

Evaluation-Kit EK-F3(_L;_R;_V)

Gas Mass Flow Meter EM1
Version 2.0

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Introduction

The CMOSens® EcoLine EM1 Mass Flow Meter (MFM) enables fast and economical measurement of gas flows over a very wide dynamic range. Its leading price/performance ratio is based on Sensirion's unsurpassed CMOSens® sensor technology which combines a sensor element with the amplification and A/D converter circuit on one single CMOS chip. This results in very good performance, fast response time and large dynamic range at very attractive cost.

The EM1 evaluation kit EK-F3 offers an easy-to-use environment to illustrate the unique features of the sensor system and to adapt it to your specific application. The contents of the kit are listed below (see Figure 1 and Table 1). It includes one EM1 meter, a serial interface cable, various standard fittings for an easy flow connection, and a Viewer Software to make the measurement results visible on a PC.



Figure 1: Photograph of the evaluation kit with its contents

(1)	Mass Flow Meter EM1
(2)	Serial interface cable (Sub-D 9pin) with power supply (Euro-Connector)
(3)	Legris Flow Connector (No. 3101 1217 ; G3/8; Tube OD=12mm)
(4)	Hausmann Flow Connector (No. 38.131; G3/8; Tube ID=10mm)
(5)	Power Adapter for US-style plugs
(6)	FlowViewer software on CD

Table 1: Contents of the evaluation kit EK-F3

What You Need to Get Started

Make sure you have all of the following items before you install the hardware and FlowViewer software for Windows 95/98/NT/2000/XP:

- Windows 95/98/2000/NT/XP
- An unused serial interface port (e.g. COM1).
- FlowViewer software for Windows 95/98/NT/2000/XP on CD.
- Contents of your evaluation kit as described in the Introduction.

Additionally, software for the use of your EM1 with a PDA using Palm OS is available on our internet page (www.sensirion.com).

Installing the Hardware

In the following section all the necessary electrical interconnections for the EM1 sensor system will be listed. These connections are required between the EM1, a PC serial interface and a power supply.

To install your EM1 complete the following steps (see Figure 2):

1. Turn off your PC. Keep your PC plugged in so that it remains grounded while you install the EM1.
2. Connect the serial interface cable with the COM port of your PC (configuration of the serial interface see datasheet EM1).
3. Turn on your PC and start Windows 95/98/2000/NT/XP.
4. Connect the interface cable with the EM1 (see also pin diagram of the EM1 given in datasheet EM1).
5. Plug in the power supply. Input 100V - 240V AC, 47Hz - 63Hz.

The EM1 is now connected with your PC and ready to use. Proceed to the next section for a general measurement setup. For further information on connecting the EM1 please refer to the datasheet.

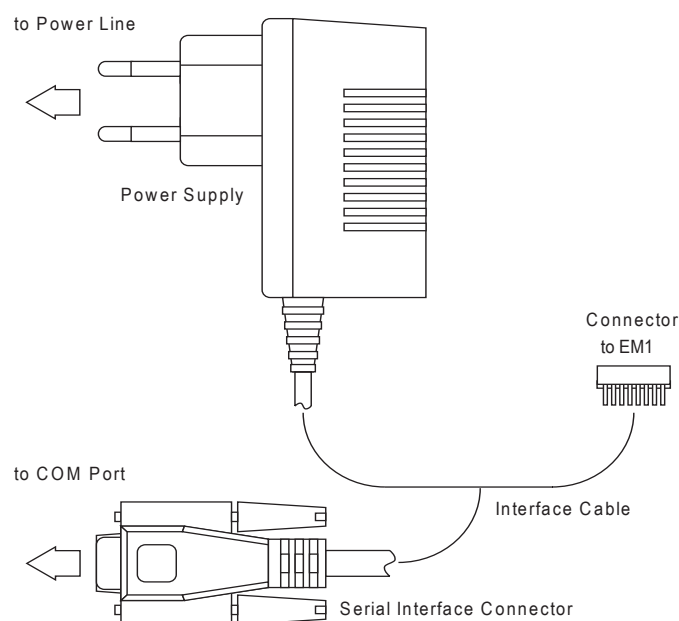


Figure 2: General measurement setup for the EM1 Mass Flow Meter system. For detailed link of the sensor system to a gas supply please refer to the next section.

General Measurement Setup

Once the hardware installation has been completed, a gas flow has to be applied to the EM1.

In order to couple a gas flow to the EM1 meter you can either use the flow connectors included in the EK-F3 kit or any other connectors with G3/8 thread.

The Legris connectors included can be used for hoses of 12 mm outer diameter, the Hausmann connectors included in the EK-F3 kit can be used for hoses of 10 mm inner diameter. Additional connectors which can be used are listed in the data sheet.

Since the EM1 meter is a unidirectional flow meter please observe the flow direction when connecting the EM1 device. The flow is indicated by arrows on the top cover of the meter (please see Figure 3 for details).

