CH4rlie

The monitoring station

We plan to install in the barn two fixed stations to continuously measure environmental parameters (Temperature, barometric Pressure, Humidity) and Methane and Carbon dioxide concentrations.
The data is sent to a server and recorded into a database for analysis.

Main components of a station

- a board to measure T,P,H that implements a BME280 sensor (MIKROE-5761)
- a Laser Gas Detector to measure the concentration of CH4 and CO2 (LGD Compact-A by Axetris)
- a vacuum pump and a filter to flow air into the cell detector
- a Wi-Fi ESP8266 microcontroller (Adafruit Feather HUZZAH)
- a GSM router for internet connection (QUARTZ-LITE-GW21-LTE by Siretta)

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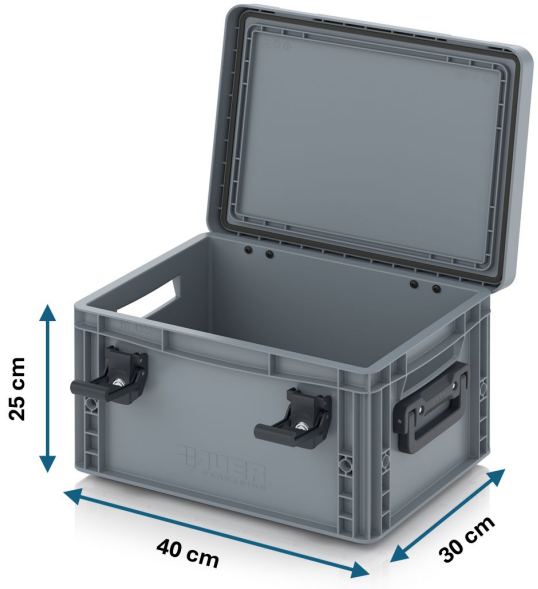
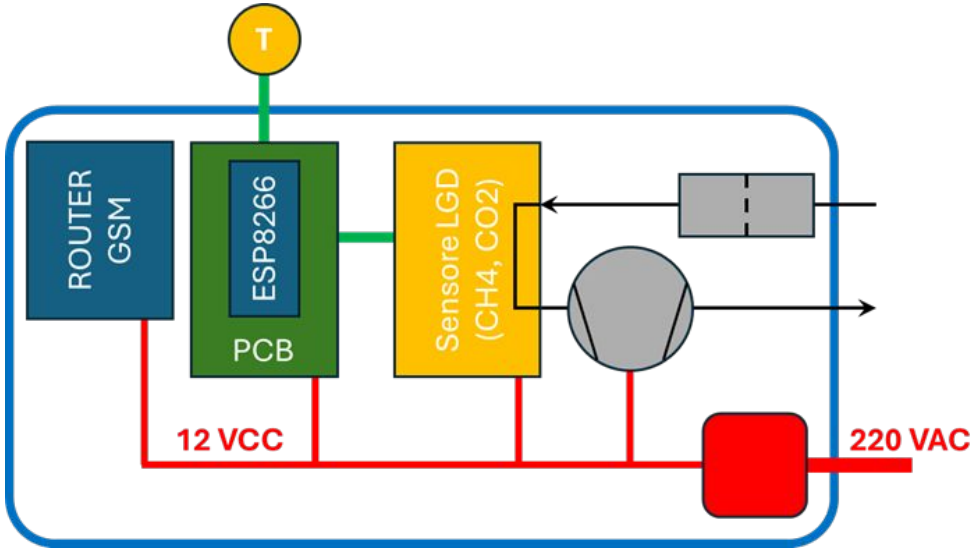
The monitoring station

The components must be housed in a closed box with high degree of protection





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The monitoring station

The LGD sensor

	CH4	CO2
Range	<100 ppm	< 40 000 ppm
Precision (2s)	< 0.8 ppm	< 250 ppm

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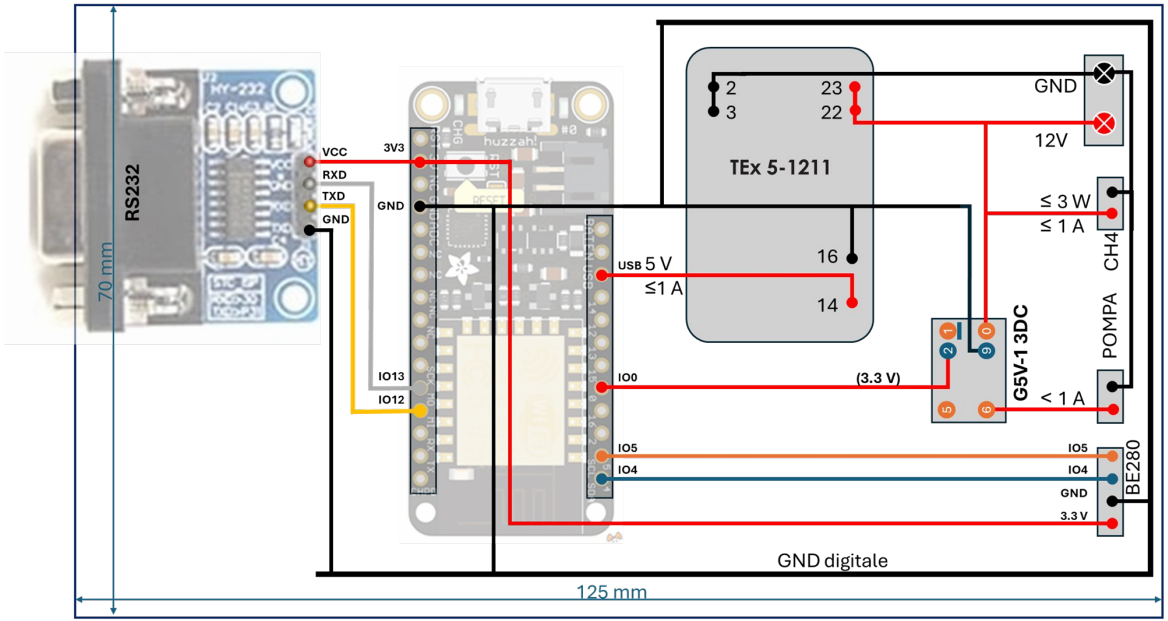
The monitoring station

