SOFTWARE MANUAL

FLOWSIC600

Ultrasonic Gas Flow Meter *II*+

SICK | MAIHAK
Analyzers and Process Instrumentation

Content

About this document

This Software Manual describes the control and configuration program MEPAFLOW600 for the Ultrasonic Gas Flow Meter FLOWSIC600. It contains general information about system configuration and diagnosis options. Additional information and is available from your SICK | MAIHAK representative.

Information on the operation of the FLOWSIC600 can be found in the Operating Manual of the measuring system.

The FLOWSIC600 documentation further includes (for specially trained staff only):

- Service Manual
- Extraction Tool Operating Manual

Symbols used in this document

Note To provide information about special features of the equipment and further recommendations.


IMPORTANT

Important

To indicate potential dangers to the equipment and possible functional impairment.


WARNING

Warning

To indicate potential dangers to the operating staff, in particular due to electrical equipment and improper use of the equipment. Always observe such warnings, as they aim to protect you from serious injuries.

Read Warning notes carefully and follow them strictly!

Note Always read this manual carefully before carrying out any work on the equipment. Always comply with any safety instructions and warnings.

1 Safety instructions

Intended use

The control and configuration software MEPAFLOW600 is used for configuration, data display and output as well as diagnosis of the Ultrasonic Gas Flow Meter FLOWSIC600.

Authorised staff

Persons responsible for safety issues shall ensure the following points:

- Any work on the measuring system shall only be carried out by qualified persons and must be checked by responsible skilled persons.
  Due to their professional training, knowledge and vocational experience, as well as their knowledge of the relevant standards, regulations, health and safety regulations and equipment conditions, qualified persons shall be assigned by the person responsible for personal and plant safety to carry out such work. Qualified persons must be able to identify possible dangers and to take preventive action in due time.
  Skilled persons are defined in DIN VDE 0105 and IEC 364, or comparable standards.
- In hazardous areas, wiring and installation shall only be carried out by staff trained according to EN 60079-14 and according to national regulations.

General safety instructions and protective measures

Always comply with the safety instructions specified where necessary and the instructions given in the FLOWSIC600 Operating Manual when using the software.

FLOWSIC600

Ultrasonic Gas Flow Meter

General

Installation

Establishing a connection

Navigating the program

Basic settings

Data saving concept

2 General

2.1 Installation

2.1.1 System requirements

The software requires a PC system with Windows 95/98, Me, 2000 or NT, and:

- 32 MB RAM
- 266 MHz Pentium processor
- Free serial port
- SVGA (800x600) compatible graphics card

In addition, an RS485 / RS232 converter capable of handling baud rates of up to 57,600 kbit and automatic signal direction switch is required for direct connection of the FLOWSIC600 with the serial port of the PC.

Note The MEPAFLOW600 software does **not** support the modem signal direction control signals of the serial interface (RTS, CTS)!

2.1.2 Compatibility

The MEPAFLOW version 3.x software can not be used for older Firmware/ Hardware versions. The following MEPA/ Firmware version are compatible:

– Version 2.x.x for devices with Firmware version 2.x.x
– Version 3.x.x for devices with Firmware version 3.x.x

2.1.3 Communication through the RS232 port of the FLOWSIC600

The serial port is wired to correspond with the RS485 standard. External devices are connected through a shielded twisted pair cable. The connections are marked “+” and “-” and are connected “1:1”, i.e. “+” on the FLOWSIC600 is connected with “+” on the converter, “-” on the FLOWSIC600 with “-” on the converter.
Other commonly used labels for these terminals are:

Terminal	Other commonly used designation		
+	A	Y	Data +
–	B	G	Data –

Terminals on the SPU

Terminal 33: RS485 +

Terminal 34: RS485 –

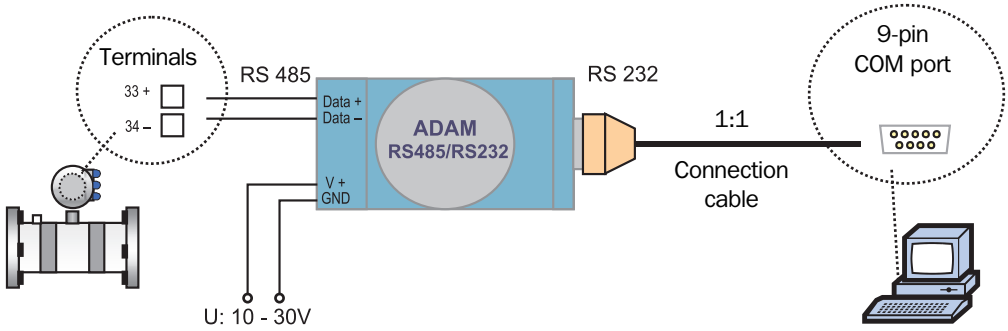

Fig. 2.1: Wiring example of the ADAM 4520 RS485 / RS232 converter

Note Make sure the Tx signal transmitted by the PC is connected with the reception channel Rx at the converter, and the Tx signal transmitted by the converter is connected with the reception channel Rx at the PC. The signal lines must always be crossed with any RS232 connections. If this is not realised inside the converter, the user must ensure that the lines are crossed externally. You may use a so-called 'Null Modem Kabel' for this purpose.

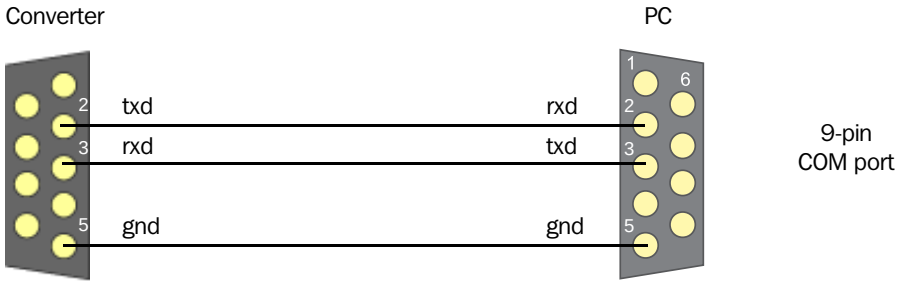

Fig. 2.2: Typical RS232 wiring between interface converter (ADAM 4520 with lines crossed internally) and PC

Note A MEPA Interface Set, consisting of interface converter, interface cable RS232 and power supply unit, is available on request under the order number 7041773.

2.1.4 USB communication

If the PC or laptop used to control the FLOWSIC600 does not have an RS232 serial port, you may use the USB.

The interface adapter is designed to allow both direct access to the flash memory and the use of the serial interface using the MODBUS protocol.

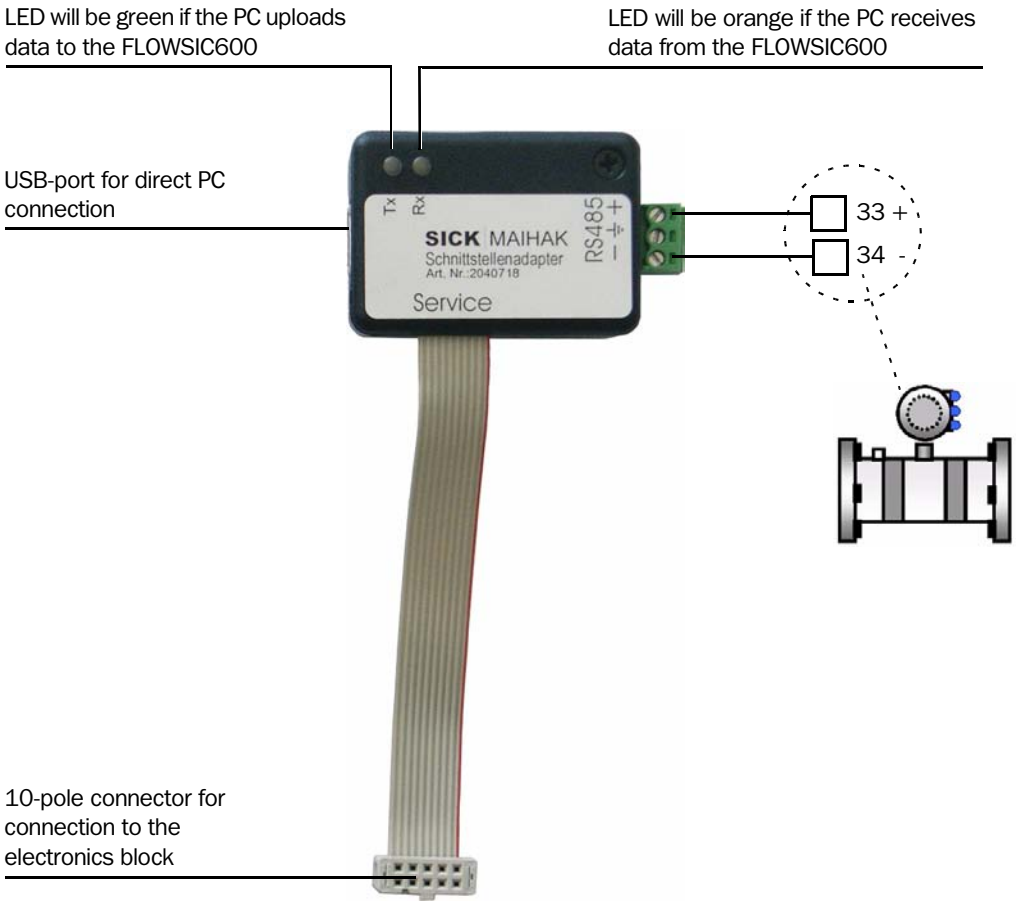

Fig. 2.3: Service interface adapter USB Rev2 (order no. 2040718)

IMPORTANT

Achtung

For connection with increased safety chose the corresponding connection adapter (e.g. STAHL 9185).

