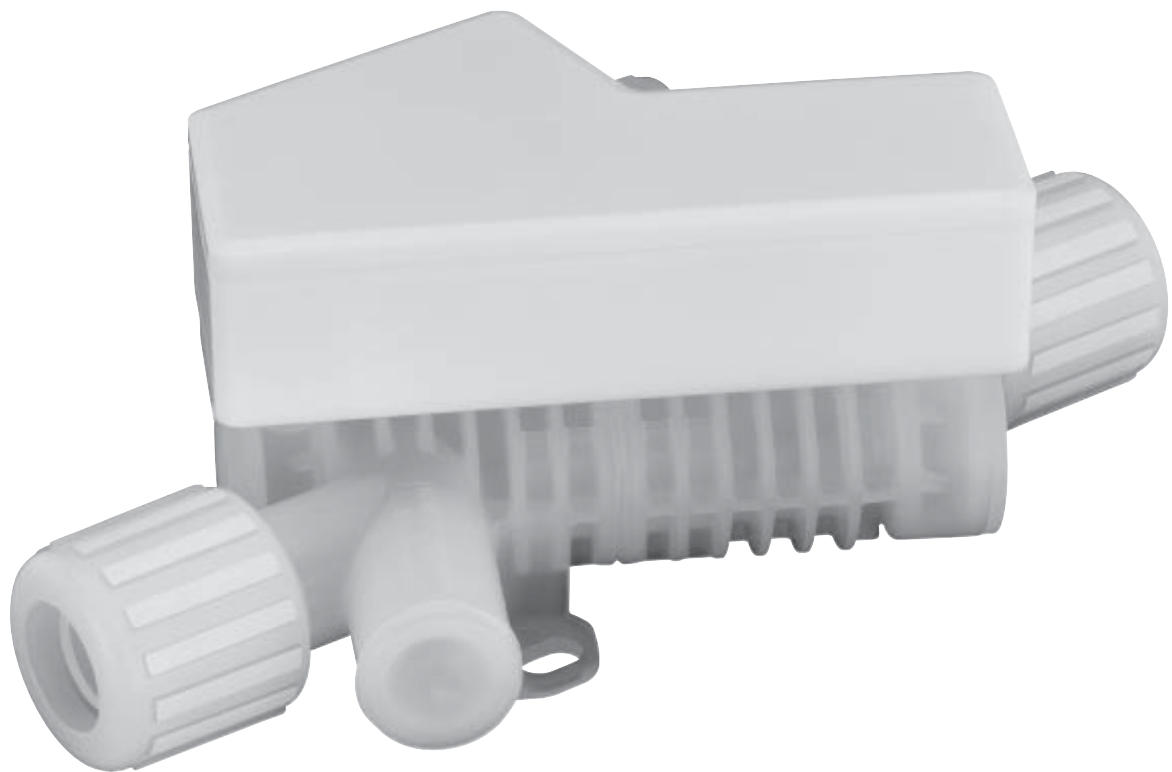


Configuration Software
for GEMÜ C38 **SonicLine®** ultrasonic flowmeter



OPERATING INSTRUCTIONS



As of 01.04.2008
Valid from software version 2.3.3

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1 General information

Please read the entire operating instructions before first use of **FlowSoft®** configuration software. It will introduce you step-by-step to the program. At the same time you will get to know all features offered by **FlowSoft®**.

Please always observe the following information!

Pay attention to information with these pictograms contained in these operating instructions:



ATTENTION!



IMPORTANT!

1.1 Validity of the operating instructions

These operating instructions are valid starting from **FlowSoft®** software version V 2.3.3.

1.2 Copying rights

The software may be copied; it is not subject to any copy protection. However, we recommend ordering the entire software package directly from GEMÜ. You will then not only receive the most current and executable version of the program, the operating instructions are also included in the package and GEMÜ ensures support in case of potential questions.

1.3 Restrictions

The software was developed and programmed conscientiously and to the best of knowledge. However, GEMÜ does not assume any warranty for potential direct or indirect damage that may be caused through the use of this software.

1.4 Technological progress

GEMÜ reserves the right to modify technological data or information without special prior notice.

2 How to use *FlowSoft*[®]

FlowSoft[®] is a configuration program for the GEMÜ C38 *SonicLine*[®] flowmeter. *FlowSoft*[®] offers the users the possibilities to

- » Update the GEMÜ C38 *SonicLine*[®] operating program
- » Configure the settings of the device
- » Read the operating data and settings of the device
- » Visualize the operating data
- » View the configuration data.

2.1 How to use these operating instructions

These operating instructions explain the steps to install and operate the *FlowSoft*[®] software.

- Keyboard entries appear in angle brackets. E.g. <RETURN> adverts you to press the RETURN key.
- *Italics* indicate names, screenshots and menu options of the applications that are described.

2.2 System requirements

The following minimum PC requirements are necessary for using the *FlowSoft*[®] configuration software:

- Pentium min. 90 MHz
- Microsoft Windows version 95[™] or higher
- 8 MB RAM
- 20 MB available disc space on hard disc
- 1 free USB port

2.3 Installation

To install the software insert the *FlowSoft*[®] CD into the CD-ROM drive of your PC. With the corresponding configuration of the PC, the installation will start automatically. If this is not the case, please start setup file in root directory of CD.

The setup program copies all *FlowSoft*[®] program files into folder *C:\Programs\Gemue*, updates the required Dynamic Link Libraries (DLL), and enters the required keys into the Windows-registry.

Installation of the driver under Windows 2000 and XP:

1. Insert setup CD
2. If setup does not start automatically after inserting the CD: Start setup via *Start* → *Execute* (setup “USBtoRS485-Converter.exe“)
3. Carry out setup
4. Check which Com-No. was assigned to the logical interface:
 - → *Start* → *Settings* → *Control panel* → *System* → *Hardware/Device manager*
 - Double click on connections (Com and Lpt): *USB Serial-Port* with a *ComNo.* must be indicated.

The *Com-No.* must be entered later in the interface configuration (chapter 3.2) of the software used.

2.4 Uninstall

To uninstall **FlowSoft**® please proceed as follows:

1. Select symbol *Software* in control panel
2. Select entry *FlowSoft* in list of installed programs
3. Use button *Add/Remove*.

3 How to operate **FlowSoft**®

3.1 Start

In order to be able to configure a GEMÜ C38 **SonicLine**® flowmeter with the **FlowSoft**® software or to read its settings, the following has to be ensured:

1. Connection of the USB to RS485 converter to a free USB port at the PC.
2. Connect the wire ends of the GEMÜ C38 **SonicLine**® with the quick connectors (?) of the converter. Please absolutely observe the pin assignment!
3. Power supply unit of RS485 converter has to be plugged into 230V socket.



IMPORTANT!

Close all programs with active access to the interface used by **FlowSoft**® before starting **FlowSoft**®.

When starting **FlowSoft**®, the project frame with the menu bar will open. In addition, the start of communication with the connected **SonicLine**® will be signaled through a white window during the start phase.

In the start phase the program will search for a connected GEMÜ C38 **SonicLine**[®] in line with the setting selected according to chapter 3.2. Should the following error message appear according to fig.1,

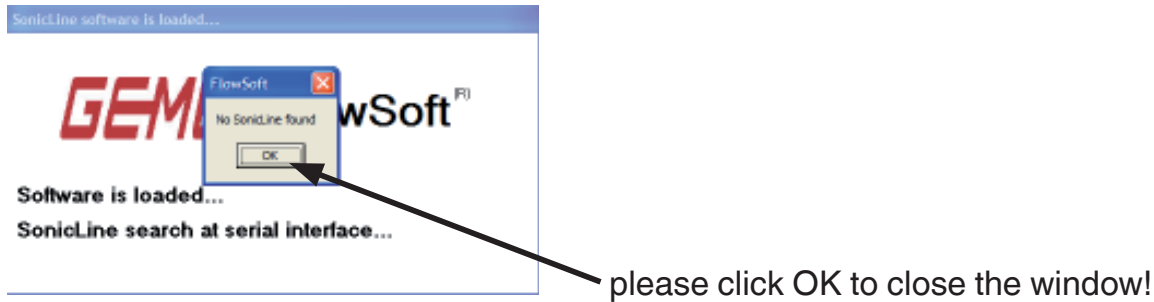


Fig. 1: The message *No SonicLine found*

the settings in the menu *configuration*→*interface* have to be checked. You may choose from 20 serial interfaces. Connection to **SonicLine**[®] via *USB to RS485 Converter*.

3.2 Interface configuration

PC and the GEMÜ C38 **SonicLine**[®] communicate via a RS485 serial interface. To configure the interface parameters select menu item *Configuration*→*Define interface*. After clicking *Define interface* the window *interface configuration* will open.

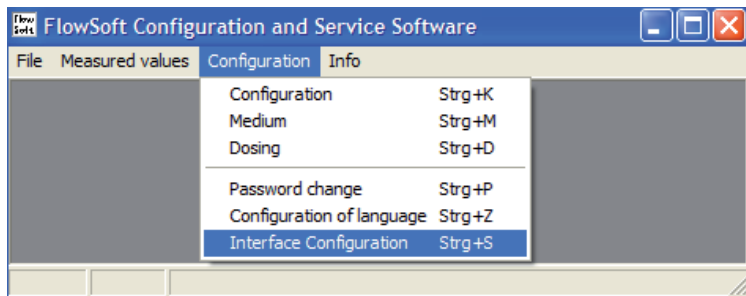


Fig. 2: The window *interface configuration*

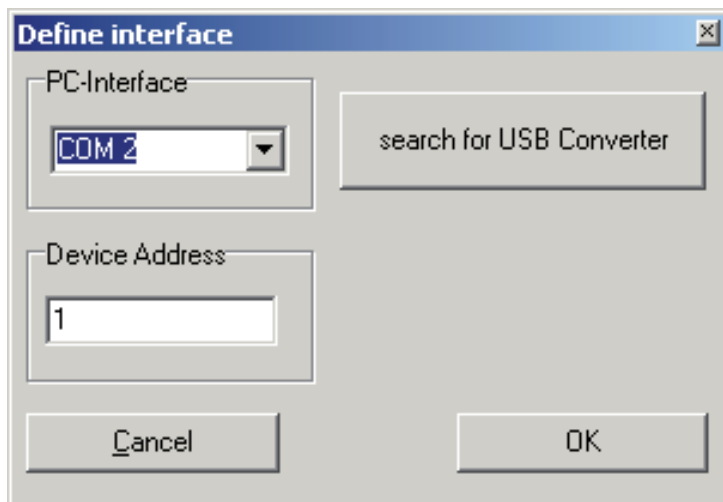



Fig. 3: The window *interface configuration*

Additionally, the logical interface number of a connected USB to RS485 Converter may be read from the Windows Registry and taken over.

To do so, first the USB port defined as logical Com-Port has to be selected in the control panel



of the PC that is used. Clicking the button starts an automatic search in the Windows Registry. If there is a relevant entry, the necessary configuration will be adapted automatically.



IMPORTANT!

In case of multiple installations of the corresponding interface driver without previous uninstall the Windows Registry may contain inadmissible entries. In this case the logical Com-Port has to be entered manually.

3.3 User log in / log out

User log in with password is required for running program updates as well as for changing various parameters.

Principally, two levels have to be distinguished:

- » Configurations can be changed without user log in
- » Program updates and changes of critical parameters as well as password changes require the entry of the customer's password

After new installation of **FlowSoft**[®] the password is pre-set to **141414** and can be changed after log in is completed. The password has to consist of 6 characters (see chapter 3.10).

You reach **Log in** via the menu *File* as follows:

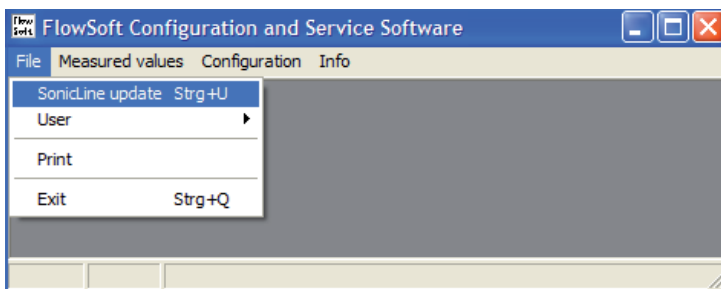


Fig. 4: User log in in the pull down menu *File*

Presently you will be asked to enter your password.

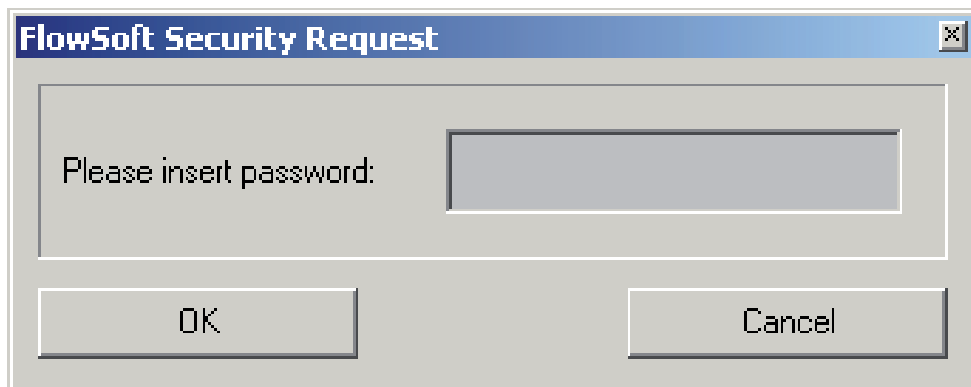


Fig. 5: The window *FlowSoft Security Request* for entering the password

Please enter password into edit field. Confirm completion of entry with mouse click on



After correct entry of the password, the positive message will appear that the above areas are now active. If a negative message appears, you may try again.



IMPORTANT!

If you should forget a password that was changed as compared to the password originally supplied, we recommend a new installation of the software. After the new installation the password will be *141414* again.

For **log out** and for restoring the password protection please use function *User log out*.

3.4 Update of GEMÜ C38 *SonicLine*[®] operating software

Before starting an update the user must log in by entering a valid password (see chapter 3.3).

FlowSoft[®] can be used to update the software of the GEMÜ C38 ***SonicLine***[®]. Please select *File*→*SonicLine update* in the menu bar.

