

AirQuality Unit

LAN/WI-FI/RS485 version

User manual

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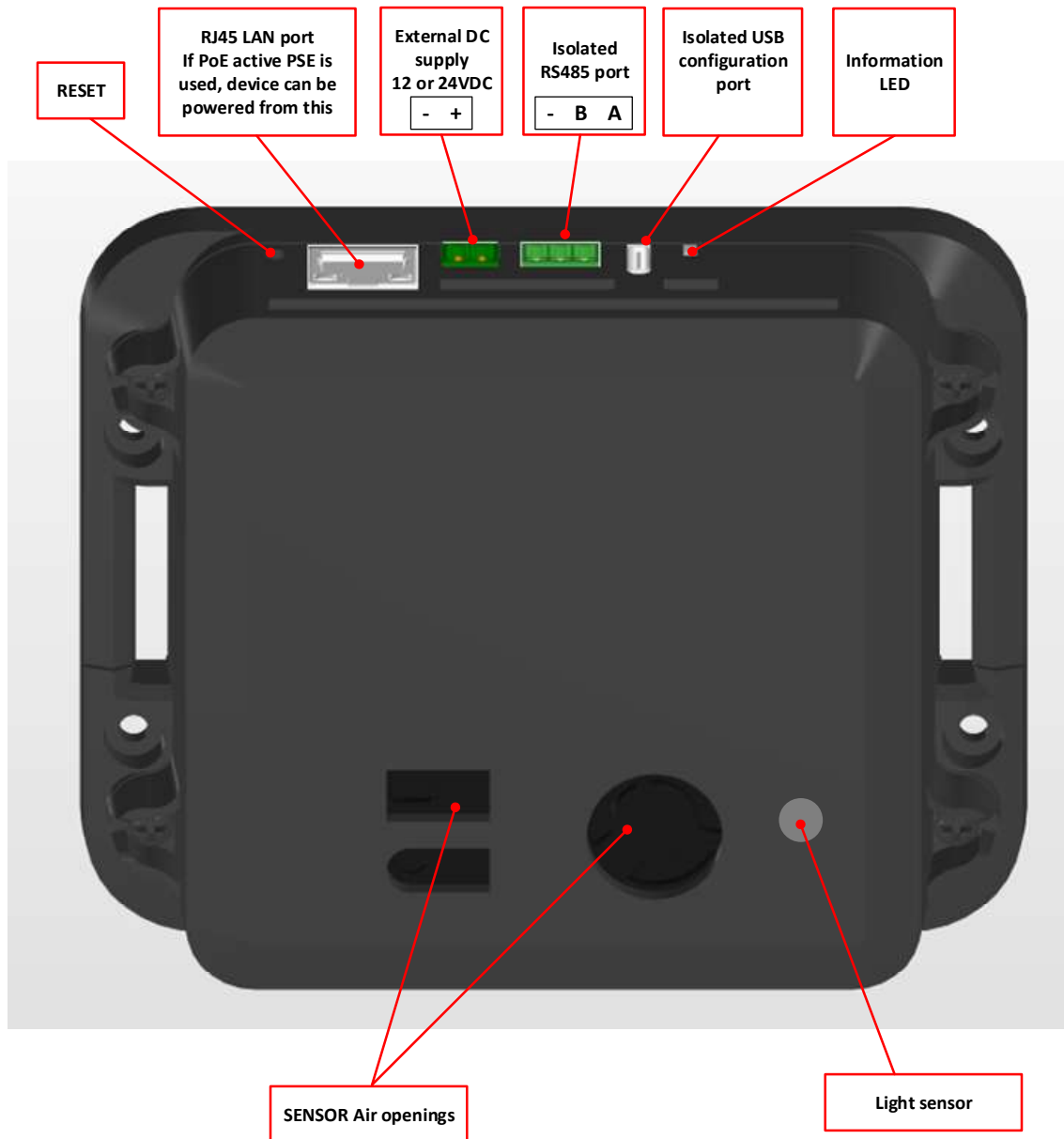
1. Device parameters