2.1.5 Installing the software driver for the interface adapter

Note The interface adapter can only be used on PCs which run under the operating systems Windows 98, Windows 2000, Windows XP.

- Plug in the USB connector at the PC.
- The operating system will signal to have found new hardware. Insert the FLOWSIC600 CD ROM which is included in the delivery and follow the installation assistant (see **Fig. 2.4**).
- After completion of the installation, a second installation will be performed for software reasons. This second installation must not be interrupted -- please follow the assistant again.

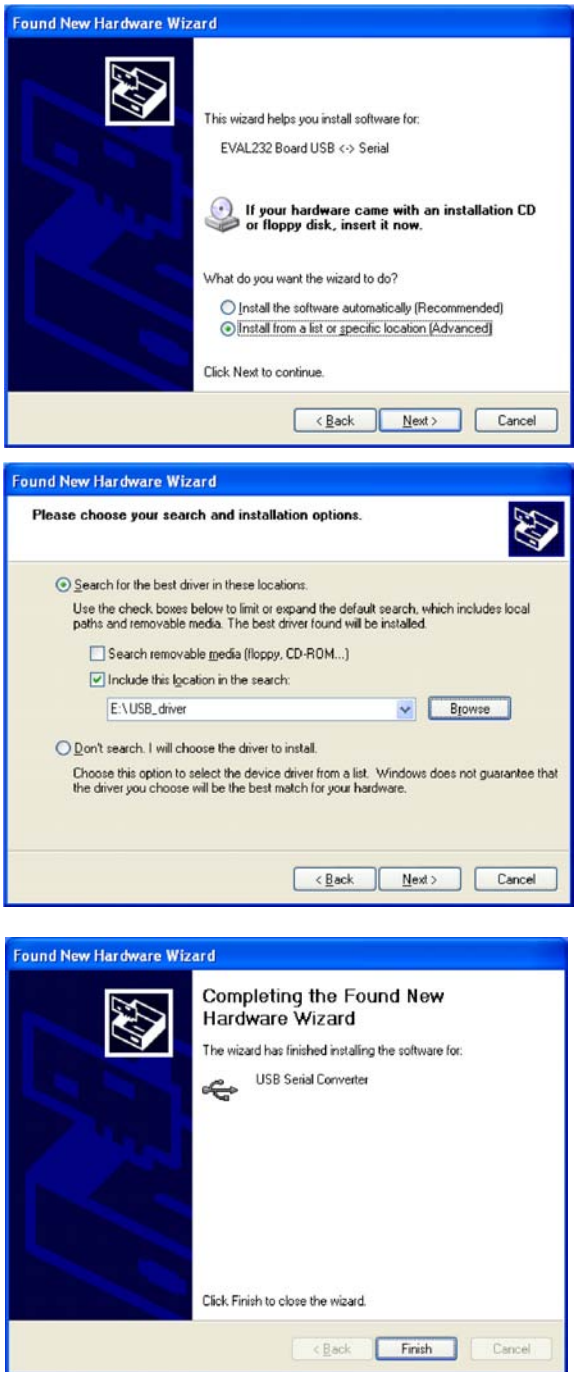

Fig. 2.4: Installing the driver

2.1.6 MEPAFLOW600 software installation

Use the Windows Exploerer, Win Commander or similar administration program, or select the “Run…” command from the “Start” menu.

The software must be installed on the PC before it can operate. For this insert the product-CD, which is attached to the FLOWSIC600 when it is delivered, into the appropriate drive. Folllow the Auto-Start-Menue or start the file ‚FLOWSIC600_R_CD’. After that the user is guided automatically.

Fig. 2.5: Files on the Product-CD

2.2 Establishing a connection

You can run the program after successful installation by selecting the MEPAFLOW600 entry in the program group created during installation, or by double-clicking on the desktop icon.

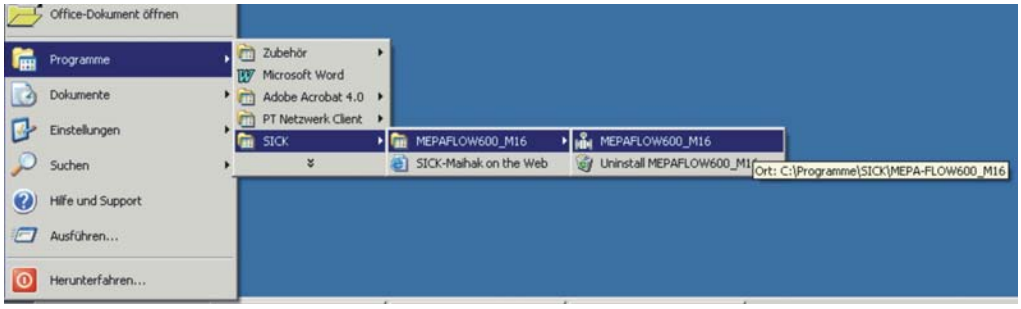

Fig. 2.6: Starting the program from the “Start” menu or with the desktop icon

2.2.1 Logging on

When starting the program the “Connect to” dialog box will appear on the screen.

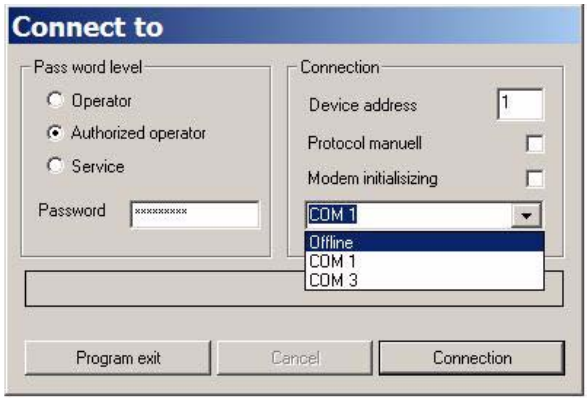

Fig. 2.7: Connect to dialog box

Select the desired access level in the “Password level” field. The following table shows the differences between the individual access levels.

You must enter a password for access to the ‘authorised operator’ and ‘service’ levels (passwords for access levels 1 and 2 can be found in the device documentation).

User	Access level	Possible activities
Operator	0	Important information is provided for display and recording, parameters cannot be modified.
Authorised operator	1	For trained staff. I/O parameters can be modified in addition to level 0.
Service (field)	2	Any diagnosis information available. Parameters can be modified, but no access to signal models. Software update possible.
Service (manufacturer)	3	No restrictions

2.2.2 Establishing a connection to the FLOWSIC600

Select an available port on the PC from the dropdown list in the “Connection” field (see “Connect to” dialog box, **Fig. 2.7**) to make a serial communication line to the FLOWSIC600.

If you select “Offline”, the program will be run without establishing an online communication line to the FLOWSIC600.

The MODBUS protocol implemented in the device generally accepts bus wiring, so that you must assign the FLOWSIC600 a device address (see **Fig. 2.7**). All FLOWSIC600 are delivered with the device address ‘1’.

The program will automatically try to communicate with a FLOWSIC600 on the specified device address through the serial port. It will start communication at a pre-set baud rate of 9600 Baud. If a connection can be established, the program will test higher baud rates one after another. If communication attempts fail at any of the tested baud rates, the program will suggest to search for alternative device addresses.

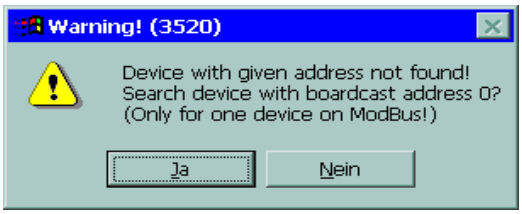

Fig. 2.8: Warning

Notes

- The device firmware is programmed to allow communication with any FLOWSIC600 on the general address ‘0’ in addition to the address set on the individual device.
- This option shall only be used if there is just **one** direct connection between a FLOWSIC600 and the PC. The reaction of further devices connected on the bus on a broadcast command may affect the results of this attempt.

see Sections *2.3.1* and *3.1.1*

The “Measured values” tab will be opened on successful connection.