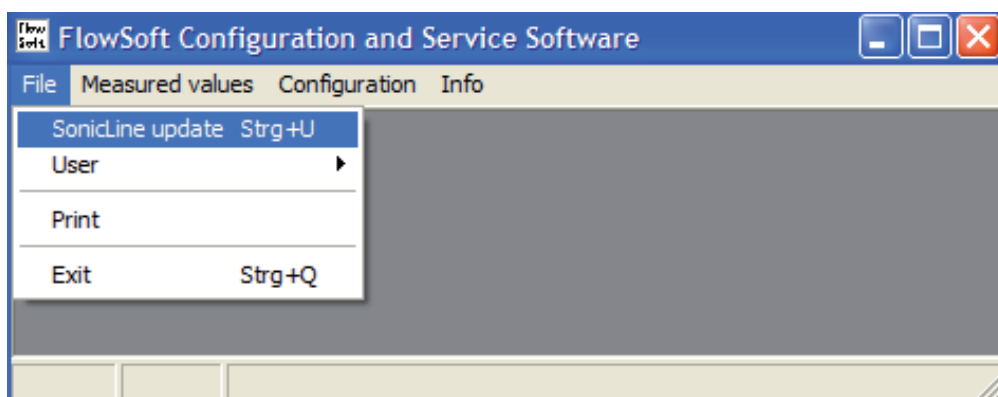


Fig. 6: The pull-down menu *File*

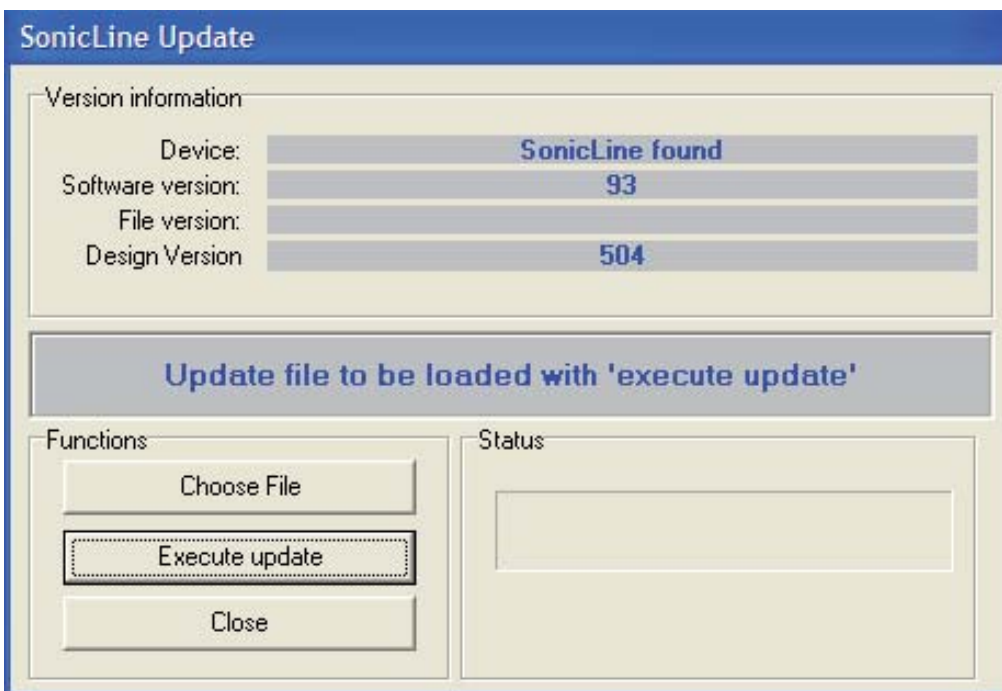


Fig. 7: The window *SonicLine update*

The window that opens shows the version number of the GEMÜ C38 **SonicLine®** software currently installed. After clicking the button **Choose File** choose the program file to be loaded.

The window *Open* appears:

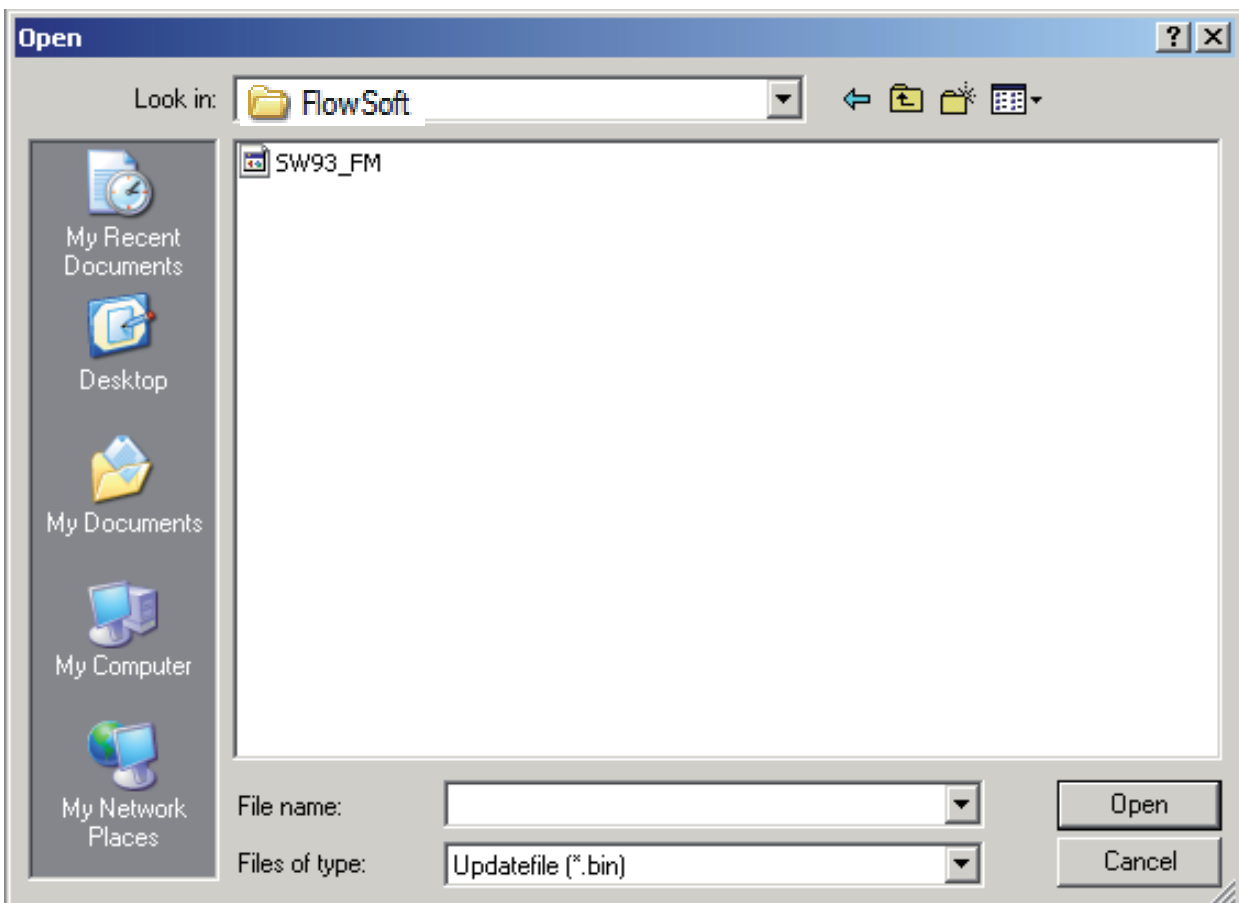




Fig. 8: The window *Open*

This dialogue is to set and to select the directory which contains the program file to be loaded. You will obtain all necessary files for updating from GEMÜ.

After selecting the program file through mouse click on  the program returns to the window *SonicLine Update*.

After clicking the button  the update will be executed and the loading progress will be shown in the *Status* field.

When the update is completed the following message will be shown:



3.5 How to print out device settings and measured values

For documentation of all settings including configuration and current measured values **FlowSoft**® offers the possibility to print out these values in a transparent and well structured version to a printer connected to a PC.

To start printing, click with the mouse on the option *Print* in the pull-down menu *File*.

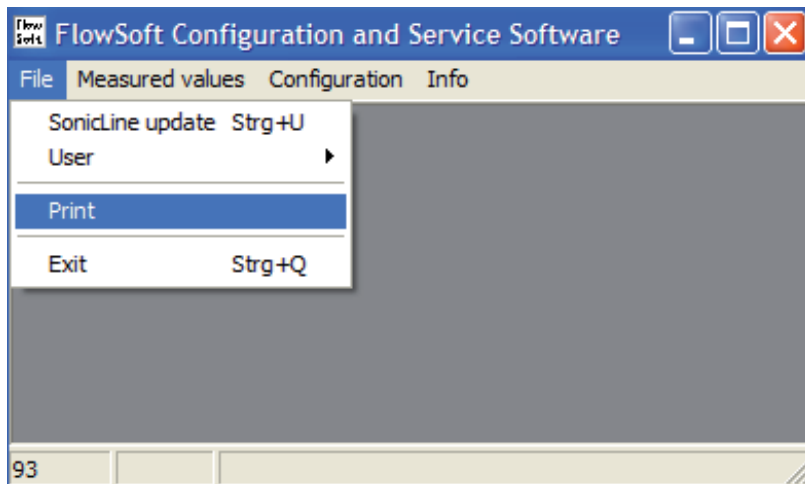


Fig. 9: Starting print-out

After clicking the button, the following window will open:

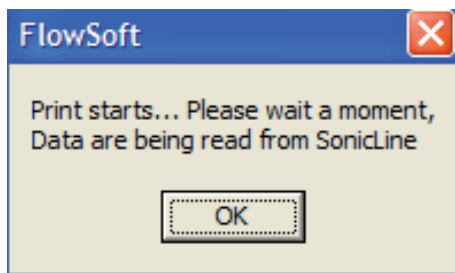



Fig. 10: Message Print starts

After confirming by clicking the button  the current data retrieved from **SonicLine**® are processed and formatted and send to printer for print-out. This may take several seconds.

3.6 Current measured values

3.6.1 View measured values

You reach the window *Display measured value figures* via the pull-down menu *Measured values*.

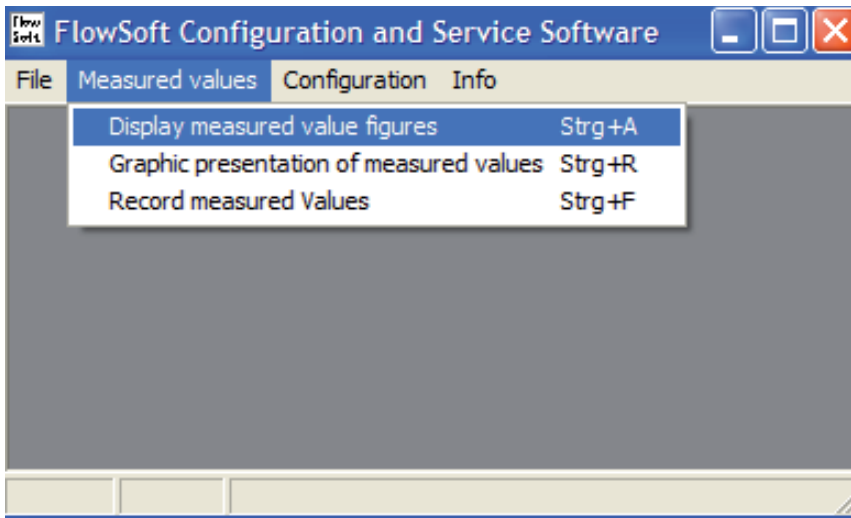


Fig. 11: Opening the window *Display measured value figures*

Mouse click on *Display measured value figures* opens the following window:

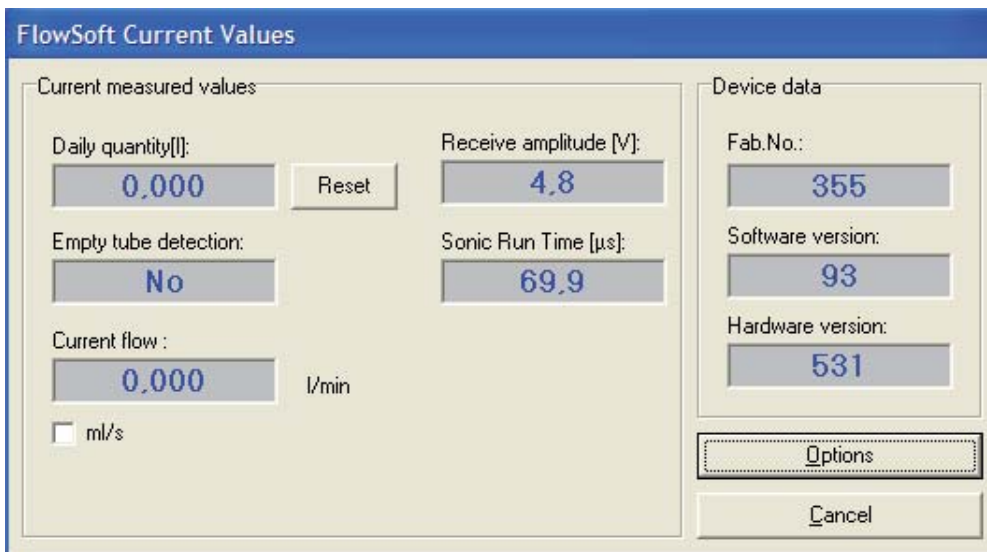



Fig. 12: The window *FlowSoft current values*

This window shows the permanently updated measured values of daily quantity, current flow, receive amplitude and sonic run time as well as empty tube detection. The flow is shown in liters/minute [l/min] and can, if necessary, be switched to milliliters/second [ml/s].

Apart from the current measured values the information of empty tube detection is also displayed.

In addition, device information, fabrication number, software and hardware version are made available.

The daily quantity value can be reset to zero by clicking the button .

3.6.2 Graphic presentation of measured values

This part of the program is only an assisting tool for process analysis during commissioning or when troubleshooting problems that might affect recording of the measured values. Quality assurance documentation and similarly important tasks can thus be realized with explicitly developed and released programs.

You reach the window *Graphic presentation of measured values* via the pull-down menu *Measured values*.

