



AlphaTracer Office

Modbus 485

Real-time radon measurements

The AlphaTracer is a professional, highly innovative real-time radon sensor for fixed installation in smart buildings for connection to ventilation controls or other devices suitable for digital input signals. It measures Rn-222 activity concentration in indoor air, which is provided as a proportional digital output signal.

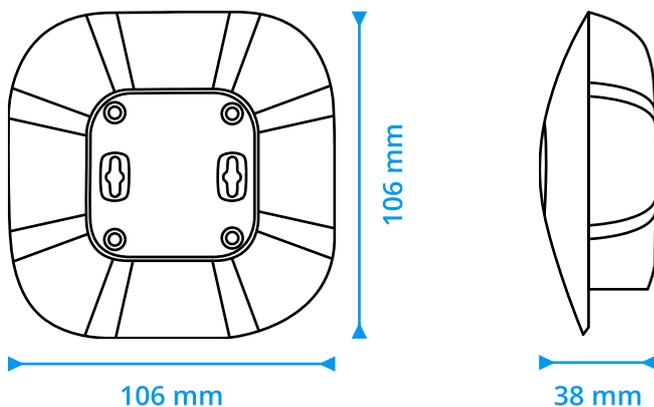


Sensor Specifications

Technology	Lucas Cell
Initial measurement value	10 min
Data interval	10 min
Sensitivity	17 cph at 100 Bq/m ³
Operation conditions	0 – 60 °C , RH < 80 %
Measurement range	0 – 1,000,000 Bq/m ³ (0.2 – 27,000 pCi/l)
Precision	< ± 10 % at 370 Bq/m ³ (10 pCi/l)
Accuracy	< ± 10 %
Data communication	Modbus RS485
Diffusion time	~ 10 min

General Device Specifications

Dimensions, Weight and Placement



Weight: 90 g

The sensor can be mounted in any conceivable position, as it is not sensitive to light or vibration.

Calibration

Recalibration is recommended every 3 years. If the sensor is exposed to very high concentrations (on average more than 1,000 Bq/m³), calibration is recommended every 2 years. A factory calibration is offered by the company LivAir GmbH. The sensor itself does not require any maintenance.

Safety and warning notices



Please read the data sheet carefully before commissioning the AlphaTracer. Damage caused by non-observance of the instructions in the data sheet is excluded from any liability.

- The radon sensor may only be installed by qualified personnel and must be installed in accordance with the data sheet.
- To avoid damage to the sensor, check that it has been connected correctly before applying the supply voltage.
- When unpacking, it must be checked whether the correct device version has been delivered.
- The AlphaTracer may only be used in the manner described in this operating manual. If the product is used in any other way, this may result in danger to the operator as well as destruction of the sensor.
- No technical modifications may be made to the sensor.
- The sensor housing should only be cleaned with a damp cloth. Do not use scouring agents or cleaning agents containing solvents.
- Furthermore, the sensor must not be used if the ambient conditions are not within the limits specified in the data sheet.
- The sensor must not be used in an explosive atmosphere.
- Failure to observe the safety instructions may result in damage to the sensor and injury to the user.

Power and Connectivity Options

Power 5 V (7 – 24 V DC, 16 mA) via JST 1.25 mm 5 Pin

Communication 2-wire modbus interface 7 – 24 V, GND

There are several ways to connect the sensor. As soon as the sensor is supplied with voltage, the measurement starts.



1. DC jack specifications (5.5 mm x 2.5 mm), please use a DC plug 5.5 mm x 2.5 mm. Vcc = 7 – 24 V
2. Terminal block is for serial communication, B-
3. Terminal block is for serial communication, A+
4. Terminal block is used for the shield
5. Terminal block is used for the power supply Vcc, please provide +7 – 24 V
6. Terminal block is used for the GND
7. Stereo jack socket, is not supplied in the Modbus version

The terminal block has following specifications: Pitch: 3,5/3,81 mm, Poles: 3P and 2P, Screw: M2



Please supply the AlphaTracer only one time with voltage!

