

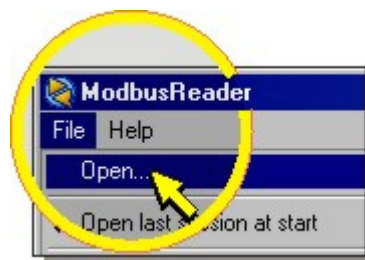
UTILITY PROGRAM FOR RS485 MODBUS CONNECTION

The reading of measurement values from an instrument connected through RS485 MODBUS can be performed thanks to the files included in the **RS485 comm utility** folder of the software package.

File usage requires the installation of the free application program for PC *Modbus Reader*. To install the program, run the file "Autorun.exe" of the software package, select *Install Modbus Reader* and follow the guided installation procedure.

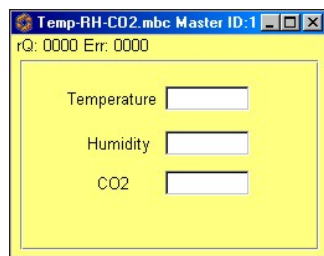
Creating a connection

1. Connect the instruments to your PC as indicated in the operating manual of the instruments. If instruments are connected through a USB/RS485 converter, ensure you installed the converter drivers in your PC.
2. Open *Modbus Reader* program and select *File > Open* menu command.

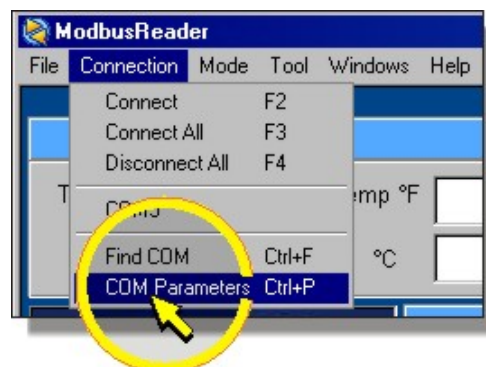


Then, select one of the *mbc* extension files included in the software package (use the most suitable file based on the quantities measured by that particular model) and press the *Open* key.

A window will open containing a series of fields for the instrument data display. The fields are temporarily empty.

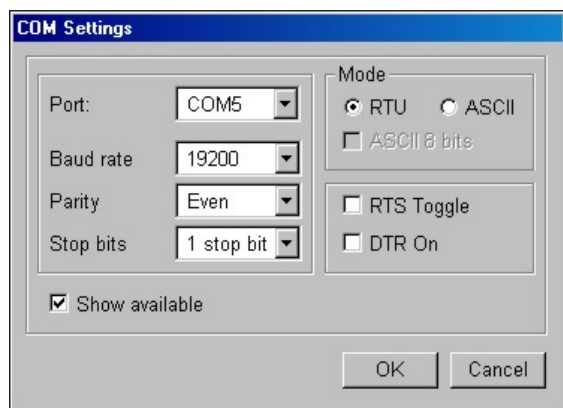


3. **A:** If the instrument is connected to an RS232 or USB port of the PC, select *Connection > COM Parameters* menu command.



Then, select the COM port to which the RS485 converter is connected. Set *Baud rate*, *Parity* and *Stop bits* parameters to the values configured in the instruments. Parameters have the following default settings:

Baud rate = 19200, Parity = Even, Stop bits = 1 stop bit.

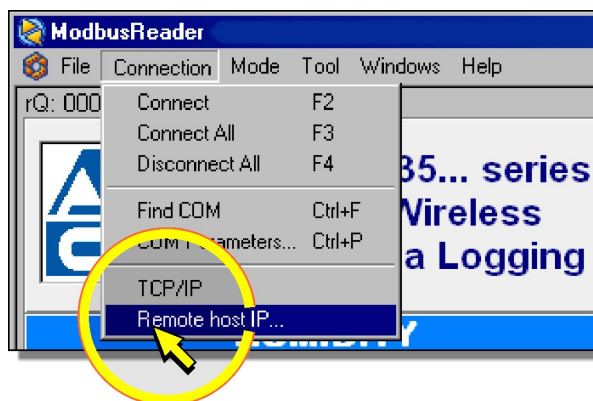


Select *RTU* mode. Deselect *RTS Toggle* and *DTR On* fields.