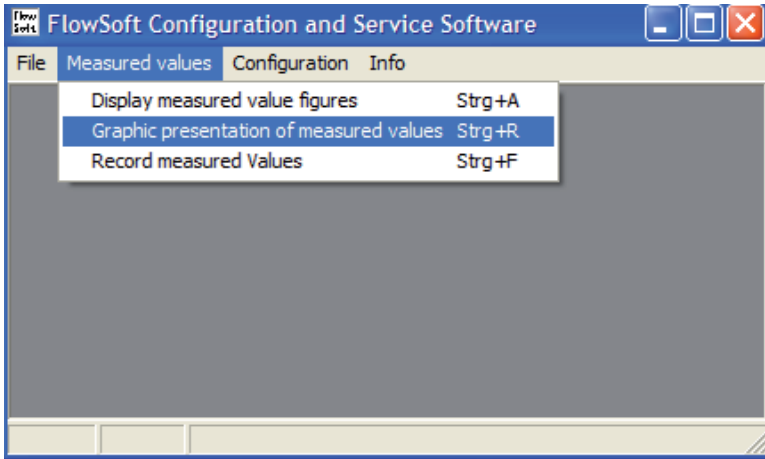


Fig. 13: Opening the window *Graphic presentation of measured values*

Clicking on *Graphic presentation of measured values* opens the following window:

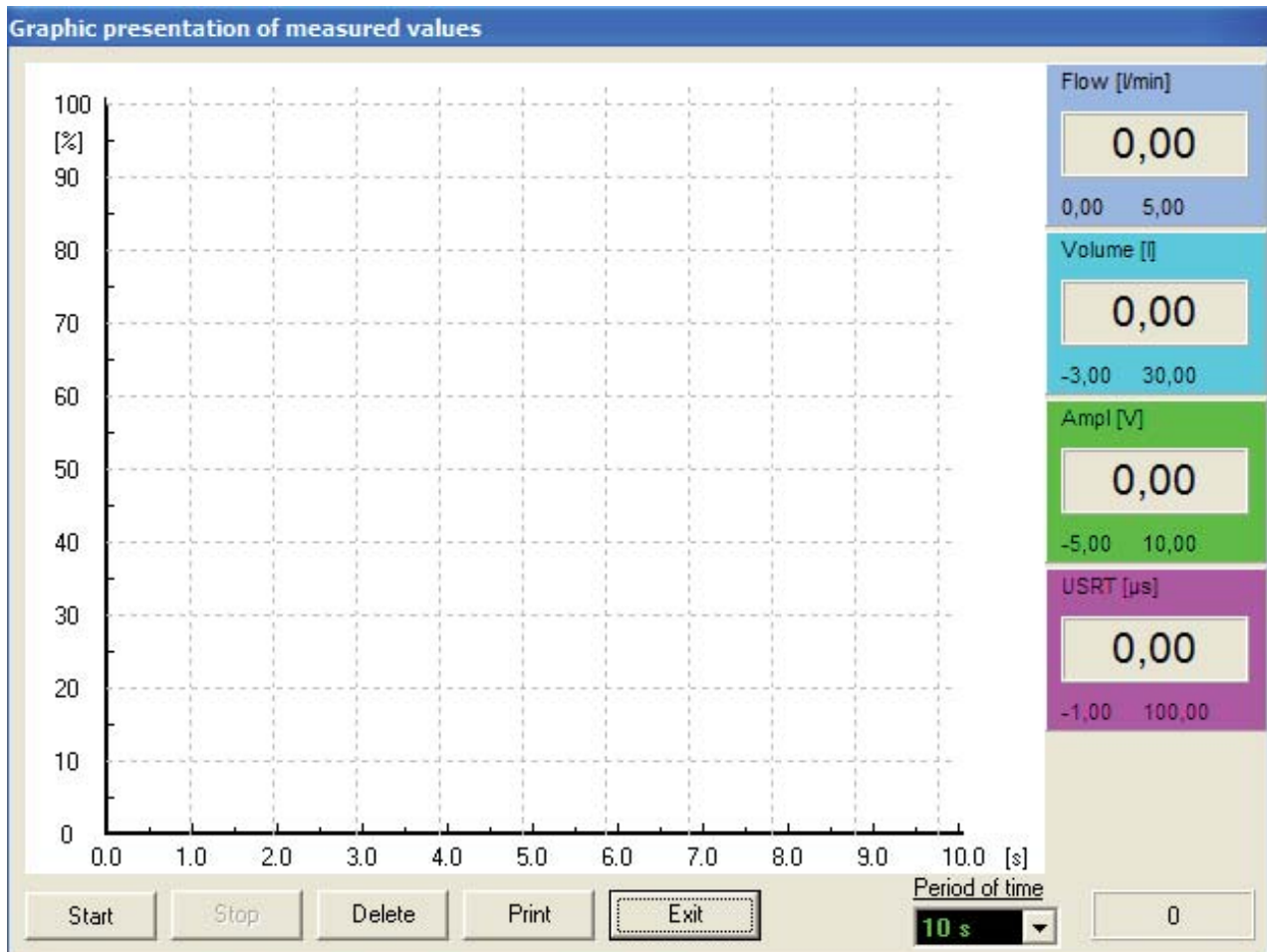






Fig. 14: The window *Graphic presentation of measured values*

In this window the values flow [l/min], volume [l], receive amplitude [V] and sonic run time [μ s] can be presented in online diagram format.

The field *Time period* can be used to set the duration of the recording in different steps from 10s to 48h.

After clicking the button  the above measured values are cyclically retrieved from GEMÜ C38 **SonicLine**[®] and shown over the associated time value in the color specific for the value. The Y-scale ranges from 0-100% for a clear simultaneous presentation of up to 4 measured values. 100% always correspond to the maximum value for each value given in a window on the right in the color in which it is presented. The X-axis shows the time that has lapsed since the recording. The scaling depends on the pre-selected timeline.

By clicking the button  a running recording can be stopped. After clicking the button  the previously recorded data are discarded, so that a new recording can be started.

There is also the possibility to print out a diagram that was recorded with this function. Simply click the button  with the mouse.

3.6.3 Recording of measured values

You reach the window *Record measured values* via the pull-down menu *Measured values*.

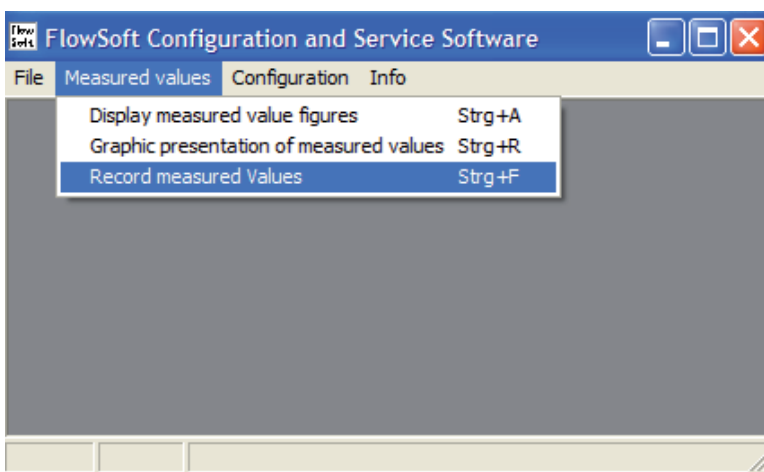


Fig. 15: Opening the window *Record measured values*

The function connected to this window allows to record the measured values flow [l/min], volume [l], receive amplitude [V] and sonic run time [μ s] with date and time in CSV-file format.

In addition information about date+time is saved, which when further process in Microsoft Excel allows to prepare diagrams from the recorded data that exceed the daily 24 hour grid.

In addition, basic device data are recorded such as settings, device number, hardware and software version.

In the upper half of the window *Record measured values* the above measured values as well as a counter for the number of data points already saved are shown in a frame. In the lower half there are 2 input fields.

The interval for saving the data can be set to seconds in the input field *Time interval*. In the input field *Filename* the desired name for the recording can be entered. The field comes with the pre-set name *file1*.

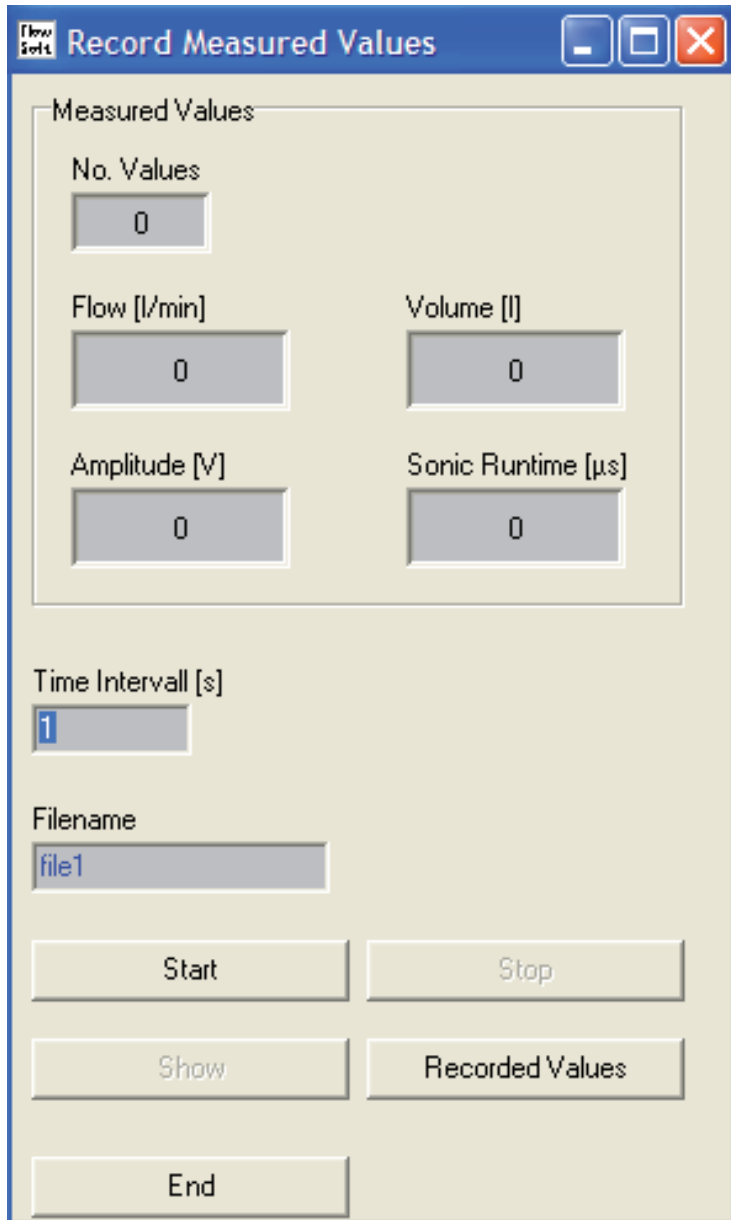


Fig. 16: The window *Record measured values*





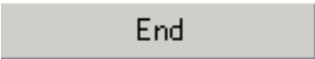
The definite name used for a recording will receive a suffix consisting of date and time of start of recording, so that even if the same name is selected, individual recordings can be made or started at different times without overwriting the old data.




Example:



1. Recording started on 19 July 2007 at 12:07:42 under the name H2O2_in_Cab1 leads to file H2O2_in_Cab1_1_19-07-2007_12-07-42.csv

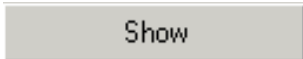
2. Recording started on 19 July 2007 at 12:31:50 under the name H2O2_in_Cab1 leads to file H2O2_in_Cab1_1_19-07-2007_12-31-50.csv

Functions of the buttons

In addition, the buttons , , ,  and  are located in the lower part of the window *Record measured values*.

Recording is started by clicking the button . While recording is running, only the buttons  and  can be selected, all the other buttons are blocked during this phase.

Clicking the button  stops running of a recording and the file that was generated is closed. Now, all buttons apart from  are available.

Clicking the button  starts Microsoft Excel and opens the CSV-file that was just created through recording. The precondition is, of course, that Microsoft Excel is installed on the relevant PC.

The dialog window *Open file* allows opening any of the CSV-files in the pre-set working directory.

The button  closes the window.



IMPORTANT!

Neither the working directory nor any of the higher-level directories must contain blanks in their names.

Please see Excel operating instructions for preparation of diagrams with Microsoft Excel. Microsoft Excel is not contained in the scope of delivery of **FlowSoft**[®].

3.7 Configuration of GEMÜ C38 SonicLine®

FlowSoft® offers the possibility of a transparent presentation of all current configurations of a GEMÜ C38 **SonicLine®** flowmeter as well as of their settings. So this tool can be used for application-specific adjustments.

In standard cases, such adjustments are not necessary because the standard default settings of the devices are such that they only have to be changed in exceptional cases.



ATTENTION!

Changes of the values shown here may result in malfunctioning of the device. We therefore recommend to gain knowledge about the influence of a parameter before changing it, and to document the current settings by noting them down or printing them out (see chapter 3.5).

Parameter	Setting range	Factory setting
Analog output	On Off	On
Analog output configuration	4-20 mA / 2-10 V 0-20 mA / 0-10 V	4-20 mA / 2-10 V
Analog output lower limit	0...Measuring range end value	0.0
Analog output upper limit	0...Measuring range end value	6 (3/8") 24 (1/2") 60 (3/4") 120 (1")
Average of flow	Off Soft Medium Strong	Soft
Function of 01	Impulse Dosing Empty tube	Impulse
Switch logic output 1	0 V 24 V	0 V
Impulse weighting	0.1...25.0 ml/impulse	1.0
Function of 02	Dosing Empty tube	Empty tube
Switch logic output 2	0 V 24 V	24 V
Creepage	0...Measuring range end value	0.09 (3/8") 0.3 (1/2") 0.9 (3/4") 1.2 (1")
Empty tube delay time	0...25 s	1 s

Parameter	Setting range	Factory setting
Counting mode	unidirectional bidirectional	bidirectional
Sum counter	On Off	On
Device address	1...254	1
Phase filter	On Off	On
Sonic run time window length	Short Medium Long	Long
Sonic run time window presetting	On Off	Off
Maximum dosing time	0...255s	0
Dosing correction	-127...+127 ml	0
Dosing volume	0...7040.930 l	0

3.7.1 Presentation of current device configuration

After selecting the function *Configuration* in the pull-down menu *Configuration* the relevant window will open.

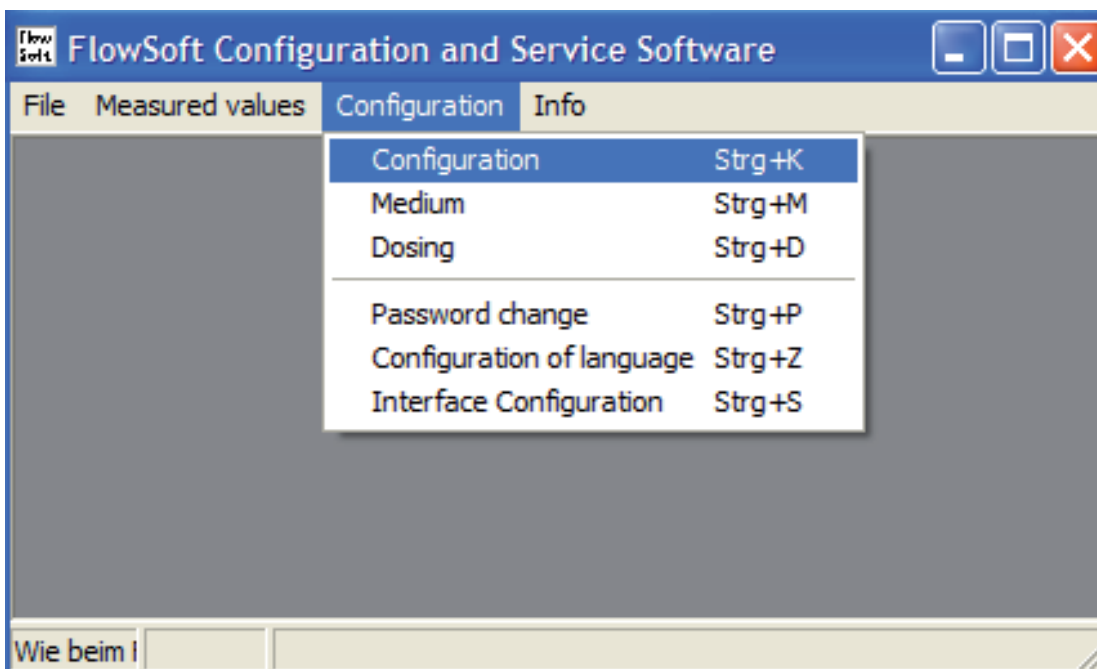


Fig. 17: Starting the window *Configuration*

After opening the window *Configuration* the PC reads out the configuration values from the connected device and presents them in table format in the column titled *ACTUAL* (see figure 18).

