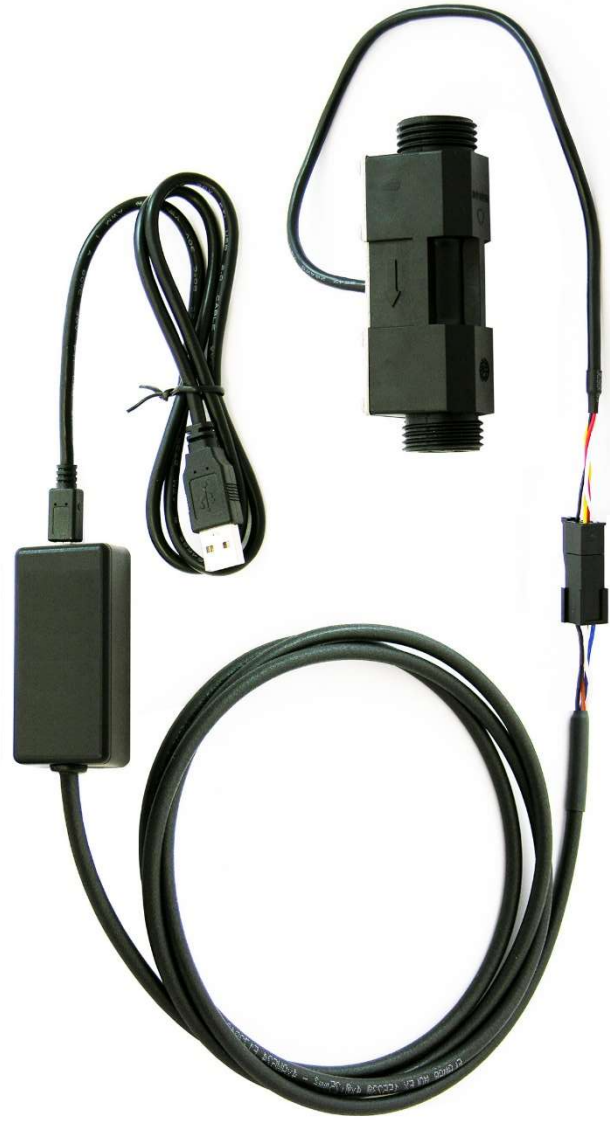


## User Manual



## Evaluation Kit

Flow Module  
for aqueous liquids

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## 1. Notes on the user manual

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The operating instructions are aimed at qualified specialists and trained workers.  
Read the operating instructions carefully before installation and follow the instructions.

If questions or problems arise, please contact your supplier.

Used danger signs and symbols:



**WARNUNG/DANGER**

Warning of an immediate danger or dangerous situation.  
Failure to do so may result in serious injury, death or serious property damage.



**Note**

Note to important information.

## 2. Intended use

---

This Evaluation Kit, comprise the Flow Module and is designated to simplify the handling of this module. It should be used for evaluating the modules performance close to application and to learn about the application specific use of the issued features.

In a first operating state, there is no need to take care about the communication interface and easy operation of the FlowModule as configuration or data readout is possible as well as data recording.



**WARNUNG/DANGER**

This Evaluation Kit must not be used in a final application. It is only for exploration/evaluation of FlowModules Performance.

The FlowModule itself is used to record the flow of water and neutral aqueous emulsions. The module basically works independently of the installation position. The current process values are output via a digital interface.

The designated operation manual of the FlowModule contains important safety information.



**DANGER**

The FlowModule may only be operated in the operating conditions specified in the data sheet / operating instructions.

The temperature ranges must be within the permissible limits.

Information on the electrical load capacity must not be exceeded.

Also observe the relevant national safety regulations when installing, commissioning and operating the FlowModule.

The FlowModule may not be operated as the sole safety component according to DGRL 2014/68 / EU.

### 3. Content of this kit

---

Following elements are part of this kit:

- SQ-FM2PA61-10M, FlowModule DN10 with connector
- Adapter to connect the FlowModule to a PC's USB port
- USB-A / USB-B Mini cable
- Windows® installable software FlowModule Software

### 4. System Requirements

---

The following system requirements apply to the FlowModule software:

Operating system:	Windows® 10/8.1/8/7 SP1 (32- & 64-bit)
CPU:	32 Bit: At least Pentium 4M/Celeron 866 MHz (or equivalent) 64 Bit: At least Pentium 4 G1 (or equivalent)
RAM:	At least 256 MB of free memory
Screen Resolution:	1024 x 768 Pixels or higher
Disk Space:	At least 620 MB of free space
USB Connection:	USB-Port 2.0/3.0
System rights:	The installation requires local administrator rights

## 5. Software Installation

### 5.1. Preparation



#### Note

Generally the FlowModule software needs to be installed. If the driver is not available, it is also necessary to install this driver.

