

### Air-Flow Analyser

Startup procedure, record of measurements with datalogger  
and analysis with MSR-software

SFGA-3000-SA T.  
Nr. 3613433



Title ..... Air-Flow Analyser  
Version ..... 1.70  
Document no. .... 100016  
Original .....en  
Author .....Festo  
  
Last saved ..... 21.05.2026

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# 1 Components/Software used

| Name/type                         | Software/firmware version | Date of manufacture |
|-----------------------------------|---------------------------|---------------------|
| Flow sensor SFAM                  | General                   | –                   |
| Pressure sensor SPAU              | General                   | –                   |
| Data logger MSR-145               | General                   | –                   |
| CD-ROM with software MSR          | General                   | –                   |
| USB cable for data logger MSR-145 | General                   | –                   |
| Power Gorilla                     | General                   | –                   |

Table 1.1: Components/software used



MSR® and Power Gorilla® are registered brand names of the respective brand holders in certain countries.

## 2 Introduction

The air flow analyser has a flow sensor and a pressure sensor that are used to measure the air consumption of the system connected to it. The data logger MSR-145 is used to record the measurements from the flow and pressure sensors. The MSR software is used to analyse these measurements.



For technical questions, please also refer to the documentation supplied with the devices.

For all Festo components (Filter *MS6-LF*, flow sensor *SFAM* and pressure sensor *SPAL*) you will find the documentation in our support portal [www.festo.com/sp](http://www.festo.com/sp)

Power is supplied to the air flow analyser's flow and pressure sensors by the "Power Gorilla" battery, which is integrated on the platform of the air flow analyser.

The data logger MSR-145 has a built-in (non-replaceable) battery.

This battery can be charged via the USB cable using the Power Gorilla or a PC.



When not in use, the data logger must be charged regularly. Failure to do so will cause the device's internal battery to lose its charge completely after a maximum of six months.

The same applies to the battery "Power Gorilla".

The standard measuring range of the sensors is as follows

- Flow rate: 30 to 3000 l/min
- Pressure: 0 to 10 bar

Sensors with other measuring ranges are available on request.



- Displayed values outside the nominal measuring range are invalid. Information for the evaluation of the measurement deviations can be found in the supplied sensor documentation.
- Due to different signal paths, which can be used over the wide measuring range cannot be synchronously adjusted, minor differences between the the value displayed on the computer and the own display of the sensor possible (see sensor documentation).
- Since the analog output of the flow sensor is not available for values smaller than 30 l/min is not blanked, these (invalid) results are displayed on the computer.
- In the measuring range between 30...150 l/min, the deviation between the display on the sensor and the recorded value is greater than in the measuring ranges >150 l/min. This is due to the accuracy of the sensor of +/-3% FullScale and the accuracy of the zero point +/-0.3% FullScale. Since these values are based on the maximum measured value, this has a stronger effect in the lower measuring range.

### 3 Commissioning battery "Power Gorilla"

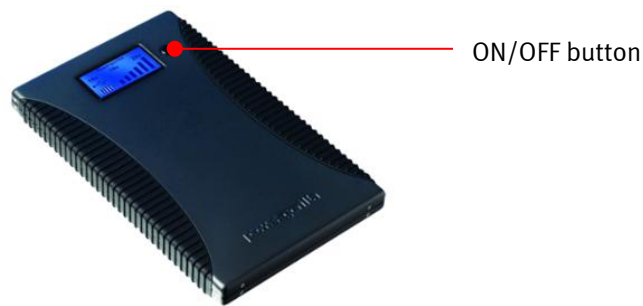


Fig. 3.1: "Power Gorilla" battery



The Power Gorilla acts as a permanent power supply for the sensors in the air flow analyser.

- In order to ensure that the analyser enjoys a long operating period, make sure that the battery is fully charged.
- The new battery will reach its rated capacity after several (approx. 3 to 5) charge/discharge processes.

#### 3.1 Charging the Power Gorilla

Plug the enclosed power supply unit into the socket.

Connect the battery to the power supply unit via the DC-IN port.

The battery will switch on automatically and the charging cycle will begin. The charging time will be 3 to 5 hours.

| Power Gorilla display     |                          |
|---------------------------|--------------------------|
| During the charging cycle | Up to 6 bars, flashing   |
| Once fully charged        | All 6 bars, solid        |
| When discharged           | Battery symbol, flashing |

Table 3.1: Power Gorilla display

## 3.2 Operating the Power Gorilla

Please observe the following procedure when switching on the rechargeable battery:

### 3.2.1 Turn the battery on using the ON/OFF button.

The power supply cable for the Air-Flow Analyser must not be connected to the OUT socket. The power supply must be set correctly in order to operate the components Air Flow Analyser. The output voltage of the Air Flow Analyser can be set to **19V** to maximize the operating time of the Power Gorilla. If the voltage is not already set to **19V**, set it to **19V** now by repeatedly pressing the on/off key.

