



Spolufinancováno
Evropskou unií

2022-2-IT02-KA210-SCH-000097208

CUP H812/22000550006

Vzdělávací program STEM pro znečištění ovzduší ve školách

Soubor technických nástrojů STAIR

Podpora této publikace ze strany Evropské komise nepředstavuje podporu jejího obsahu, který odráží pouze názory autorů, a Komise nenesou odpovědnost za jakékoli použití informací v ní obsažených.

Obsah

| | |
|-------|----|
| | 3 |
| | 5 |
| | 8 |
| | 10 |
| | 12 |
| | 17 |
| | 19 |

Jednotka STAIR pro kontrolu kvality ovzduší

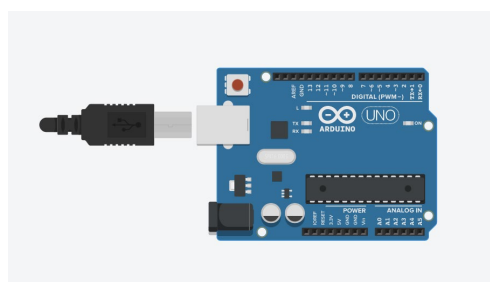
Glosář -

Slovníček pojmů -

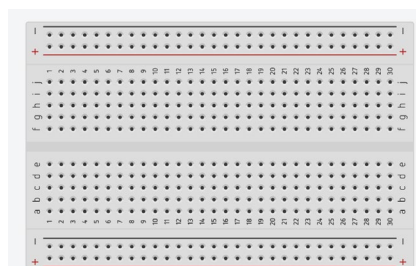
Glosář -

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1.0 Jak sestavit jednotku kontroly kvality STAIR krok za krokem - Hardware:

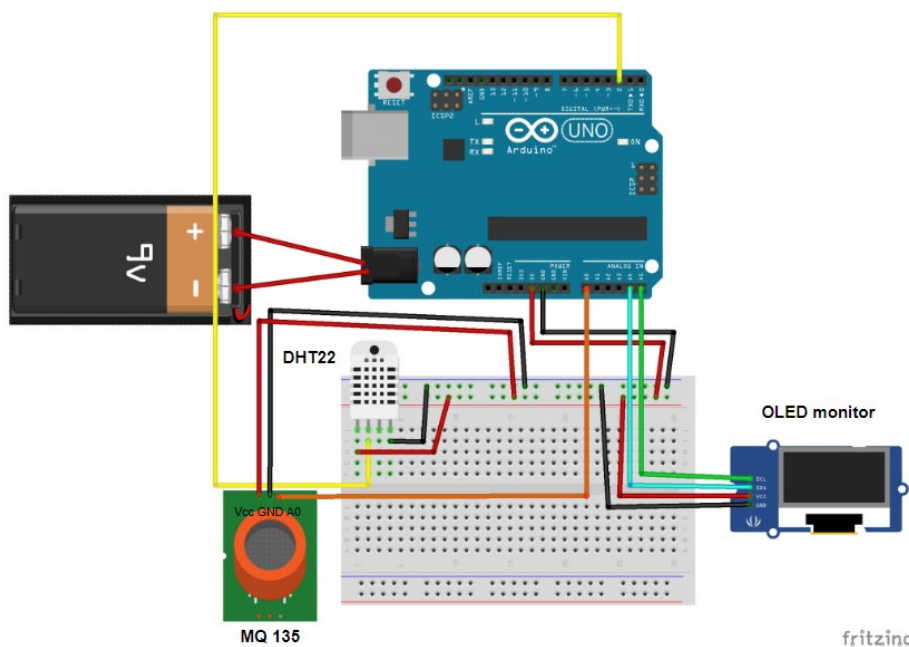
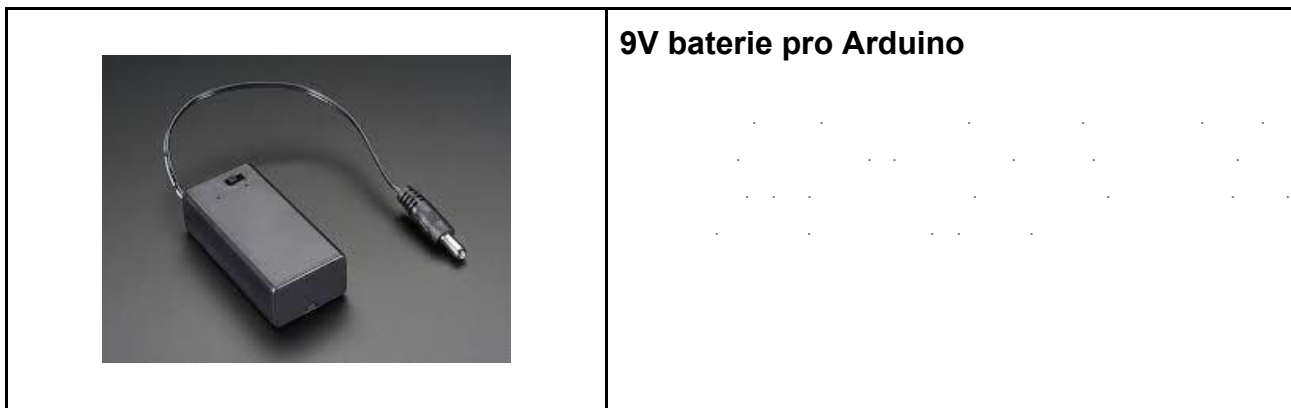


