WEATHER CONTROLLER MANUAL

LE CMP 6.0 ROAD WEATHER STATION

1. ESTABLISHING COMMUNICATION WITH THE METEOROLOGICAL STATION

Communication with the station can take place in several ways:

- via the serial RS485 communication input for service communication at the station itself (labels: "OUT(RS485)"),
- via Ethernet and IP technology: local and remote (labels: "ETH")
- by connecting to the local route device (road traffic station),
- remotely from the competent traffic management and control center via the basic communication network (Ethernet / optics SM, MM)

1.1. Local connection

Local connection can be performed using a terminal program (e.g. Termite, Modscan, Hercules, etc.).

The "Termite" terminal was used as an example for connection.

When starting the terminal, delete the record history by clicking the "Clear" command.

For serial communication, it is necessary to adjust the settings as follows (click on the "Settings" command to open an additional "Serial port settings" window):

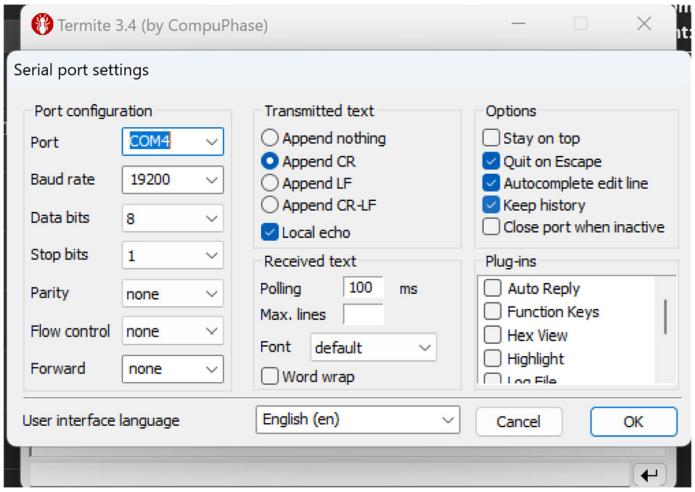
- PORT – set the COM port through which communication takes place
- BAUD RATE: 19200
- DATA BITS: 8
- STOP BITS: 1
- PARITY: none
- FLOW CONTROL: none
- FORWARD: none
- TRANSMITTED TEXT: select "Append CR" and check "Local echo"
- RECEIVED TEXT:
    - Polling-100ms
    - Max.lines - leave blank

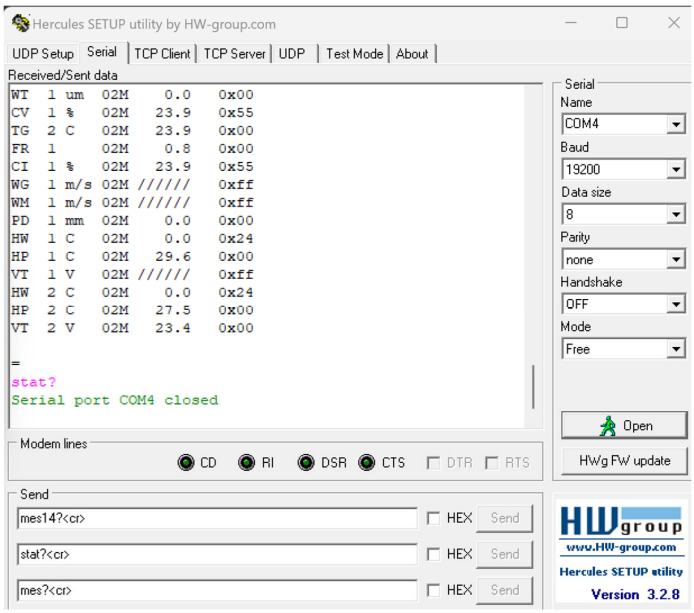
- Font-default
- Uncheck "Word wrap"

- OPTIONS: check "Quit on Escape", "Autocomplete edit line", "Keep history", uncheck other parameters
- PLUG-INS: uncheck all parameters

After all the necessary settings have been configured, click on the confirmation of the selection ("OK") and if the connection is not established automatically, click on the command "click to connect".

Example: Retrieving data via serial communication





Connecting to the station via an IP client is done via any test computer. The test computer must be in the same subnet as the weather station (e.g. the predefined IP address may be 192.168.0.101/24, in which case the test computer should be in the same subnet).

Communication ends when the client closes the TCP/IP connection.

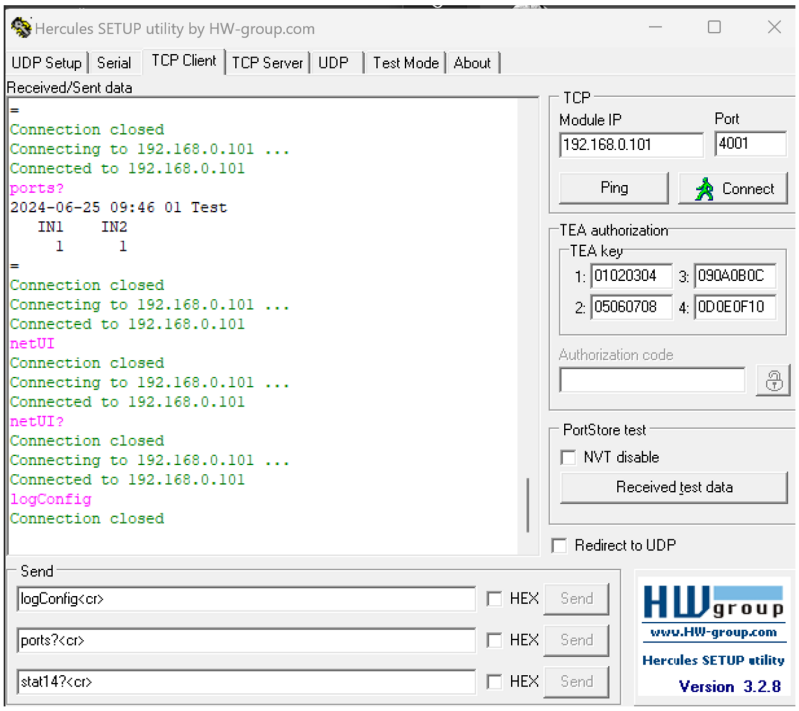
Additionally, as a possibility to check the operation and availability of measured data from the station, it is possible to check it via a web browser using the "VTO_LED CMP" web interface (it is not possible to read or download data from the meteorological station via the web interface).