Then insert the power supply cable for the Air-Flow Analyser into the OUT socket. The sensor displays will light up. The display of the set voltage will blink twice.

As soon as the display of the set voltage stops flashing, press the ON/OFF button twice quickly in succession. After that the display will flash three times. The display lighting will remain permanently on-



Fig. 3.2: SFGA unit

### 3.2.2 Switching off the Power Gorilla

Press the ON/OFF button and hold it down for 5 seconds.

The Power Gorilla display switches off.



#### Note

Before switching on again, make sure that the Air-Flow Analyser is disconnected from the power bank for at least 2 minutes.

### 3.2.3 Ports at Power Gorilla

IN – connection power supply

OUT- port for supplying power to the components of the air flow analyser.

USB port for charging the data logger MSR-145

## 3.3 Connecting components

### 3.3.1 Electrical connection

Connect the power cable for the air flow analyser's to the OUT socket on the top of the Power Gorilla.

The display of the flow sensor SFAM shows a value of 0 l/min.

The display of the pressure sensor SPAU shows a value of 0.00 bar.



Fig. 3.3: Electrical connection

### 3.3.2 Pneumatical connection

The measuring system must be installed in the compressed air supply line to the machine.

To avoid possible flow losses and pressure drops in the supply lines, the used tubes should be as short as possible and the diameter as large as possible.

The measuring system should not be connected via quick couplings, as these connecting elements reduce the flow rate considerably and may lead to incorrect measuring results

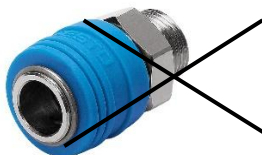


Fig. 3.4: Quick coupling

## 4 Commissioning the data logger -MSR-145



### Calibration is required for new data loggers.

The measurements recorded from your air flow analyser by a new data logger (i.e. one used to replace the original) may be incorrect.

- The settings can be found in our support portal [www.festo.com/sp](http://www.festo.com/sp).  
Please use the 11-digit serial number or the QR code.  
For further questions please contact Festo Service.



Inspection window

PushButton

Fig. 4.1: Data logger MSR-145

#### Display in the data logger inspection window

|                        |                           |
|------------------------|---------------------------|
| 1. Red LED lit briefly | Data logger switched on   |
| 2. Yellow LED lit      | Data logger charging      |
| 3. Yellow LED not lit  | Data logger fully charged |

Table 4.1: Display in the data logger inspection window

### 4.1 Connecting the data logger to the air flow analyser

Push the data logger into the bracket on the air flow analyser.

Plug the round plug on the data logger into the air flow analyser.

### 4.2 Connecting the data logger to the PC

Connect the mini USB plug connector (type B) on the USB cable to the data logger.

Connect the standard USB plug connector (type A) on the USB cable to a USB port on the Windows PC.

## 5 Commissioning battery "Power Gorilla"



File names, buttons, menu commands and icons are always shown in *italics*.

### 5.1 Installing software

Prerequisite:

- The data logger must **not** be connected to the Windows PC

To install the software:

- Place the supplied PC software into the CD drive or download the actual software version from <https://www.msr.ch/de/support/pcsoftware/>
- Run the file *install\_msr.exe*.
- Follow the instructions given by the setup wizard.
- The software and drivers will be installed.

### 5.2 Launching the software

Prerequisites:

- The software must have been installed successfully.
- The data logger must be connected to the PC via a USB cable.

At first, the red LED will be lit in the data logger inspection window.

Once the data logger is connected successfully to the Windows PC, the red LED will go out.

To launch the software:



- Click the icon in the start menu OR
- Double-click the icon on the desktop

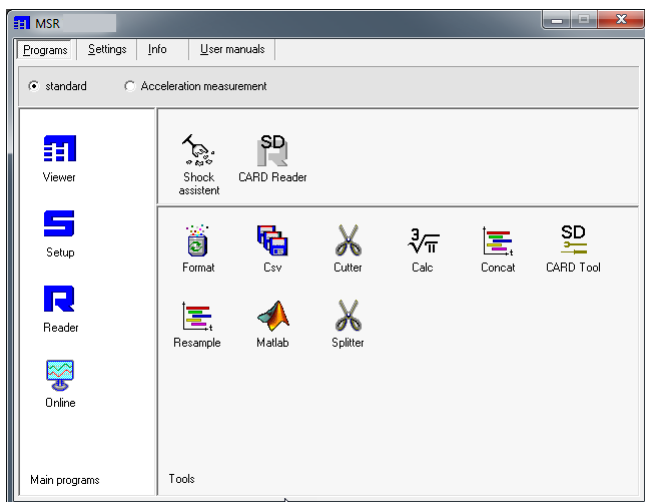


Fig. 5.1: MSR program window

## 5.3 Configuring the software

### 5.3.1 Data recording settings

- Click on the [Settings](#) tab
- Click the [MSR](#) button

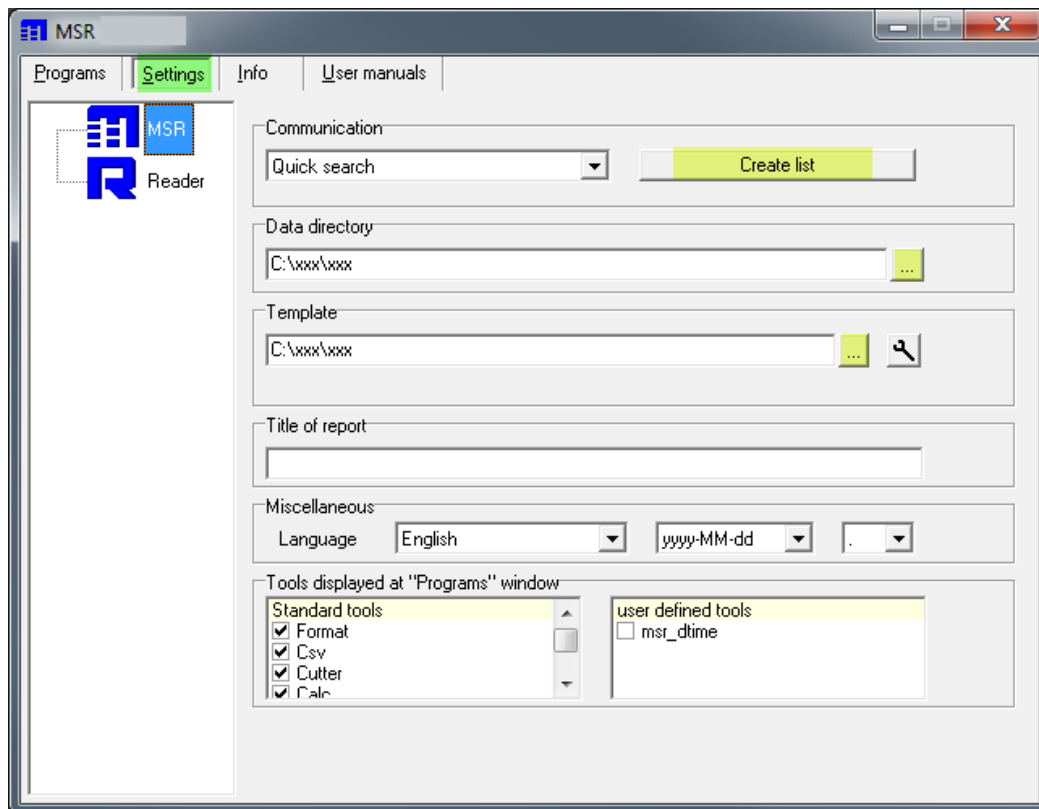


Fig. 5.2: Software MSR – Settings tab

To check whether the data logger is connected to the PC system:

- Click the [Create list](#) button.

A window appears with a list of the serial interfaces of the PC system.

The data logger should be listed as "MSR145B".

- Close the serial interfaces window: 
- Define the data directory: 
- Define the template and template directory: 
- Enter the title of the report.