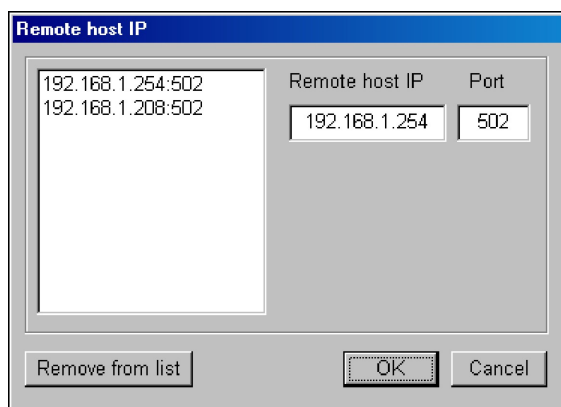
If *Show available* field is selected, not all PC ports will be displayed, but only the COM ports available for connection.

Finally, press *OK* to confirm.

B: If the instrument is connected to the local network and communicates with the MODBUS TCP/IP protocol, select *Connection > Remote host IP* menu command.



Then, enter the instrument IP address and port number.



Finally, press *OK* to confirm.

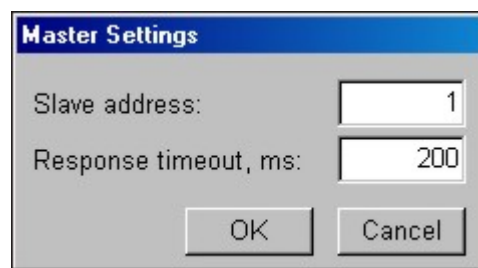
4. Select *Mode > Master* menu command to configure the program window suitable for interaction with instruments as the Master unit.



5. Select *Mode > Master Settings* menu command.



Then, enter the address of the instrument you wish to communicate with in the *Slave address* field.



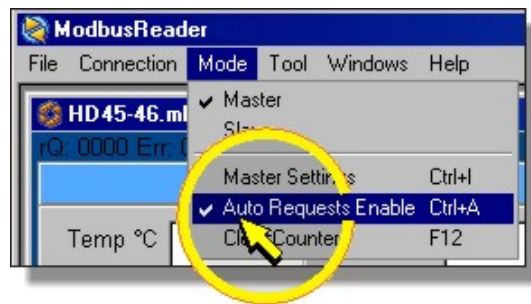
The *Response timeout* field shows the PC maximum response timeout for the instrument reply after a PC command is sent.

Note: if the instrument is connected to the local network, set a greater response timeout (e.g. 1000 ms).

Press *OK* to confirm. The mode (Master) and the address of the instrument chosen for interaction (Slave ID) are displayed in the window header.

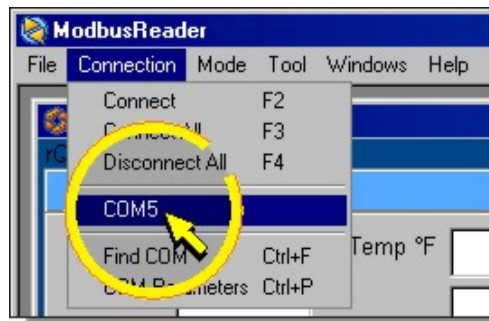


6. Select *Mode* menu and ensure a check mark is enabled next to *Auto Requests Enable* item. If there is no check mark enabled, select the item for enabling the continuous request of the instrument info.

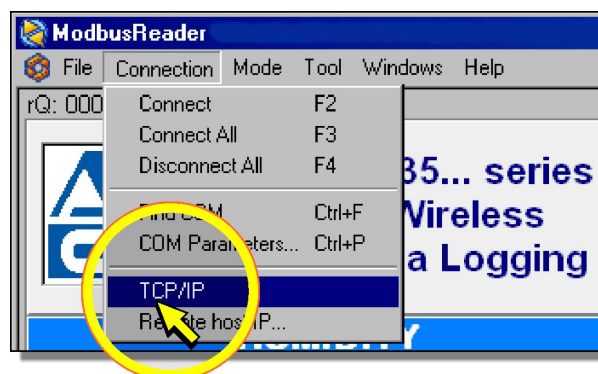


Note: if a checkmark is already enabled, selecting *Auto Requests Enable* causes requests to be disabled and checkmark to be removed.