By successfully connecting to the weather station controller, the commands shown and listed in the next chapter (Chapter: "2. Commands for local/remote data reading") can be entered and sent for the purpose of retrieving the necessary data from the weather station.

The format of received meteorological data as examples of responses from a meteorological station can be seen in Chapter 2, and the obtained measured quantities, units and ranges are described in Chapter 3 ("Tables of meteorological measured values").

The weather station can transfer all or part of the data from Table 1, depending on the number of sensors connected to it.

Example: Retrieving data via Ethernet and IP technology using the "Hercules SETUP 3.2.8" tool



1.2. Remote connection

Remote connection to the weather station is possible via TCP/IP connection. The protocol to the station is in ASCII format. Each command sent to the station must have a UNIX line termination method, i.e. it must end with CR (carriage return).

2. COMMANDS FOR LOCAL/REMOTE DATA READING

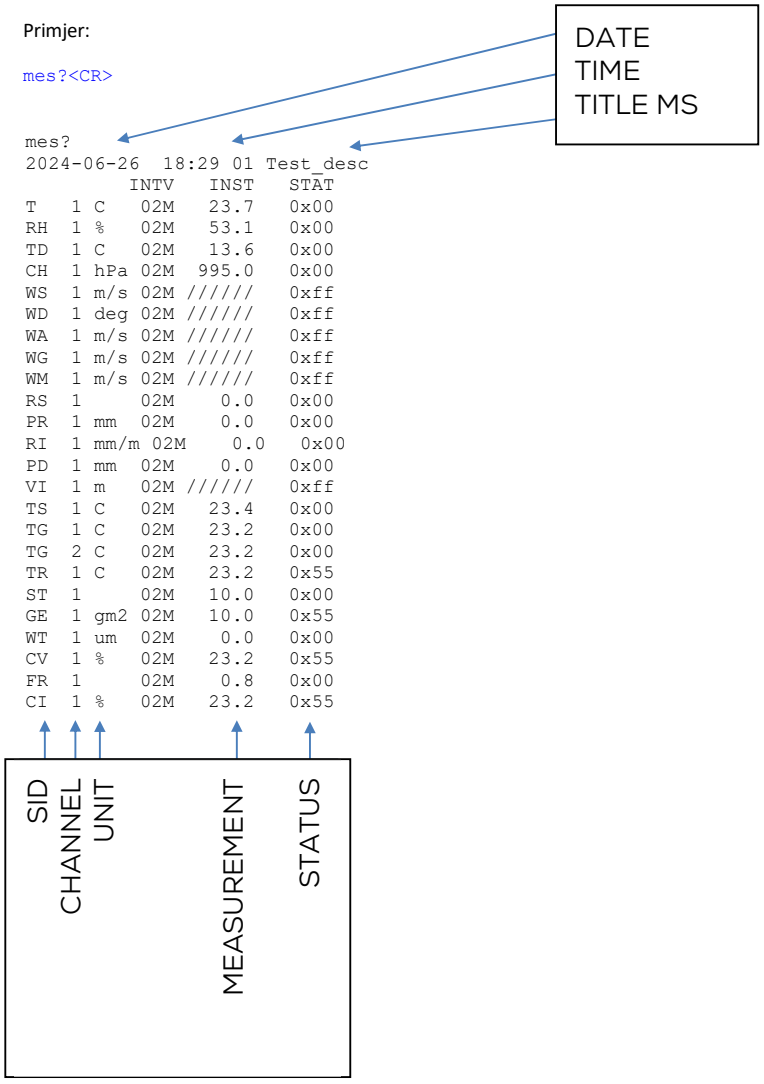
2.1. COMMAND: mes?<CR>

Retrieve measurement data in a structured printout and read sensor status.

Primjer:

```
mes?<CR>
```

```
mes?
2024-06-26  18:29 01 Test_desc
          INTV   INST   STAT
T   1 C   02M   23.7   0x00
RH  1 %   02M   53.1   0x00
TD  1 C   02M   13.6   0x00
CH  1 hPa 02M  995.0   0x00
WS  1 m/s 02M ////// 0xff
WD  1 deg 02M ////// 0xff
WA  1 m/s 02M ////// 0xff
WG  1 m/s 02M ////// 0xff
WM  1 m/s 02M ////// 0xff
RS  1     02M    0.0   0x00
PR  1 mm  02M    0.0   0x00
RI  1 mm/m 02M    0.0   0x00
PD  1 mm  02M    0.0   0x00
VI  1 m   02M ////// 0xff
TS  1 C   02M   23.4   0x00
TG  1 C   02M   23.2   0x00
TG  2 C   02M   23.2   0x00
TR  1 C   02M   23.2   0x55
ST  1     02M   10.0   0x00
GE  1 gm2 02M   10.0   0x55
WT  1 um  02M    0.0   0x00
CV  1 %   02M   23.2   0x55
FR  1     02M    0.8   0x00
CI  1 %   02M   23.2   0x55
```



2.2. COMMAND: mes14?<CR>

Retrieve measurement data and print it in the format recommended for retrieving measurement data from the central system.