Download the FlowModule Software and the driver (if necessary) from the two links below

FlowModule Software

<https://www.sonoq.de/products/sq-flow/download-center-sq-fm2-serie.html>

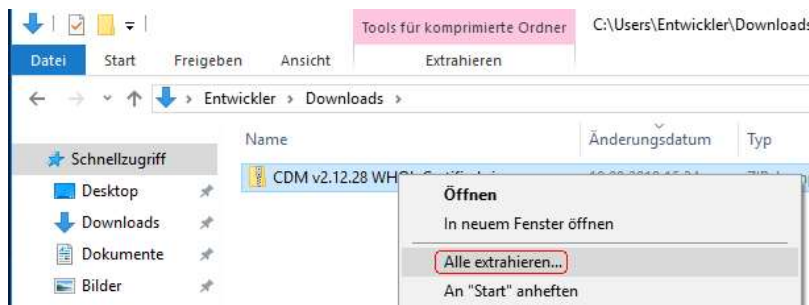
Original driver page

<https://www.ftdichip.com/Drivers/CDM/CDM%20v2.12.28%20WHQL%20Certified.zip>

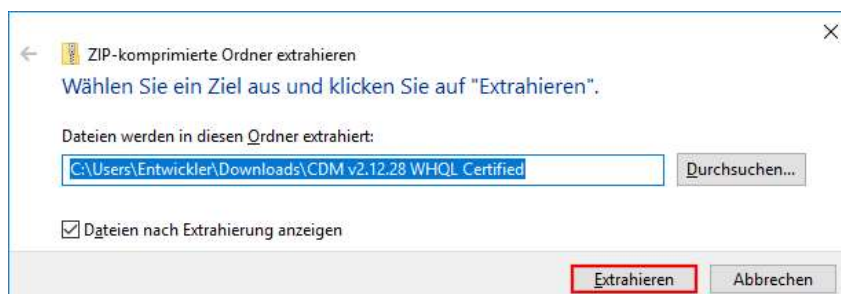


Extract both .zip files successively.

Right click on .zip file that you want to unzip (uncompress), and click on "Extract All" in context menu.



In "Extract Compressed (Zipped) Folders" dialog, enter or browse folder path where you want files to be extracted.



Repeat the steps with the other .zip file.



#### NOTE

You need administrator rights to install the FlowModule software and the driver. If necessary, contact your IT department.

Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

In the following, Windows® will be referred to as Windows

LabView is a registered trademark of National Instruments in the United States and other countries.

<http://www.ni.com/legal/export-compliance.htm>

## 5.2. Installation of FlowModule Software

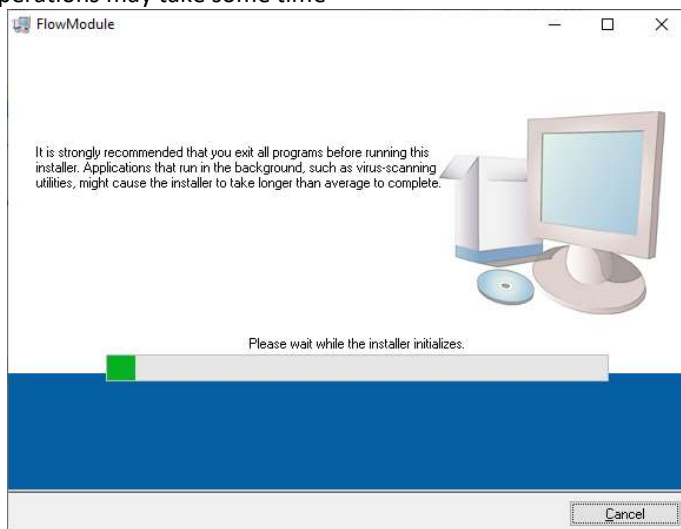
1. Enter the folder FlowModule Installer (Double-click the folder)
2. Double-click setup.exe
3. If the User Account Control dialog box appears, click Yes
4. Proceed to [5.3 Guided Installation](#) below.