7. **A:** If the instrument is connected to an RS232 or USB port of the PC, select *Connection* menu and ensure a check mark is enabled next to the item corresponding to the COM port to which the RS485 converter is connected. If there is no check mark enabled, select the item for enabling communication through that port.

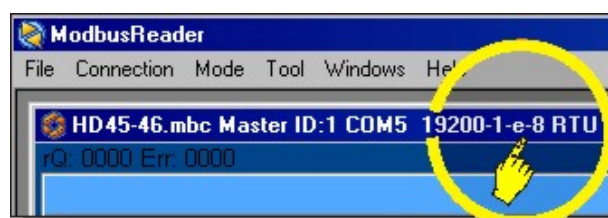


- B:** If the instrument is connected to the local network, select *Connection* menu and ensure a check mark is enabled next to the item TCP/IP. If there is no check mark enabled, select the item for enabling TCP/IP communication.

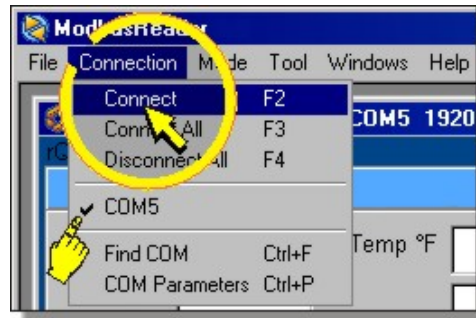


Note: if a checkmark is already enabled, selecting the *COM...* or *TCP/IP* item causes the option to be disabled and the checkmark to be removed.

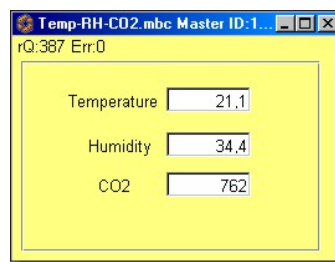
The set communication parameters appear in the window header.



8. Select the *Connection* menu and ensure a check mark is enabled next to the COM port selected in the previous step (if the instrument is connected to an RS232 or USB port) or next to the TCP/IP option (if the instrument is connected to the local network), then select *Connect*.

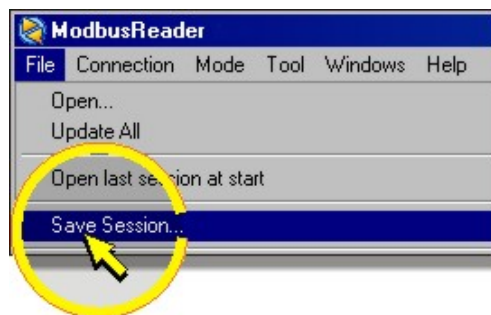


9. If connection is performed successfully, the values transmitted by the instrument appear in the measurement fields.

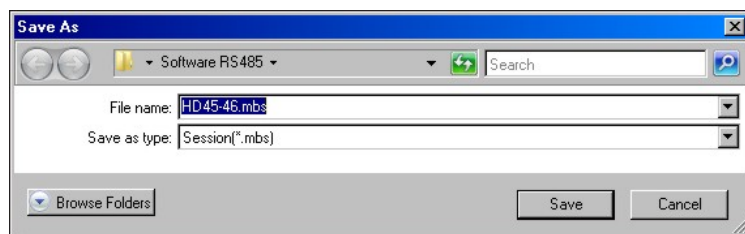


Some of the fields containing the measured values may remain empty if that particular model doesn't measure the corresponding quantities.

10. To save the created session settings, select *File > Save Session...* command.



In the displayed window, select the folder in which you want to save the session and write a name for the file (with *mbs* extension) to be saved, for example *Instrument_ID1.mbs*, then press the *Save* key.



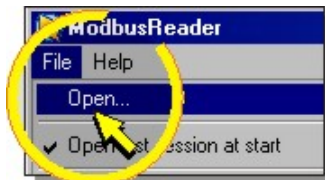
For next connections, just open the saved session file to automatically upload the settings and quickly connect to the instrument.

Note: the *mbs* file must be saved in the same folder as the *mbc* source file, otherwise an error message will be displayed when trying to open the file.