Arduino Uno:



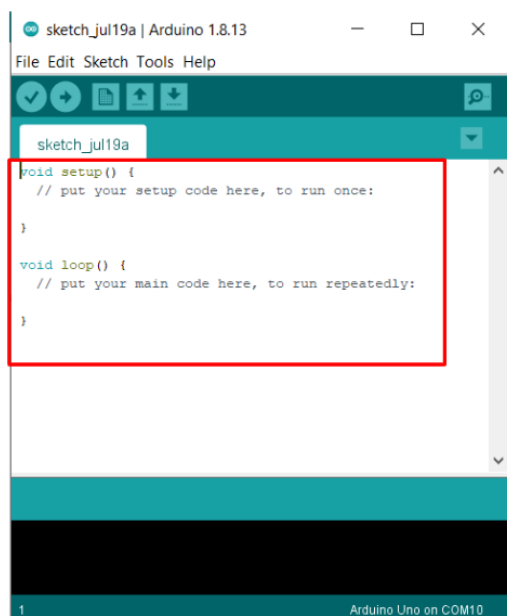
Breadboard nebo prototypová deska 400 otvorů:

| | |
|---|---|
|  | <p>Senzor plynu MQ135</p> |
|  | <p>Kabel USB</p> |
|  | <p>SSD1306, 128 x 64 pixelů I2C OLED displej:</p> |
|  | <p>Transformátor 12V pro Arduino</p> <p style="text-align: right;">-06</p> |