### 5.3.2 Settings for the Reader

- Click on the *Settings* tab
- Click the *Reader* button

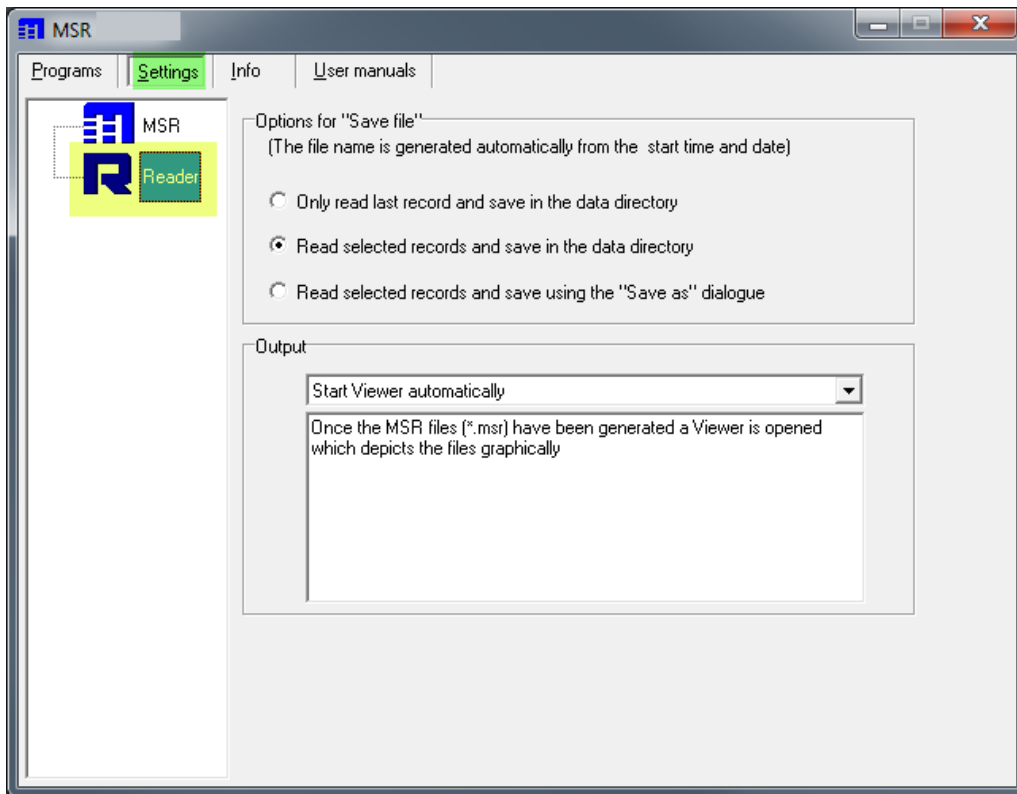


Fig. 5.3: Software MSR – Reader settings

- *Options for "Save file" area:*  
Click on the *Read selected records and save in the data directory* option.  
(Settings for directory see Fig 5.2)
- *Output area:*  
In the list, select *start Viewer automatically*

#### Return to the main menu:

Click on the *Programs* tab → Fig 5.1

## 5.4 Configuring the data logger MSR-145

### 5.4.1 Preparing the data logger for the air flow analyser

The data logger is prepared using the software MSR. As part of this process, you can choose the control method for data recording.

Regardless of the PC you are using, you can choose to schedule specific times for the system to record measurements, or to start and stop measurement recording manually at the data logger with the blue Start/Stop button .

To open the "Setup" window:

- Click on the *Programs* tab.

- Double-click the *Setup* button.

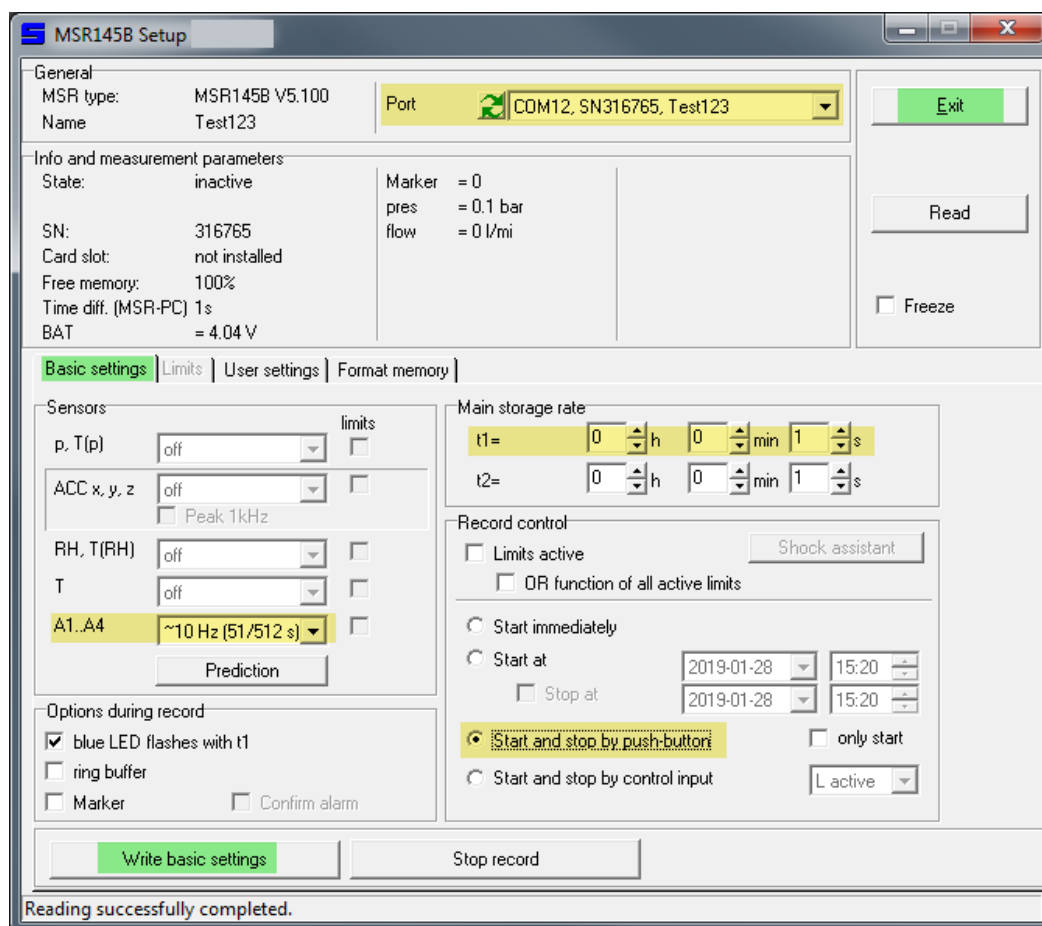


Fig. 5.4: Software MSR – Setup (basic settings)

Select the data logger you wish to set up → Drop-down list *Port*



The data logger can now be prepared for its next use on the air flow analyser.  
The settings can only be transferred to the data logger if data recording is stopped.