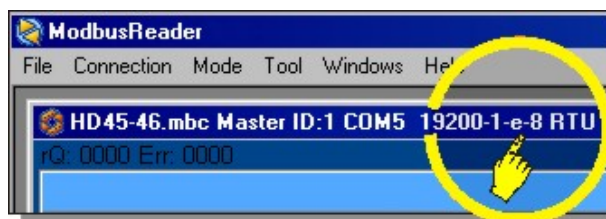
Opening an existent session

In order to open a previously saved connection session and quickly connect to an instrument, proceed as follows:

1. Open *Modbus Reader*.
2. Select *File > Open* menu file.



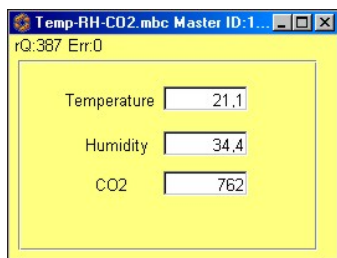
Then, select the previously saved *mbc* extension file and press the *Open* key. The connection settings are displayed in the window header. The value fields are temporarily empty.



3. Select the *Connection* menu and ensure a checkmark is present next to the connected COM port, then select *Connect*.



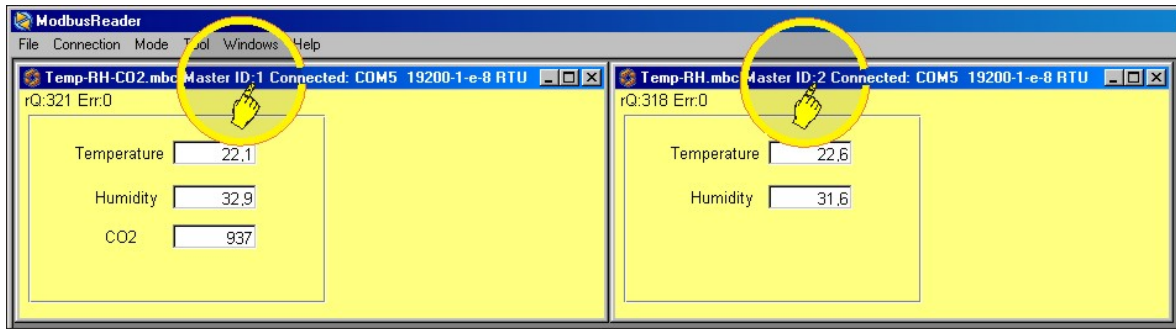
4. If connection is successful, the values transmitted by the instrument appear in the measurement fields.



Multiple connections

A simultaneous communication with multiple instruments can be obtained by simply opening a window for each instrument, repeating the procedure indicated in the "Creating a connection" paragraph and associating the address of the instrument you want to communicate with to each window.

Resize, if necessary, the opened windows for a simultaneous display on the PC screen of the values measured by the instruments.

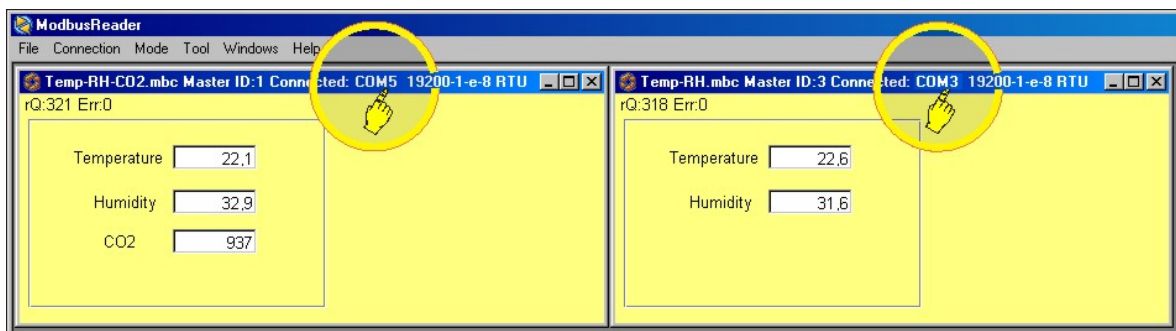


In order to save the created session settings, select *File > Save Session...* menu command and write a name for the file to be saved, for example, *Instruments_ID1_ID2.mbs*, then press the *Save* key. A session consists of all the windows that are open when saving the *mbs* extension file.