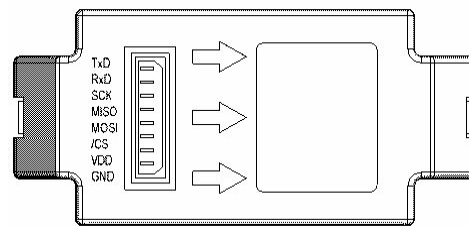


Figure 3: Indication of the flow direction on the EM1 device. Also the pin layout is shown

Installing the Software and Start-Up

After having installed the EM1 hardware, complete the following steps to install the FlowViewer software for Windows 95/98/2000/NT/XP on your PC:

1. Insert the CD with the FlowViewer software for Windows 95/98/2000/NT/XP.
2. Open the file "DISKS", double-click "SETUP.EXE" and follow the instructions of the installation wizard.
3. Start with Start -> Programme -> Sensirion AG -> Sensiview_v2_2 or through the path where you installed the software.
4. Note: If no units are displayed in the program it may be possible your decimal symbol in the "Regional Setting Properties" of the Windows operating system is wrong.

For a detailed description on FlowViewer please refer to next section.

Please note: This software is protected and intended exclusively for demonstration and laboratory purposes. It may not be used or multiplied commercially. SENSIRION does not offer any guarantee.

Software Overview FlowViewer

In order to operate the EM1, dedicated software is provided with your evaluation kit. Although the software allows *plug-and-play*, some additional remarks will be given.

To start the FlowViewer, double click its icon. A pop-up window will appear which guides you to a proper setting of your COM port with the connected EM1 (see Figure 4). In case the EM1 cannot be linked to the FlowViewer please check all your connections between the sensor and your system. Make also sure that the COM port chosen is not used by any other application already running in the background (i.e. Palm Hotsync etc.)

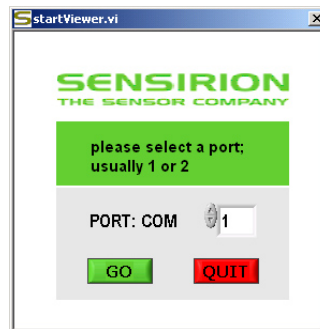


Figure 4: Pop-up window for proper connection of the EM1 to the FlowViewer 2.2

Once the connection has been set up, the FlowViewer main window will appear (see Figure 5), allowing mass flow to be displayed. Measurements are started with the START button and interrupted with the STOP button.

You will notice that the EM1 is displayed as ASF1430/ASL1430. The reason for this is that the EM1 uses the same software in its microprocessor as the ASF/ASL1430 series.

The different full scale versions of the EM1 (500 mln/min, 20'000 mln/min = 20 l/min and 200 l/min) can be recognized by the values of the y-axis on the left side graph and the given unit in the "Flow Reading" section. Samples for each version are shown in Figure 5 to Figure 7.

In the section "Sensor Settings" the sampling rate, data format and modus can be set. Depending on power supply and heat dissipation the sensor temperature can be a few degrees above room temperature.

The section "Chart Setting" allows you to configure the graphs. If "Integrating" is on, information about accumulated volume and peak flow is displayed.

The left side shows the full meter range and the right side shows a selectable zoom area. The zoom factor and the level shift can be set by the selectors above the graph.

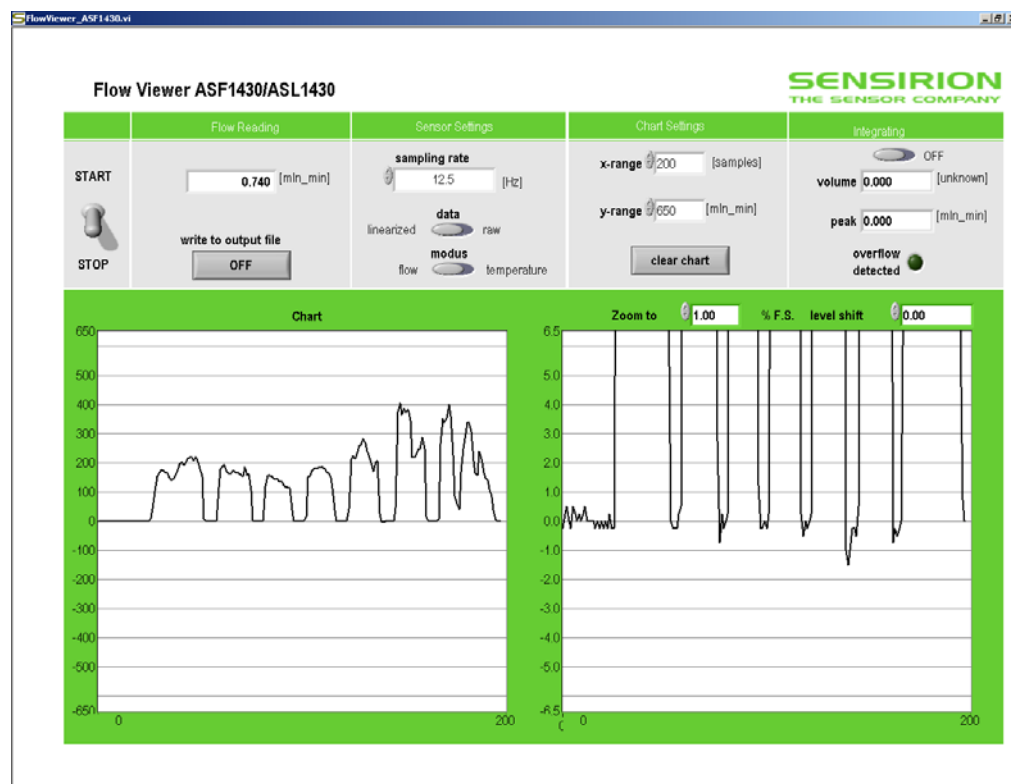


Figure 5: FlowViewer displaying measurement data of the EM1_L (500 mln/min)