2.0 Jak používat Arduino Uno krok za krokem - Software:

Řídicí jednotka kvality vzduchu STAIR



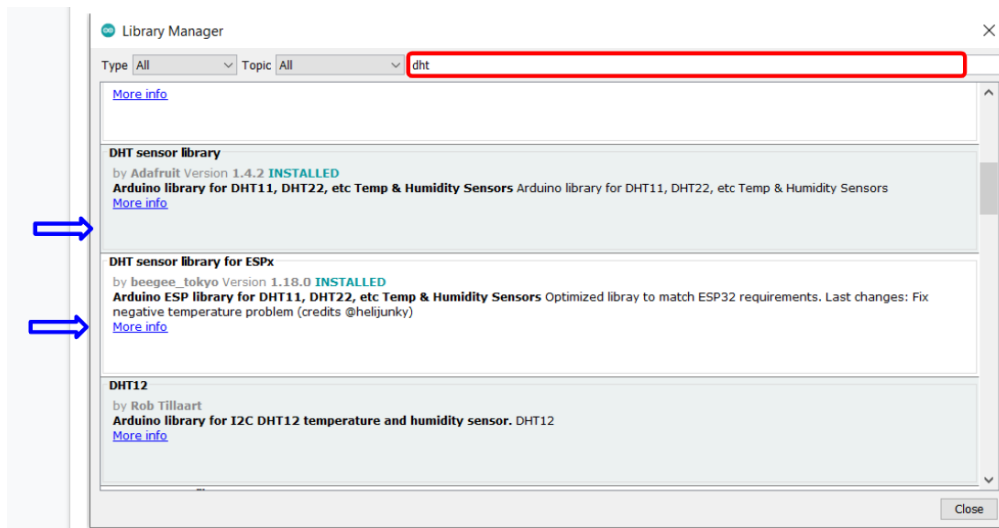
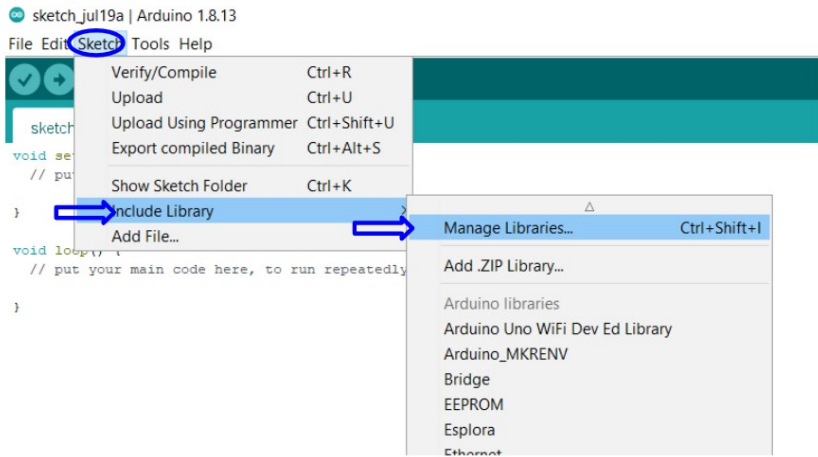
```
sketch_jul19a
void setup() {
  // put your setup code here, to run once:
}

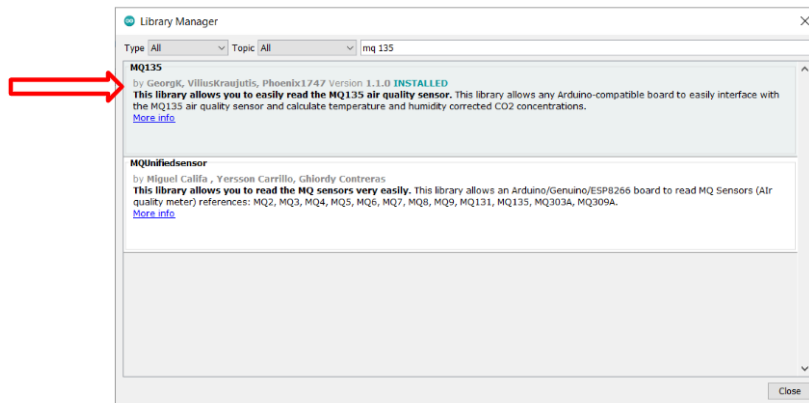
void loop() {
  // put your main code here, to run repeatedly:
}

1 Arduino Uno on COM10
```