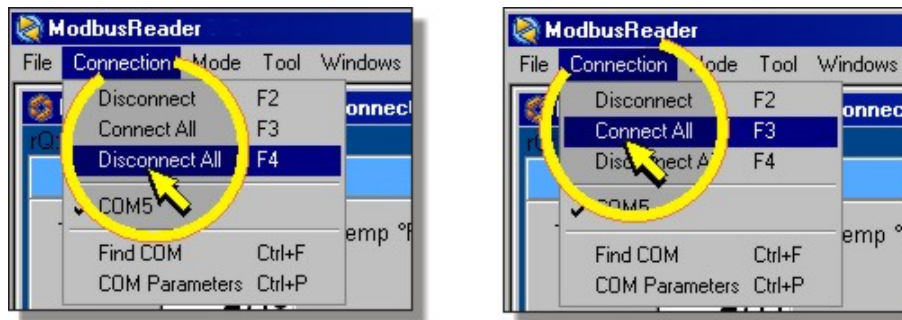
Additionally, sessions with multiple instruments connected to different networks can also be created. In this case, create a connection for each instrument, as indicated in paragraph "Creating a connection", and ensure that a checkmark appears in the *Connection* menu next to each COM port connected to a RS485 network.



The following image shows the simultaneous connection of two instruments, the first one belonging to the network connected to COM5, the second one belonging to the network connected to COM3.

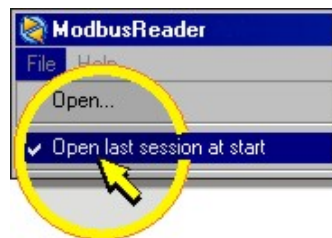


The simultaneous connection with all instruments can be stopped or restored by selecting *Connection > Disconnect All* or *Connection > Connect All* commands, respectively.



Automatic opening of the last session

If you wish the last session to open automatically at program start, select *File > Open last session at start* command: a checkmark will appear next to the command.



If selecting the command when the checkmark is already enabled, the option is disabled and the checkmark disappears.

The last session will open automatically only if Modbus Reader is closed with the session still open. Windows that are closed before leaving the program, are not reopened automatically at next Modbus Reader new start, even if *Open last session at start* was selected.

If the option *Open last session at start* has been activated and Modbus Reader is opened by double clicking on a *mbs* or *mbc* file, in addition to the selected file they will be opened all the windows of the session that was opened at previous program shutdown as well. If the same session related to the file selected by double clicking was open, double windows will be displayed for that session.

Logging

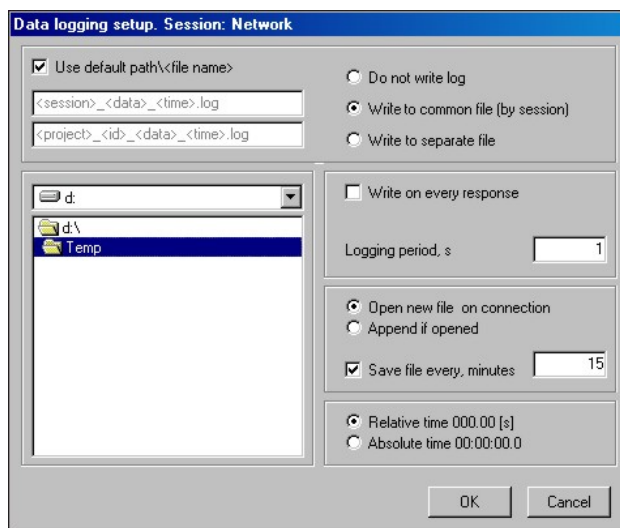
Data displayed in a session window can be stored in a text file at regular intervals or after any data request to instruments from PC.

After opening a session, logging options can be set for each single session window and logging can be enabled for individual windows or for multiple windows simultaneously.

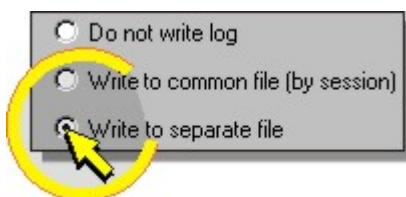
In order to setup logging options for a window, select it by clicking on any point of the window, then select *Tool > Data logging setup...* command.