With the command "mes14" the station returns the read measurements of each sensor and each measurement adjusted for retrieving measurement data from the central system. The obtained measurements are defined in the table at the end of the document called *"Table 1. - Measurement quantity, unit and range"*

Example:

```
months14?<CR>

month14?
2024-06-26 18:29,01,M14,Test_desc
01 23.7;02 53.1;03 13.6;12 995.0;05 //////;06 //////;07 //////;80 //////;
81 //////;23 0.0;08 0.0;09 0.0;82 0.0;11 //////;30 23.4;31 23.2;
46 23.2;35 23.2;36 10.0;40 10.0;42 0.0;43 23.2;86 0.8;85 23.2;
=
```

Remark:

Eg: "01 23.7;"

"01" - The first piece of information represents the "ID" of the sensor or measurement according to the names in the table below.

"Table 1. - Measurement quantity, unit and range"

"23.7" - The second data item represents the measurement data of the individual measurement data item under the "ID" of the first data item. The measurement data can be found in the table below:

"Table 1. - Measurement quantity, unit and range"

";" – symbol separating individual measurements

" //////" - the symbol represents the non-measurable nature of the data. For additional interpretation of the symbol, it is necessary to read the measurement status under the corresponding ID using the "stat14" function.

2.3. COMMAND: rstat?<CR>

Retrieve the status of warning and alarm conditions.

Example:

```
rstat?<CR>


            start?
            2024-06-26 18:29 01 Test_desc
                   RAIN ICE FROST VISIBILITY
                      0 0 0 0

            =
```

Meanings of warnings and alarms:

RAIN :

0 = no warning

1 = rain warning (RAIN ALARM)

ICE:

0 = no warning

1 = ice warning (ICE Warning)

2 = ice danger (ICE alarm)

FROTS:

0 = no frost

1 = danger of frost (FROST alarm)

VISIBILITY:

0 = no danger

1 = visibility warning (VIS warning)

2 = visibility hazard (VIS alarm)

2.4. COMMAND: stat14?<CR>

Retrieve measurement data and print it in the format recommended for retrieving measurement data from the central system.

With the command "stat14" the station returns the status of each sensor and each measurement. The obtained statuses are defined in the table:

"Table 4. - Sensor Status"

Example of a weather station response:

```
stat14?<CR>
            stat14?
            2024-06-26 18:29,01,M14,Test_desc
            01 00;02 00;03 00;12 00;05 ff;06 ff;07 ff;80 ff;
            81 ff;23 00;08 00;09 00;82 00;11 ff;30 00;31 00;
            46 00;35 55;36 00;40 55;42 00;43 55;86 00;85 55;
            =
```

Remark:

Eg: "01 00;"

"01" - The first piece of information represents the "ID" of the sensor or measurement according to the names in the table below.

"Table 1. - Measurement quantity, unit and range"

"00" - The second data item represents the measurement status of the measurement data item under the "ID" of the first data item. The meaning of the data item can be read from

"Table 4. Sensor Status".

";" – symbol separating individual measurements

2.5. COMMAND: ports?<CR>

Access status status of digital inputs.

Example:

```
ports?<CR>
ports?
            2024-06-26 18:29 01 Test_desc
               IN1 IN2 IN3 IN4
                 1 1 1 1
            =
```

Meaning of status and state of digital inputs:

1 = open, 0= closed

IN1 - door open status

IN2 - mains power status (DC OK)
IN3 – UPS battery status
IN4 – surge arrester status

2.6. COMMAND: ports?<CR> timeset Dow Mnt Dy 00:00:00 CEST 2024<CR>

Command to set date and time.

Example:

```
timeset Fri Sep 6 13:17:10 CEST 2024<CR>

MET responds:
b'pet, 6.09.2024. 13:17:10 CEST\n'
```

Explanation:
Dow*– day of the week (Mon, Tue, Wed, Thu, Fri, Sat and Sun)*
Mnt*– month of the year (Jan, Feb, Mar …and so on)*
Dy –*day of the month (1, 2, 3…)*

2.7. COMMAND: service?<CR>

Command to read the status of service measurements (sensor heaters, sensor voltage, etc.)

Example:

```
service?<CR>
2025-07-11 15:21 01 Test_desc
         INTV INST STAT
SP 1 02M ////// 0xff
RP 1 02M ////// 0xff
SD 1 02M ////// 0xff
TO 1 C 02M ////// 0xff
HW 1 C 02M 0.0 0x24
HP 1 C 02M 26.8 0x00
VT 1 V 02M ////// 0xff
HW 2 C 02M 0.0 0x2b
```

```
HP 2 C 02M 24.5 0x00

VT 2 V 02M 23.4 0x00
```

=

2.8. COMMAND: reboot?<CR> >

Command to reset the weather controller.

3. METEOROLOGICAL VALUE TABLES

Table 1. – Measurement quantity, unit and range:

Naziv mjerne veličine	sid	id	Jedinica	Raspon	Status senzora (STAT)
AIR TEMP	T	1	°C	-50.00 … 60.00	**Tablica 4**
REL HUM	RH	2	%	0.00 … 100.00	**Tablica 4**
DEW POINT	TD	3	°C	-50.00 … 60.00	**Tablica 4**
REL AIR PRESS	CH	12	hPa	300.0 … 1200.0	**Tablica 4**
W SPEED	WS	5	m/s	0.00 …90.00	**Tablica 4**
W DIREC	WD	6	deg	0.00 … 359.00	**Tablica 4**
AWG W SPEED	WA	7	m/s	0.00 …90.00	**Tablica 4**
WIND GUST SPEED	WG	80	m/s	0.00 …90.00	**Tablica 4**
MAX W SPEED	WM	81	m/s	0.00 …90.00	**Tablica 4**
PREC TYP	RS	23	status	**Tablica 2**	**Tablica 4**
PREC QUAN	PR	8	mm	0.00 … 100000.0	**Tablica 4**
PREC INTENS	RI	9	mm/h	0.0 … 200.0	**Tablica 4**
PERC DIFF QUANT	PD	82	mm	0.00 … 100000.0	**Tablica 4**
VIS	VI	11	m	10.0 … 20000.00	**Tablica 4**
SURF TEMP	TS	30	°C	-40.00 … 80.00	**Tablica 4**
GROUND TEMP 10cm	TG	31	°C	-40.00 … 80.00	**Tablica 4**
GROUND TEMP 30cm	TG	46	°C	-40.00 … 80.00	**Tablica 4**
FREZ TEMP *	TR	35	°C	-40.00 … 0.00	**Tablica 4**
SURF STAT	ST	36	status	**Tablica 3**	**Tablica 4**
SALT QTY *	GE	40	g/m2	0.00 … 100.00	**Tablica 4**
LAYER TICKNESS **	WT	42	µm	0.00 … 4000.00	**Tablica 4**
SALT CONC *	CV	43	%	0.00 … 100.00	**Tablica 4**
FRICTION	FR	86		0 … 1	**Tablica 4**
ICE COVERAGE	CI	85	%	0.00 … 100.00	**Tablica 4**