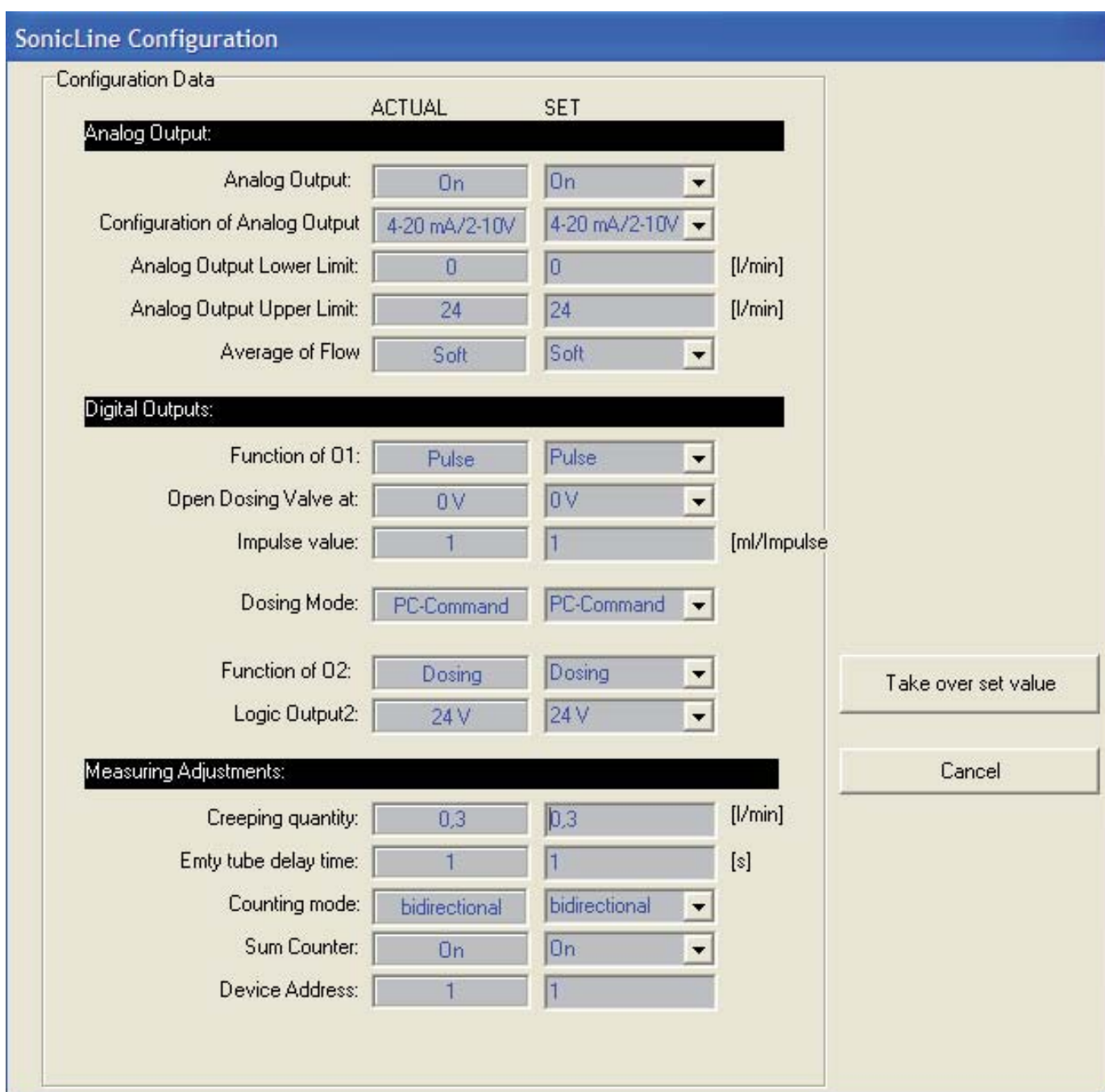


Fig. 18: The window *SonicLine Configuration*

3.7.2 Changing configuration settings



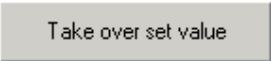
IMPORTANT!

It is principally possible to change any of the parameters of this window. However, we would like to expressly advise you again that it is indispensable to get sufficiently acquainted with the individual parameters and their significance before interfering with the configuration of the device.



ATTENTION!

If you would like to change the parameters to adapt them to plant-specific requirements, it is indispensable to enter the new setting either numerically into the column *SET* or select it in one of the button-down fields. When changing a numerical value use the numerical format of column *ACTUAL*.

If a change in the column *SET* is to be executed in the GEMÜ C38 **SonicLine**[®] use mouse to click on button . The PC will now transmit the new configuration data to the GEMÜ C38 **SonicLine**[®] which will save the changed configuration in its memory.

3.7.3 Significance of the configuration parameters

Analog output: The GEMÜ C38 **SonicLine**[®] has an analog output that depending on the type can transmit the current flow as electrical current or voltage. The output can be switched on or off.

Configuration of the analog output: It can be decided, if the analog output is to transmit current in the range from 0 to 20mA or from 4 to 20mA or a voltage from 0 to 10V or from 2 to 10V for the respective pre-set flow range.

Lower limit analog output: Please enter the flow rate, at whose occurrence the current respectively the voltage is to be created according to the lower limit of the pre-set range.

Upper limit analog output: Please enter the flow rate, at whose occurrence the current respectively the voltage is to be created according to the upper limit of the pre-set range.

Average of flow: The GEMÜ C38 **SonicLine**[®] has a median filter for the measured raw flow value. The function smoothens the output value at the analog interface, which outputs the measured flow value as a directly proportional current or voltage signal.

Apart from smoothing the median filter excludes such measured values from determining the average that are clearly erratic. This is where you decide whether to use to filter or not. Smoothing can be pre-selected in 3 steps, but can also be switched off totally.

Function of O1: This is to determine, whether output O1 is used to output pulses or an empty tube message or whether it will be used to control a dosing valve.

Dosing valve open at: This determines, whether a valve connected via a relay will be wired to 0 V or to 24 V for opening.

Pulse value: The *pulse value* represents the volume, after which the GEMÜ C38 **SonicLine**[®], when it has passed, will generate a complete pulse phase at output O1.

Dosing mode: Here you can choose, if dosing is to be started via a push button that will wire the dosing input to 24 V when actuated or via PC command. In addition, the dosing function can be fully deactivated.

Function of O2: This is to determine, if the output O2 will serve to output empty messages or to control a dosing valve.

Behavior with empty tube: same as *dosing valve open at*, but referring to empty message.

Creepage: The creepage suppression serves the purpose of excluding flows from the measurement that can evolve through convection even with a closed valve in a narrow frame around zero.

Empty tube delay time: The *empty tube delay time* is the time interval during which metering in the measured section continues after detection of a gas bubble, before the empty tube detection responds. This prevents small gas bubbles from being recognized as empty tube and thus interrupting metering.

Counting mode: Here you can define the behavior of the internal counter (daily quantity counter or operation quantity counter). **This selection does not affect the pulse output.**

- unidirectional → Counter changes only with positive flow direction
- bidirectional → Counter changes in both flow directions

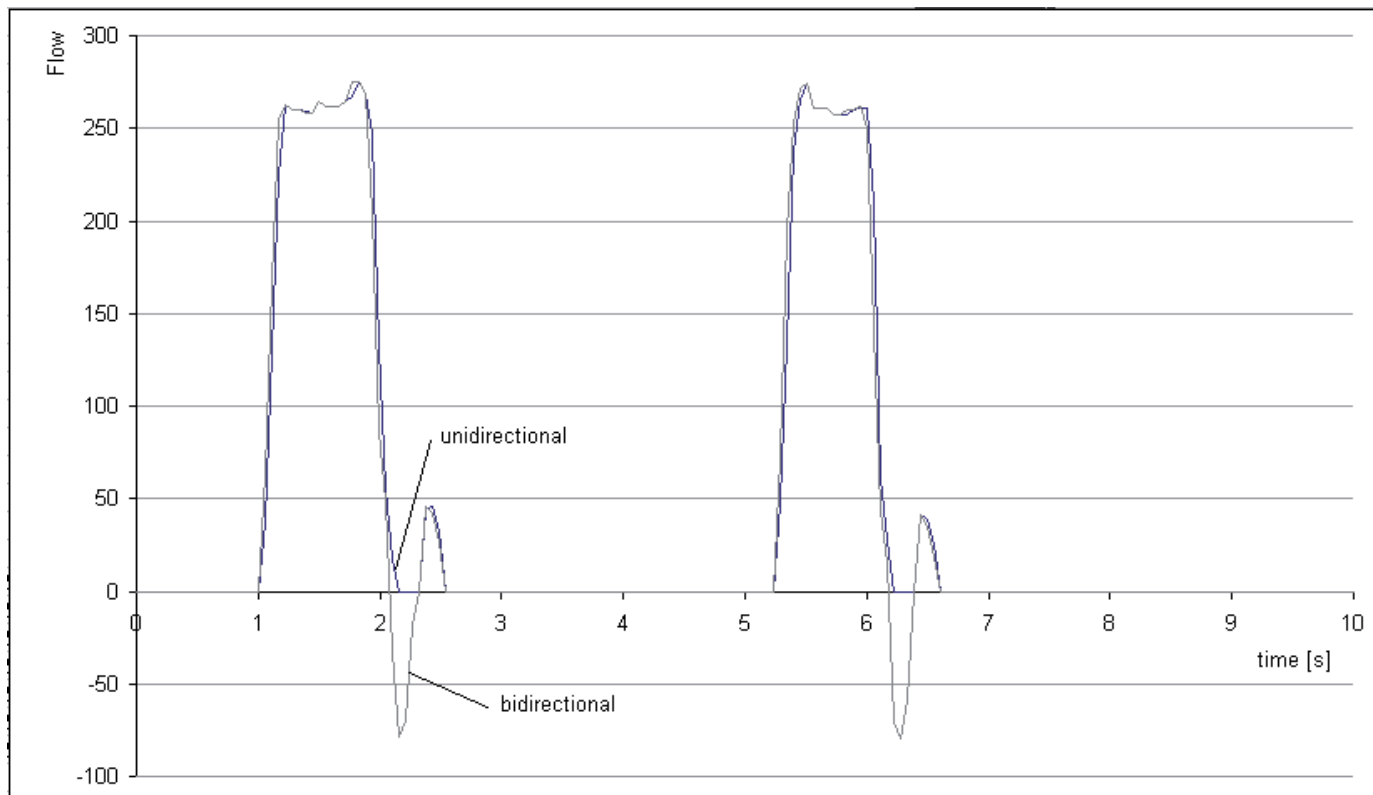


Fig. 19: Flow with unidirectional or bidirectional metering

The standard setting is bidirectional, because in this mode dynamic and uniform flows can be metered with high accuracy. Choose this setting, if high accuracy is necessary in plants with oscillations in the pipe system due to e.g. closing of valves (see figure 19). In this case, setting to unidirectional metering would mean that the negative parts of the oscillation would not be metered and thus cause metering errors.

Setting to unidirectional is advisable, if e.g. forward and backward flows have to be determined independent from each other. In this case, install one GEMÜ C38 **SonicLine**® in direction of the flow and one GEMÜ C38 **SonicLine**® in counterdirection of the flow in the same tube.

Counting: This is to switch off counting of the flow volumes. Deactivating the counter may e.g. be useful when cleaning the pipeline. The cleaning media flowing through the flowmeter during this time are in general not to be recorded.

Device address: It is possible to connect several GEMÜ C38 **SonicLine**[®] devices parallel to one RS485 bus. The master system can address each individual flowmeter selectively via a previously allocated address. The necessary configuration settings are made here. The range of admissible values is from 1 to 254.



ATTENTION!

If you change the device address here and transmit it, the bus address in the interface configuration will also be changed correspondingly.

This has to be taken into account when later connecting another GEMÜ C38 **SonicLine**[®].

Phase filter: The GEMÜ C38 **SonicLine**[®] has a filter for smoothing the phase values. In standard cases the filter will remain ON, since the **SonicLine**[®] has excellent dynamics also with activated filter.

The filter should only be switched off when metering extremely dynamic flows. During ordinary metering operations switching OFF the filter may have a negative impact on the accuracy.



IMPORTANT!

This parameter only appears after user log in with admissible password.

3.8 Adaptation of GEMÜ C38 **SonicLine**[®] to the medium and the environment

The window *Medium* offers the user the possibility of adapting the flowmeter in a very differentiated way to medium-specific properties. At the factory, the flowmeters are calibrated with water. When metering media that have similar properties to water as to viscosity and sound these adaptations are therefore usually not necessary. If metering errors are detected in the application that are outside of the specifications of the device, these can be corrected with a matrix function. Non-linear variances can be compensated with the help of a maximum of 8 basic values over the entire metering range. The user determines the number of basic values. The measured values are presented online in order to facilitate the comparison. In addition, several basic adjustments can be carried out automatically. Furthermore, complete data sets can be stored, in order to be able to transmit them to another flowmeter.



ATTENTION!

Changes of the values shown here may result in malfunctioning of the device. It is therefore recommended to gain precise knowledge about the influence of a parameter before changing it, to write down the current settings or to document them by printing them out.

3.8.1 Presentation of the current medium values

Selecting the function *Medium* in the pull-down menu *Configuration* opens the relevant window.

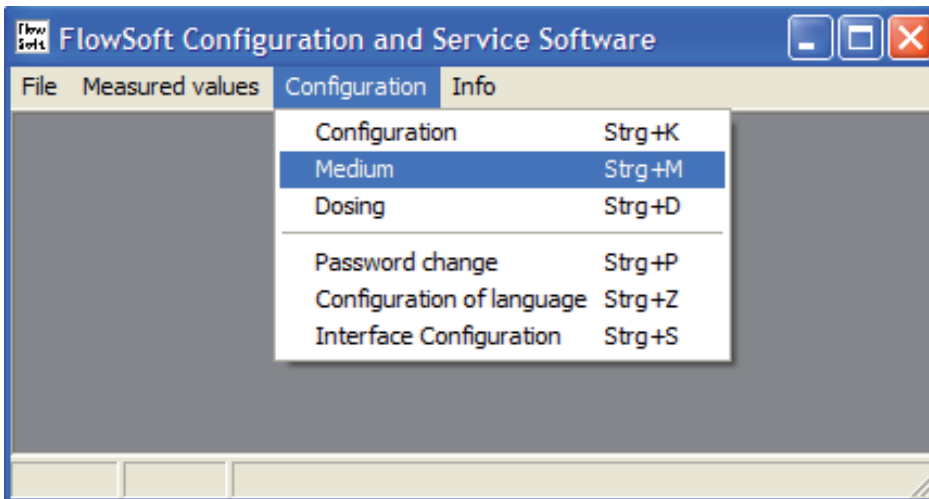


Fig. 20: Starting the window *Medium*

When opening the window *Medium* the medium values set in the connected device are read out and shown.