2.2.3 Support in case of communication problems

The table below shall help you in case of communication errors between the PC and the FLOWSIC600.

Problem	Possible reason	Remedy
No communication between MEPAFLOW600 and FLOWSIC600	FLOWSIC600 power supply defective	• Check voltage at the terminals 1+, 2 in the terminal box of the FLOWSIC600 using a multimeter (reading must be between 12 and 30 V). • Replace the power supply unit if necessary
	Voltage reversal at the FLOWSIC600 power supply	• Make sure the power supply unit of the FLOWSIC600 is connected in accordance with the marking inside the terminal box.
	Converter power supply defective (only applies to converters with external power supply)	• Check voltage at the converter using a multimeter • Compare with the manufacturer specifications • Replace the power supply unit if necessary
	Wrong RS485 wiring	• Make sure the signal conductor (+) of the converter is connected to terminal 33 • Make sure the signal conductor (-) of the converter is connected to terminal 34

Problem	Possible reason	Remedy
No communication between MEPAFLOW600 and FLOWSIC600	Wrong RS232 wiring	• Make sure wining is in accordance with Section – and *2.1.4* • Make sure the signal reception conductor is connected with the signal transmission conductor and vice versa (txd and rxd crossed, see also Section –)
	Wrong COM port at the PC	• Select a different COM port in the “Connect to“ dialog box
	Device wrongly addressed	• Make sure the device address selected in the “Connect to“ dialog box corresponds with the device address of the FLOWSIC600 • If connection has failed, try connecting to device address ‘0’
	RS232 connection cable defective	• Check cable continuity • Find out whether or not rxd and txd conductors must be crossed in the cable (see Section –)
	RS485 connection cable defective	• Check cable continuity
	Converter does not support the automatic simulation of the modem control signals RTS and CTS	• Use a different interface converter, such as ADAM 4520 (see Sections – and *2.1.4*)
	Wrong baud rate selection at the converter	• Make sure FLOWSIC600 and converter operate at the same baud rate • Use a converter with automatic baud rate detection
	FLOWSIC600 service port defective	• Contact the manufacturer
	RS232 cable too long	• Make sure the cable is no longer than 5 m
	RS485 cable too long	• Make sure the cable is no longer than 1,000 m
	Power supply of the laptop port insufficient for the converter (only applies to laptop users in conjunction with converters supplied through the serial port)	• Use a converter with external power supply • Install MEPAFLOW600 on a desktop PC and try again to establish a connection
No COM port available in the “Connect to“ dialog box	All COM ports of the PC or laptop are occupied by other devices (modems, IRDA interfaces etc.)	• Use the Device Manager of the Windows Control Panel to release a COM port
Slow signal transmission and screen refreshing	PC does not meet the hardware requirements	• Upgrade your PC or replace it by a suitable model
	Electromagnetic interference in the communication line	• Apply additional shielding measures • Separate the signal cable from power cables
No display of measured values in the MEPAFLOW600	MEPAFLOW600 does not support the current device software	• Contact the manufacturer • Either use an earlier MEPAFLOW version or update the FLOWSIC600 firmware

2.3 Navigating the program

The MEPAFLOW600 control program was developed as an application software based on Microsoft Windows® . The control elements used, i.e. buttons, menu bars, dialog boxes, are designed to correspond with generally used Windows elements.

The program interface is generally divided into five parts: menu bar, tool bar (icons), tabs, dialog area and status bar.

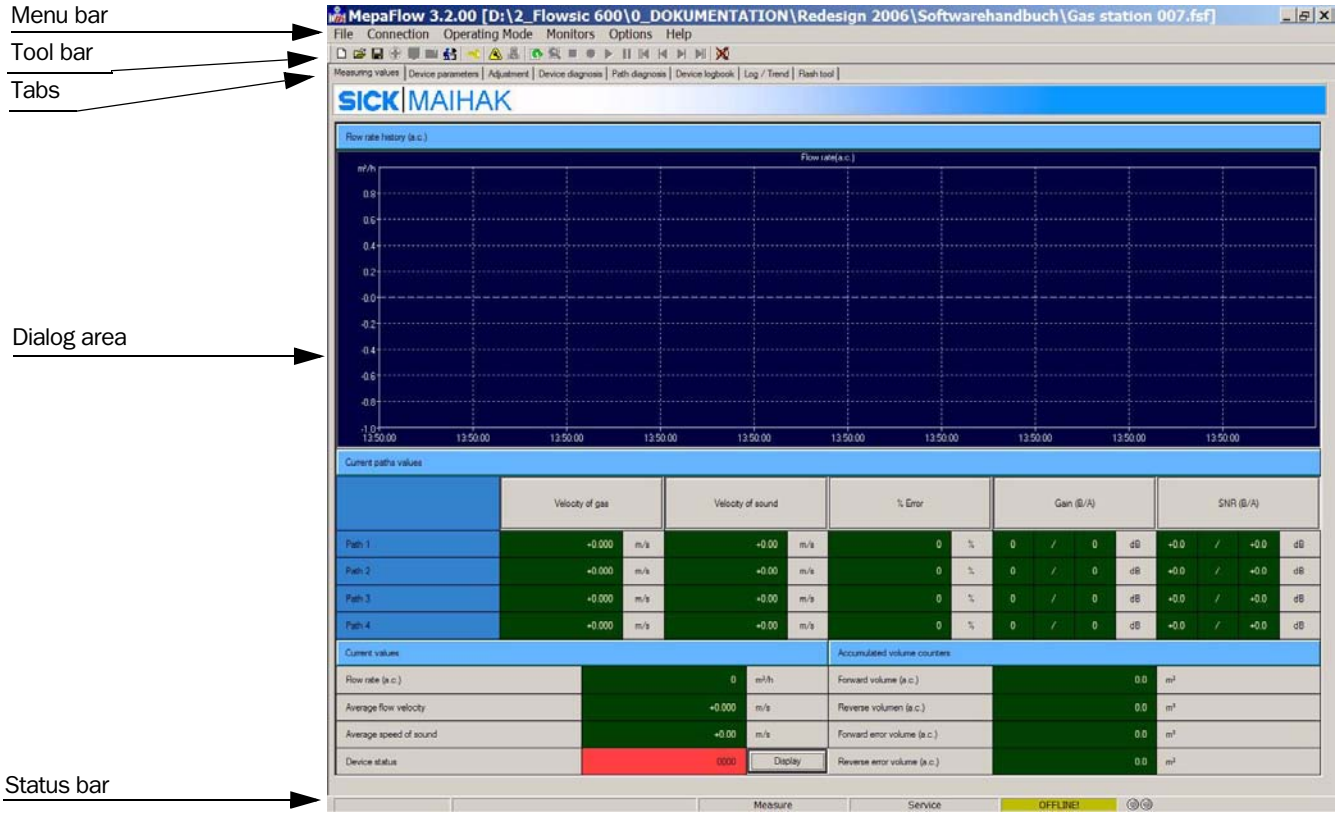

Fig. 2.9: Program interface on the “Service” password level

2.3.1 Tabs

Detailed description see Section *3.1*.

Availability and content of the tabs depend on the selected password level.

Tab	Password level	Content
Measured values	Operator, Authorised operator	Display of currently measured values of flow rate, flow velocity, sound velocity, indication of system status, display of forward and reverse volume counters as well as forward and reverse error volume counters
	Service	Additionally, display of current measured values of flow velocity, sound velocity, error rate, gain and signal-to-noise ratio of the individual paths
Device parameters	Operator	Display of parameters for calibration, frequency output, digital outputs, LCD, warning/ limit, analog output, replacement values, path failure compensation
	Authorised operator	Display and input of parameters for calibration, frequency output, digital outputs, LCD, warning/ limit, analog output, replacement values, path failure compensation
	Service	Display of device identification parameters, display and input of all parameters for meter set-up, process parameters, meter body, limits, profile correction, calibration, pulse and analog outputs, path values

Tab	Password level	Content
Adjustment	Operator, Authorised operator	Display od data that are used for adjustment/correction of the device
	Service	Display of and access tom the adjust factors
Device diagnosis	Operator, Authorised operator, Service	Display of operational voltage and device identification information, display and test option for pulse and analog outputs
Path diagnosis	Service	Display of path status, received signal images, measured values, path parameters
Device logbook	Operator, Authorised operator, Service	Display of the logbook content, option to acknowledge events
Log/ trend	Operator, Authorised operator, Service	Dialog for collecting measured values, menu to select measured values for logging
Flash tool	Service	Firmware programming tool