3.0 Jak nastavit knihovny pro MQ 135 a DHT22:

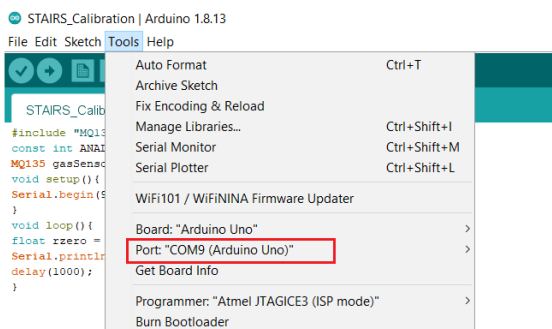
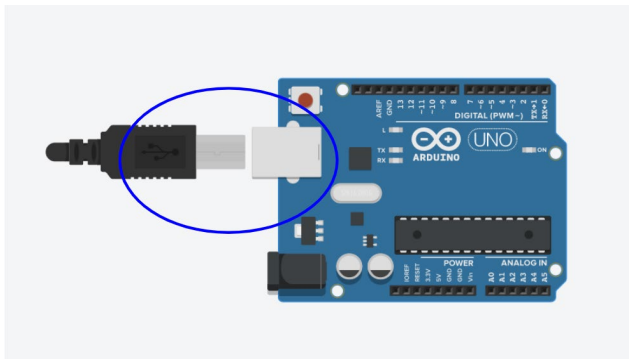
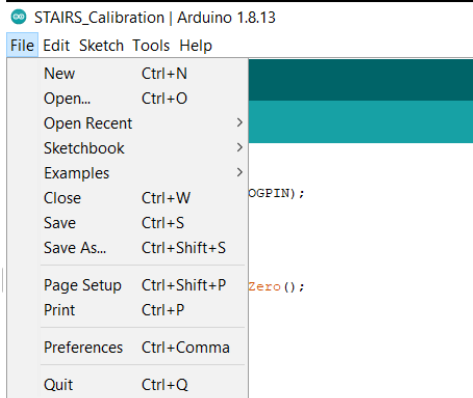
Glosář -