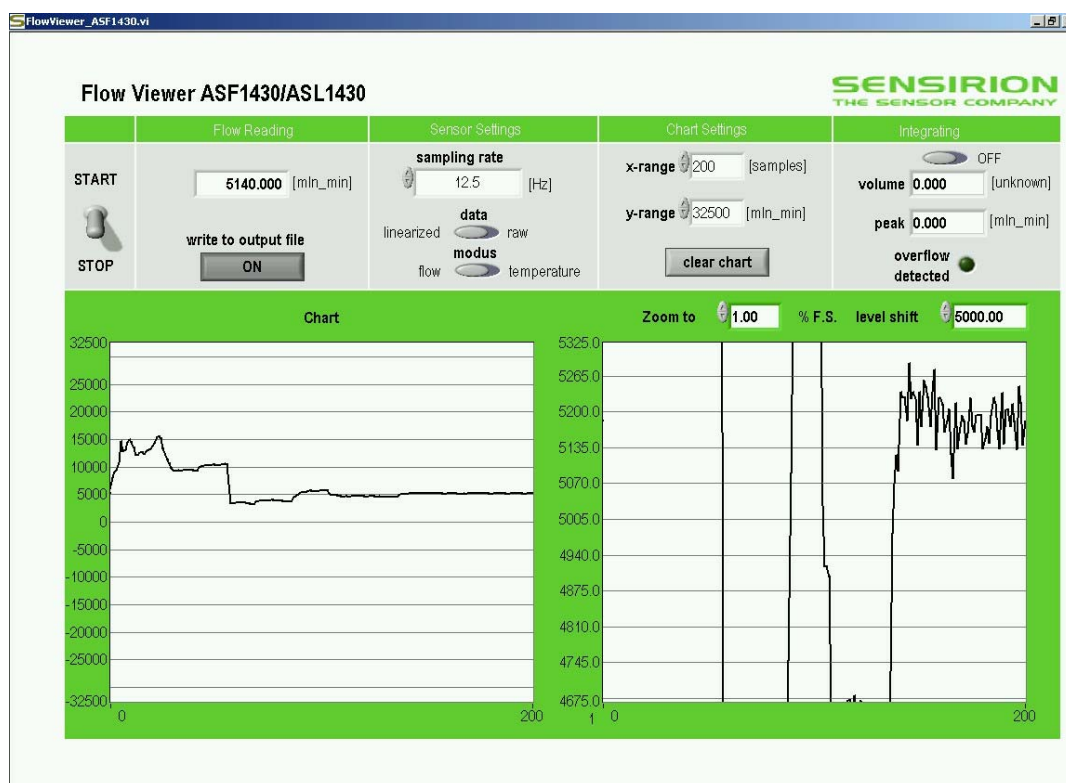


Figure 6: FlowViewer displaying measurement data of the EM1_R (20'000 mln/min = 20 ln/min)



Figure 7: FlowViewer displaying measurement data of the EM_V (200 ln/min)

Important Notices

Warning, personal injury

Do not use this product as safety or emergency stop devices or in any other application where failure of the product could result in personal injury. Failure to comply with these instructions could result in death or serious injury.

Should buyer purchase or use SENSIRION AG products for any such unintended or unauthorized application, Buyer shall indemnify and hold SENSIRION AG and its officers, employees, subsidiaries, affiliates and distributors harmless against all claims, costs, damages and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SENSIRION AG was negligent regarding the design or manufacture of the part.

ESD Precautions

The CMOSens[®] EcoLine Mass Flow Meter is an electronic device. For this reason Sensirion recommends to use standard ESD (electrostatic discharge) precautions when handling this device.

Warranty

SENSIRION AG makes no warranty, representation or guarantee regarding the suitability of its product for any particular purpose, nor does SENSIRION AG assume any liability arising out of the application or use of any product or circuit and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typical" must be validated for each customer applications by customer's technical experts.

SENSIRION AG reserves the right, without further notice, to change the product specifications and/or information in this document and to improve reliability, functions and design.

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FCC and CE Statement

The CMOSens[®] EcoLine MFM product has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules (FCC CFR 47). These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult a dealer or an experienced radio/TV technician for help.



The CMOSens[®] EcoLine device fully complies with norm EN 61000-6-1 to EN 61000-6-4 (Immunity and Emission Test Series).

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