Power supply	Power Over Ethernet PoE (802.3af / 802.3at Type 1 or Type 2)
Nominal PoE supply voltage	+48 VDC
PoE standard	active only based on 802.3af / 802.3at Type 1 or Type 2
Power consumption	max. 6,5 W (Powered Device Class 2)
Power Supply external	12 – 24 VDC
Sensed and measured values	PM1, PM2.5, PM5, PM10 particles VOC, NOX index CO₂ concentration Temperature and humidity Ambient light level
ModBUS RTU	galvanically isolated RS485 from LAN, and Ext. supply
USB configuration port	galvanically isolated from RS485, LAN and external supply, VCP standard 115200/8/n/1
WiFi interface	2.4 GHz WiFi (802.11 b/g/n)
Dimension	112 x 112 x 36 mm
Operational temperature range	0 – 40 °C

2. Factory settings

IP address	192.168.0.100
Subnet mask	255.255.255.0
Gateway	192.168.0.1
TCP Modbus Port	502
TCP Port timeout	60 s
DHCP	disabled / static IP
WLAN IP adress	192.168.103.2
WLAN Subnet mask	255.255.255.0
WLAN Gateway	192.168.103.1
WLAN TCP Modbus Port	502
ModBUS RTU address	1
ModBUS RTU Baudrate	19200
ModBUS RTU Parity	Even

3. Front view and connection schematic



4. Description

The device is an industrial air quality sensor designed for continuous monitoring in a wide range of environments, including technological and industrial facilities, residential and commercial buildings, HVAC systems, educational institutions, and public spaces. It provides reliable, real-time data to support healthy indoor environments, process safety, and efficient ventilation control.

The sensor measures all relevant particulate matter sizes, enabling comprehensive assessment of airborne particle pollution. In addition, it monitors ambient temperature, relative humidity, ambient light level, and carbon dioxide (CO₂) concentration, offering a complete overview of environmental conditions from a single compact unit. This combination of measurements makes the device suitable for both air quality analysis and smart building applications.

Connectivity is ensured through multiple interfaces to allow easy integration into existing systems. The device supports wired LAN (Ethernet) and Wi-Fi connectivity for modern network infrastructures, as well as RS485, which is widely used as an industrial communication standard. Power can be supplied either via active Power over Ethernet (PoE) or through an external DC power source, providing flexibility for different installation scenarios.

5. Connectivity

The device provides four distinct communication interfaces to ensure flexible integration into a wide range of industrial and building automation systems.

Wired LAN (Ethernet) interface

The wired LAN interface supports industrial network connectivity, with Modbus TCP implemented as the primary communication protocol. This interface is intended for direct integration into IP-based control systems, SCADA platforms, and building management systems, providing reliable, deterministic data exchange over Ethernet networks.

RS485 wired interface with galvanic isolation

For industrial fieldbus applications, the device is equipped with an RS485 interface with galvanic isolation, ensuring high noise immunity and electrical separation from external systems. The communication protocol on this interface is Modbus RTU, enabling robust operation in electrically noisy industrial environments and compatibility with standard industrial controllers and PLCs.

Wi-Fi interface

The Wi-Fi interface allows the device to operate in client (station) mode, connecting to an existing WLAN infrastructure. When connected via Wi-Fi, the device provides the same Modbus TCP communication functionality as the wired Ethernet interface, ensuring protocol consistency and transparent integration regardless of the physical network medium.

USB configuration interface

A dedicated USB configuration interface is provided for device commissioning, parameter configuration, diagnostics, and firmware-related service operations. This interface is intended for local access during installation and maintenance and is not used for operational data exchange.

6. Sensor information

Value	Range	Typ. precision	Unit
Mass concentration PM (PM1,PM2.5,PM5,PM10)	0 - 1000	±10 %	µg/m ³
Rel. Humidity	0-100	±4.5 %RH	%RH
CO ₂	0-40000	±(50.0 + 2.5% reading)	ppm
VOC	0-500		-
NOX	0-500		-
Temperature	-10 to +60	±0.45	°C
ALS	0 - 5000	±5 %	lux

For more detailed information of repeatability, lifetime please contact the manufacturer for detailed specification sheet.