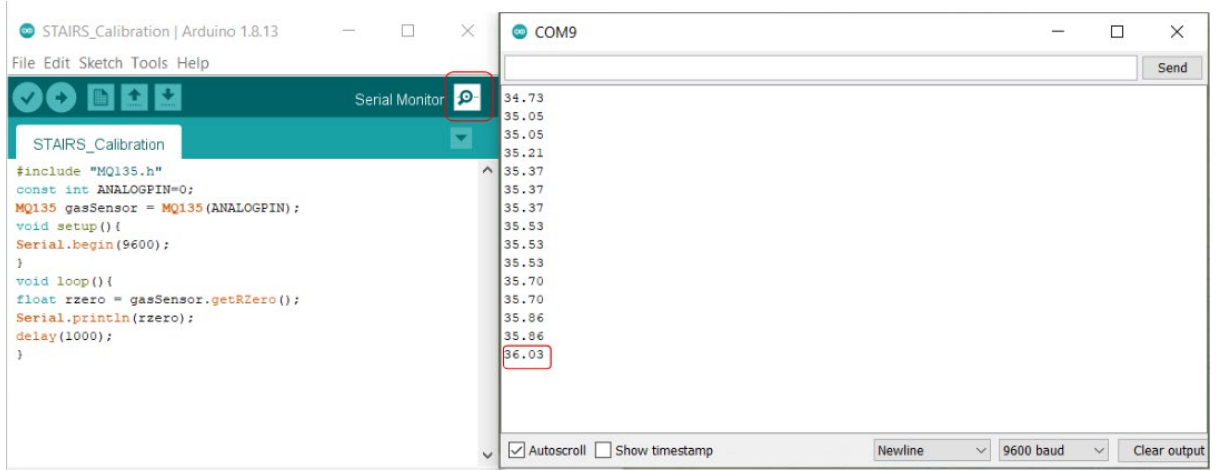
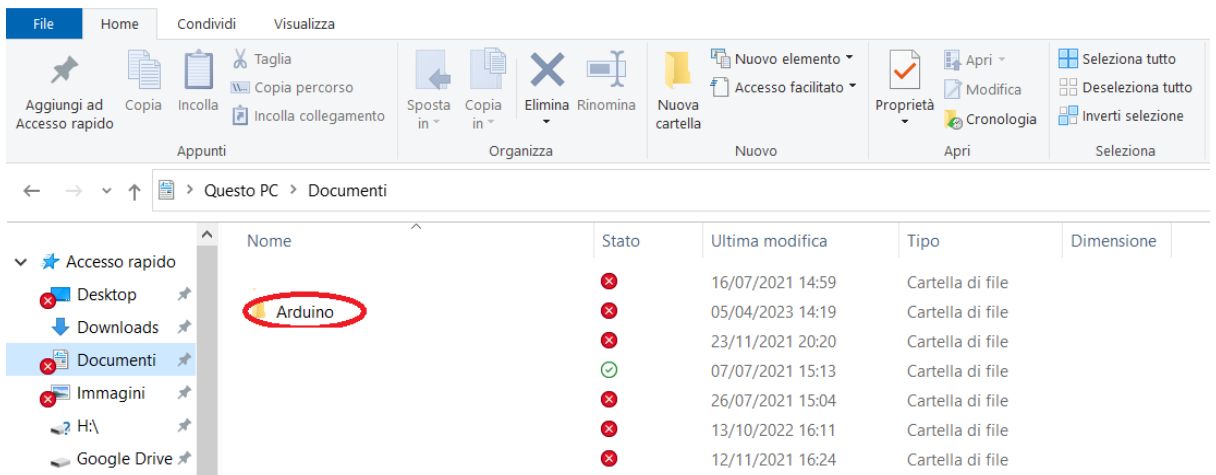
4.0 Jak kalibrovat snímač MQ 135:





```

STAIRS_Calibration | Arduino 1.8.13
File Edit Sketch Tools Help
Upload
STAIRS_Calibration
#include "MQ135.h"
const int ANALOGPIN=0;
MQ135 gasSensor = MQ135(ANALOGPIN);
void setup(){
  Serial.begin(9600);
}
void loop(){
  float rzero = gasSensor.getRZero();
  Serial.println(rzero);
  delay(1000);
}
  
```

| Nome | Stato | Ultima modifica | Tipo | Dimensione |
|----------------|-------|------------------|------------------|------------|
| Accesso rapido | | | | |
| Desktop | ✗ | 16/07/2021 14:59 | Cartella di file | |
| Downloads | ✗ | 05/04/2023 14:19 | Cartella di file | |
| Documenti | ✗ | 23/11/2021 20:20 | Cartella di file | |
| Immagini | ✓ | 07/07/2021 15:13 | Cartella di file | |
| H:\ | ✗ | 26/07/2021 15:04 | Cartella di file | |
| Google Drive | ✗ | 13/10/2022 16:11 | Cartella di file | |
| | ✗ | 12/11/2021 16:24 | Cartella di file | |