The following instructions must be carried out **once** for each data logger MSR-145.

In the *Basic settings* tab :

- *Sensors* area:  
In the drop-down list *A1...A4* click on the option *10 Hz*  
or choose one of the other measuring rates
- *Options during record* area:  
Click on the option *blue LED flashes with t1*
- *Main storage rate* area:  
set the time interval to *0 h, 0 min, 1s*

#### 5.4.2 Activating the data logger



Clicking on the *Stop record* button resets the start/stop setting to *Start immediately*.  
As such, the following instruction must be carried out **every time**.

In the *Basic settings* tab:

*Record control* area:

- Click on the *Start and stop by push-button* option
- Click on the *Write basic settings* button

The data logger is now in Ready-To-Record mode.

Ready-To-Record mode is indicated by regular double flash of the blue LED.

Close the "Setup" window by pressing the *Exit* button.



Controlling data recording using the start/stop pushbutton allows you to work without being connected to a PC.

#### 5.4.3 Carrying out measurements

- Connect the data logger to the air flow analyser.  
Before connecting, align the plug connector using the notch as a reference.
- Press the pushbutton on the data logger to start measurement recording.  
The blue LED flashes once per second when measurements are being recorded.
- Press the pushbutton on the data logger again to stop measurement recording.

Once measurement recording is complete, a new file containing the recorded measurements (records) is saved in the data logger's memory. This can be analyzed using the "Reader" program → chapter 6.1.



To simplify the assignment of the recordings, note the time at the start of the measurement

## 5.5 Monitoring measurements

The data logger can be connected to both the air flow analyser and a PC at the same time. This allows you to transfer measurements. The current data logger measurements can then be transferred directly and analyzed in real-time (test frequency 1Hz) using the software MSR.

This is useful for the following tasks:

- Installation
- Monitoring



The measurements are transferred to the PC independently of measurement recording on the data logger.

### 5.5.1 Launching the Online program

- Click on the *Programs* tab.



- Double-click the *Online* button.

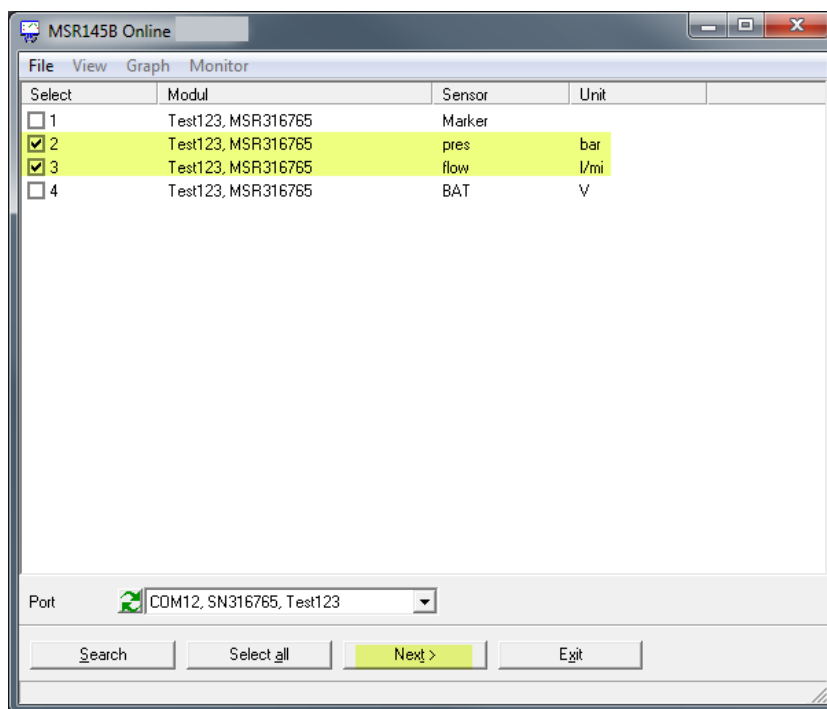


Fig. 5.5: Software MSR – "Online" program – Sensor selection

- Select measurement channels:
  - Click on *flow* for the flow sensor and *pres* for the pressure sensor.
- Click on the *Next >* button.

A graph appears in the "Online" window. The Time axis records and shows the current measurements (Test frequency 1Hz) from the sensors connected to the data logger.