Modbus

Driver Typ:	Modbus RTU
Polling frequ. max [sec]:	180
Data bits	8
Stop bits	1
Parity	none
RTS	disable
Timeout [ms]:	500

Standard values to read out

Poll the sensor as seldom as possible!
Measured values only change every 10 min.
Too frequent polling (<1 min) can influence the measurement!

Name	DeviceID	Function	Type	Read only	Address	WordSize	ContentType	Modbus Address	
Register 0	1	03/06	Holding Register		0	Word(16bit)	unsigned	Modbus Address	1*
Register 4	1	03/06	Holding Register		4	Word(16bit)	unsigned	Baudrate	5*
Register 20	1	03	Holding Register	x	20	Dword(32bit)	unsigned	Radon value live	16*
Register 22	1	03	Holding Register	x	22	Dword(32bit)	unsigned	Radon value 24h	17*
Register 24	1	03	Holding Register	x	24	Dword(32bit)	unsigned	Radon value long	18*
Register 26	1	03	Holding Register	x	26	Word(16bit)	unsigned	Radon entries since start	19*

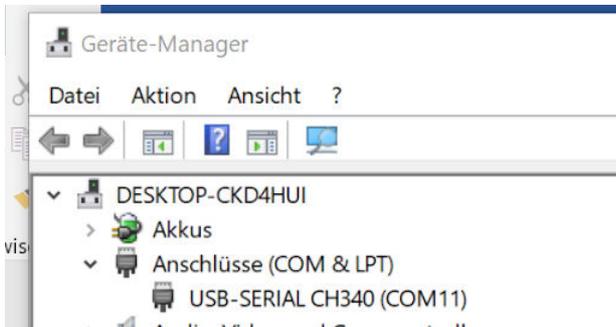
1*	2-248 1*standard
5*	0=2400 1=4800 *2=9600 3=19200 4=38400
16*	Radon value live 0-2,000,000 Bq/m ³
17*	Radon value 24h 0-2,000,000 Bq/m ³
18*	Radon value long 0-2,000,000 Bq/m ³
19*	Radon entries [10 min] since start

As default the sensor is using slave address 1. The radon value can be found in register 20.

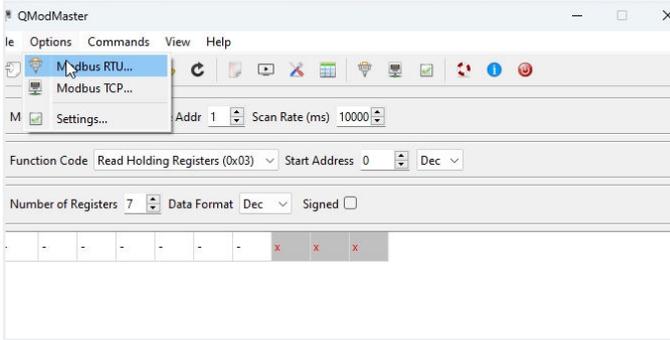
Example 1 - QModMaster

You can use the open source program QModMaster, which you can download here: <https://sourceforge.net/projects/qmodmaster/>

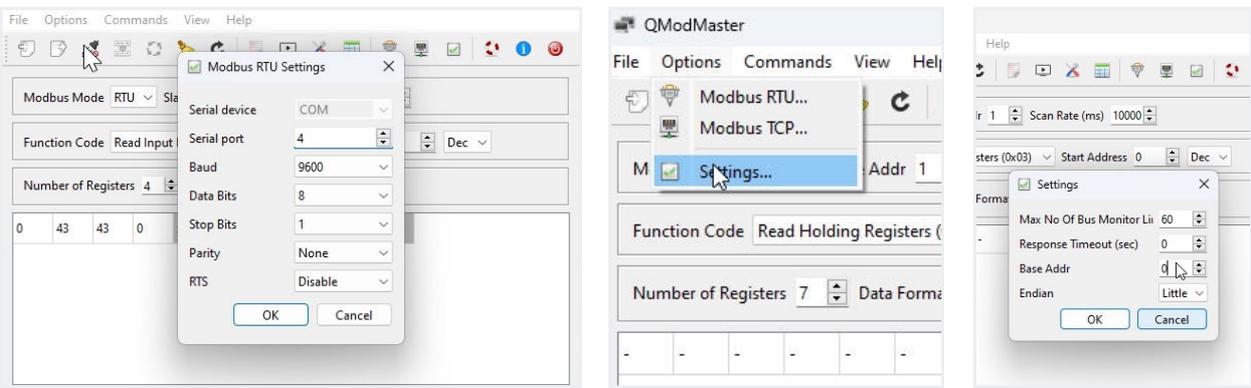
Just check which Com Port your USB to RS485 adapter is using. In our case it's COM11.