libraries

MQ135

MQ135.h

```
MQ135.h - Blocco note di Windows
File Modifica Formato Visualizza ?
/*****
#ifndef MQ135_H
#define MQ135_H

#if ARDUINO >= 100
#include "Arduino.h"
#else
#include "WProgram.h"
#endif

// Parameters for calculating ppm of CO2 from sensor resistance
#define PARA 116.6020682
#define PARB 2.769034857

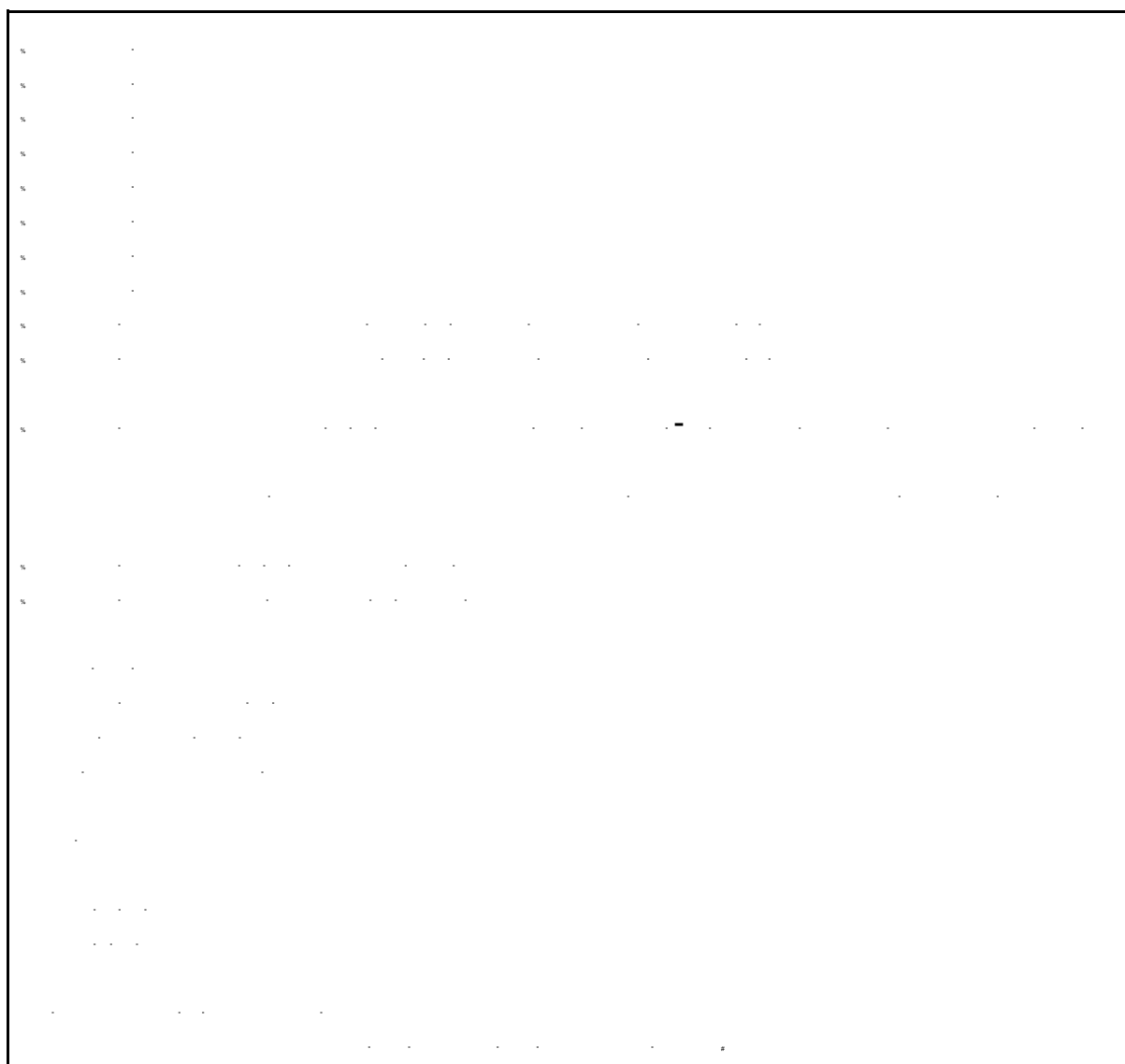
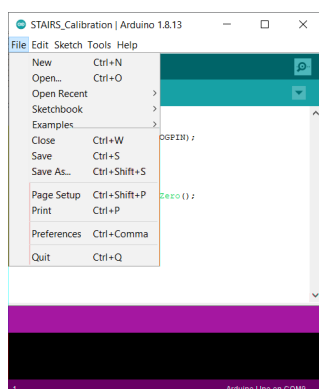
// Parameters to model temperature and humidity dependence
#define CORA .00035
#define CORB .02718
#define CORC 1.39538
#define CORD .0018
#define CORE -.003333333
#define CORF -.001923077
#define CORG 1.130128205