## 6 Displaying measurements in a graph

As long as the data logger is connected, saved measurement data records can be transferred to the Windows PC using the software MSR.

### 6.1 Starting the Reader program

- Click on the *Programs* tab.

- Double-click the *Reader* button.

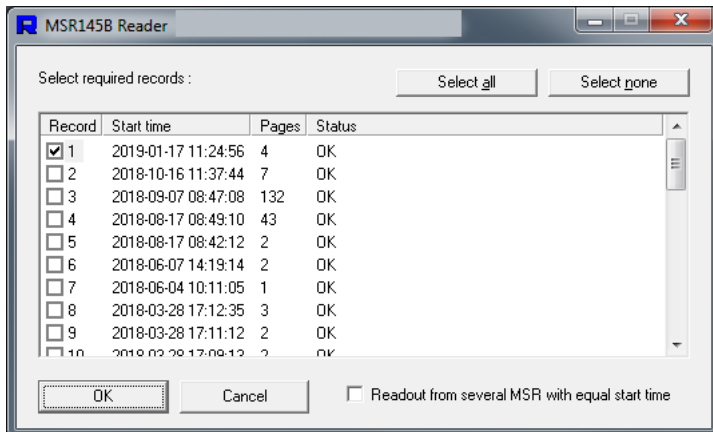


Fig. 6.1: Software MSR – "Reader" program – Record selection

- Click on one or more records to analyse.
- Click the *OK* button.
- The data of each selected record will be stored in the predefined directory (see chapter 5.3.1/ picture 5.2) and, depending on the setting, immediately displayed in the viewer as a diagram.

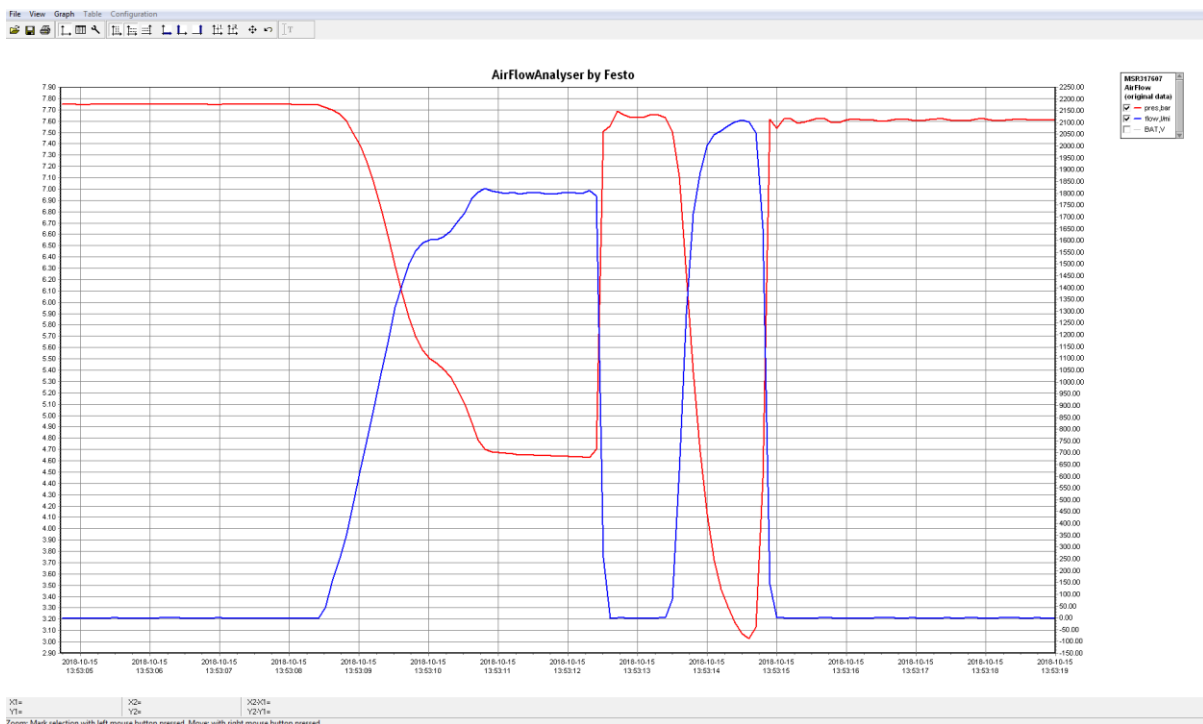


Fig. 6.2: Software MSR – "Reader" program – Graph

## 6.2 Templates

### 6.2.1 Creating a new template

Select the *Configuration* option in the *View* menu.

