones) supported per gateway. The zone is a defined part of your home or building within which you want to control Temperature, Humidity, and Air Quality. Part of wireless network that supports a limitless combination for heating and ventilation devices.

VOC signal: Ethanol

VOC measurement range\*: 0 ppm to 1000 ppm\*\*

\* Exposure to ethanol and H2 concentrations up to 1000 ppm have been tested

\*\* ppm: parts per million. 1 ppm = 1000 ppb (parts per billion)