2.3.2 Menu bar

Menu	Item	Description
File	New session	Opens a new session file (“DEFAULT.~SF”)
	Open session	Opens an existing session file
	Save session	Saves the current session file
	Save session as…	Saves the current session under a new name
	Diagnosis session	Starts a diagnosis session
	Session history	Opens the “Session history” dialog box and displays scanned session contents
	Upload configuration	Starts transmission of a configuration to the FLOWSIC600
	Printer selection	Opens the printer selection menu
	Exit	Terminates the program after a confirmation dialog
Connection	Connection	Opens the “Connect to” dialog box (see Section *2.2.2*)
Operational mode	• Configuration • Measurement	Changes the FLOWSIC600 operational mode
Monitors	System status	Indicates the current system status
	% Errors	Displays the error rates in all paths
	SNR	Displays the signal-to-noise ratio in all paths
	AGC levels	Displays the gain in all paths
	Velocity of sound	Displays the velocity of sound in all paths
	Relation of velocity of sound	Relative variation of the sound velocity among the individual paths
	Velocity of gas	Displays the velocity of gas in all paths
Options	Trend set-up	Opens a dialog box to change the trend representation on the “Log/ trend” tab (colours, time slot - X axis)
	Colour adjustment	Opens a dialog box to select a global colour pattern
	Language	Opens a dialog box to select the interface language
	Diagnosis set-up	Opens a dialog box to select the time slot for data recording in a diagnosis session, distinguished into signal and value recording
Help	Version	MEPAFLOW600 program version
	Help F1	Online help

2.3.3 Tool bar

The tool bar contains major functions which can be activated quickly and simply.

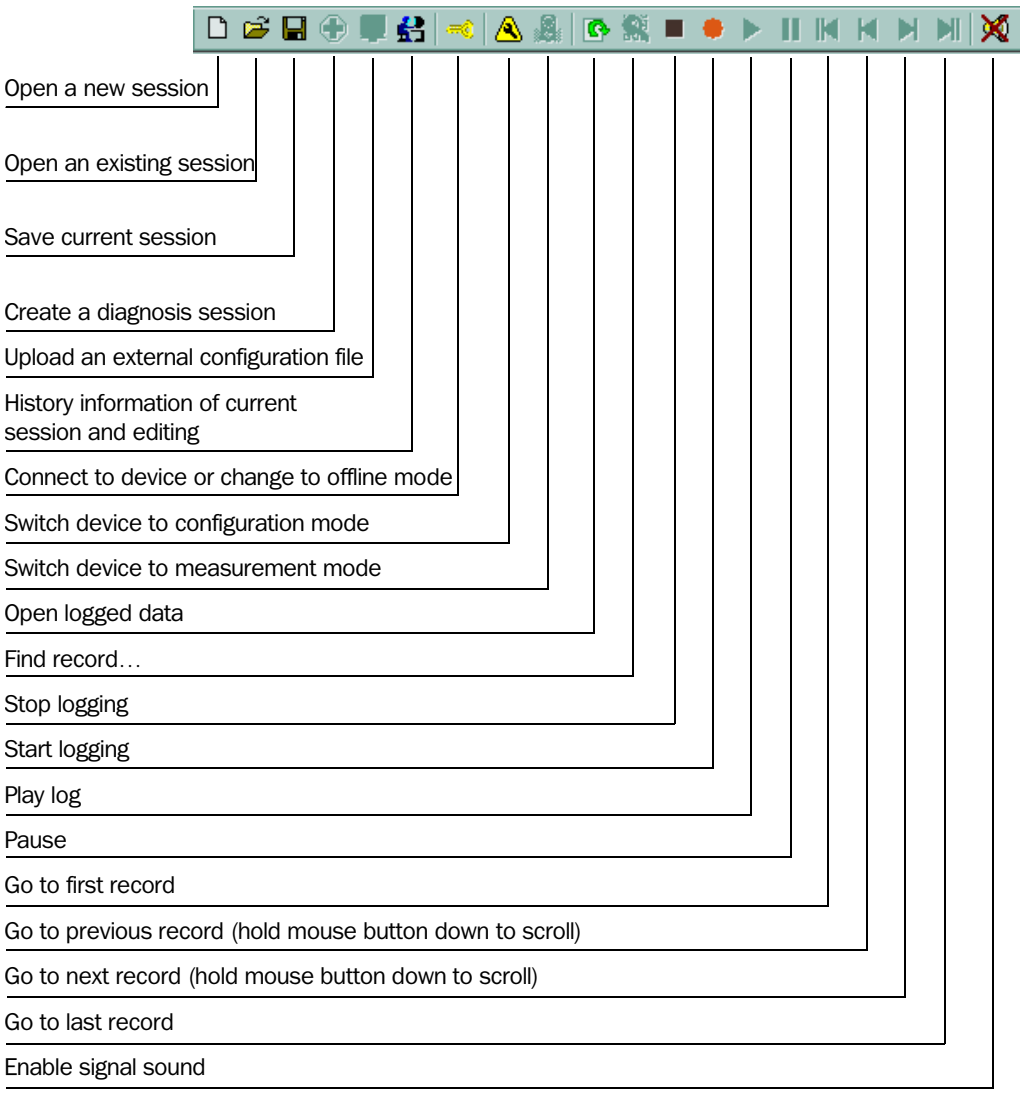

Fig. 2.10: Tool bar and description of icons

2.3.4 Status bar

The status bar contains information about the following device statuses:

- Progress bar for time-consuming functions
- Indication of the current operational mode
- Indication of the current password level
- Error rate of the running data communication between device and PC
- Status indicators for data transmission and reception through the data interface

2.4 Basic settings

2.4.1 Pre-requisites

Before you can use the FLOWSIC600, it is necessary to adjust the output channels of the measuring system to match your requirements. This requires the following condition:

- The FLOWSIC600 is completely mounted and wired.
- The MEPAFLOW600 program is installed on a PC or laptop.

Proceed as follows:

- ▶ Connect the RS485 / RS232 interface converter to the terminals 33+ and 34- in the terminal box of the signal processing unit.
- ▶ Connect the COM port of the PC or laptop with the interface converter.
- ▶ Start the PC and run MEPAFLOW600.
- ▶ Establish a connection on the password level “Authorised operator”.

2.4.2 Switching to the configuration mode

If you are successfully connected, the control program will show all measured values and parameters in accordance with the selected password level. Switch the device to the configuration mode to be able to perform any changes of the parameters: Click on the “Switch device to configuration mode” button in the tool bar (see **Fig. 2.11**).

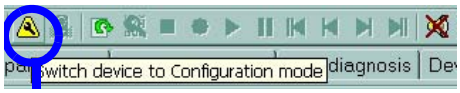

Fig. 2.11: Switching to the configuration mode

The section below provides information on typical parameter modifications which may become necessary during commissioning.

2.4.3 Configuration

Adjusting the frequency output

- ▶ Select the “Device parameters” tab.

Impulse output			
Pulse source	7001 Flowrate		o.E.
Meter factor	1800		1/m³
Qmax at 2kHz	4000		m³/h
Update Cycle	100		ms
Output mode	Flow Direction (+/- 90°)	normal open(D0+D1)	

Fig. 2.12: “Pulse output” on the “Device parameters” tab

- ▶ Select the output value “7001 Flow rate”.

▶ Set the pulse value.
The pulse value represents the number of pulses output by the FLOWSIC600 for one measured cubic metre.
Example: Pulse value = 1000 means one pulse per litre

The pulse value should be selected so that the output frequency does not exceed e.g. 5 kHz at the maximum flow rate. You may use the following formula for your calculation:

$$\text{Pulse value} = \frac{5\ \text{kHz} \cdot 3600}{Q_{max}}$$

Example: $Q_{max} = 1600\ m^3/h \rightarrow$ Pulse value = 11250

Alternatively, the pulse value may be calculated automatically by the MEPAFLOW600 program. To use this option, enter the maximum flow rate in the “Qmax at 5 kHz” box.

▶ Specify an update rate.
This defines the rate at which the output frequency is updated.

Note For informations about the menu item “Output mode“ see Section *3.1.2*.

Adjusting the analog output

▶ Select the “Device parameters” tab.

Analog output		
Output source	7001 Flowrate	o.E.
Physical value at 4mA	0.0	m³/h
Physical value at 20mA	3000.0	m³/h
Alarm value	22.0	mA
Damping (T90)	0.0	s

Fig. 2.13: “Analog output” on the “Device parameters” tab

▶ Select the output value “7001 Flow rate”.

4 mA: AORangeLow
20 mA: AORangeHigh

▶ Enter the physical flow rate values corresponding to the range limits, AORangeLOw and AORangeHigh in the respective input boxes.