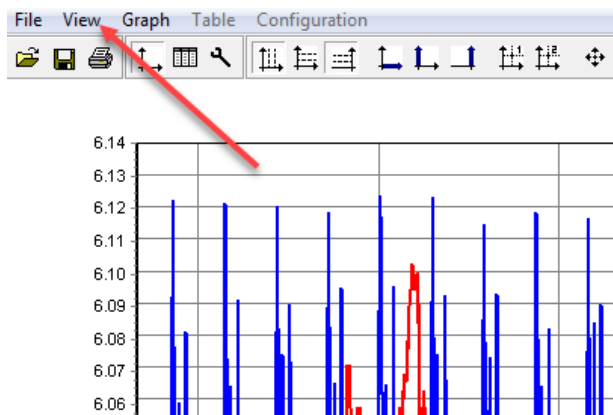


Fig. 6.3: Creating template (1)

In *General* tab Title, Footer, Font... can be determined

The screenshot shows the 'General' tab of a configuration window. It contains three sections: 'Title' with a text input field and a 'Show MSR name' checkbox; 'Footer' with a 'Show start date and time' checkbox and a text input field; and 'Font' with settings for Title, Axes, Legend, and Text, each with a font family dropdown (all set to 'Arial'), a size dropdown (all set to '8'), and a style dropdown (all set to 'normal').

Fig. 6.4: Creating template (2)

In the tab *Curves*, axis labels, axis positions, line thickness, color... can be determined

| General <b>Curves</b> Time axis X left Y axis right Y axis Crosshairs |           |      |          |        |            |       |        |
|-----------------------------------------------------------------------|-----------|------|----------|--------|------------|-------|--------|
| Number                                                                |           | Name | Axis     | Colour | Line width | Style | Format |
| 1                                                                     | MSR321556 | pres | left     |        | 2          | Line  |        |
| 2                                                                     | MSR321556 | Flow | right    |        | 2          | Line  |        |
| 3                                                                     | MSR321556 | BAT  | inactive |        | 1          | Line  |        |

Fig. 6.5: Creating template (3)

After you have made the settings, please click on the menu item *Save* in the *File menu*.

The settings are saved and used for the current graphic.

To save as a new template:

Select the *Save as template* option in the *File menu*.

The template can be set for general use (see chapter 5.3.1/ picture 5.2)

It is also suitable for use in the program "Online" chapter 5.5.1

### 6.3 Calculating air consumption

- Display the graph as described in section 6.1.
- Select the time interval (beginning/end) to one minute or the period you want to analyze in the graph while pressing and holding the left mouse key.

Click the following menu options: *File, Print Report*.