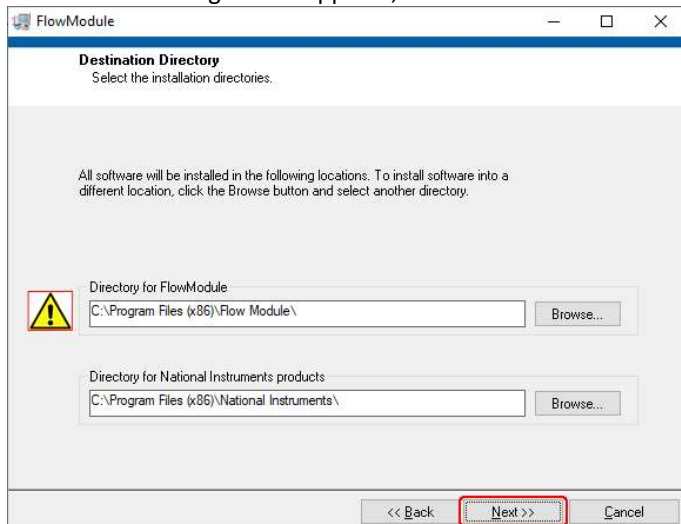
## 5.3. Guided Installation

1. Follow the on-screen instructions

These operations may take some time



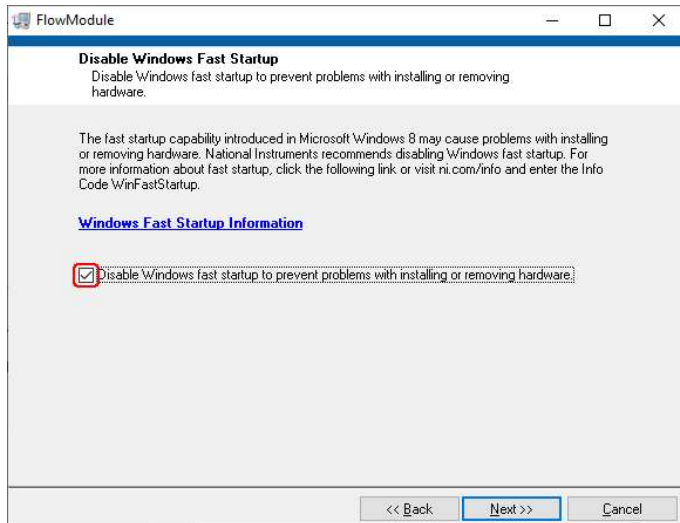
2. When the following screen appears, click Next



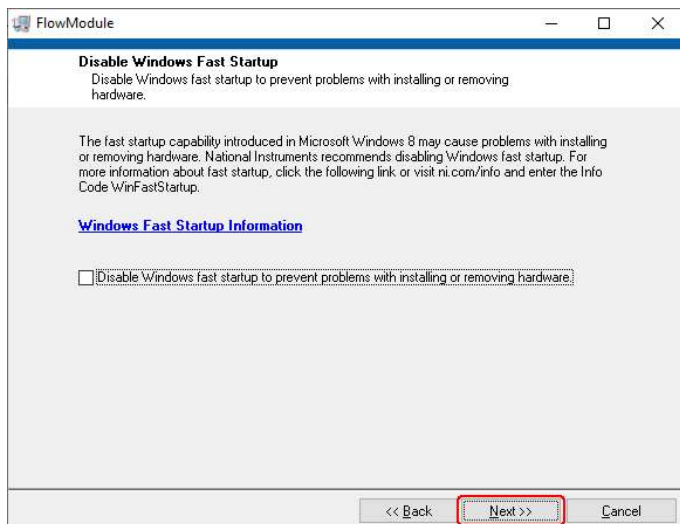
### WARNING

The software requires write permission in the installed folder. If the selected user does not have write access to "C:\Program Files (x86)\", change the directory for FlowModule, to: "C:\Software\FlowModule"

3. Click the check mark in the check box to remove it.



4. Then click Next

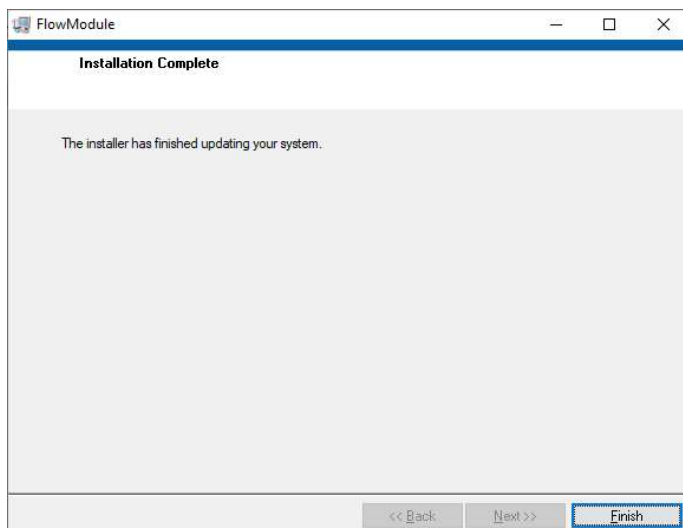
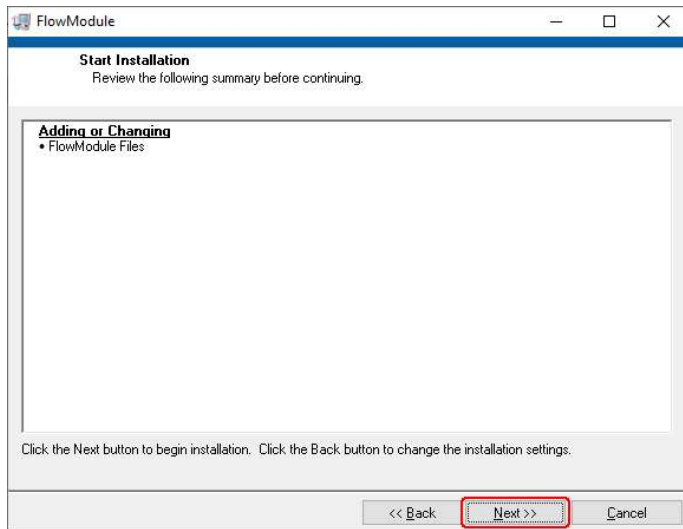