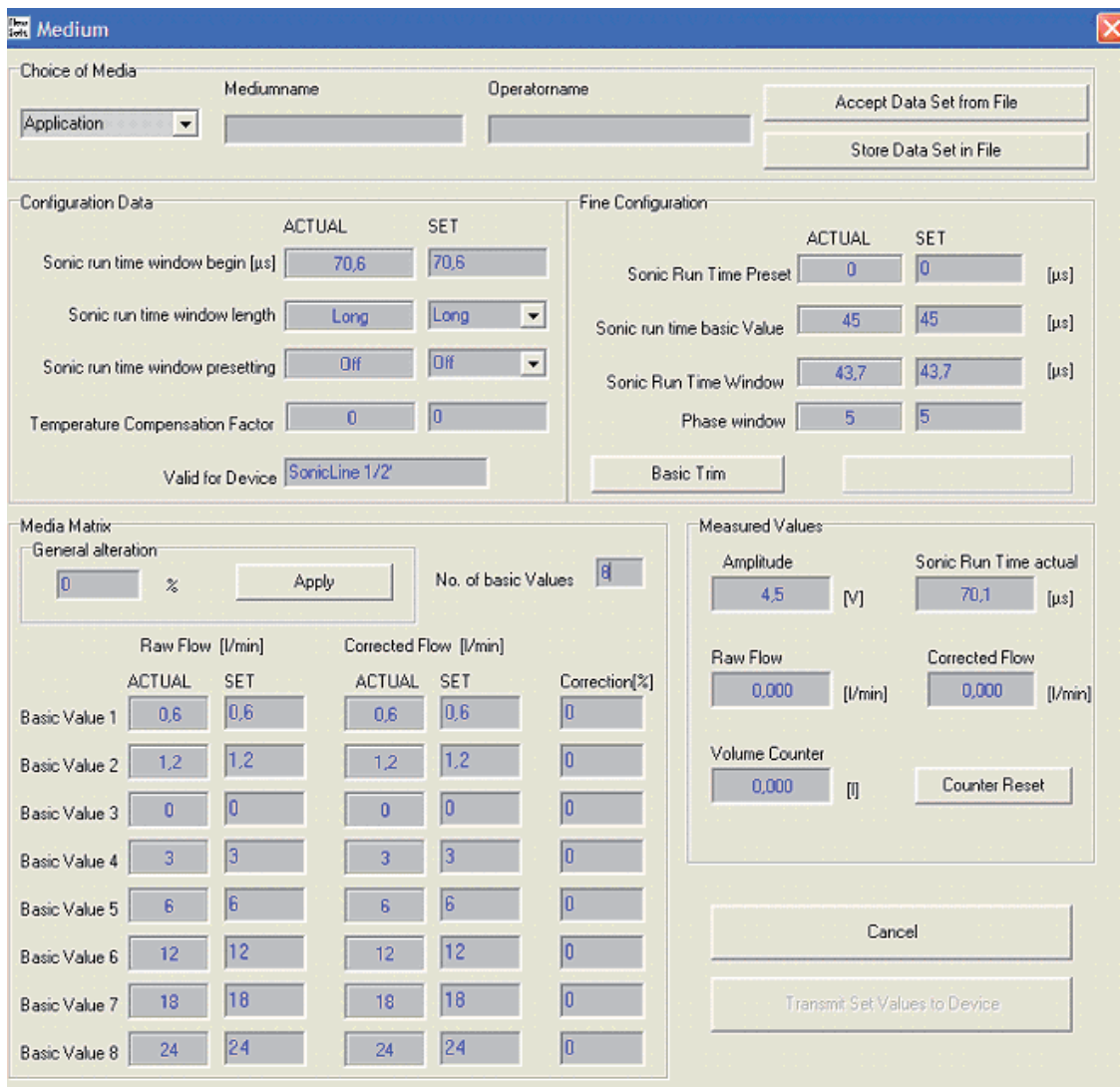


Fig. 21: The window *Medium*

3.8.2 The field Measured values

The screenshot shows the 'Measured values' window with the following data:

Parameter	Value	Unit
Amplitude	4.4	[V]
Sonic Run Time actual	70.1	[µs]
Raw Flow	0.000	[l/min]
Corrected Flow	0.000	[l/min]
Volume Counter	0.000	[l]

Fig. 21: The window *Measured values*

The values presented here are measured values that facilitate determining the parameters to be inserted into the matrix. The values are continuously read from the connected metering device and they are online data. The indispensable prerequisite for reliable values in this context is the correct previous settings in the window sonic run time as well as the execution of a basic trim (see chapter 3.8.3).

Amplitude: The measured value presented here is the receive amplitude. If the amplitude value is lower than 2.5 V or higher than 4.5 V a basic trim has to be carried out. If the value = 0, metering is not possible because the gas portion in the medium is too high.


Sonic run time actual: This is a presentation of the sonic run time determined by the device for the medium it contains. The prerequisite for a usable measurement are the correct settings in the sonic run time window (see also fields Configuration data and Fine configuration, see chapters 3.8.5.3 and 3.8.5.4). The sonic run time depends on the medium and the temperature.

Raw flow: The *raw flow* is the flow determined directly from the phase values of the reception electronics. Median filtering as well as creepage monitoring (both chapter 3.7.3) do not influence the presented measured value.

Corrected flow: The *corrected flow* is the result of the computation of the values in the matrix as well as the filtration via creepage suppression and median filter. The measured value thus generated can be used for determining the correction factors for the matrix, if a master flow meter is used for reference metering.

Volume counter: The *volume counter* shows the current counter reading of the GEMÜ C38 **SonicLine**[®] in liters with a resolution of 1 milliliter. For user-friendly calculation of a measured volume without the need for calculating the difference between two counter readings, it can be

reset to 0 (zero) before a metering process, by clicking on the button

A rectangular button with a light gray background and a thin black border, containing the text "Counter reset" in a dark gray font.

3.8.3 Basic trim

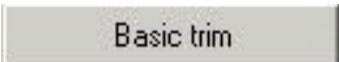
The basic trim is a commissioning function to automatically optimize the measured signal enhancement, the phase window, and the zero point of the device.

The basic trim must always be carried out during commissioning of the flowmeter. To be able to do so the flowmeter has to be bubble-free filled with the medium to be measured. The basic trim may repeated, when essential operating parameters have changed. This is e.g. the case after change of medium.

To execute the function, it is indispensable that the following preconditions are met:

- The metering tube has to be filled with the SET medium
- The SET medium has to be gas-free and bubble-free
- The temperature has to correspond to the one during the process
- There has to be a minimum pressure of 0.3 bar rel.
- Flowmeter and medium have to be absolutely undisturbed. We recommend to close a valve in flow direction behind the GEMÜ C38 **SonicLine**[®].
- The sonic run time window has to be set for the medium.
- Please compare the approximate congruence of the sonic run time parameters currently programmed in the **SonicLine**[®] with the information given by the manufacturer of the fluid.

After clicking the button

A rectangular button with a light gray background and a thin black border, containing the text "Basic trim" in a dark gray font.

there will be an automatic basic trim to the medium contained in the metering tube.

During the basic trim the following message for signaling the active function is shown in the status panel underneath the field *Phase window*:

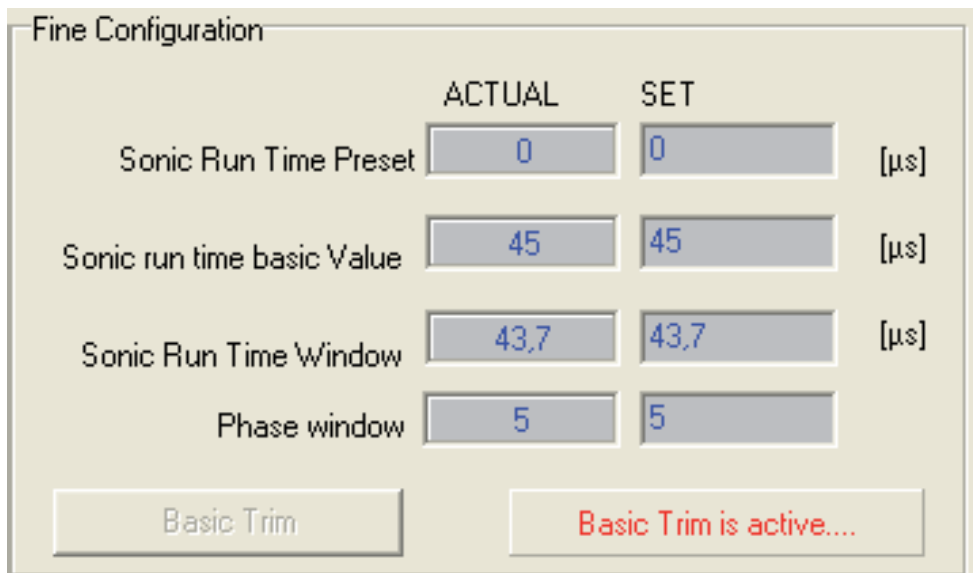


Fig. 23: The status message *Basic trim is active* in the field *Fine configuration*

When the basic trim is successfully finished the feedback message appears:

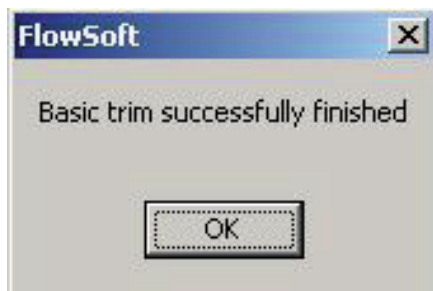


Fig. 24: The message *Basic trim successfully finished*

When this message appears the device is ready for executing a general alteration or a matrix adjustment.

If basic trim could not be finished successfully, the following message will be shown:



Fig. 25: The message *Basic trim finished with error*

We recommend in this case to first check, if the conditions listed in chapter 3.8.3 are complied with and then repeat the basic trim.

If the field *Measured values* shows received amplitude of less than 2.0 V, filling and bubble-freeness of metering tube must be checked.

3.8.4 Changing medium-specific settings



ATTENTION!

It is basically possible to modify any of the parameters of this window apart from the pure measured values. However, we would like to expressly advise you again that it is indispensable to get sufficiently acquainted with the individual parameters and their significance before interfering with the settings for the medium.



IMPORTANT!

If a change of parameters is desirable for adaptation to a medium, as a general rule the column *SET* has to be newly set either as numerical entry or in one of the button-down fields. When changing a numerical value use the numerical format of column *ACTUAL*.

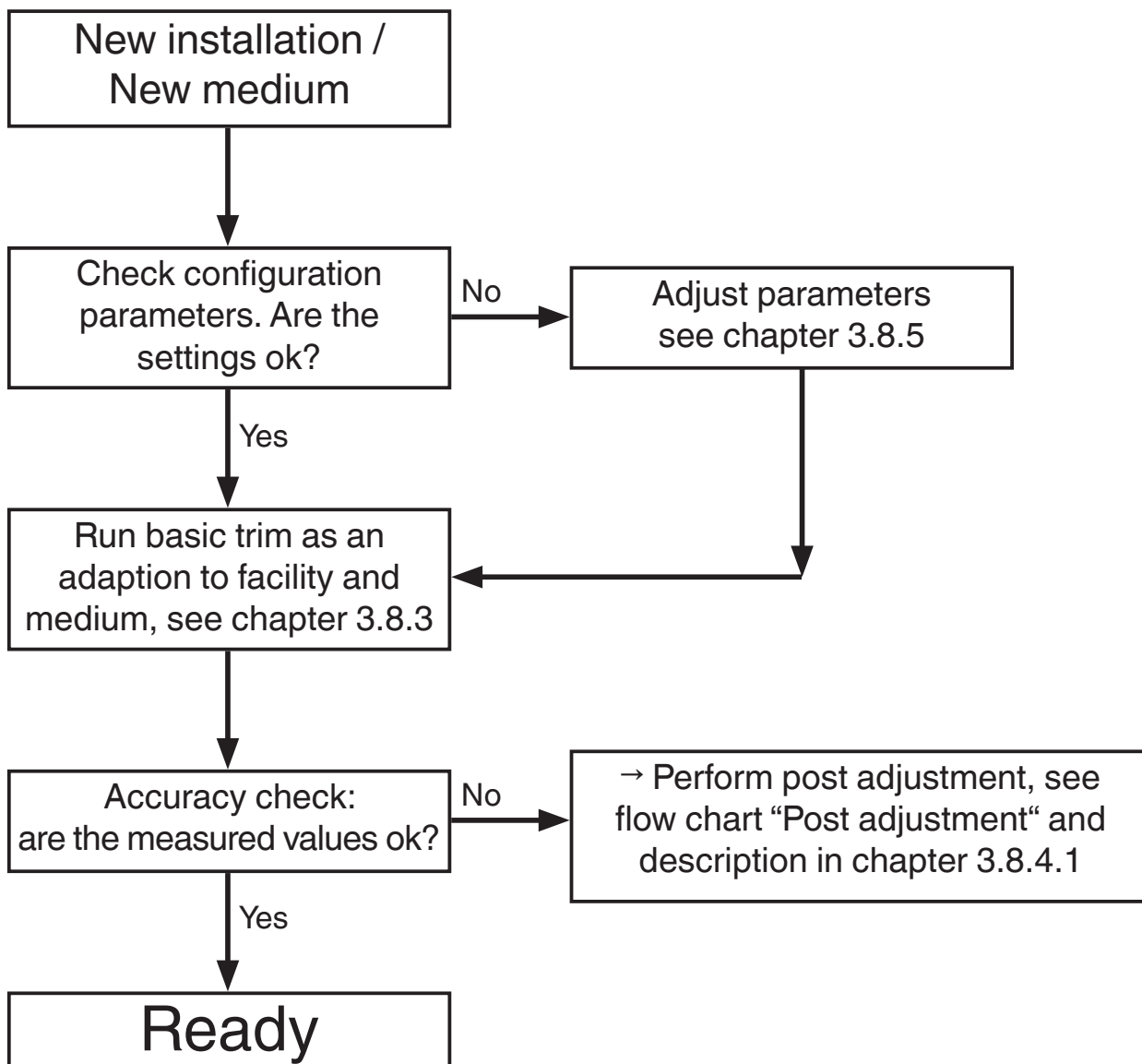


Fig. 26: Flow chart *New installation / New medium*

3.8.4.1 Post adjustment

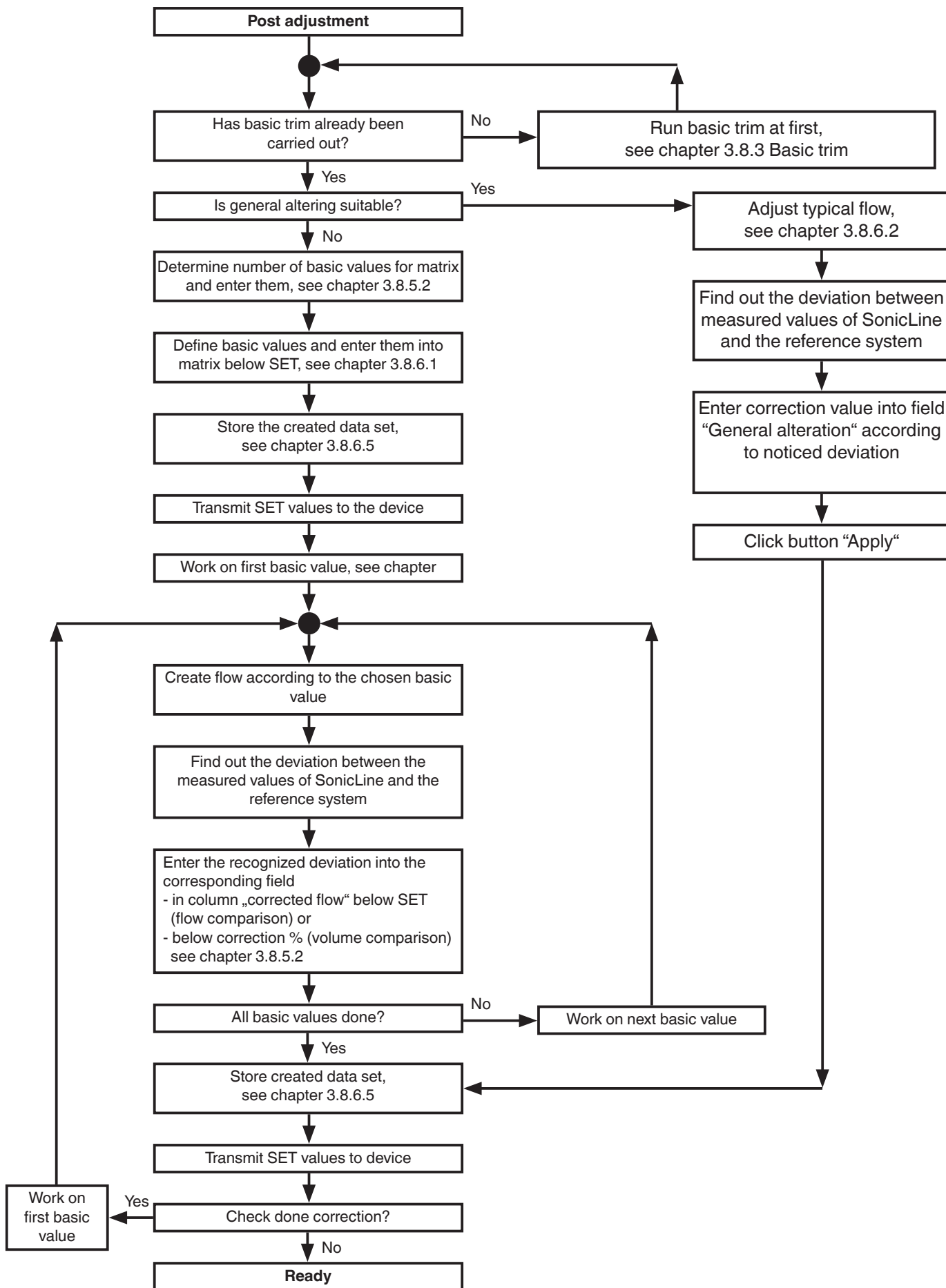


Fig. 27: Flowchart *Post adjustment*

To change the settings for the medium values of GEMÜ C38 **SonicLine**® please proceed as follows:

If a change in the column *SET* is to be executed in the **SonicLine**®, click the button

Transmit set values to device

. The PC will now transmit the new configuration data to the GEMÜ C38 **SonicLine**®, which will save the changed configuration in its memory.



IMPORTANT!

In order for the **FlowSoft**® to release the function *Take over SET values*, first the data set visible in the window has to be saved by entering a medium name and an operator name and clicking the button

Store data set in file



IMPORTANT!

As a general rule: to determine all measured values with GEMÜ C38 **SonicLine**® the device must be filled bubble-free with the SET medium.

3.8.5 Determining medium-specific corrective data

3.8.5.1 Correction via general alteration

The fastest way to obtain a metering result is to adapt to the medium to be metered via *general alteration*.

During *general alteration* all corrective values for all 8 matrix basic values will be changed by the same factor defined by the user.



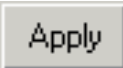
IMPORTANT!

This method is recommended for applications with flow rates that vary little. This method uses a one point correction, therefore, a minimum of one verification with several typical flow steps must be carried out for applications with varying flow rates.

A comparison with a balance may help to check the application conditions in consideration of the density of the medium. The volume determined by GEMÜ C38 **SonicLine**® and the mass determined by the balance have to be compared for a clearly defined filling process. Insert the calculated difference for the same flow considering the density after confirmation in several repetitions into the matrix.

$$V[l] = m[\text{kg}] / \rho[\text{kg/l}], \quad V_{\text{SonicLine}} - V_{\text{balance}} = \text{difference}$$

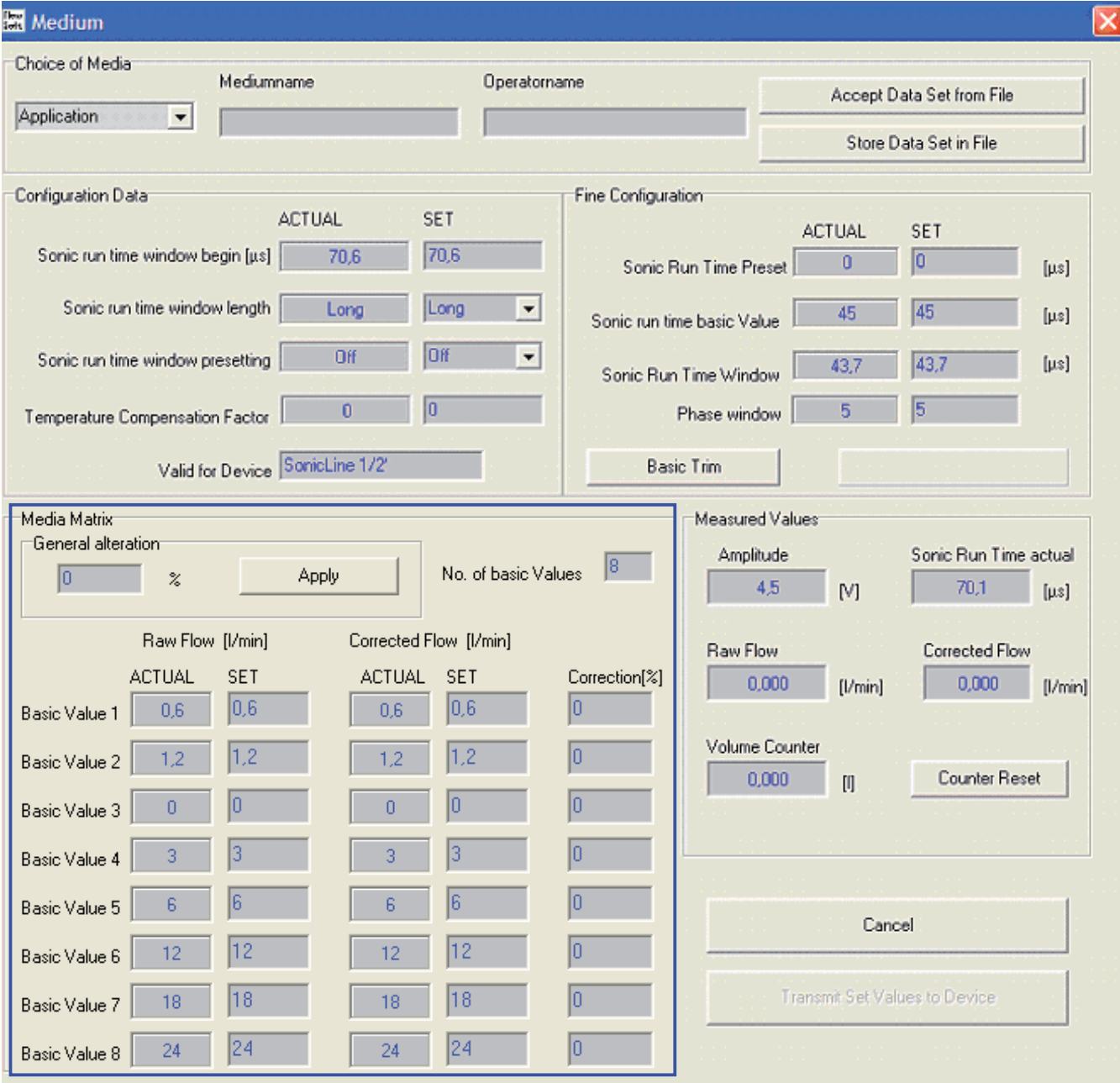
The flow rate that is set has to be constant and the value should be as close as possible to the typical value for the application.

The corrective value thus determined has to be entered into the input field General alteration. After clicking the button  , the conversion of the corrective values for all basic values is calculated automatically based on the value of the general alteration. Now the modified data set will be stored (Choice of media) and transmitted to the device. In the subsequent test run the modifications that were made can be verified with the same approach.

3.8.5.2 Correction via individual matrix changes

In order to achieve highest possible accuracy in the entire metering range of the GEMÜ C38 **SonicLine**® we recommend to use all 8 basic values over the flow range in question. It is also possible to reduce the number of basic values, in order to minimize the adaptation efforts.

By default the 8 basic values are distributed over the metering range. We recommend to orient the adaptation toward this distribution.



The screenshot shows the 'Medium' configuration window. It is divided into several sections:

- Choice of Media:** Includes fields for 'Mediumname' and 'Operatormame', and buttons for 'Accept Data Set from File' and 'Store Data Set in File'.
- Configuration Data:** Contains 'Sonic run time window begin [µs]' (70.6), 'Sonic run time window length' (Long), 'Sonic run time window presetting' (Off), and 'Temperature Compensation Factor' (0). A 'Valid for Device' field is set to 'SonicLine 1/2'.
- Fine Configuration:** Contains 'Sonic Run Time Preset' (0), 'Sonic run time basic Value' (45), 'Sonic Run Time Window' (43.7), and 'Phase window' (5).
- Media Matrix:** Features a 'General alteration' field (0%) with an 'Apply' button and 'No. of basic Values' set to 8. Below is a table of 8 basic values.
- Measured Values:** Shows 'Amplitude' (4.5 V), 'Sonic Run Time actual' (70.1 µs), 'Raw Flow' (0.000 l/min), 'Corrected Flow' (0.000 l/min), and 'Volume Counter' (0.000 l).

	Raw Flow [l/min]		Corrected Flow [l/min]		Correction[%]
	ACTUAL	SET	ACTUAL	SET	
Basic Value 1	0,6	0,6	0,6	0,6	0
Basic Value 2	1,2	1,2	1,2	1,2	0
Basic Value 3	0	0	0	0	0
Basic Value 4	3	3	3	3	0
Basic Value 5	6	6	6	6	0
Basic Value 6	12	12	12	12	0
Basic Value 7	18	18	18	18	0
Basic Value 8	24	24	24	24	0

Fig. 28: Example of a matrix with specific corrective data

A comparison with a balance may help to check the application conditions in consideration of the density of the medium. The volume determined by GEMÜ C38 **SonicLine**® and the mass detected with the balance have to be compared for a clearly defined filling process. Insert the calculated difference for the same flow considering the density after confirmation in several repetitions into the matrix.

$$V[l] = m[\text{kg}] / \rho[\text{kg/l}], \quad V_{\text{SonicLine}} - V_{\text{balance}} = \text{difference}$$

The flows for the individual steps should be constant and their value should be as close as possible to the basic value that is verified. If the relevant flow cannot be set accurately, the basic value in the matrix has to be adjusted to the actual value.

Now the modified data set will be stored (Choice of media) and transmitted to the device.

The corrective values thus determined have to be entered into the input fields of the matrix screen and the modified data set will be stored (Choice of media) and transmitted to the device. In the subsequent test run, the modifications that were made can be verified with the same approach.

The medium matrix is designed for positive flows. Therefore, negative values may only be used for percentage correction.

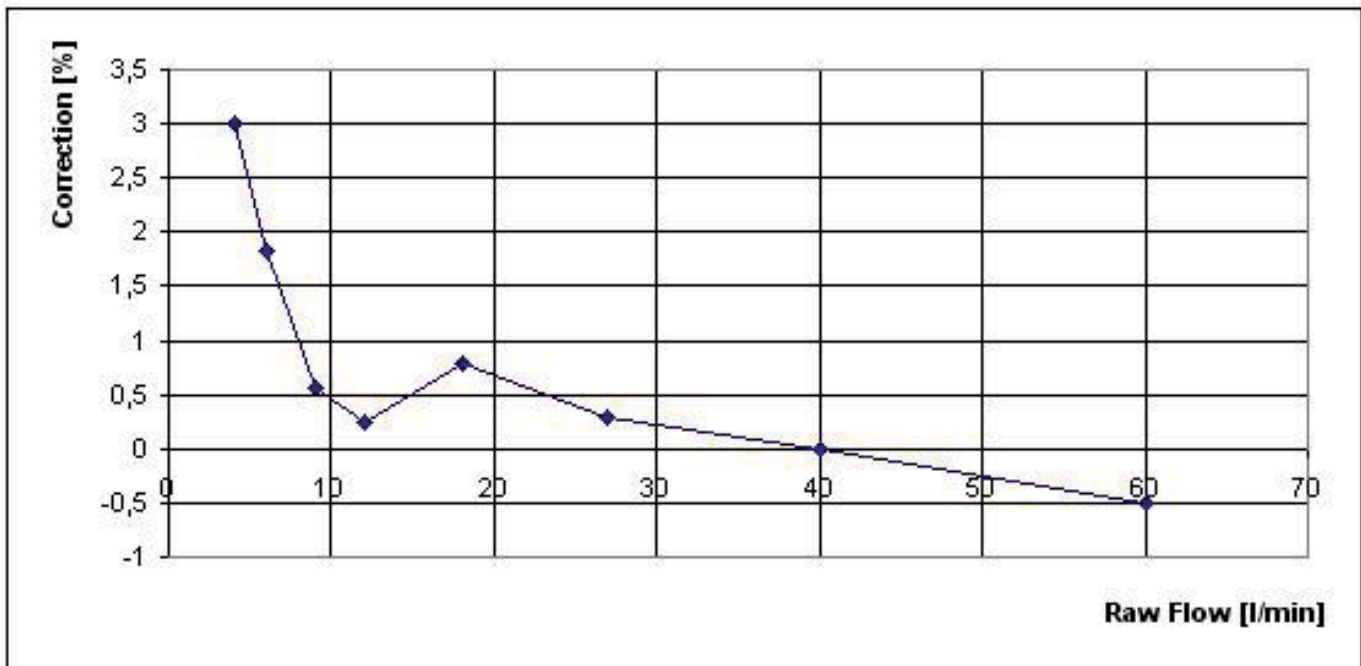


Fig 29: Correction [%] via raw flow according to matrix in figure 28

3.8.6 Fields and parameters of the window Medium

3.8.6.1 The field Medium matrix

This field contains the actual matrix for adaptation of the device to the medium and plant-specific conditions.

The screenshot shows the 'Medium' configuration window with the following sections:

- Choice of Media:** Includes 'Application' dropdown, 'Mediumname' and 'Operatorname' text boxes, and buttons for 'Accept Data Set from File' and 'Store Data Set in File'.
- Configuration Data:** Contains 'Sonic run time window begin [µs]' (70.6), 'Sonic run time window length' (Long), 'Sonic run time window presetting' (Off), and 'Temperature Compensation Factor' (0). A 'Valid for Device' field is set to 'SonicLine 1/2'.
- Fine Configuration:** Contains 'Sonic Run Time Preset' (0), 'Sonic run time basic Value' (45), 'Sonic Run Time Window' (43.7), and 'Phase window' (5).
- Media Matrix:** Features a 'General alteration' section with a percentage input (0) and an 'Apply' button. Below is a table with 8 rows and 6 columns: 'Raw Flow [l/min]' (ACTUAL, SET), 'Corrected Flow [l/min]' (ACTUAL, SET), and 'Correction[%]'. The table shows values increasing from 0.6 to 24 l/min.
- Measured Values:** Displays 'Amplitude' (4.5 V), 'Sonic Run Time actual' (70.1 µs), 'Raw Flow' (0.000 l/min), 'Corrected Flow' (0.000 l/min), and 'Volume Counter' (0.000 l) with a 'Counter Reset' button.

Fig. 30: The field *Medium matrix*

Basically, the matrix consists of a table with the columns *Raw flow* and *Corrected flow* and 8 lines.