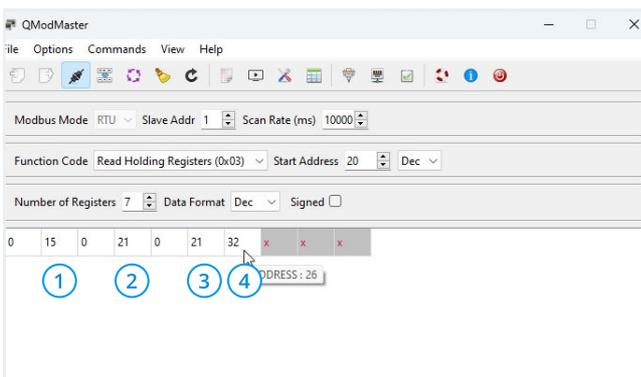
Select **Modbus RTU...** in the **Options** menu.



Set **Serial device** to **Com**, **Serial port** to **4** and **Baud** to **9600** and go to **Settings** and switch the **Base Addr** to **0**.



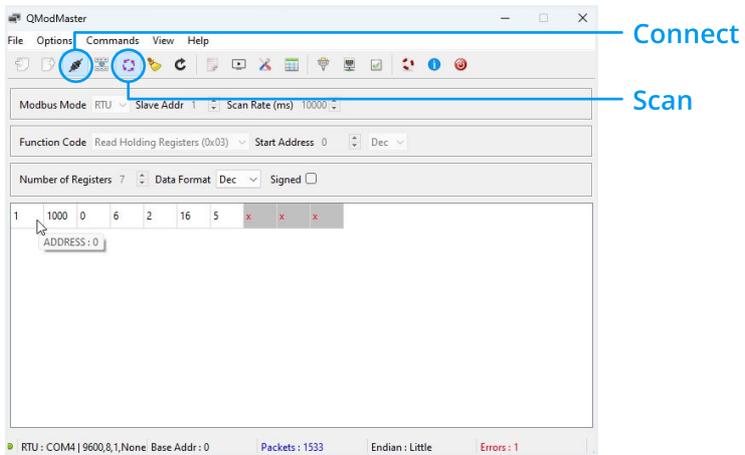
Set the **Modbus Mode** to **RTU** and **Slave Addr** to **1**. Important, put the **Scan Rate** to **10000 ms** (which means every 10 seconds). Normally we recommend to set the scan rate to 10 minutes, because the sensors radon value is updated every 10 minutes. A faster scan rate just disturbs the sensors radon measurement process.



In this example, we read 7 registers.

1. Radon value live
2. Radon value 24h
3. Radon value long since start
4. Radon entries since start

Define **Function Code Read Holding Registers (0x03)** and **Start Address 0**, **Number of Registers 7** and the **Data Format Dec**. **Connect** and activate **Scan** (so that the tool automatically updates the information every 10 seconds). Now you can see the sensor address in register 0.