#### NOTE

For more information click on Windows Fast Startup Information or follow this link

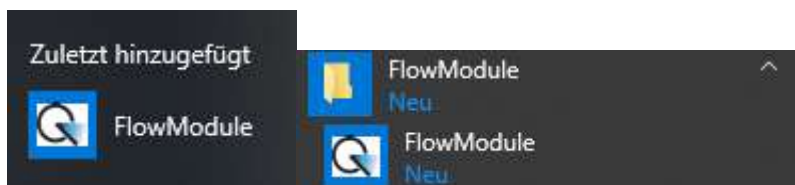
<https://knowledge.ni.com/KnowledgeArticleDetails?id=kA00Z000000P9ErSAK&l=de-DE>

5. When the following screen appears, click Next to start the installation  
This procedure may take some time.



6. After successful installation, you will find a desktop icon and an entry in the start menu for the FlowModule.

Example: Windows 10/German Version



7. Double-Click the FlowModule icon to start the program.



## 5.4. Installation of the driver



### NOTE

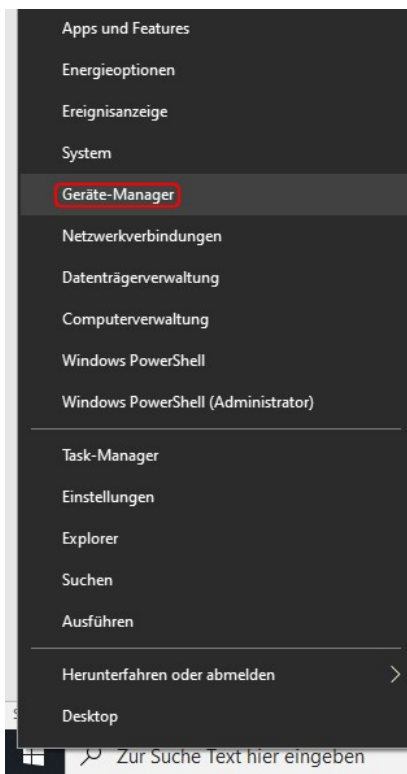
You need administration rights to install the driver.  
If necessary, contact your IT department.

### 5.4.1. Enter device manager Windows 10/Windows 8.1

1. Right click the bottom low left corner of the Windows Button



2. Click on Device Manager



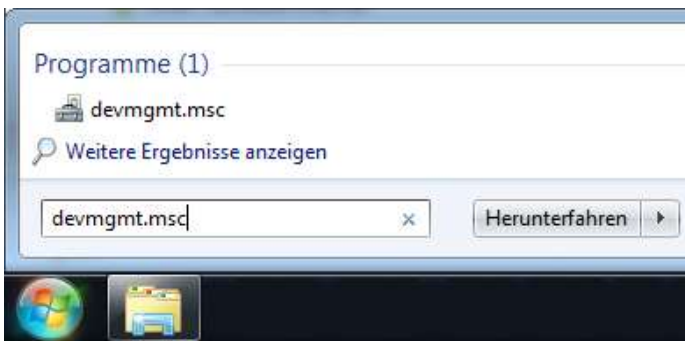
3. If the User Account Control dialog box appears, click Continue Proceed to [5.5 Device Manager](#) below.

## 5.4.2. Enter device manager Windows 7

1. Click the bottom-left **Start button** on desktop



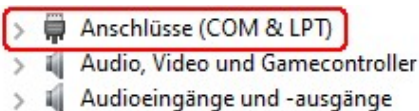
2. Type devmgmt.msc in the search box and tap Device Manager (devmgmt.msc ) on the menu.



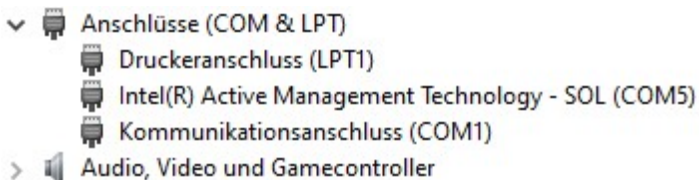
3. Proceed to [Step 4](#) below.