The *raw flow* is the flow directly calculated by GEMÜ C38 **SonicLine**[®]. Median filtering and creepage suppression (both chapter 3.7.3) do not have an influence on the presented measured value.

The *corrected flow* is the measured value resulting from the correction in the medium matrix (see example in fig. 29) as well the creepage suppression, and serves the purpose of outputting current/voltage respectively generating a pulse and for serving as the internal volume counter. In addition, the *corrected flow* is smoothed in a median filter and evaluated by the creepage suppression.

The eight lines in the first column of the table contain the standard default basic values (flow steps) of the GEMÜ C38 **SonicLine**[®] that serve as the basis for making corrections. The result for the respective basic value is comprised in the column *corrected flow*. Since the values of both columns can change, auxiliary columns exist for both titled *SET*, with whom the values in the column *ACTUAL* can be changed. This means *ACTUAL* and *SET* refer to the current settings in the device.



ATTENTION!


Please pay attention that any values in the columns, apart from the column *correction %* have to ascend with the number of the basic value.

Otherwise there may be device errors.

The software does not carry out a plausibility check here!

The column *correction in %* is for the relative changes of the *SET* value of the *corrected flow* as compared to the *SET* value of the *raw flow*. The values of the columns titled *SET* are

transmitted to the flowmeter after clicking the button



. After subsequently reading back the settings from the device these are presented in the column titled *ACTUAL*. The results may be used for documentation purposes when stored and / or printed out as a screenshot.

By entering a value between 2 and 8 the user decides the number of flow steps to carry out a correction. If the flowmeter is e.g. used in a reproducible very narrow flow range very few steps will be sufficient.

If the range of flow velocities is big, it is advisable to use the maximum number of 8 steps. The more basic values are used, the more fine-tuned is the adaptation of the flowmeter to the medium and the plant properties.

After entry of a valid value in the input field *number of basic values*, the table is automatically re-created in the desired size. Lines that are not needed are hidden.

FlowSoft Medium
✖

Choice of Media

Application: Application Mediumname: Operatorname:

Accept Data Set from File
Store Data Set in File

Configuration Data

	ACTUAL	SET
Sonic run time window begin [µs]	70,6	70,6
Sonic run time window length	Long	Long ▾
Sonic run time window presetting	Off	Off ▾
Temperature Compensation Factor	0	0

Valid for Device: SonicLine 1/2'

Fine Configuration

	ACTUAL	SET	
Sonic Run Time Preset	0	0	[µs]
Sonic run time basic Value	45	45	[µs]
Sonic Run Time Window	43,7	43,7	[µs]
Phase window	5	5	

Basic Trim

Media Matrix

General alteration: 0 % Apply

No. of basic Values: 4

	Raw Flow [l/min]		Corrected Flow [l/min]		Correction[%]
	ACTUAL	SET	ACTUAL	SET	
Basic Value 1	0,6	0,6	0,6	0,6	0
Basic Value 2	1,2	1,2	1,2	1,2	0
Basic Value 3	0	0	0	0	0
Basic Value 4	3	3	3	3	0
Basic Value 5					
Basic Value 6					
Basic Value 7					
Basic Value 8					

Measured Values

Amplitude	4,5 [V]	Sonic Run Time actual	70,1 [µs]
Raw Flow	0,000 [l/min]	Corrected Flow	0,000 [l/min]
Volume Counter	0,000 [l]	Counter Reset	

Cancel
Transmit Set Values to Device

Fig. 31: Medium matrix with 4 basic values

A minimum of 2 basic values have to be entered in order to ensure a reasonable correction.

3.8.6.2 The field General alteration

Choice of Media

Application: Mediumname: Operatorname:

Buttons: Accept Data Set from File, Store Data Set in File

Configuration Data

	ACTUAL	SET
Sonic run time window begin [μs]	70.6	70.6
Sonic run time window length	Long	Long
Sonic run time window presetting	Off	Off
Temperature Compensation Factor	0	0

Valid for Device: SonicLine 1/2'

Fine Configuration

	ACTUAL	SET	
Sonic Run Time Preset	0	0	[μs]
Sonic run time basic Value	45	45	[μs]
Sonic Run Time Window	43.7	43.7	[μs]
Phase window	5	5	

Buttons: Basic Trim

Media Matrix

General alteration: %

No. of basic Values:

	Raw Flow [l/min]		Corrected Flow [l/min]		Correction[%]
	ACTUAL	SET	ACTUAL	SET	
Basic Value 1	0.6	0.6	0.6	0.6	0
Basic Value 2	1.2	1.2	1.2	1.2	0
Basic Value 3	0	0	0	0	0
Basic Value 4	3	3	3	3	0
Basic Value 5	6	6	6	6	0
Basic Value 6	12	12	12	12	0
Basic Value 7	18	18	18	18	0
Basic Value 8	24	24	24	24	0

Measured Values

Amplitude	4.5 [V]	Sonic Run Time actual	70.1 [μs]
Raw Flow	0.000 [l/min]	Corrected Flow	0.000 [l/min]
Volume Counter	0.000 [l]	<input type="button" value="Counter Reset"/>	

Buttons: Cancel, Transmit Set Values to Device

Fig. 32: The field *General alteration*

If all the output values of the pre-selected basic values in the field *medium matrix* are to be changed by the same corrective factor, this can be done centrally via *general alteration*.

After entering a value into the edit field and then clicking the button all values in the columns (SET) are calculated correspondingly. The message appears



Fig. 33: The message *General alteration done*

The changed values are transmitted to the flowmeter after clicking the button



3.8.6.3 The field Configuration data

The screenshot shows a software window titled 'Medium' with a close button in the top right corner. The window is divided into several sections:

- Choice of Media:** Includes a dropdown menu for 'Application', input fields for 'Mediumname' and 'Operatormame', and two buttons: 'Accept Data Set from File' and 'Store Data Set in File'.
- Configuration Data:** A table with columns 'ACTUAL' and 'SET'.

	ACTUAL	SET
Sonic run time window begin [μs]	70,6	70,6
Sonic run time window length	Long	Long
Sonic run time window presetting	Off	Off
Temperature Compensation Factor	0	0

 Below this table is a 'Valid for Device' field containing 'SonicLine 1/2''.
- Fine Configuration:** A table with columns 'ACTUAL' and 'SET'.

	ACTUAL	SET	
Sonic Run Time Preset	0	0	[μs]
Sonic run time basic Value	45	45	[μs]
Sonic Run Time Window	43,7	43,7	[μs]
Phase window	5	5	

 A 'Basic Trim' button is located below this section.
- Media Matrix:** Includes a 'General alteration' section with a percentage input (0) and an 'Apply' button. A 'No. of basic Values' input field contains the number 8.
- Measured Values:** Displays 'Amplitude' (4,5 [V]) and 'Sonic Run Time actual' (70,1 [μs]). It also shows 'Raw Flow' (0,000 [l/min]) and 'Corrected Flow' (0,000 [l/min]). A 'Volume Counter' shows 0,000 [l] with a 'Counter Reset' button.
- Buttons:** 'Cancel' and 'Transmit Set Values to Device' are located at the bottom right.

Fig. 34: The field *Configuration data*

This field offers a user-friendly way to enter the settings concerning the sonic properties of the medium to be measured, which is the precondition for any further medium adaptations.

Sonic run time window: The sonic run time is the time that lapses between the time of the transmittal of a measuring signal from the sensor at one end of the measuring channel to the reception of the signal by the sensor at the other end of the measuring channel. The sonic run time depends on the medium, temperature, length of the measuring channel and wall thickness between the sensors and the measuring channel.

The media-specific sonic run time in μs under operating conditions must be entered in this field. After confirming the entry of a value in this input field by pressing <ENTER> the value will be taken over in the input field *Sonic run time window preset* under *Fine configuration* and the parameters *Sonic run time window begin* and *Phase window* will be calculated taking into account the *Sonic run time window length*. See fig. 34.

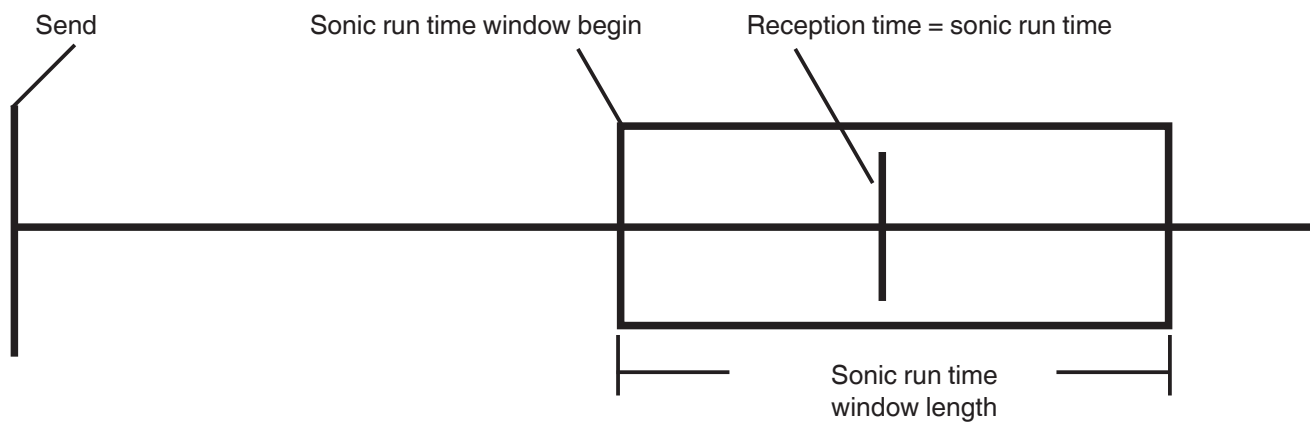


Fig. 35: Reception window

Sonic run time window length: A 3-fold grid can be used for setting the length of the time interval, in which the flowmeter is to expect the signal for *sonic run time metering*. If the data of the medium to be metered are known from tables, it is advisable to select the setting *short* here. In case of imprecise information, the window should initially be set to *long* and should be switched to *short* after more precise determination of the sonic run time, i.e. as soon as the sonic run time is in the middle of the pre-set window based on the measured result. When using the setting *short*, the measurements of the sonic run time and of the phase are clearly separated from each other.

Sonic run time window presetting: This is to decide whether to use a preset sonic run time (ON) based on experience or to calculate with the sonic run time resulting from the sonic run time measurement (OFF).

Valid for device: Shows the type of connected flowmeter from which the settings are read when opening the window, such as GEMÜ C38 **SonicLine**® ¾“.

3.8.6.4 The field Fine configuration

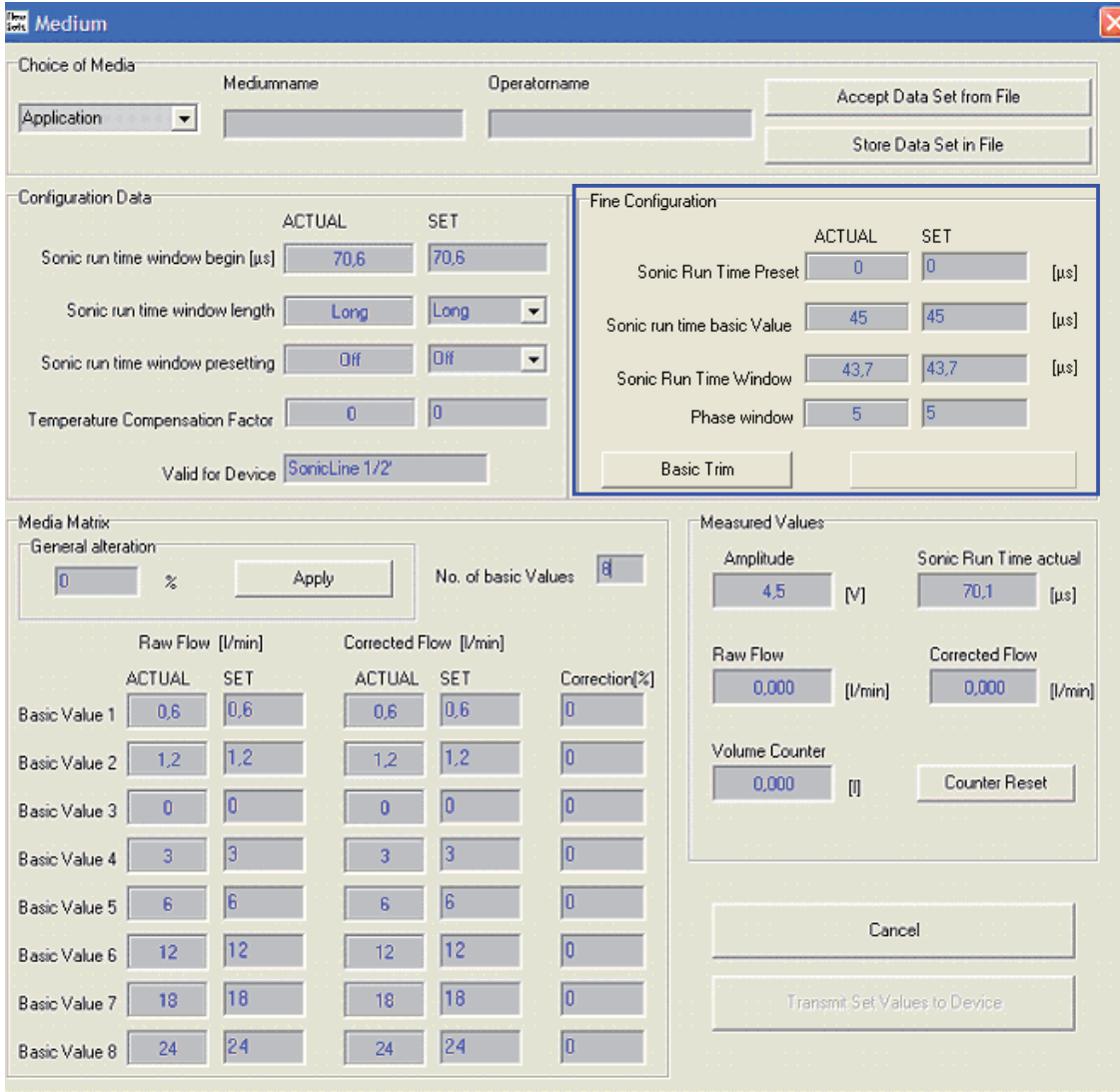


Fig. 36: The field *Fine configuration*

The fine configuration can be used for GEMÜ C38 **SonicLine**[®] settings made by personnel with in-depth detail knowledge of the sonic properties of a medium. It allows even finer configuration of the sonic run time and phase windows as well as of the temperature compensation factor.

Basic trim: see chapter 3.8.3

Sonic run time window preset: The preset sonic run time is a parameter that is included in the flow calculation, if the sonic run time compensation* is switched on (see chapter 3.8.6.3, sonic run time presetting ON/OFF). The preset sonic run time should correspond to the sonic run time of the medium at process temperature.

Sonic run time window: The sonic run time window is the time calculated in µs starting from the time of the transmittal of the sonic run time signals, when electronics has to be switched to triggering to the reception signal (see chapter 3.8.6.3).

* The sonic run time compensation enables alterations of the measured value dependent on sonic run time, e.g. for temperature fluctuations, to be compensated by calculation by the GEMÜ C38 **SonicLine**[®].