7. ModBus address space

Address	Name/Function	Description	Unit / LSB	Default
Input registers - Firmware & System Info				
0	fw_version[0]	Firmware version – major	-	
1	fw_version[1]	Firmware version – minor	-	
2	fw_version[2]	Firmware version – patch	-	
3				
4	uptime_hours	Device uptime	hours	
5	uptime_minutes	Device uptime	min	
6	uptime_seconds	Device uptime	sec	
Input registers - Meteorological Data (Float IEEE754)				
50-51	Pm 1	Particulate Matter PM 1.0	µg/m ³	
52-53	Pm 2.5	Particulate Matter PM 2.5	µg/m ³	
54-55	Pm 5	Particulate Matter PM 5.0	µg/m ³	
56-57	Pm 10	Particulate Matter PM 10.0	µg/m ³	
58-59	Voc	Volatile Organic Compounds index	-	
60-61	Nox	Nitrogen Oxides index	-	
62-63	Temperature	Temperature	°C	
64-65	Humidity	Humidity relative	%	
66-67	CO₂	Concentration of carbon dioxide	ppm	
68-69	Ambient Light	Ambient light level	lux	
Environmental & Meteorological Data (Integers)				

70	Pm 1	Particulate Matter PM 1.0	0.1 µg/m³	
71	Pm 2.5	Particulate Matter PM 2.5	0.1 µg/m³	
72	Pm 5	Particulate Matter PM 5.0	0.1 µg/m³	
73	Pm 10	Particulate Matter PM 10.0	0.1 µg/m³	
74	Voc	Volatile Organic Compounds index	index	
75	Nox	Nitrogen Oxides index	index	
76	Temperature	Temperature	0.1 °C	
77	Humidity	Humidity relative	0.1 %	
78	CO₂	Concentration of carbon dioxide	ppm	
79	Ambient Light	Ambient light level	lux	
Status of sensor part				
80	Stat 1	16 bit field <i>0x0020 = inner fan speed warning</i>		
81	Stat 2	16 bit field <i>0x0010 = inner fan blocked</i> <i>0x0040 = RH&T sensor error</i> <i>0x0080 = Gas error (VOC/NOx)</i> <i>0x0200 = CO₂ error 2.part</i> <i>0x0400 = Error of HCHO</i> <i>0x0800 = Error of PM</i> <i>0x1000 = CO₂ error 1.part</i>		
Holding registers - Network Configuration				
0-3	ip0 – ip3	IP address of wired network	-	192,168,0,100
4-7	subn0 – subn3	IP subnet of wired network	-	255,255,255,0
8-11	gw0 – gw3	IP gateway of wired network	-	192,168,0,1
12	modbus port	Modbus TCP port for wired network	-	502
13-18	mac0 - mac5	MAC address of device	-	unique
20	Modbus RTU address	Address for RS485 Modbus RTU	-	1
21	Modbus RTU baudrate	Baudrate for Modbus RTU 0=9600 1=19200 2=38400 3=57600 4=115200	-	1
22	Modbus RTU parity	Parity for Modbus RTU 0=None 1=Even 2=Odd	-	1
30-33	wlanip0 – wlanip3	IP address of wlan network	-	192,168,103,2
34-37	wlsubn0 – wlsubn3	IP subnet of wlan network	-	255,255,255,0
38-41	wlgw0-wlgw3	IP gateway of wlan network	-	192,168,103,1
42	wl modbus TCP	Modbus TCP port for wlan network	-	502
Coils				
0	reset	device performs system reset	-	
1	bootloader enter	device enters bootloader – only for wired networks	-	-
2	save network	Wired, WLAN, RS485 settings will be saved to nonvolatile memory	-	-

3				
4				
5	WLAN enable	if set, device will use also WLAN		

Notes:

- Coils used for saving configurations automatically reset to `0` after execution.
- Float data are stored as follows **32-bit float = 2 registers** (low word + high word).
- value NaN means value not available (in case of integer registers 65535 is applicable)
- WLAN SSID and password must be set up over USB interface
- After saving Network configurations (coil 2), the device performs a reset.