## 5.5. Device Manager

1. Double-Click / expand the category Ports (COM & LPT)



2. Now you see all available ports



3. Connect the Opt-USB-RS485 Converter with your PC

## 5.5.1. Device is correctly detected by Windows

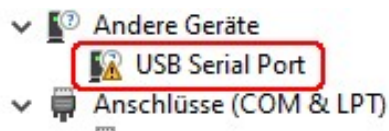
1. If the driver is already loaded, you will see the new USB Serial Port (COM2)



2. Proceed to 6. Use of Software below.

## 5.5.2. Device is not correctly detected by Windows

1. If the device is not correctly found, the USB Serial Port will be found at other devices

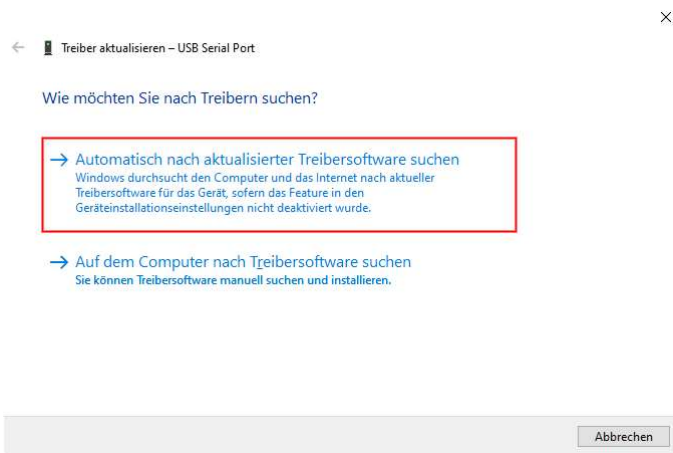


2. Right click on USB Serial Port and Update driver



## 5.5.3. PC is connected to the internet

1. Select-> Search automatically for updated driver software.

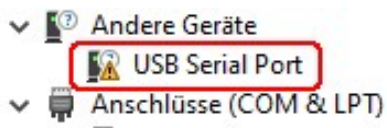


2. The device will be listed as USB Serial Port (COM2)



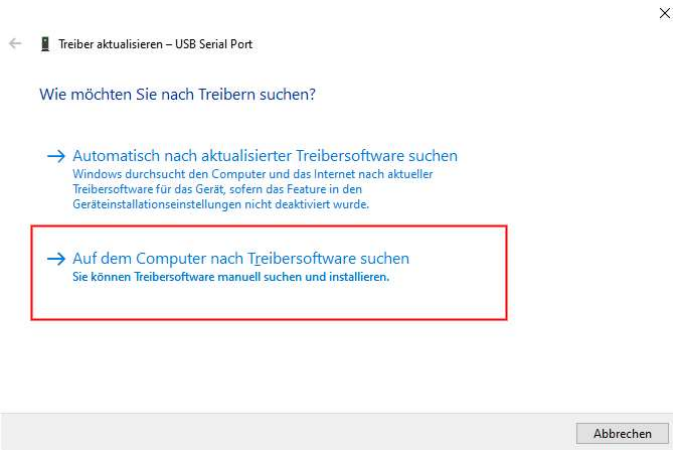
3. If the driver was successfully installed proceed to [6. Use of Software](#) below.

4. If the driver was not installed proceed with [5.5.4 PC is not connected to the internet](#)

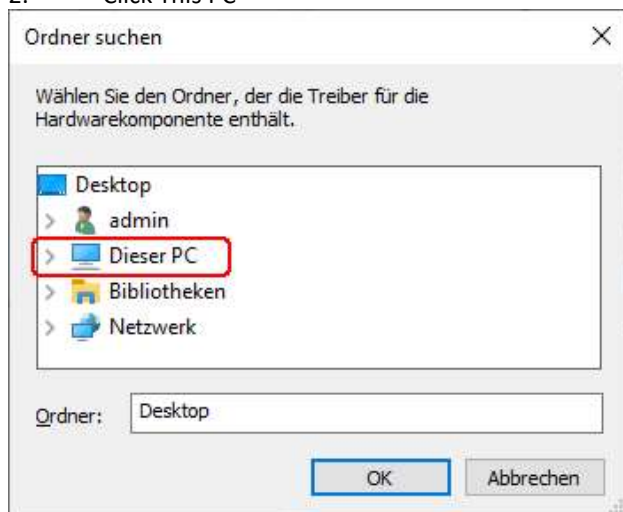


## 5.5.4. PC is not connected to the internet

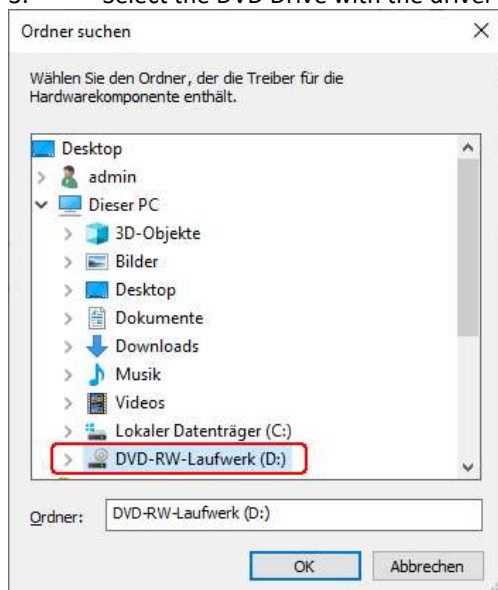
1. Select -> Browse my computer for driver software.