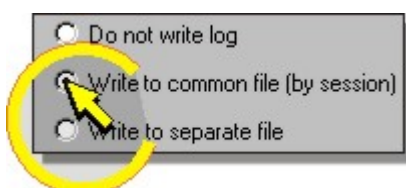
The following window will open:



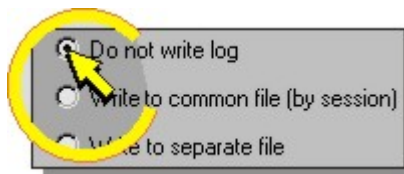
- To save the instrument values in a separate file, and not together with the values of the other connected instruments, select *Write to separate file*.



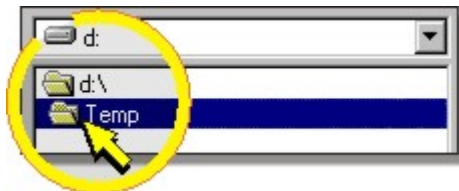
- To save instrument values together with the values of the other instruments in the connection session, and not in a separate file, select *Write to common file (by session)*.



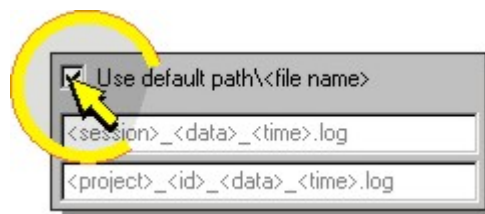
- To disable the option for logging the instrument values, select *Do not write log*.



- To save the logging file in a specific path, select file destination folder.



- To assign automatically a name to the logging file, select *Use default path\<file name>* item.

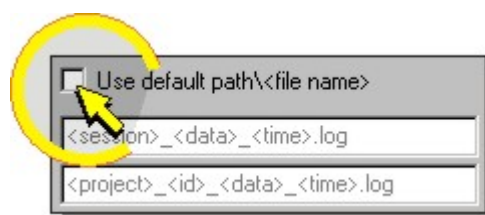


Selecting the *Write to common file (by session)* option, the file name will be composed by the session name followed by the log start date and time.

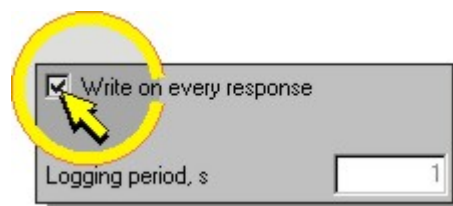
Selecting the *Write to separate file* option, the file name will be composed by the window name followed by the instrument address along with log start date and time.

The file extension is *log*.

- In order not to automatically assign the logging file name, deselect *Use default path\<file name>* item. At logging startup, the program will ask to assign a name and a destination folder to the file.



- To save instrument values after every request of data from PC, select *Write on every response*.



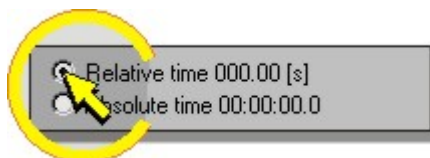
- To save instrument values at regular intervals, deselect *Write on every response* and write the logging interval in seconds in the *Logging period, s* field. The minimum interval is 1 second.



- To save instrument values together with PC time at acquisition time, select *Absolute time*.



- To save instrument values together with the acquisition time considered as the relative time elapsed from the logging start, select *Relative time*.



- If, during logging, the instrument is disconnected and then reconnected without manually interrupting the logging process, this will restart automatically. Logging will continue storing values in a new file if *Open new file on connection* option is selected.



If, on the contrary, *Append if opened* is selected, values will be appended to the values that were acquired before disconnection.



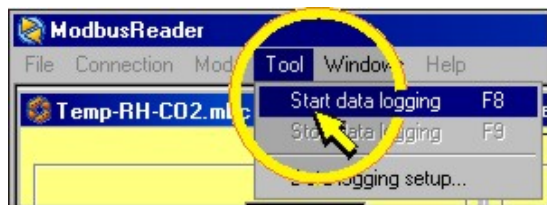
If the logging process is interrupted and then restarted, values will always be saved in a new file.

- The log file can be automatically closed after a preset time and the logging process automatically restarted in a new file. To enable this option, select *Save file every* and write in the corresponding field the number of minutes after which file closure must occur.