// Atmospheric CO2 level for calibration purposes
#define ATMOCO2 414.47 //Global CO2 Aug 2021

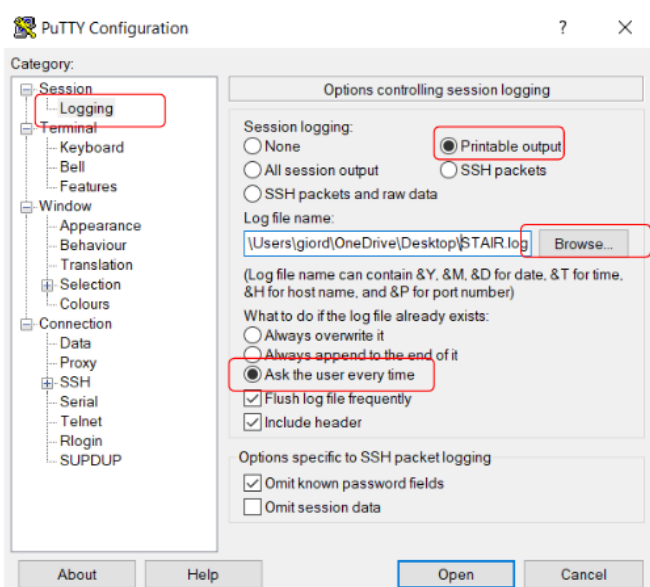
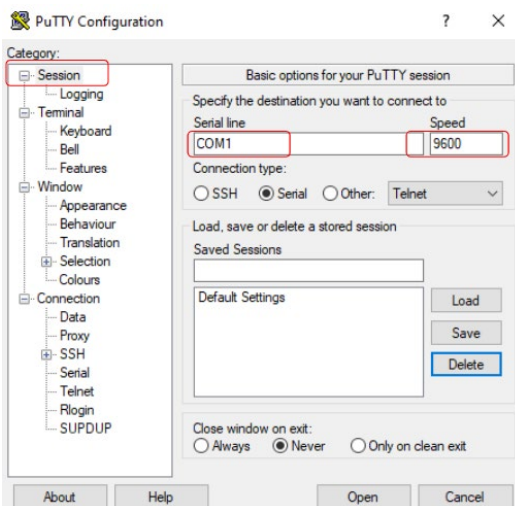
class MQ135 {
private:
uint8_t _pin;
float _rload; // The load resistance on the board in kOhm
float _rzero; // Calibration resistance at atmospheric CO2 level

public:
MQ135(uint8_t pin, float rzero=42.16, float rload=10.0);
float getCorrectionFactor(float t, float h);
float getResistance();
float getCorrectedResistance(float t, float h);
float getPPM();
float getCorrectedPPM(float t, float h);
float getRZero();
float getCorrectedRZero(float t, float h);
};
#endif
```