2. Click This PC



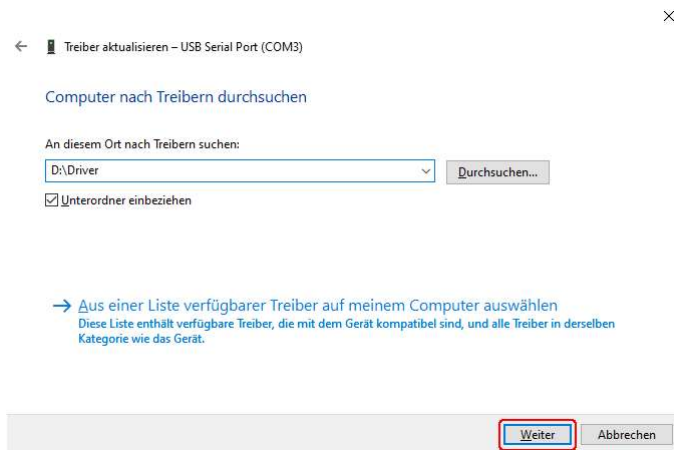
3. Select the DVD Drive with the driver DVD



4. Click Driver and press OK



5. The driver installation begins with pressing on Next



6. The device will be listed as USB Serial Port (COM2)



7. You can start now the FlowModule Software
8. Proceed to 6. Use of Software below.

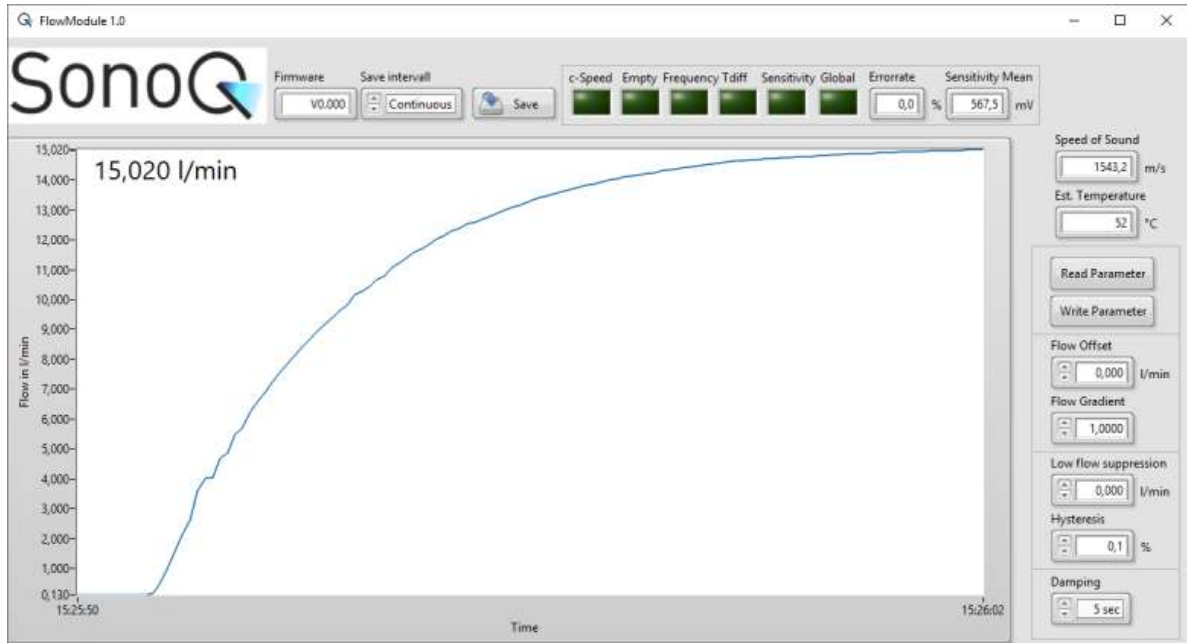


#### Note

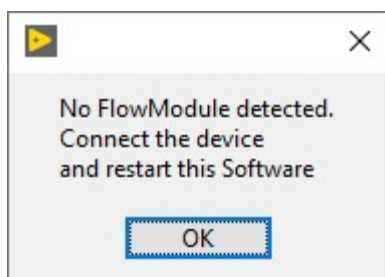
The COM port number (here COM2) depends on how many devices were already connected to Windows.

## 6. Use of Software

1. The Software will detect the connected Flow Module automatically



2. Measurement begins directly  
If no device is detected following message appears



Make sure the Flow module and the USB-Adapter is connected and the driver properly installed.

### 6.1. Measurement Data

#### Flow

Flow rate is shown as chart and as numeric overlay in the upper left corner of the chart

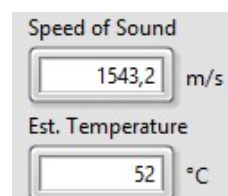
#### Speed of Sound

This value is a powerful indicator to identify or control liquids, because this value is mainly depending on compressibility and density (but also on temperature).