*Napomena: podaci se mjere samo u slučaju kada temperatura površine kolnika padne ispod 4°C
Napomena: stanje površine kolnika ovisi o debljini vodenog sloja (<30um-suho**, 30um<**vlažno**<200um u >200um-**mokro)**

Table 2. – precipitation type status:

Status	Precipitation type
0	No precipitation

60	Rain
70	Snow
40	Unknown
67	Freezing rain
69	Blizzard
90	Fight

Table 3. – Roadway status:

Status	**Road condition**
10	dry
15	humid
20	wet
25	Wet salted
30	Wet salted
35	ice
40	snow
45	frost

**Note: the condition of the road surface depends on the thickness of the water layer (<30um-dry, 30um<wet<200um and >200um-wet)

Table 4. – Sensor status:

Status	**Sensor status**
0x00	OK
0x10	Unknown query
0x11	Invalid parameter
0x24	Invalid channel
0x28	Device is not ready.
0x50	Measured variable outside set range
0x51	
0x52	Measured data outside set range
0x53	
0x54	Measurement error
0x55	Measurements are not ready.
0xff	Data read failed

4. SETTING THE BASIC PARAMETERS OF THE METEO CONTROLLER

In the Command Prompt program, it is possible to change the IP address of the weather controller, set the weather station name, reset the controller, check the list of current directories, find out the permission levels, stop and start services, etc.

Each controller has a default IP address, user and password:

IP: 192.168.0.100

Username: user1

Password: LY234pVt1

To change the IP address, it is necessary to connect to the controller in the Command Prompt using the following command:

ssh user1@192.168.0.100

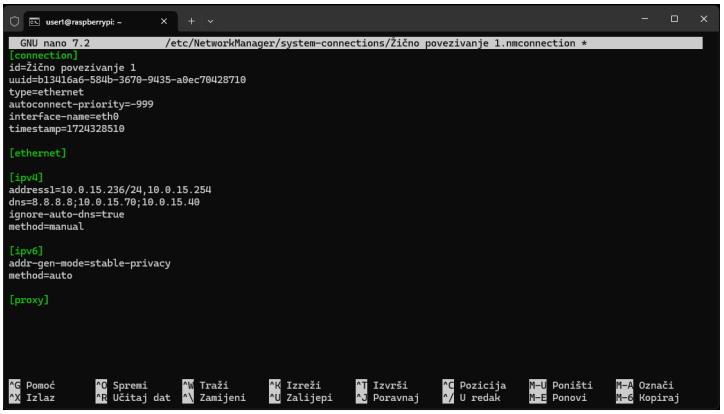
The program will then ask for a password (the entry is hidden and after entering it you need to click enter)

Then you need to open the configuration file using the following command:

sudo nano /etc/NetworkManager/system-connections/Wired Connection 1.nmconnection

After running the file in the field*ipv4* set address1 (IP address, subnet mask and gateway) and dns, and add the line ignore-auto-dns=true

After entering data, save the changes with ctrl+X (exit) and then ctrl+D (save).



Changing the name of a weather station can be done using the following command:

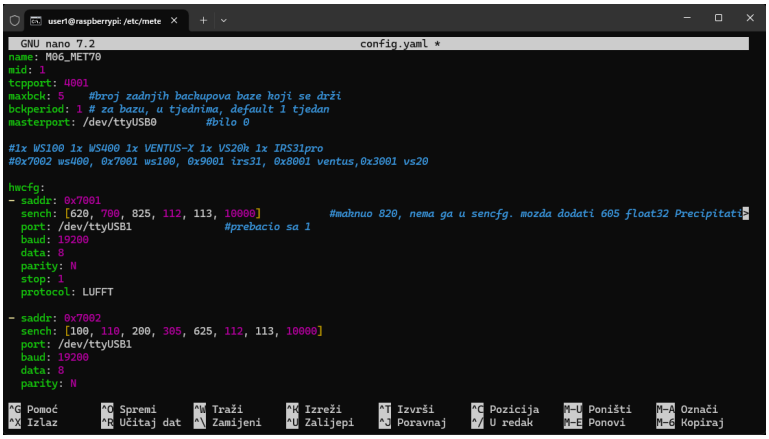
```
sudo nano /etc/meteo_py/config.yaml
```

The first line contains name where you enter the desired name of the weather station.

After entering data, it is necessary to save the changes with ctrl+X (exit) and then ctrl+D (save).