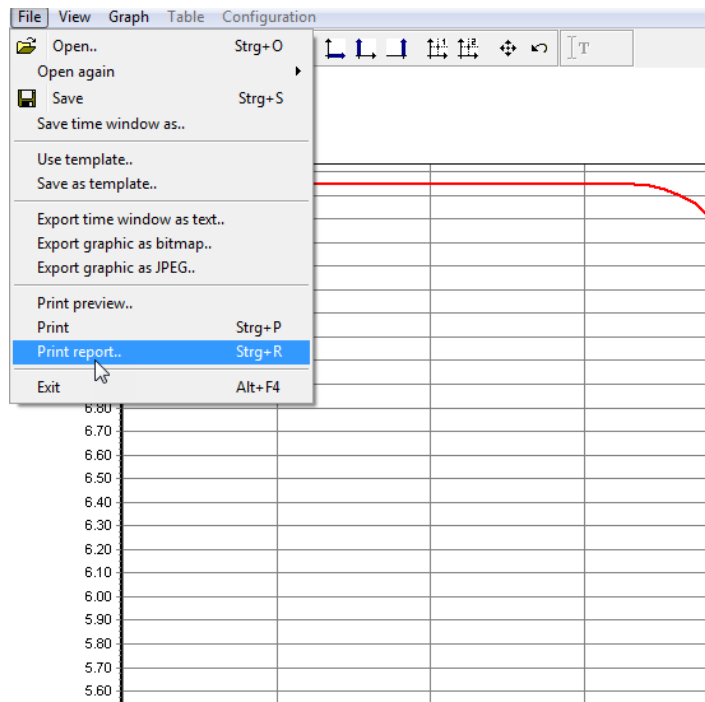


Fig. 6.6: "Print Report" window

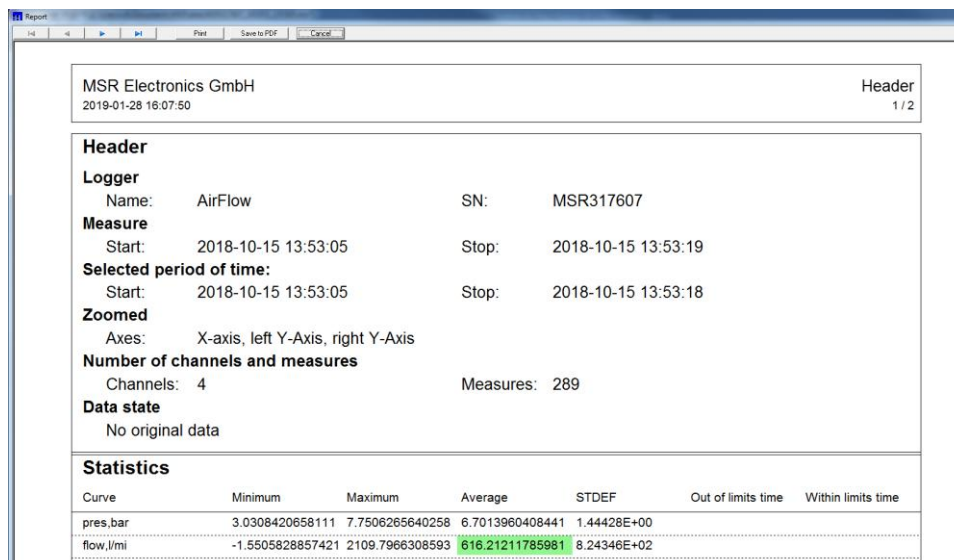


Fig. 6.7: "Report"

## 6.4 Deleting measurements from the data logger

- Click on the *Programs* tab.

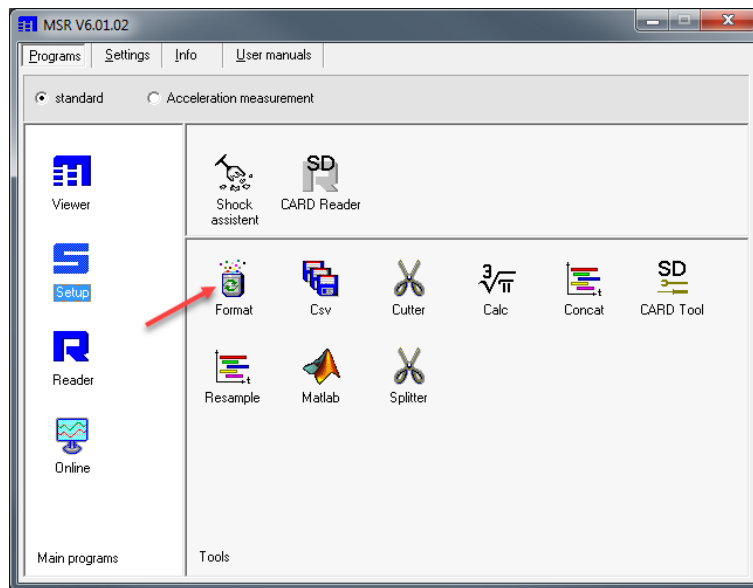


Fig. 6.8: “Format”



The Setup menu window of the MSR software opens → Fig. 5.4

- Click tab *Format memory*

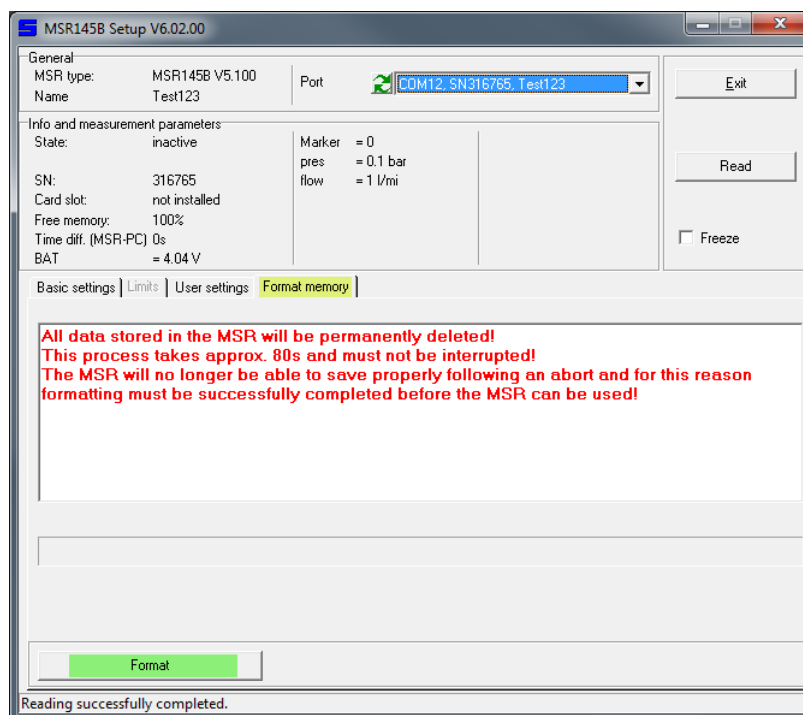


Fig. 6.9: “Format”

- Click on the *Format* button
- Answer to the security prompt



**Please note**

All the records on the data logger will be deleted permanently.

The settings will not be deleted



The data logger memory is not formatted via Windows, only via the software of the MSR.

Reading / writing data via the MSR software works even if a BitLocker should be installed on the computer.