5.0 Jak zahájit sběr dat pomocí řídicí jednotky kvality ovzduší STAIR:



| | |
|---|--|
| } | |
| | |
| } | |
| | |
| } | |
| | |



File Name
Save as:

PuTTY Configuration

Category:

- Session
- Logging
- Terminal
 - Keyboard
 - Bell
- Features
- Window
 - Appearance
 - Behaviour
 - Translation
- Selection
- Colours
- Connection
 - Data
 - Proxy
 - SSH
 - Serial
 - Telnet
 - Rlogin
 - SUPDUP

Basic options for your PuTTY session

Specify the destination you want to connect to

Serial line: Speed:

Connection type:
 SSH Serial Other:

Load, save or delete a stored session

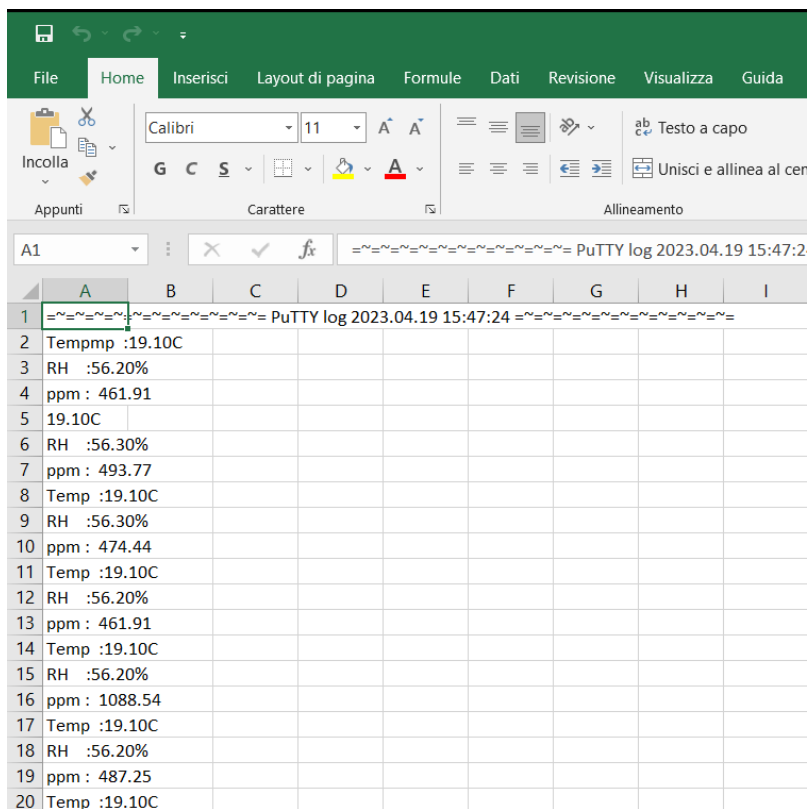
Saved Sessions:

Default Settings:

Close window on exit:
 Always Never Only on clean exit

```
COM9 - PuTTY
RH : 55.80%
ppm : 120052.66
Temp : 19.10C
RH : 55.80%
ppm : 640.55
Temp : 19.10C
RH : 55.80%
ppm : 128949.17
Temp : 19.10C
RH : 55.90%
ppm : 648.77
Temp : 19.10C
RH : 55.90%
ppm : 123521.75
Temp : 19.10C
RH : 55.80%
ppm : 120052.66
Temp : 19.10C
RH : 55.80%
ppm : 127109.39
Temp : 19.10C
RH : 55.80%
ppm : 577.91
```

POZOR!



| | A | B | C | D | E | F | G | H | I |
|----|---|-----------|---|---|---|---|---|---|---|
| 1 | ===== PuTTY log 2023.04.19 15:47:24 ===== | | | | | | | | |
| 2 | Tempmp | :19.10C | | | | | | | |
| 3 | RH | :56.20% | | | | | | | |
| 4 | ppm | : 461.91 | | | | | | | |
| 5 | Temp | :19.10C | | | | | | | |
| 6 | RH | :56.30% | | | | | | | |
| 7 | ppm | : 493.77 | | | | | | | |
| 8 | Temp | :19.10C | | | | | | | |
| 9 | RH | :56.30% | | | | | | | |
| 10 | ppm | : 474.44 | | | | | | | |
| 11 | Temp | :19.10C | | | | | | | |
| 12 | RH | :56.20% | | | | | | | |
| 13 | ppm | : 461.91 | | | | | | | |
| 14 | Temp | :19.10C | | | | | | | |
| 15 | RH | :56.20% | | | | | | | |
| 16 | ppm | : 1088.54 | | | | | | | |
| 17 | Temp | :19.10C | | | | | | | |
| 18 | RH | :56.20% | | | | | | | |
| 19 | ppm | : 487.25 | | | | | | | |
| 20 | Temp | :19.10C | | | | | | | |