The actual current at the analog signal output is determined in the FLOWSIC600 as follows:

Q: Current volumetric flow

$$\text{Output current} = 4\ \text{mA} + \frac{Q - \text{AORangeLow}}{(\text{AORangeHigh} - \text{AORangeLow})} \cdot 16\ \text{mA}$$

▶ Specifying the fault current value
According to the NAMUR standard, the output current ranges between 3.8 mA and 20.5 mA. The signal is interpreted as a measured value within these limits.
In case of a device error a value should be output which is outside this range (≤ 3.6 mA for four-line installations and ≥ 21 mA for two-line installations).
Enter the respective value in the “Alarm current output” box.

Configuring the response time t_{90}

The response time allows the analog output signal to be smoothed in case of heavily fluctuating measured values. It defines the point of time at which the system response after transmission of a jump signal to a delay system achieves 90 % of the set-point value (see **Fig. 2.14**).

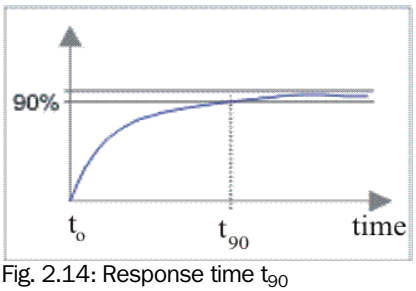

Fig. 2.14: Response time t_{90}

- Select the “Device parameters” tab.
- Enter the response time value in the “Damping (T90)” box (see **Fig. 2.13**).

Low flow cutoff

To suppress measurement of extremely small volumetric flows (such as leakage volumes), you may specify a limit for the smallest volumetric flow to be output. All volumetric flows which are smaller than the specified value are set to zero by the FLOWSIC600.

- Select the “Device parameters” tab.

Calibration		
Low flow cutoff	0.0	m³/h
Adjust forward	1.00000	o.E.
Adjust reverse	1.00000	o.E.

Fig. 2.15: “Calibration” on the “Device parameters” tab

- Enter the smallest volumetric flow you want to display.

Setting the calibration parameters

If a FLOWSIC600 is calibrated after delivery under high pressure, the parameters “Adjust factor forward” and “Adjust factor reverse” must be adapted (see **Fig. 2.15**). These factors are used by the FLOWSIC600 to calculate the output volumetric flow $Q_{v,\,cal}$ from the measured values Q_v.

Positive volumetric flows:

$$Q_{v,\,cal} = \text{Adjust factor forward} \bullet Q_v \qquad \text{if } Q_v \geq 0$$

Negative volumetric flows:

$$Q_{v,\,cal} = \text{Adjust factor reverse} \bullet Q_v \qquad \text{if } Q_v \leq 0$$

Configuring the substitution values

Depending on the actual process conditions, temperature and pressure dependence are compensated by the FLOWSIC600. The gas pressure and temperature parameters, which are needed for this compensation, are used as start values after device initialisation.

▶ Select the “Device parameters” tab.

Substitution values		
Temperature(fixed)	293.15	K
Pressure (fixed)	1.0	bar(a)
Compressibility (fixed)	1	o.E.

Fig. 2.16: “Substitution values” on the “Device parameters” tab

▶ Enter the average operating pressure and temperature in the input boxes “Pressure (fix)” and “Temperature (fix)”.

2.5 Data saving concept

2.5.1 General

The data saving concept shown below forms the basis for the data management.

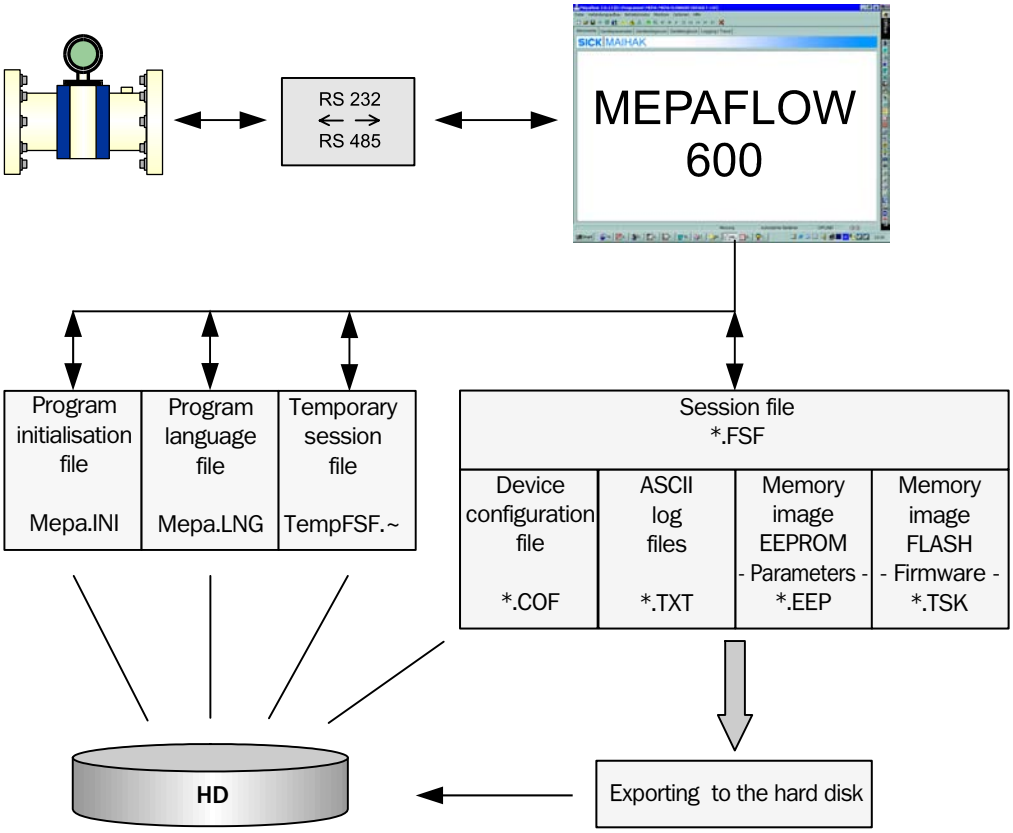

Fig. 2.17: Data saving concept

2.5.2 Session file – session concept

The MEPAFLOW600 device management is based on the session concept described below.

Functions - terms

- **Session**

  The term “session” includes controlling, monitoring, data collecting and configuration activities of a FLOWSIC600 with the help of the MEPAFLOW600 program. All major operations in the program during a session are automatically logged by the software and are available for later offline reading and analysis.

- **Session file**

  If you start a new session the session file will be generated. All operations performed on a certain device with the help of MEPAFLOW600 after a session is opened are saved in this file. Session files have the extension *.FSF.

- **Device management**

  A session opened for a certain device only contains information about this device. New session files can be generated for further devices. The correspondence between the open session and connected device is monitored by the software, instances of inconsistency will be signalled.

- **Long-term data management**

  Sessions can be saved and are thereby closed. If further operations become necessary later, the existing session file can be opened again. All further operations will then be in the existing session file. It will always be saved in the session history when you open a session, so that you operations and time can be related over the entire installation period of a device.

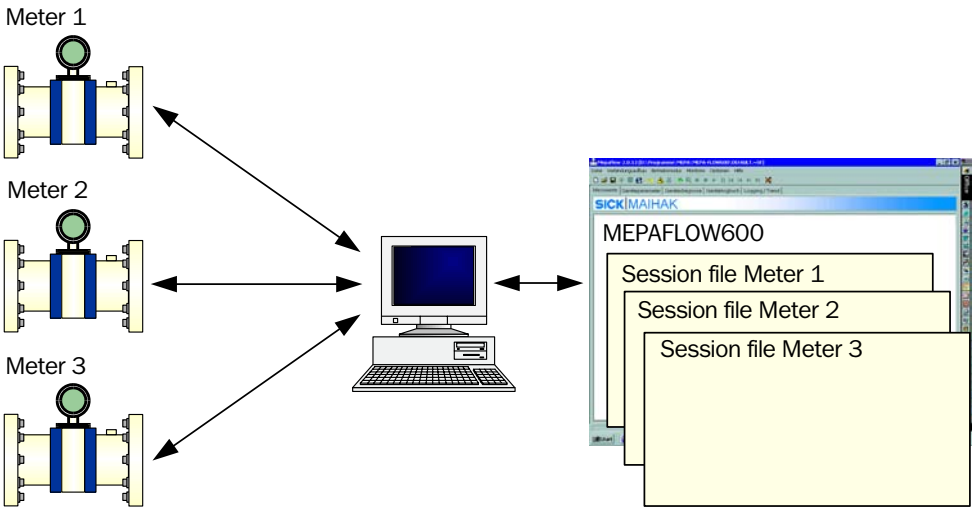

Fig. 2.18: Session concept

- **New session**

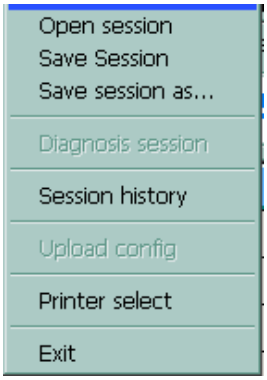

Fig. 2.19: Menu item “New session”

This command opens a session and creates a new session file.