8. USB configuration interface

The AirQuality Unit accepts ASCII commands over the UART interface. UART / VCP USB settings: **115200 baud, 8 data bits, no parity, 1 stop bit (115200/8/n/1)**. Each command must be terminated with a newline character (**\n**).

Responses are returned either as text messages or simple "OK" / "Error".

Command	Description	Example Usage	Example Response
VER?	Returns FW build date	"VER?"	"AirQuality Unit build: Jan 15 2025"
RESET	Triggers a reset	"RESET"	"OK"
METEO	Printout actual measured data	"METEO"	"PM1.0:.....ALS: 123.0"
LANSETTINGS?	Printout actual wired LAN settings	"LANSETTINGS?"	"complete IP settings..."
WIFISettings?	Printout actual wired WLAN settings	"WIFISettings?"	"complete wlan and IP settings..."
IPADR?	Query wired LAN IP	"IPADR?"	„IPADR=192,168,0,100“
SNMASK?	Query wired LAN subnet	"SNMASK?"	„SNMASK=255,255,255,0“
GWADR?	Query wired LAN gateway	"GWADR?"	„GWADR=192,168,0,1“
WLIPADR?	Query WLAN IP	"WLIPADR?"	„WLIPADR=192,168,103,2“
WLSNMASK?	Query WLAN subnet	"WLSNMASK?"	„WLSNMASK=255,255,255,0“
WLGWADR?	Query WLAN Gateway	"WLGWADR?"	„WLGWADR=192,168,103,1“
WLSSID?	Query WLAN SSID	"WLSSID?"	„WLSSID=AirQ“
WLEN?	Query WLAN enable	"WLEN?"	„WLEN=1“

IPADR=	Set wired LAN IP	„IPADR=192,168,0,100“	“OK”
SNMASK=	Set wired LAN subnet	„SNMASK=255,255,255,0“	“OK”
GWADR=	Set wired LAN gateway	„GWADR=192,168,0,1“	“OK”
WLIPADR=	Set WLAN IP	„WLIPADR=192,168,103,2“	“OK”
WLSNMASK=	Set WLAN subnet	„WLSNMASK=255,255,255,0“	“OK”
WLGWADR=	Set WLAN Gateway	„WLGWADR=192,168,103,1“	“OK”
WLSSID=	Set WLAN SSID	„WLSSID=AirQ“	“OK”
WLPASS=	Set WLAN password	“WLPASS=pass123”	“OK”
WLEN=	Set WLAN enable	„WLEN=1“	“OK”

9. Mounting and positioning of the sensor

The following criterias should be taken into account when installing the sensor:

- **Isolation from Airflow**
 - External airflow can create a pressure differential between the device inlets and outlet, potentially affecting measurement accuracy.
 - High-velocity air streams may physically restrict particle entry into the measurement channels.
 - The device should be isolated from direct airflow of nearby equipment (e.g., air purifiers or fans) if the local air velocity exceeds 1 m/s.
 - For applications with airflow >1 m/s, a duct or airflow-conditioning mount is recommended to minimize turbulence at the device inlets.
- **Decoupling from External Heat Sources**
 - Make sure that the device is installed reasonably far from HVAC sources like air conditioning and heating sources
 - Direct exposure to these external sources will make the sensor readings inaccurate
- **Protection from Sunlight**
 - Direct exposure to sunlight may cause temperature offsets, temperature gradients, and accelerate aging of internal components.
 - Sunlight entering the air inlets or outlets may affect particulate matter measurement accuracy.
 - It is recommended to protect the device from direct sunlight, either through suitable design integration or by using a light-shielding cover.

10. Factory settings button

There is a factory reset button on the top panel of the device. This button allows the user to resets the device to the factory state. For succesful factory reset follow the steps:

1. Power up the device (if not powered already) – **do not hold** the button during power-up
2. Push and hold the reset button
3. Wait until the LEDs will start blinking alternately
4. Release the reset button, device will reset itself and the process is done

Document updates

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**On behalf of
Embedded Electronics & Solutions, s.r.o.
we would like to thank you.**

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