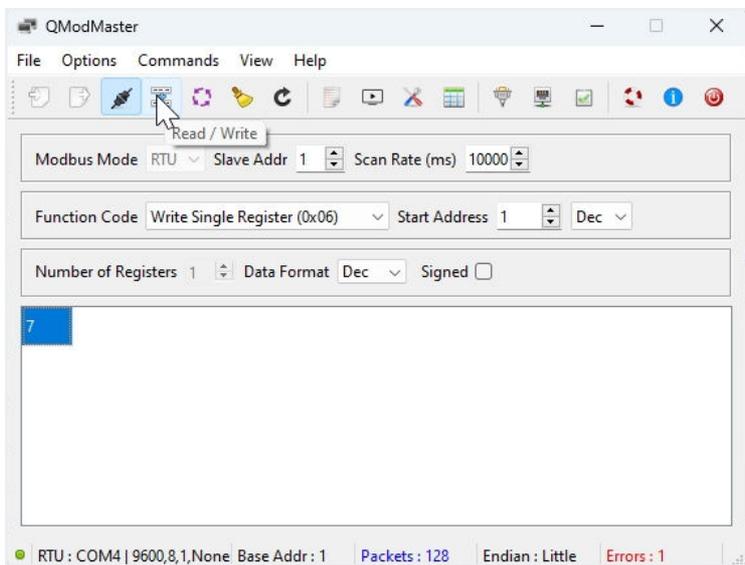


How to change the slave id address?

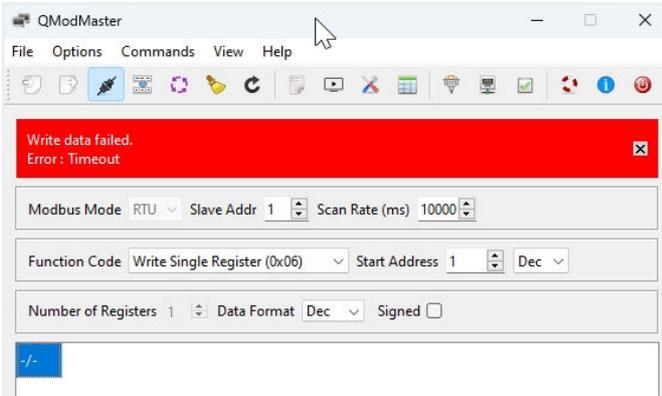
If you want to use more than one sensor on the cable, then you need to give each sensor its own address. By default each sensor is on the Modbus slave id 1.

You can change the slave id as follows:

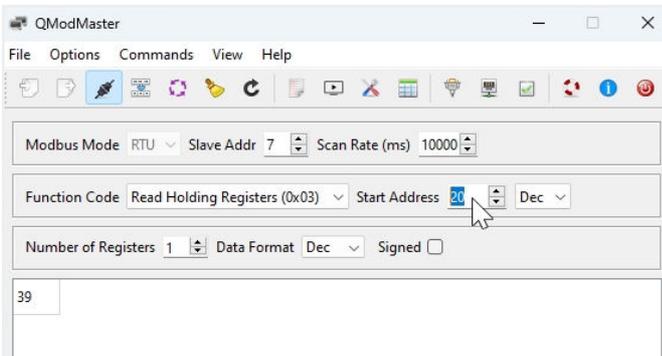
1. Select **Function Code Write Single Register (0x06)**
2. Now you can write for example the slave address to 7
3. Press the button **Read/Write**



If you now try to read out the input register again, you will get an error message because the tool cannot reach the sensor on **Slave Addr 1**, that means that the change of the slave address has worked.



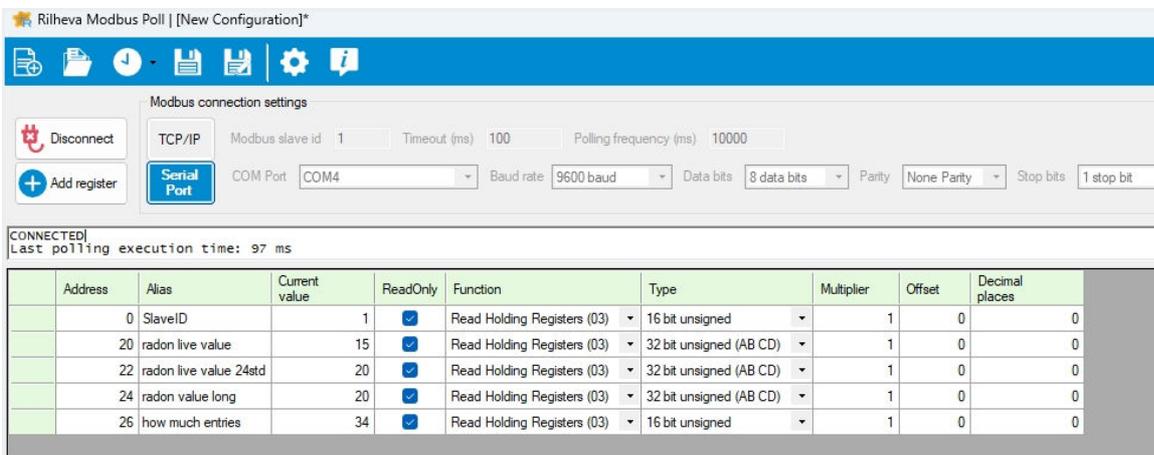
Let's change the **Slave Addr** to **7** and the **Start Address** to **20** and test again.