Changes on the meteo controller will be visible only after the controller is reset. A controller reset can be initiated using the following command:

```
sudo reboot
```



To check the level of rights, the command is used:

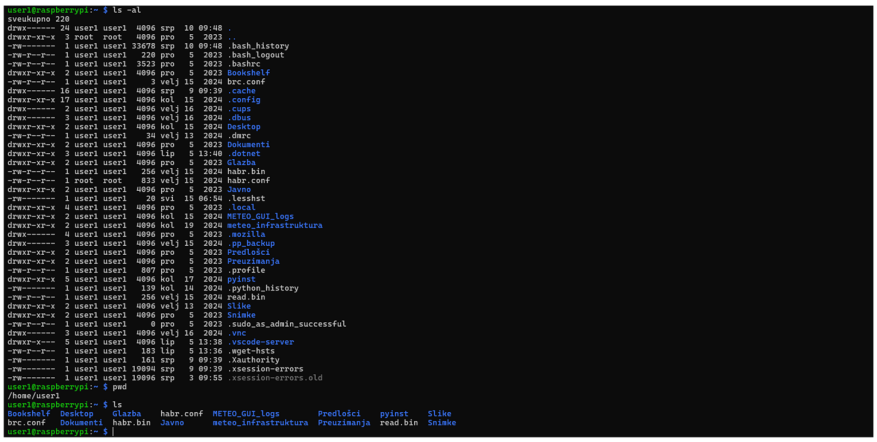
ls -al

To check the current directory, use the command:

pwd

The list of current directories can be opened using the command:

yes



5. CONNECTING TO THE METEO CONTROLLER AND ADJUSTING THE SENSOR PARAMETERS IN THE CONFIGURATION FILE

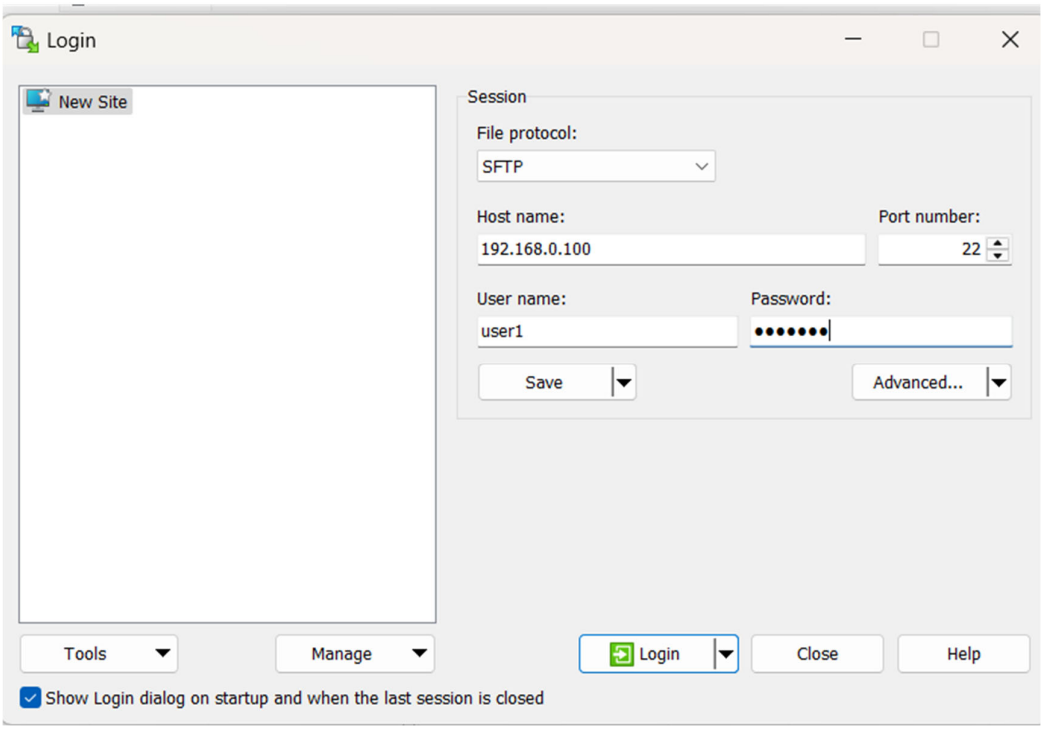
To manage the sensor parameters, it is necessary to connect to the meteo controller using the winSCP program:

Host name: IP address of the controller

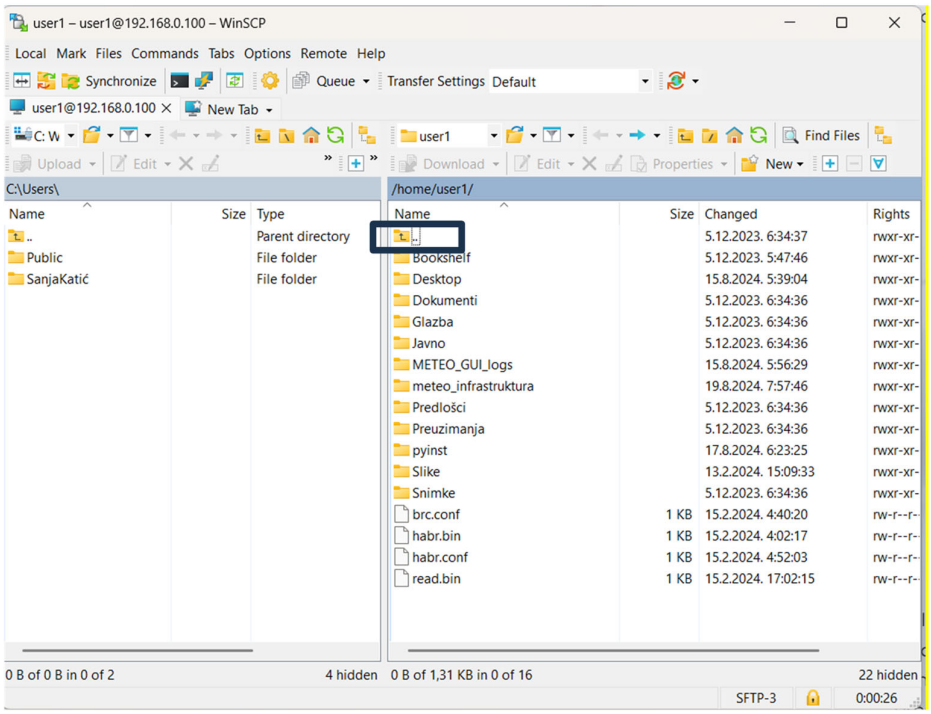
Username: user name

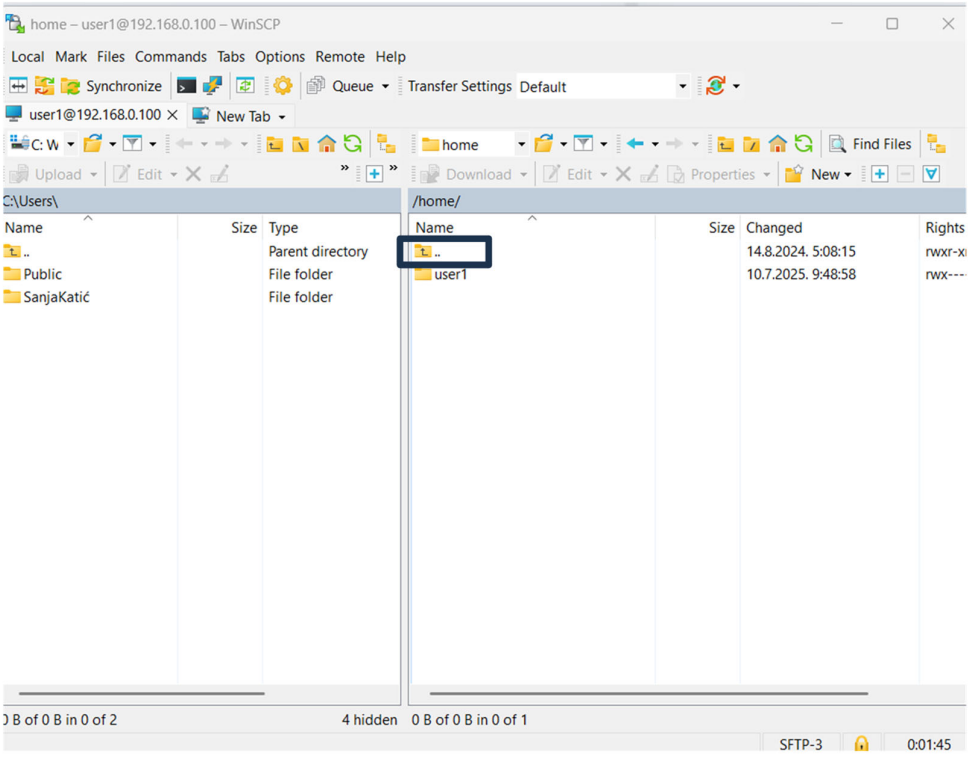
Password: enter password

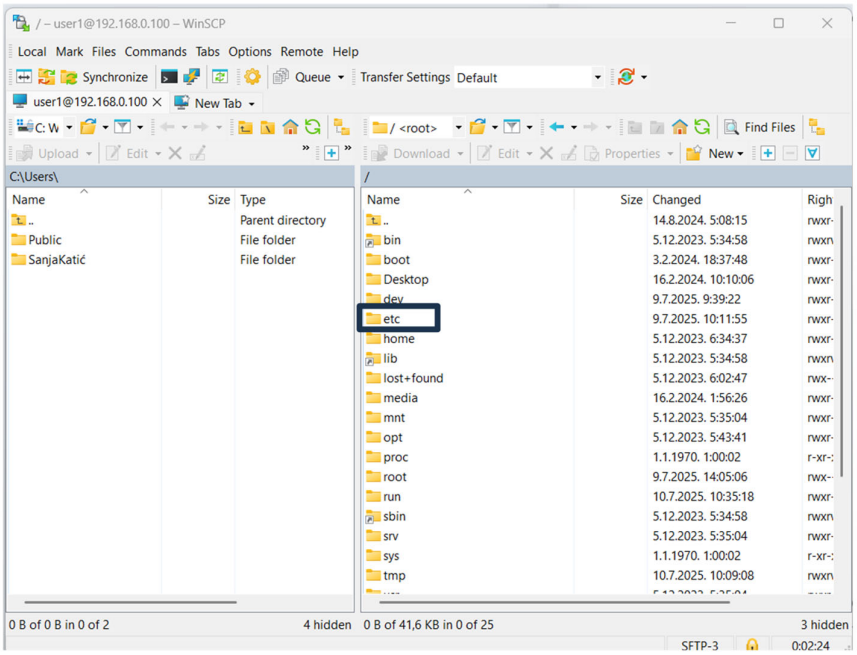
After entering the required information, click Login.

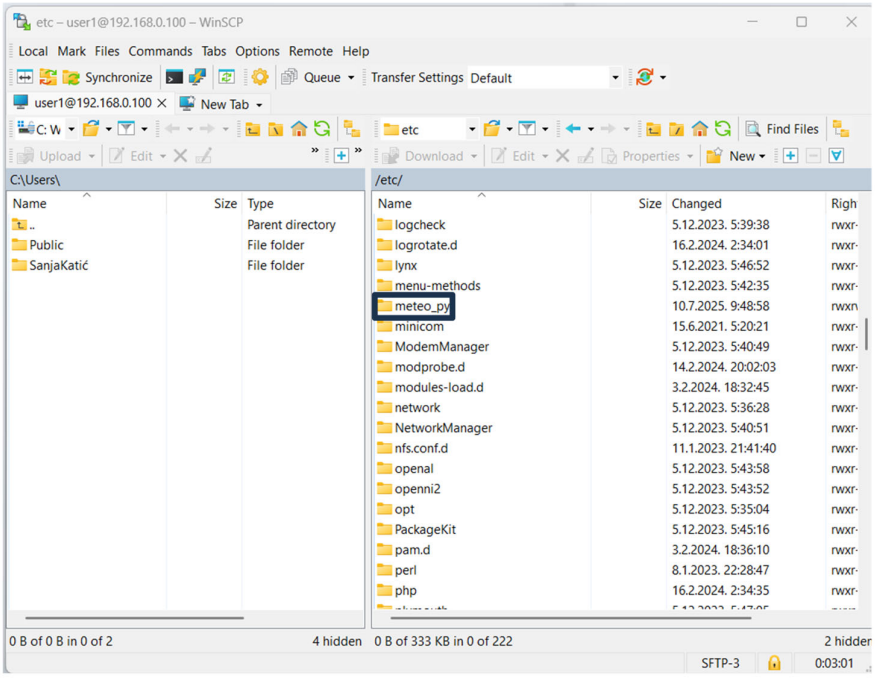


After logging in, you need to select the folders in the order marked in the images below:


user1 – user1@192.168.0.100 – WinSCP
Local Mark Files Commands Tabs Options Remote Help
Synchronize
Queue
Transfer Settings Default
user1@192.168.0.100
New Tab
C:\Users\
Name Size Type
.. Parent directory
Public File folder
SanjaKatić File folder
/home/user1/
Name Size Changed Rights
.. 5.12.2023. 6:34:37 rwxr-xr-
Bookshelf 5.12.2023. 5:47:46 rwxr-xr-
Desktop 15.8.2024. 5:39:04 rwxr-xr-
Dokumenti 5.12.2023. 6:34:36 rwxr-xr-
Glazba 5.12.2023. 6:34:36 rwxr-xr-
Javno 5.12.2023. 6:34:36 rwxr-xr-
METEO_GUI_logs 15.8.2024. 5:56:29 rwxr-xr-
meteo_infrastruktura 19.8.2024. 7:57:46 rwxr-xr-
Predlošci 5.12.2023. 6:34:36 rwxr-xr-
Preuzimanja 5.12.2023. 6:34:36 rwxr-xr-
pyinst 17.8.2024. 6:23:25 rwxr-xr-
Slike 13.2.2024. 15:09:33 rwxr-xr-
Snimke 5.12.2023. 6:34:36 rwxr-xr-
brc.conf 1 KB 15.2.2024. 4:40:20 rw-r--r-
habr.bin 1 KB 15.2.2024. 4:02:17 rw-r--r-
habr.conf 1 KB 15.2.2024. 4:52:03 rw-r--r-
read.bin 1 KB 15.2.2024. 17:02:15 rw-r--r-
0 B of 0 B in 0 of 2
4 hidden
0 B of 1,31 KB in 0 of 16
22 hidden
SFTP-3
0:00:26

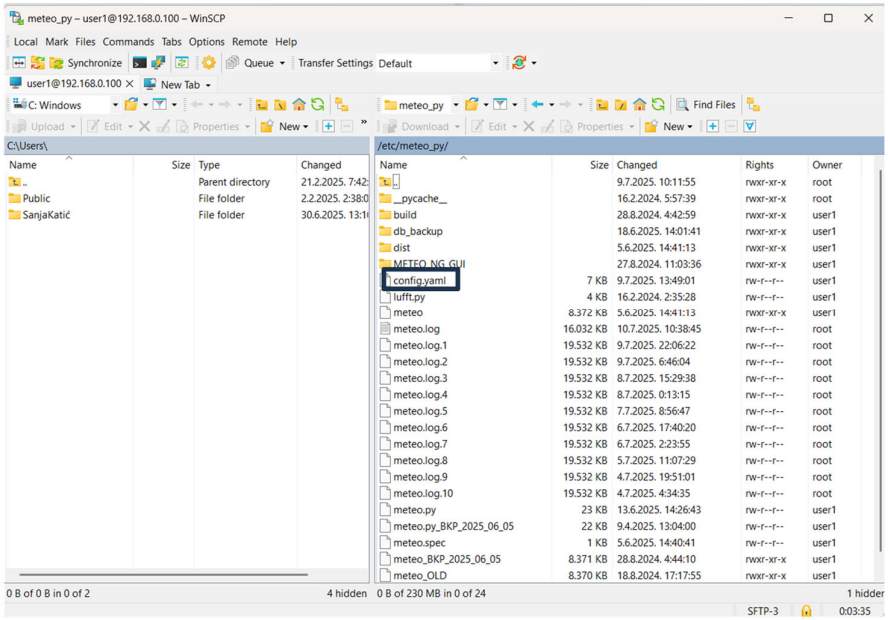

home – user1@192.168.0.100 – WinSCP
Local Mark Files Commands Tabs Options Remote Help
Synchronize
Queue
Transfer Settings Default
user1@192.168.0.100
New Tab
C:\Users\
Name Size Type
.. Parent directory
Public File folder
SanjaKatić File folder
/home/
Name Size Changed Rights
.. 14.8.2024. 5:08:15 rwxr-x
user1 10.7.2025. 9:48:58 rwx---
B of 0 B in 0 of 2
4 hidden
0 B of 0 B in 0 of 1
SFTP-3
0:01:45