If many small air bubbles are available, this value will likely reduce because of scattering.

#### Estimated Temperature

In most cases the temperature dependence of speed of sound in aqueous liquids is quite similar to this of pure water. The estimated temperature is considering this relation and can predict the temperature from speed of sound value in a limited temperature range.



## 6.2. FlowModule Parameter

With the parameters Flow Offset and Flow Factor, the FlowModule can be adapted to your system.

The flow offset allows a zero point correction. Set Flow Offset to 0 and Flow Factor to 1.0. Note that the measuring section is free of air bubbles and is closed by valves to prevent thermal compensation flows. The displayed flow rate at the zero flow can be transmitted as a flow offset.

Flow Factor corrects the sensitivity. To do this, set the desired flow rate and determine the displayed error. A difference between the real flow and the indicated error is corrected multiplicatively.

### Flow rate offset

With the flow rate offset the zero flow offset can be adjusted.

$$Q^* = Q_{measured} - Offset_{Flow\ rate}$$

### Flow gradient

With the flow rate gradient the slope of the flow module can be adjusted.

$$Q^* = Q_{measured} - Offset_{Flow\ rate}$$

### Low flow suppression

The low flow suppression is a threshold.

All flow rates lower than the threshold are set zero.

### Hysteresis

The hysteresis prevents bouncing around the threshold for low flow suppression.

The hysteresis refers to the threshold and is given as percentage.

### Damping

The output filter for the flow rate can be adjusted with the damping.

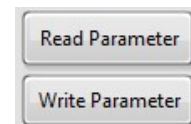
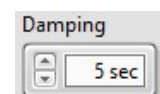
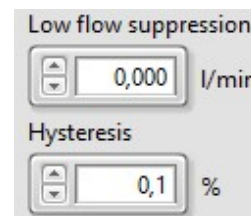
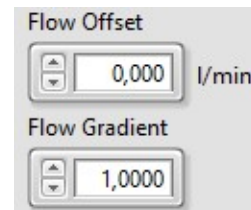
The damping is the time it takes to reach 63% of a unit step in flow rate.

The parameters of the FlowModule will be read automatically by startup

You can also press the Read Parameter button to update the values

To transfer changed parameters a click on Write parameters

The parameters will be permanently stored within the FlowModule





## 6.3. Save measured data

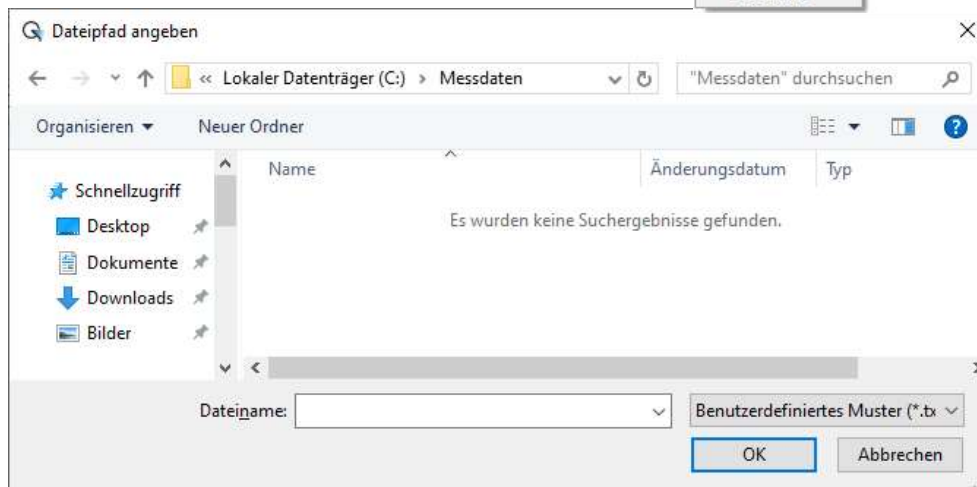
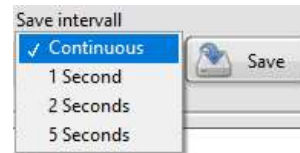
The measurement data is stored continuously as soon as the Save button is pressed.

It is possible to specify an interval for saving the data.