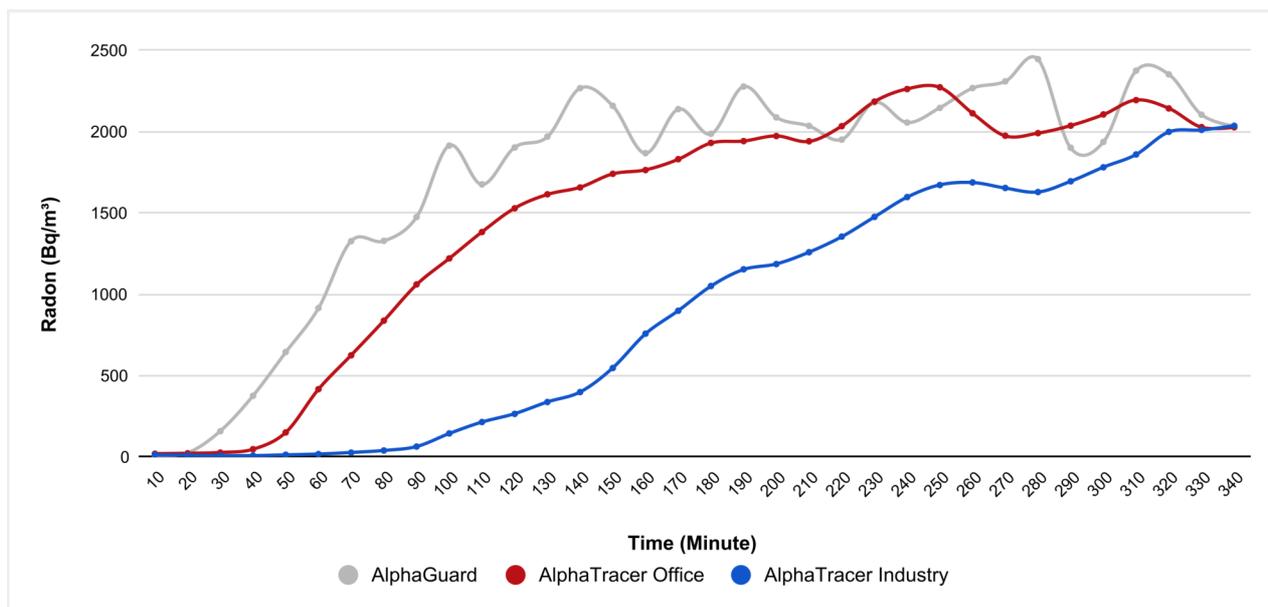
As a result the connection works and we get the radon live value on address 20.

Example 2 - Rilheva Tool

There is a free version called Rilheva Modbus Poll that you can download here:
<https://www.rilheva.com/rilheva-modbus-poll-desktop-edition>



Comparative measurement



In this example, we have induced (under laboratory conditions) a very rapid increase in the Radon-222 activity concentration from 30 to over 2,500 Bq/m³:

Both AlphaTracer variants show, only delayed in time, the same total exposure as the reference instrument AlphaGuard (approx. 15,000 Euro acquisition cost).

Thus, the **AlphaTracer Office** reaches the measurement curve of the reference instrument with a time delay of approx. 30 min, the **AlphaTracer Industry** with a delay of approx. 100 min due to its IP54 class.

A very fast increase or decrease of the radon concentration leads to a delayed reproduction of the concentration change for radon measuring instruments with a denser housing and consequently slower air entry, but the correct measurement of the total exposure is not falsified or impaired by this.



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