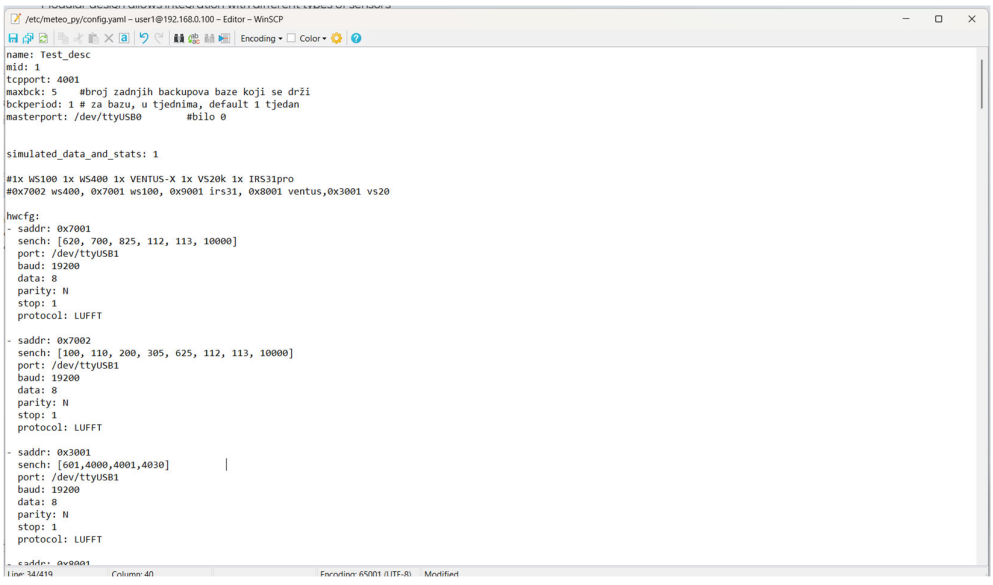

/ – user1@192.168.0.100 – WinSCP
Local Mark Files Commands Tabs Options Remote Help
Synchronize Queue Transfer Settings Default
user1@192.168.0.100 New Tab
C:\Users\
/
Name Size Type
Name Size Changed Righ
.. Parent directory
Public File folder
SanjaKatić File folder
.. 14.8.2024. 5:08:15 rwxr-
bin 5.12.2023. 5:34:58 rwxr
boot 3.2.2024. 18:37:48 rwxr-
Desktop 16.2.2024. 10:10:06 rwxr-
dev 9.7.2025. 9:39:22 rwxr-
etc 9.7.2025. 10:11:55 rwxr-
home 5.12.2023. 6:34:37 rwxr-
lib 5.12.2023. 5:34:58 rwxr
lost+found 5.12.2023. 6:02:47 rwx--
media 16.2.2024. 1:56:26 rwxr-
mnt 5.12.2023. 5:35:04 rwxr-
opt 5.12.2023. 5:43:41 rwxr-
proc 1.1.1970. 1:00:02 r-xr-
root 9.7.2025. 14:05:06 rwx--
run 10.7.2025. 10:35:18 rwxr-
sbin 5.12.2023. 5:34:58 rwxr
srv 5.12.2023. 5:35:04 rwxr-
sys 1.1.1970. 1:00:02 r-xr-
tmp 10.7.2025. 10:09:08 rwxr
0 B of 0 B in 0 of 2 4 hidden
0 B of 41,6 KB in 0 of 25 3 hidden
SFTP-3 0:02:24


etc – user1@192.168.0.100 – WinSCP
Local Mark Files Commands Tabs Options Remote Help
Synchronize Queue Transfer Settings Default
user1@192.168.0.100 New Tab
C:\Users\
/etc/
Name Size Type
Name Size Changed Righ
.. Parent directory
Public File folder
SanjaKatić File folder
logcheck 5.12.2023. 5:39:38 rwxr-
logrotate.d 16.2.2024. 2:34:01 rwxr-
lynx 5.12.2023. 5:46:52 rwxr-
menu-methods 5.12.2023. 5:42:35 rwxr-
meteo_py 10.7.2025. 9:48:58 rwxr
minicom 15.6.2021. 5:20:21 rwxr-
ModemManager 5.12.2023. 5:40:49 rwxr-
modprobe.d 14.2.2024. 20:02:03 rwxr-
modules-load.d 3.2.2024. 18:32:45 rwxr-
network 5.12.2023. 5:36:28 rwxr-
NetworkManager 5.12.2023. 5:40:51 rwxr-
nfs.conf.d 11.1.2023. 21:41:40 rwxr-
openal 5.12.2023. 5:43:58 rwxr-
openni2 5.12.2023. 5:43:52 rwxr-
opt 5.12.2023. 5:35:04 rwxr-
PackageKit 5.12.2023. 5:45:16 rwxr-
pam.d 3.2.2024. 18:36:10 rwxr-
perl 8.1.2023. 22:28:47 rwxr-
php 16.2.2024. 2:34:35 rwxr-
0 B of 0 B in 0 of 2 4 hidden
0 B of 333 KB in 0 of 222 2 hidden
SFTP-3 0:03:01

After opening the folder with the meteo files, it is necessary to open the config.yaml file in which

it is possible to adjust the parameters of the sensor, that is, to change the configuration of the meteo controller.





Within the header of the config.yaml file is general information related to the project:

```
name: Test_desc
middle: 1
tcpport: 4001
maxbck: 5 #number of last database backups kept
bckperiod: 1 # for the database, in weeks, default 1 week
master port: /dev/ttyUSB0
```

The data that you want to read from the sensor is entered inside hwcfg.

Example:

```
hwcfg:
        - address: 0x7001      // channel from which we read data from a particular sensor
          sench: [620, 700, 825, 112, 113, 10000]//addresses from which we read the desired
                                                                    measurements
          port: /dev/ttyUSB1
          baud rate: 19200
          date: 8
          parity: N
          stop: 1
          protocol: LUFFT// depending on the type of sensors used
```

Within sencfg, the parameters and display of data readings for each individual measurement are defined.

```
sencfg:
        - channel: 1
          id: 1
          name: T
          address: 0x7002
          sench: 100
          stat: 255
          unit: C
```

value: 65535

desc: air temp.

service: 0

On the weather controller, it is possible to simulate the values of measured data to confirm the correctness of data reading and alarm generation from it.

Data simulation is performed using the following parameter:

simulated_data_and_stats: 1

When the value of the parameter = 0, the data is read from the meteo controller. When the value of the parameter = 1, then the controller reads the data given to it in the configuration file.

Simulated values are entered for the values value and stat.

Loading simulated values is done with the command:

reload_value_stat

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