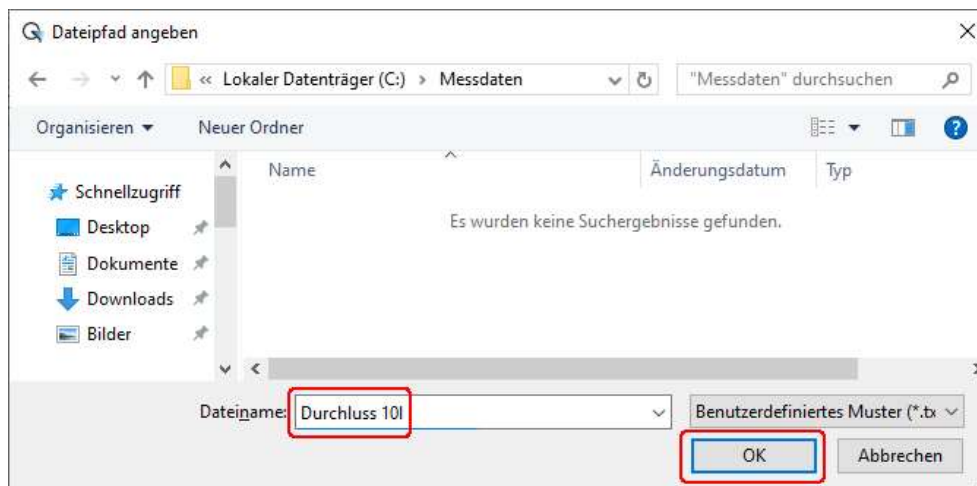
If the interval is set to, for example to 5 seconds, the software continues to run normally, but only one set of data is recorded every 5 seconds.

The interval can also be varied during the storage process.

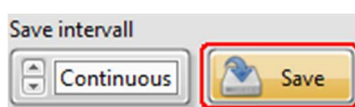
1. Set your desired measurement interval
2. Click on Save
3. Now select your location



4. Select a file name.



5. You will recognize by the yellow marked Save button that the save process is in process.





## 6.4. Sample Logfile

Settings:			
Flow Offset l/min	Flow Factor	Low flow suppression l/min	Hysteresis %
0	1	0	0
			Damping %
			2

Measurementdata:												
Date	Time	Flow l/min	Flow raw l/min	Speed of Sound m/s	Temperature °C	Amplitude up mV	Amplitude down mV	Amplitude Mean mV	Errorrate %	Errorstate1		
20.09.2019	09:09:49	12,426	12,378	1485	19	476	467	471,5	0	0		0
20.09.2019	09:09:50	12,424	12,514	1485	19	476	467	471,5	0	0		0
20.09.2019	09:09:51	12,439	12,431	1485,1	19	475	468	471,5	0	0		0
20.09.2019	09:09:52	12,446	12,356	1485,1	19	475	468	471,5	0	0		0
20.09.2019	09:09:53	12,459	12,62	1485,1	19	474	468	471	0	0		0
20.09.2019	09:09:55	12,445	12,37	1485	19	475	466	470,5	0	0		0
20.09.2019	09:09:56	12,456	12,471	1485	19	475	466	470,5	0	0		0
20.09.2019	09:09:57	12,028	10,232	1485	19	476	466	471	0	0		0
20.09.2019	09:09:58	10,727	8,939	1485,1	19	476	466	471	0	0		0
20.09.2019	09:09:59	9,975	8,83	1485	19	475	468	471,5	0	0		0
20.09.2019	09:10:00	9,484	8,807	1485	19	475	468	471,5	0	0		0
20.09.2019	09:10:01	9,166	8,792	1485	19	476	468	472	0	0		0
20.09.2019	09:10:02	9,028	8,801	1485	19	475	468	471,5	0	0		0
20.09.2019	09:10:03	8,932	8,758	1485	19	475	468	471,5	0	0		0
20.09.2019	09:10:05	8,873	8,683	1485	19	476	468	472	0	0		0
20.09.2019	09:10:06	8,835	8,8	1485	19	476	468	472	0	0		0
20.09.2019	09:10:07	8,664	7,253	1485	19	474	467	470,5	0	0		0
20.09.2019	09:10:08	6,49	2,185	1485	19	474	467	470,5	0	0		0

## 6.5. Error Messages

---



The following errors / warnings are displayed:

In principle, it is possible that individual measurements are invalid. In particular, with changes in the process conditions (such as pressure surges, temperature change, etc.), this can happen.

### c-Speed

The speed of sound is out of plausible range. Other media than water can also cause this error.

### Empty

Detection of an empty measuring section can also be triggered by defective or non-connected sound transducers.

### Frequency

Frequency of the receiving signal is not plausible. The error can be caused as single error through small bubbles or particles.

### Tdiff

The transit time difference is implausible.

Can be caused by wrong flow direction.

Can be caused by air in the system.

### Sensitivity

The error can be caused as single error through small bubbles or particles.

As permanent error check your pipe. If there are bubbles in front of the transducers or you are using a media with high acoustic damping.

### Global

Displayed if any error is permanent.

### Error-Rate

Indicates the number of invalid measurements of the last 64 measurements.

### Sensitivity Mean

Average of the receiving amplitudes in upstream and downstream direction.

## 7. Order Code

---

Article	Description
SQ-FM2PA61-10M	Flow module DN10 incl. electronic with UART, PA61-pipe, ultrasonic transducer
SQ-FM2PA61-10EK	Flow module SQ-FM2PA61-10Me incl. USB-Adapter, USB-Cable and PC-Software

**Important Note:**

Technical changes without notice

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