- **Open session**

  This command is used to open an existing session file. All operations which are now performed in the MEPAFLOW program will be logged in this session file.

- **Save session**

  This command saves the currently open session.

- **Save session as ...**

  A default session file will always be generated when you start the MEPAFLOW600 program. All further activities will be saved in this file. The default session can be saved as an ordinary session (“Save session as…”).

Note If the default session is not saved under a file name, it will be overwritten when you start the MEPAFLOW600 program the next time, and the information will be lost.

- **Session history**

  This menu item is used to monitor the current session and activities contained therein (see **Fig. 2.20**). Certain operations performed in a session can also be stored in ASCII files (e.g. measuring records).

- **Diagnosis session**

  The diagnosis session aims to save all important information which should be collected during maintenance actions. If you call up this command, the program will automatically start, execute and exit a data logging session. The information is saved in a session file which can be opened and analysed later.

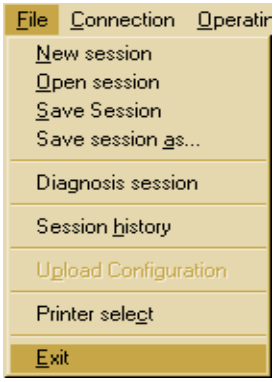

Fig. 2.20: Menu item “Diagnosis session”

- **Contents of a session file**

  The following operations and information collected in a session are saved in a session file (see also **Fig. 2.23**).

Session entry	Type of information	Corresponding activity	Description
Current device configuration	Parameter set	• Automatically when a new session is created • Continuous update	Contains the current configuration of the FLOWSIC600
FLASH file	Program code	Automatically when a new session is created	Program code segment of the flash memory
EEPROM file	Parameter code	Automatically when a new session is created	Data code segment of the EEPROM memory
Parameter modifications	Parameters	Parameter modifications	Entry of the modification of a parameter, parameter name, old and new value
Log/ trend	Record	Log/ trend Start logging	• Collection of the values measured by the FLOWSIC600 • Selection of measured variables for data logging in the “Log/ trend” menu
Path diagnosis, data logging	Record	Path diagnosis Start logging	Collection of current signal images
Switching between measurement and configuration mode	Event	Switching between measurement and configuration mode	Logging the operational mode change
Opening and closing a session	Event	Opening/ closing	Each opening and closing of the session file will be logged together with a time stamp.

- **Session scenario**

  The session concept of the MEPAFLOW600 control program was developed to manage all measured values, parameters, operations etc. of several FLOWSIC600 devices consistently and comprehensibly over the entire life of the devices. If you use this function with care, these data provide information over years on the condition of the device at each point of time you have carried out actions on the device. A sample scenario is illustrated below.

Sample session scenario

1. Installation of a FLOWSIC600 – first session

After mechanical and electrical installation of the measuring system the output channels of the FLOWSIC600 are adjusted in accordance with the local requirements and the functions of the device are initially tested with the help of the control program.

The following activities should be executed after starting a new session.

▶ Run the MEPAFLOW600 program and enter the password for access level 1.
If the program has established a data connection, you will be asked whether or not you wish to continue the previous session.

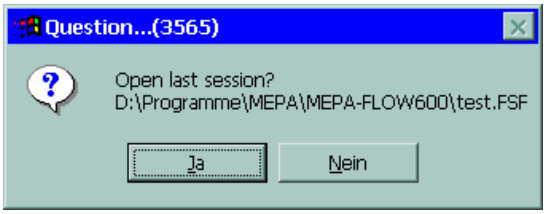

Fig. 2.21: “Open previous session” dialog

- Click on “No”, as you want to create a new session.
- Select “New session” from the “File” menu.
  The program creates a new default session file and logs the activities listed in the table on page *27* during the session.

You can now adjust the output channels. Proceed as follows:

- Switch the FLOWSIC600 to the configuration mode (see **Fig. 2.11**).
- Select the “Device parameters” tab.
- Enter the adjustment values for the pulse output and analog output.
- Carry out other operations if necessary (e.g. data logging, parameter modifications etc.).
- Switch the FLOWSIC600 to the measurement mode.

If you have finished the operating activities, you can exit the session. To do this, save the default session file as an ordinary session file by selecting “Save session” from the “File” menu. You will be asked if you want to save the current default session under a new name.

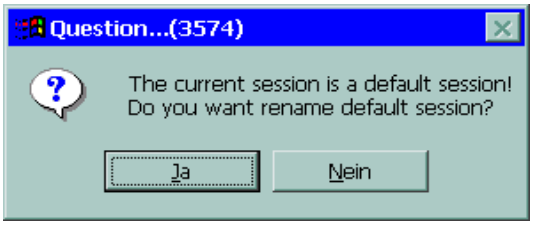

Fig. 2.22: “Rename default session” dialog

- Click on “Yes” and enter a session file name.
  You have now created an ordinary session file for your session.

Note

The name of a session file should be associated with the FLOWSIC600 it relates to (e.g. serial no., measuring point no. etc.). The session file can be used and managed during the entire life of the device, even if it is modified or reinstalled somewhere else. Session files automatically receive the extension *.FSF.

See Section *Session history* and following

You may save the EEPROM and FLASH code segment and the current logbook (if any) when saving the session.

2. Continuing an existing session

If further operations become necessary on the FLOWSIC600 at a later point of time, they should be performed while the session file generated during commissioning is open. Carry out the following steps:

- Run the MEPAFLOW600 program and connect to the FLOWSIC600.
- Open the associated session file by selecting “Open session” from the “File” menu. The program title bar now shows the session file name.
- Carry out further operations (e.g. trend logging).
- Select the “Log/ trend” tab.
- Select the measuring variable registers for data logging (see *Section 3.1.7*).
- Start data logging, record data and stop data logging.

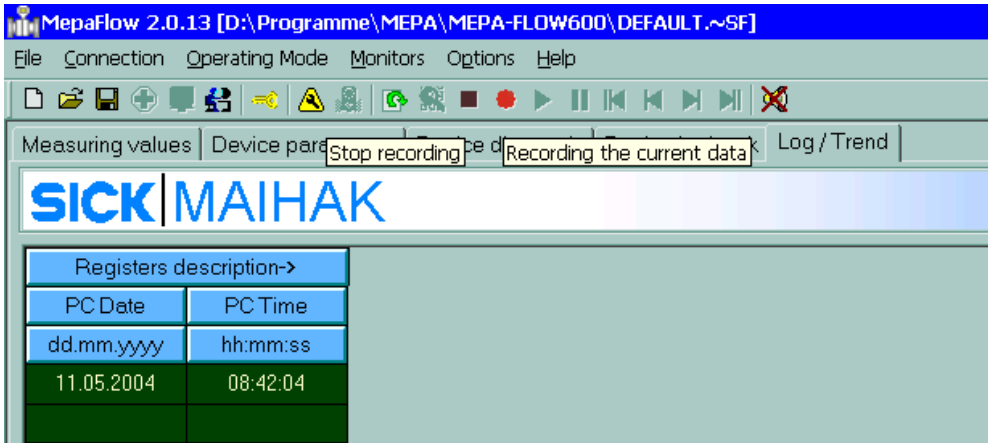

Fig. 2.23: “Log/ trend” tab

The logged data are saved in the session file. If you do not want to carry out further operations, you can exit the program.

3. Offline modification of parameters in the session file

Session files can be opened online with the FLOWSIC600 connected and offline without a connection to the measuring system. This allows to set parameters before you connect to the device. The FLOWSIC600 is updated with the changed information when you connect to the device the next time. Proceed as follows:

- Run MEPAFLOW600.
- Select Offline from the interface dropdown list in the **“Connect to”** dialog box.
- Open the existing session file associated with the FLOWSIC600 by selecting “Open session” from the “File” menu.
- Modify the parameters as desired.
  The parameters are automatically saved in the session file.

If the changed session file is opened during the next connection, non-conformance of parameters saved in the session file and the information stored in the FLOWSIC600 will be detected automatically. You can confirm the validity of the changed parameters saved in the session file and upload them to the measuring system (see also **Fig. 2.27**).

Session history

You can monitor and analyse the history of a session including all operations, data logging events etc. at any time by selecting “Session history” from the “File” menu. It is necessary to open the session file associated with the FLOWSIC600 to be able to use this function. You may analyse a session while the program is connected to the device (online) or later, i.e. without a connection to the device (offline). If you want to use the offline option, you must select “Offline” from the interface dropdown list in the “Connect to” dialog box when you start MEPAFLOW600. Then open the associated session file by selecting “Open session” from the “File” menu.