A custom PCB is being realized to power the devices and to connect them to the microcontroller.



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The monitoring station

Software has been prepared and tested

- Microcontroller. Switch on/off the pump, read sensors, connect to the server, send data. Readout frequency to be set.
- Server. Receive data from the station and store it in a mysql database. Tools to download and track data from any site.

The prototype of the custom PCB should be ready for tests in one month.
We expect to have the first of the two stations in March.

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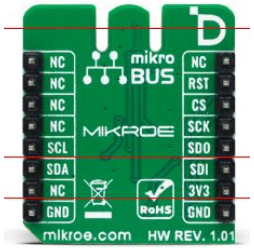
The monitoring station



The microprocessor reads the sensors

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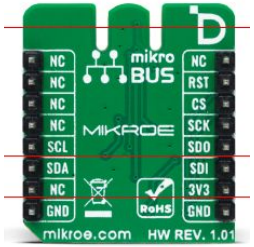
The monitoring station



The microprocessor is connected to a GSM router via Wi-Fi

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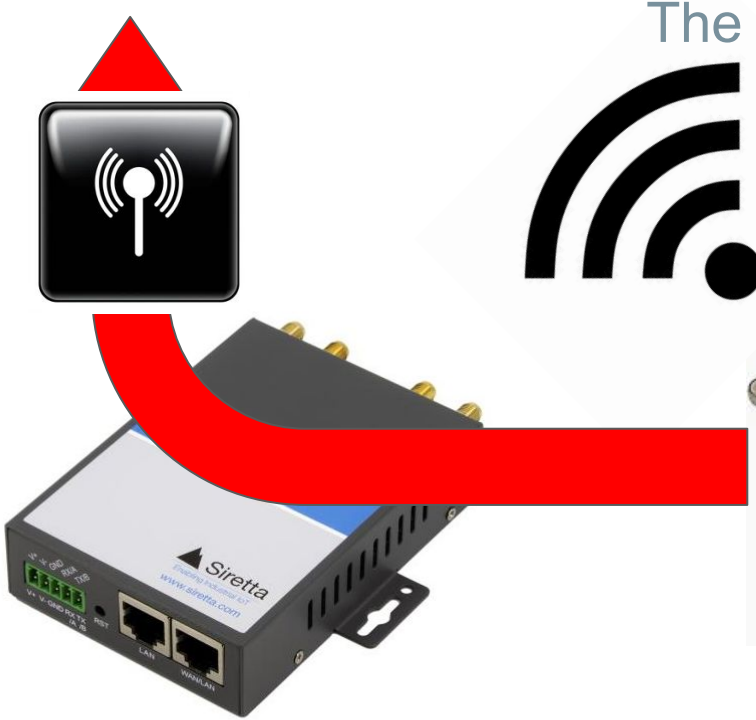
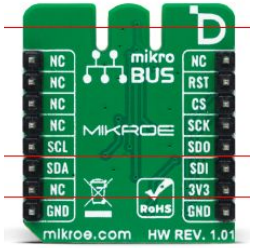
The monitoring station





The microprocessor establishes a TCP/IP connection to the server and send data

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The monitoring station

The server accepts data and stores it in a Mysql database

num	timestamp	nevt	temp	rh	pressure	lgdcmd	lgderr	lgdCH4	lgdCO2	sens4
926	1734342489	262	18.44	31	102721	77	0	100.6	2002.96	NULL
927	1734342492	263	18.45	31	102725	77	0	100.59	2052.38	NULL
928	1734342495	264	18.43	31	102719	77	0	100.59	2038.69	NULL
929	1734342498	265	18.43	31	102719	77	0	100.6	2043.67	NULL
930	1734342501	266	18.44	31	102721	77	0	100.59	2026.55	NULL
931	1734342504	267	18.43	31	102721	77	0	100.58	2043.22	NULL
932	1734342507	268	18.44	31	102719	77	0	100.58	2058.48	NULL
933	1734342510	269	18.43	31	102721	77	0	100.57	2067.83	NULL
934	1734342513	270	18.43	31	102720	77	0	100.57	2067.11	NULL
935	1734342516	271	18.43	31	102718	77	0	100.56	2067.48	NULL
936	1734342519	272	18.42	31	102721	77	0	100.55	2084.9	NULL
937	1734342521	273	18.43	31	102723	77	0	100.55	2074.92	NULL

data on the server can be:

- downloaded in csv
- analysed using Root

We are thinking to integrate Grafana