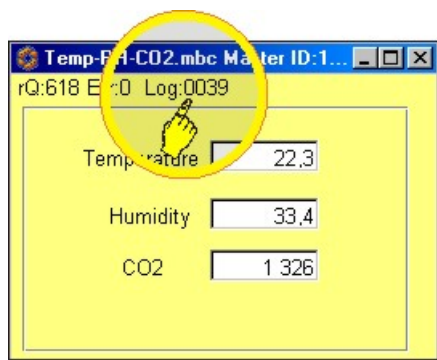


Setup logging options as indicated in the previous steps for each open window of the current session.

After the logging options have been set, select *Tool > Start data logging* command to start value logging.



Log indication appears under the window header, followed by the number of acquired samples.



If *Write to common file (by session)* option was selected, the logging of the other connected instruments having the same option set is automatically started.

To stop logging, select *Tool > Stop data logging*.



In case the logging file contains values belonging to multiple instruments, these are ordered by their address number. The addresses of the instruments do not appear in the file.

Time	Temperature	Humidity	CO2	Temperature	Humidity	CO2
08:59:46,5	22,5	32,1	821	23,0	31,6	664
08:59:47,6	22,5	32,1	821	23,0	31,6	664
08:59:48,6	22,5	32,1	814	23,0	31,6	664
08:59:49,6	22,5	32,2	814	23,0	31,6	666
08:59:50,6	22,5	32,2	814	23,0	31,6	666
08:59:51,6	22,5	32,2	809	23,0	31,6	666
08:59:52,6	22,5	32,2	809	23,0	31,6	667

Instrument with lower ID
Instrument with next ID

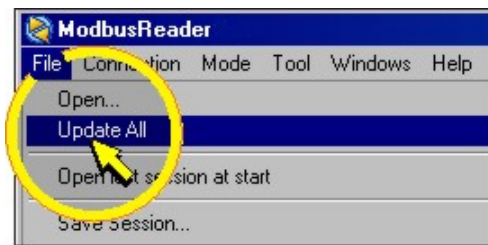
In the text file, values are separated by tabulations and may appear as not perfectly aligned with the corresponding column header. However, the data can be imported in a spreadsheet in order to obtain a perfect alignment and to process data.

	A	B	C	D	E	F	G	
1	Time	Temperature	Humidity	CO2	Temperature	Humidity	CO2	
2	08:59:46	22,5	32,1	821	23	31,6	664	
3	08:59:48	22,5	32,1	821	23	31,6	664	
4	08:59:49	22,5	32,1	814	23	31,6	664	
5	08:59:50	22,5	32,2	814	23	31,6	666	
6	08:59:51	22,5	32,2	814	23	31,6	666	
7	08:59:52	22,5	32,2	809	23	31,6	666	

Instrument with lower ID
Instrument with next ID

Displayed data refresh

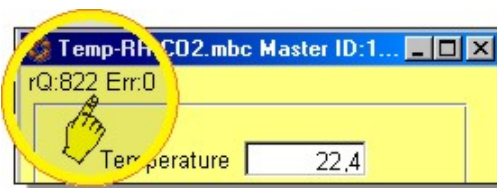
Data are requested from PC to instruments continuously, and displayed values are always updated. If screens do not appear as correctly displayed, they can be refreshed by means of *File > Update All* command.



The command execution involves displayed values rewriting.

Request and error counters

In the top left corner of a connection window some counters are displayed. *rQ* counter shows the number of requests sent to the instrument since connection startup. *Err* counter shows the number of data transmission errors occurred since connection startup.



When errors occur, the Frame-transmission error (FrErr), the parity bit error (PtyErr) and the Time Out error (TOErr) counters can be displayed as well. Counters can be zeroed through *Mode > Clear Counters* command.



Connection troubleshooting

If instrument data cannot be displayed, check the following points:

- Ensure communication parameters that were set up in the program (*Connection > COM Parameters* menu) are the same parameters as those set up in the instruments.
- Ensure a checkmark is displayed in the *Connection* menu next to the COM port the network RS485 converter is connected to.
- Ensure *Mode > Auto Requests Enable* command is selected.
- Check the address of the instruments to be connected (*Mode > Master Settings* menu).

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