The item “Session history” in the “File” menu now enables you to monitor all operations which have been carried out in the currently opened session file since it was created (see **Fig. 2.24**).

Type and scope of logged information are shown in the table on page 27.

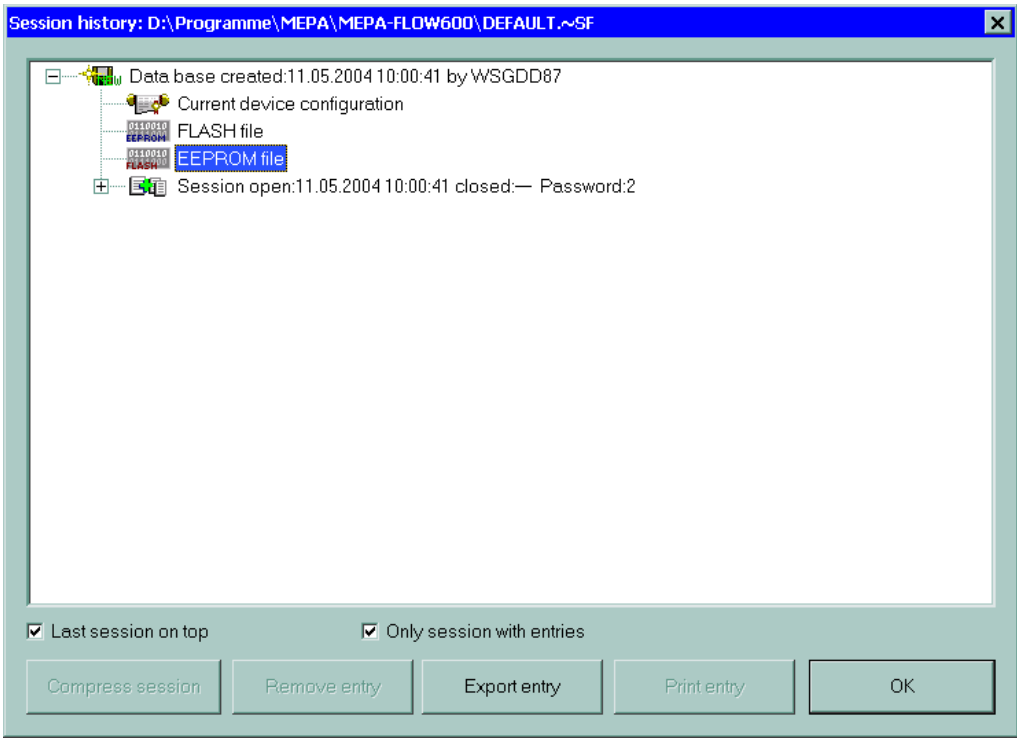

Fig. 2.24: “Session history” dialog box

Several entries in the session history can be exported and printed.

Exporting data records

Data records will be exported to a structured ASCII file if you click on the “Export entry” button. An export dialog box will appear in which you can configure export formats (see **Fig. 2.25**).

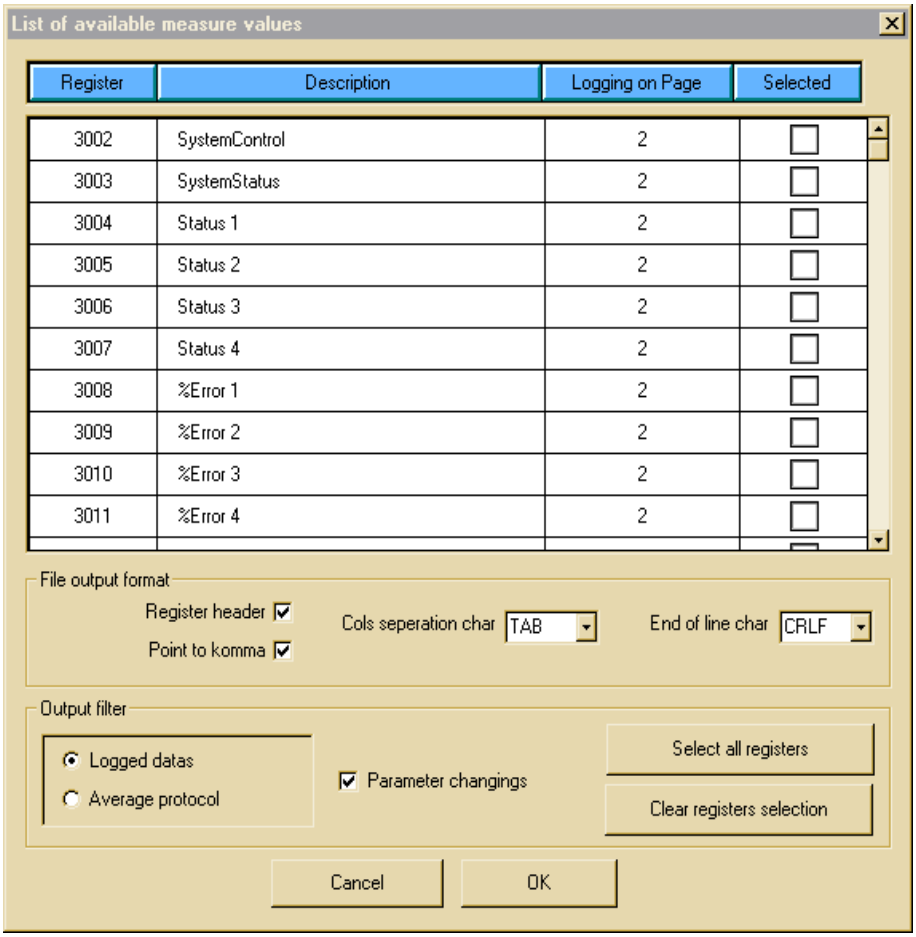

Fig. 2.25: “Measured values” export dialog

Exporting current parameters

The current set of parameters will be exported to a configuration file if you select the “Current device configuration” entry (see dialog area in **Fig. 2.24**) and click on the “Export entry” button. You can name the file as desired. Configuration files have the extension *.COF.

Printing current parameters

The current set of parameters will be printed to a specified printer if you select the “Current device configuration” entry and click on the “Print entry” button.

Exporting a FLASH segment

The flash segment (memory image of the firmware) will be exported to a file if you select the “FLASH file” entry and click on the “Export entry” button. You can name the file as desired. Flash files have the extension *.TSK.

Exporting an EEPROM segment

The EEPROM segment (memory image of the parameters) will be exported to a file if you select the “EEPROM file” entry and click on the “Export entry” button. You can name the file as desired. EEPROM files have the extension *.EEP.

Diagnosis session

After completion of maintenance work on the FLOWSIC600 it is recommended to diagnose and to save the current condition of the measuring system. For this purpose, you can run a diagnosis session in addition to the standard session. If you start the session, the MEPAFLOW600 program will automatically detect any measuring variables and parameters which characterise the condition of the measuring system and save them in a diagnosis session file. Proceed as follows:

- Run the MEPAFLOW600 program and connect to the FLOWSIC600.
- Specify the scope of data collected in the diagnosis session by selecting “Diagnosis set-up” from the “Options” menu.

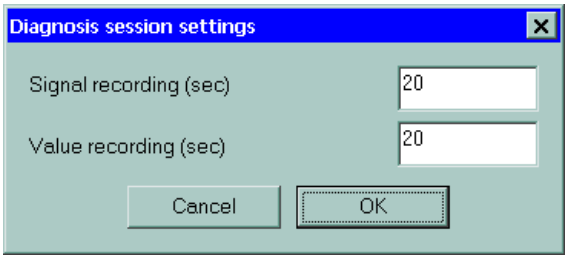

Fig. 2.26: “Diagnosis session settings” dialog box

- Select “Diagnosis session” from the “File” menu to start the diagnosis session.

The MEPAFLOW600 program automatically collects the following information:

- EEPROM and FLASH code segment
- Current configuration
- After changing to the “Path diagnosis” tab, it detects the signals received by the ultrasonic transducers one after another in all measuring paths.
- After changing to the “Log/ trend” tab, it automatically records all major measured variables.
- After changing to the “Measured values” tab, it automatically records further measured variables.
- Saving and termination of the diagnosis session file

The information collected in a diagnosis session can be analysed afterwards in two different ways:

1. Export to a structured ASCII file

   Export a completed diagnosis session through the item “Session history” in the “File” menu, just like a standard session (see page *30*).

2. Replaying recorded tab contents in the MEPAFLOW600 program

   The tab recordings of the diagnosis session can be replayed with the help of the data recorder integrated into the MEPAFLOW600 program (see Section *3.2*).