Sonic run time window length: The length of the sonic run time window is the period, starting from the beginning of the sonic run time window, in which the GEMÜ C38 **SonicLine**[®] electronics is to trigger the sonic run time signal. Since the sonic run time may fluctuate depending on the temperature, the selected sonic run time window should not be too small. Values around 20µs have proved to be reasonable.

Phase window: The phase window is the period after transmittal of the measuring signal in which a usable reception can be expected. The period until start of the phase window depends on medium and temperature.

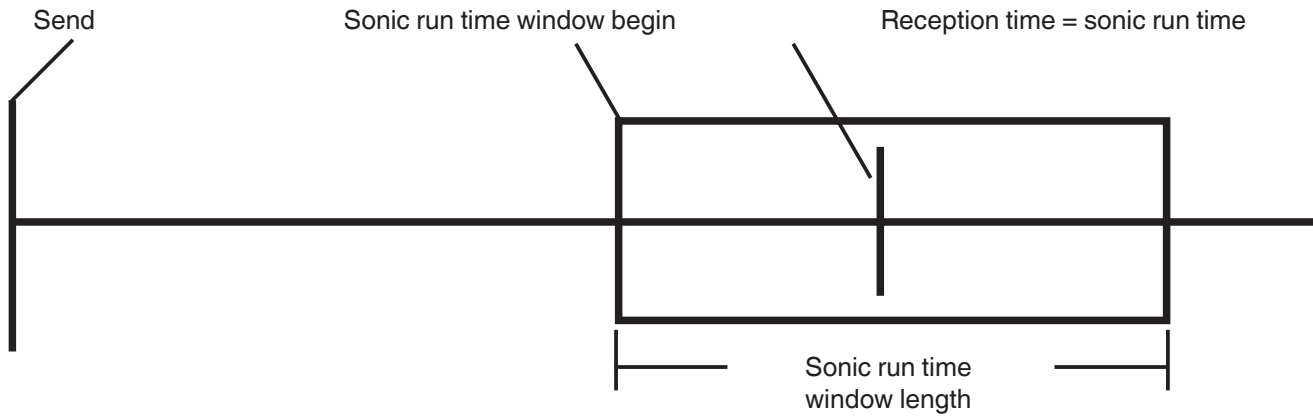


Fig. 37: Reception window

3.8.6.5 The field Choice of media

FlowSoft® offers the possibility of storing the data set determined for a medium and a GEMÜ C38 **SonicLine®** with a specific nominal diameter on the hard disc of the computer that is used under a name that can be chosen freely.

A data set created in this way may later be loaded from the hard disc and transmitted to a GEMÜ C38 **SonicLine®** with the same nominal diameter for setting it for the same medium.

In order to recognize the author of the data set later on it is necessary to also enter the operator name.


The media data sets are managed in the window *Medium* in the field *Choice of media*.

	ACTUAL	SET
Sonic run time window begin [µs]	70,6	70,6
Sonic run time window length	Long	Long
Sonic run time window presetting	Off	Off
Temperature Compensation Factor	0	0

	ACTUAL	SET
Sonic Run Time Preset	0	0
Sonic run time basic Value	45	45
Sonic Run Time Window	43,7	43,7
Phase window	5	5

	Raw Flow [l/min]	Corrected Flow [l/min]	Correction[%]		
	ACTUAL	SET	ACTUAL	SET	
Basic Value 1	0,6	0,6	0,6	0,6	0
Basic Value 2	1,2	1,2	1,2	1,2	0
Basic Value 3	0	0	0	0	0
Basic Value 4	3	3	3	3	0
Basic Value 5	6	6	6	6	0
Basic Value 6	12	12	12	12	0
Basic Value 7	18	18	18	18	0
Basic Value 8	24	24	24	24	0

Fig. 38: The field *Choice of media*

Storing data sets: for storing a data set first enter *name of medium* into the input field, a designation for the data set, and in the field *operatorname* a designation for the user. If you then click the button  the data set is stored on the hard disc of the PC.

Accept data set from file: If you want to re-load a data set that was previously stored, first click the application in the field *Choice of media* and make your selection of the existing data sets.

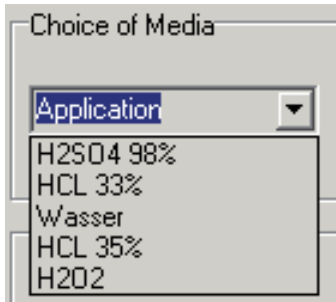



Fig. 39: Select data set from list under *application*

Now the complete data set will be transmitted to the auxiliary columns titled *SET*.
If the data set that was loaded is to be transmitted to the connected GEMÜ C38 **SonicLine**[®],

press button  .

Data sets that are stored are contained in the file *Medium.cfg* and can e.g. be send via e-mail. This is useful in order to create a data base of media parameters, but also in order to transfer data sets from an existing data base to an application.

3.9 Dosing with the GEMÜ C38 **SonicLine**[®]

GEMÜ C38 **SonicLine**[®] offers the possibility of an independent dosing function for which no separate control unit is necessary. See also operating instructions GEMÜ C38 **SonicLine**[®]. The dosing function only requires the one-time setting of the dosing quantity with the help of the PC software documented here.

Apart from configuring the dosing quantity a test of the dosing function as well as an optimization of the dosing accuracy can be run taking account of plant-specific influences.

Selecting the function *Dosing* in the pull-down menu *Configuration* opens the related window:

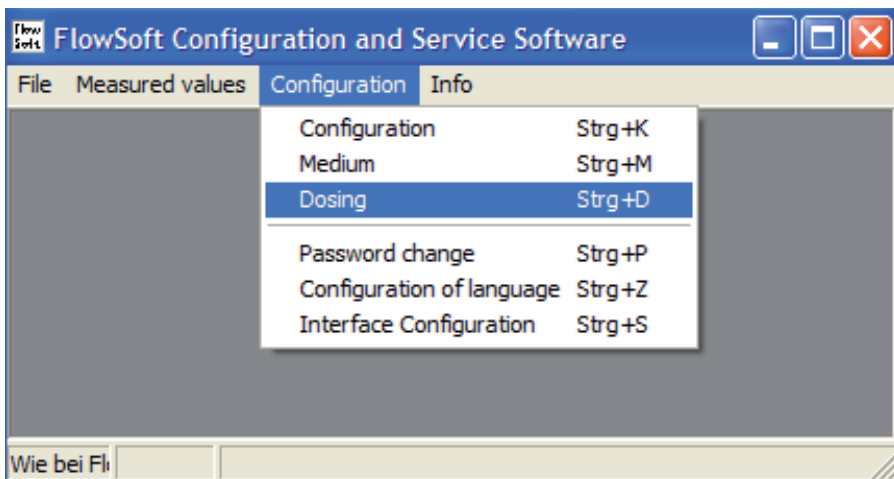


Fig. 40: Starting the window *FlowSoft dosing operation*

After opening the window *SonicLine Dosing operation* the PC will read out the values configured in the connected device and will present them in table format in the column titled *ACTUAL*.

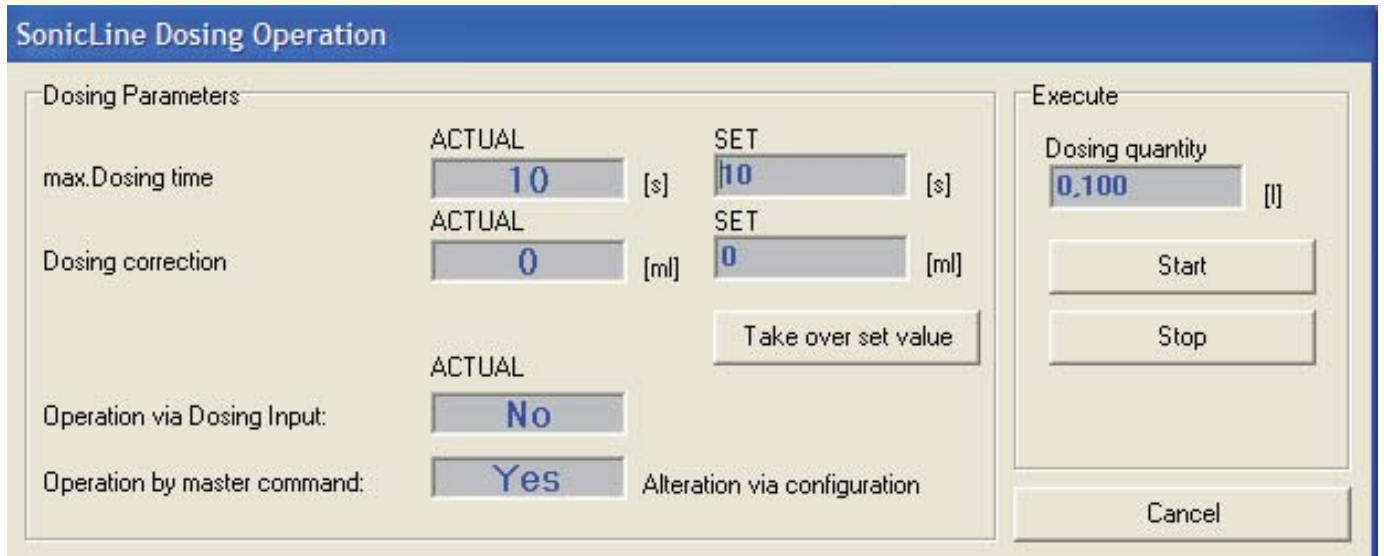
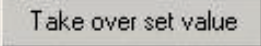


Fig. 41: The window *FlowSoft Dosing operation*


3.9.1 Setting the dosing parameters



Basically, for the dosing parameters presented in the left frame applies that the current values in the connected GEMÜ C38 **SonicLine**[®] are shown in the column *ACTUAL*. If a value is to be altered the new target value has to be entered into the column *SET*. After clicking the button  the new value is transmitted to the GEMÜ C38 **SonicLine**[®], where it is permanently stored.

Dosing may be started via a master command (PC) or via the dosing input.

The configuration of the switching output for the valve control has to be set according to chapter 3.7.2, *Changing configuration settings*. This is where also the configuration of the switching output for the valve control is explained.

3.9.2 Dosing quantity and dosing test

The dosing quantity is set in the input field in the right frame of the window *SonicLine Dosing operation*. After clicking the button  the value entered there is transmitted to the GEMÜ C38 **SonicLine**[®], where it is permanently stored.

There is also the possibility to run a test of the dosing function. Similar to the transmission of the dosing value it is triggered by clicking the button . By clicking the button  a running dosing process may be interrupted at any given time.

3.9.3 Significance of the dosing parameters

Dosing time: The dosing time is the period of time, for which the output O1 is maximally activated after start of dosing. This function helps to prevent that large quantities of liquid are dosed uncontrolled e.g. in case of operating troubles.

Dosing correction: The dosing correction serves the purpose of compensating for empirically identified variances between ACTUAL and SET volumes. For example a later running empty when the valve has long been closed can distort the dosing accuracy. This is possible by setting the value dosing correction.

Dosing quantity: The dosing quantity is the fluid volume, after whose passing through the **SonicLine**[®] the output O1 switches to passive again at the end of a dosing process. After transmittal, the value for the dosing quantity from the PC is stored in the GEMÜ C38 **SonicLine**[®] and serves as the basis for any further dosing processes, if it is not changed by the PC.

3.10 Changing the password

As mentioned in chapter 3.3 User log in / log out, the standard default password after installation

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can be changed by the user. The password is changed in the window *Password change*.

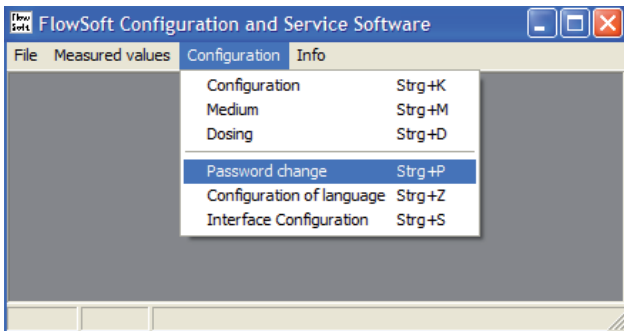


Fig. 42: Starting the window *Password change*

After selecting *Password change* in the pull-down menu *Configuration*, the relevant window will open.

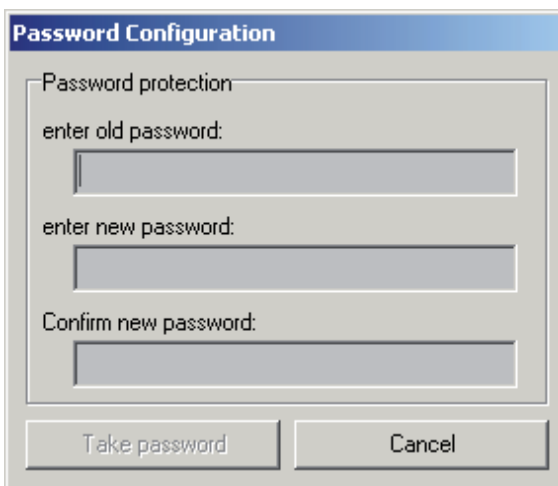



Fig. 43: The window *Password Configuration*

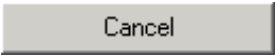
Take the following steps to change the password:

1. First write the password that is still valid into the field: *enter old password*.
2. Then write the desired password that is to be valid in the future into the field: *enter new password*.
3. Then *Confirm new password*: enter the new password again.
4. If the three entries above are correct please click the button  to conclude. The new password will be saved and is valid immediately.

The following message appears:



Fig. 44: The message after valid password change

Entering new passwords can be cancelled any time by clicking the button  and maintaining the old password.

3.11 Selecting a language

FlowSoft[®] offers the possibility to choose between the languages German and English. After selecting the function *Configuration of language* in the pull-down menu *Configuration* the related window will open.

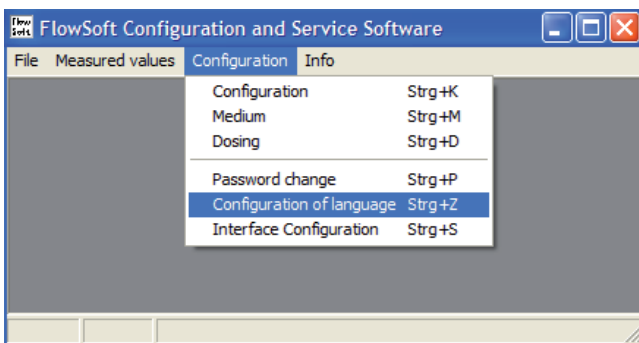
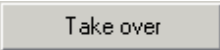


Fig. 45: Starting the window *FlowSoft configuration of language*

The selection is made by choosing the desired language in the button-down menu and then confirming it by clicking the button . The selected language will be active **after** the next start of the software.

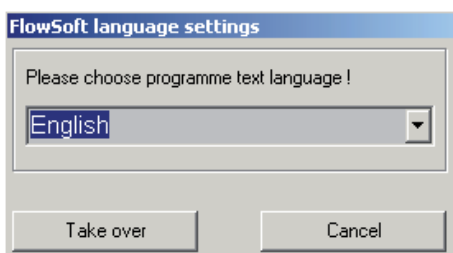


Fig. 46: The window *FlowSoft language settings*

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