Data consistency

The MEPAFLOW600 program checks whether or not the configuration saved in the session file is identical to that stored in the connected FLOWSIC600 when you open a session file. If differences are detected, the dialog box shown in **Fig. 2.27** will appear. It contains a list of all deviating parameters.

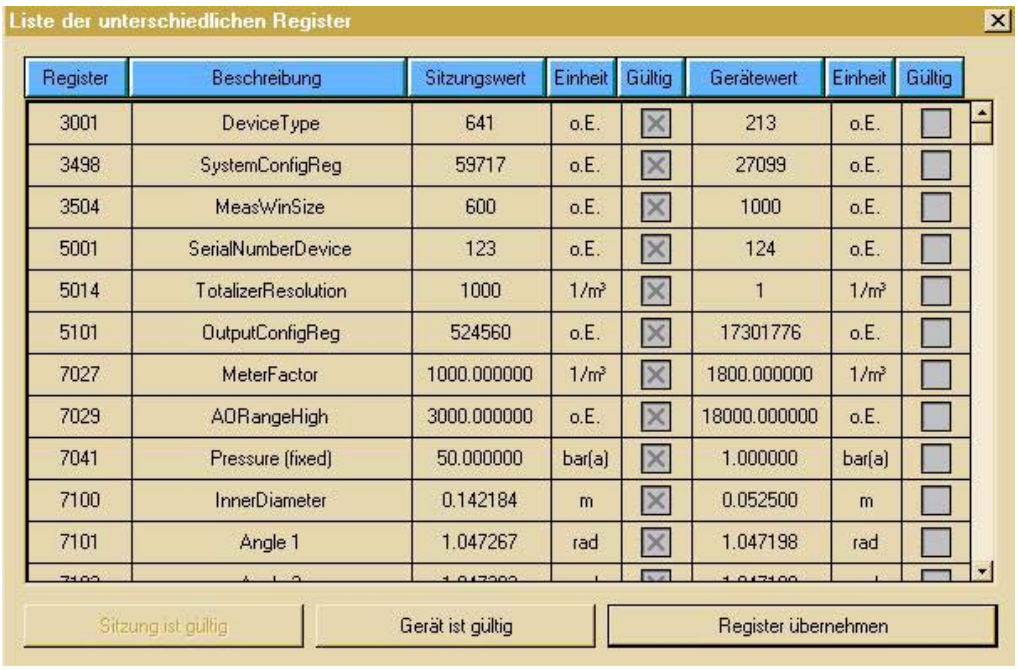

Fig. 2.27: Consistency check: session configuration – device configuration

You can now decide:

- The parameters stored in the FLOWSIC600 are valid → “Device is valid” button
- The parameters stored in the session file are valid → “Session is valid” button
- The session file is not associated with the FLOWSIC600 → Cancel

If you click on the “Apply to registers” button to apply the parameters of the valid system to the other system.

2.5.3 Program language file

The available program interface languages are managed in the language file MEPA.LNG. This file contains any text modules in the available languages in the ASCII format.


IMPORTANT

Important

Changes of the language file directly affects the operation of the MEPAFLOW600 program and may result in faulty execution of the control program. Changes should only be performed after consultation of the manufacturer.

2.5.4 Program initialisation file

Basic settings of the MEPAFLOW600 program made by the user during the execution of the program are saved in the binary file MEPA.INI and are used during initialisation in the context of the next program start (e.g. program layout, interface, directories etc.).

2.5.5 Device configuration file

The device configuration file contains the current device configuration which can be exported from a session history. Identifier, register no. and value of all parameters are saved in the form of structured ASCII text.

2.5.6 ASCII export files

Measured values exported from the session history are saved as text in structured ASCII files. The measured values are arranged in columns. The data contained may be formatted as locally required during the export operation from the session history (see **Fig. 2.25**). ASCII files have the extension *.TXT. You can name the file as desired during export.

2.5.7 EEPROM memory image

If you export the EEPROM segment from a session, the MEPAFLOW600 program will create a binary file with the extension *.EEP which contains a memory image of the EEPROM parameters.

An exported parameter set may be uploaded to the FLOWSIC600 with the help of the "**Flash tool**" tab (see Section *3.1.8*).

2.5.8 FLASH memory image

If you export the FLASH segment from a session, the MEPAFLOW600 program will create a binary file with the extension *.TSK which contains a memory image of the FLASH firmware memory.

The firmware may be uploaded to the FLOWSIC600 with the help of the "**Flash tool**" tab (see Section *3.1.8*).

FLOWSIC600

Ultrasonic Gas Flow Meter

Using the program

Tabs

Data recorder for recording and replay of measurements

3 Using the program

3.1 Tabs

FLOWSIC600 parameters and measured values are shown on tabs in the MEPAFLOW600 control program. Several tabs and parameters are only available on higher password levels (see Section *2.3.1*).

3.1.1 “Measuring values” tab

The “Measured values” tab contains major values measured by the FLOWSIC600. The display depends on the selected password level (see Section *2.3.1*).

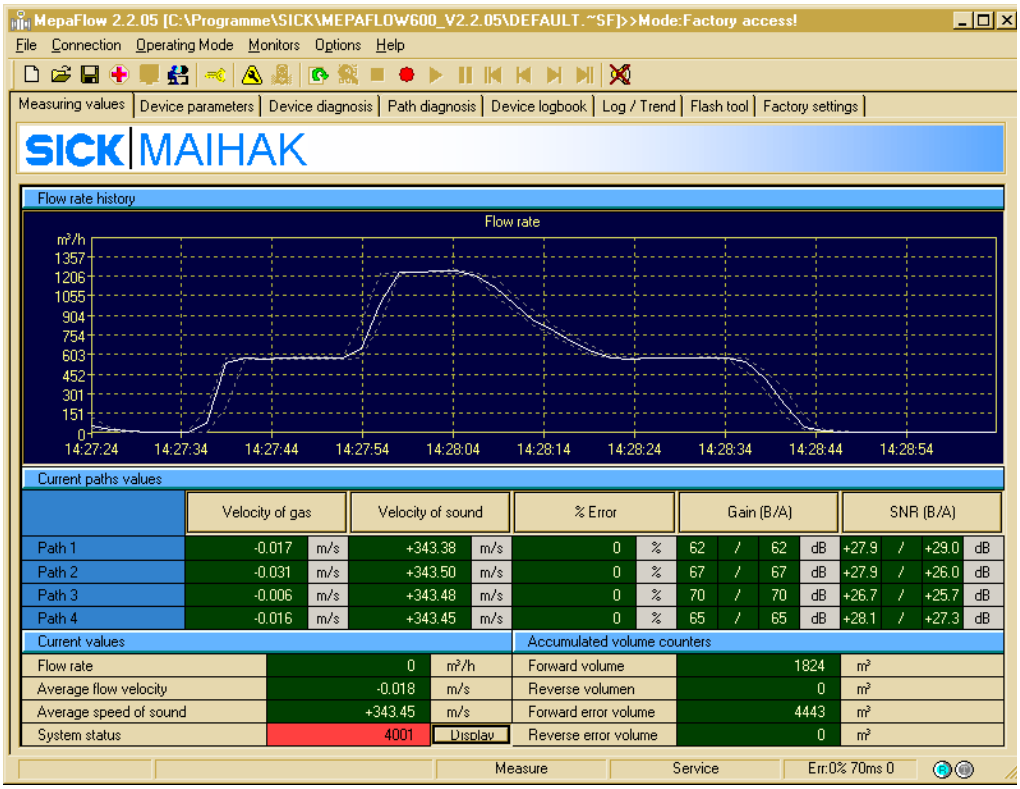

Fig. 3.1: “Measured values” tab (“Service” password level)

The “Flow rate history” field shows the trend of the actual flow rate. If you use the cursor in the trend display, you can show the average flow rate and the low and high peaks.

In addition, actual values of flow rate, flow velocity and velocity of sound as well as the system status code are displayed in the “Current values” field. The status code represents an addition of current error and warning bits. If you click on the “Display” button, all error information and warning messages are shown in detail (see **Fig. 3.2**). The meaning of the individual bits is explained in the Service Manual.

Fig. 3.2: System status monitor

The “Accumulated volume counters” field provides information about the gas volumes transported in the two directions of flow as well as the error volumes in the two directions.

3.1.2 “Device parameters” tab

This tab shows all FLOWSIC600 parameters and provides the possibility to change these parameters. The parameters shown depend on the selected password level, in order to avoid maladjustment due to insufficient knowledge of the device (see Section *2.3.1*). The FLOWSIC600 must be set to the configuration mode to be able to modify parameters. The input boxes will change from an inactive to an active condition. To modify a parameter, simply double-click into the desired input box, enter the new value and apply your changes to the device by pressing ENTER. Parameter modifications are saved in the current session and in the FLOWSIC600 logbook.

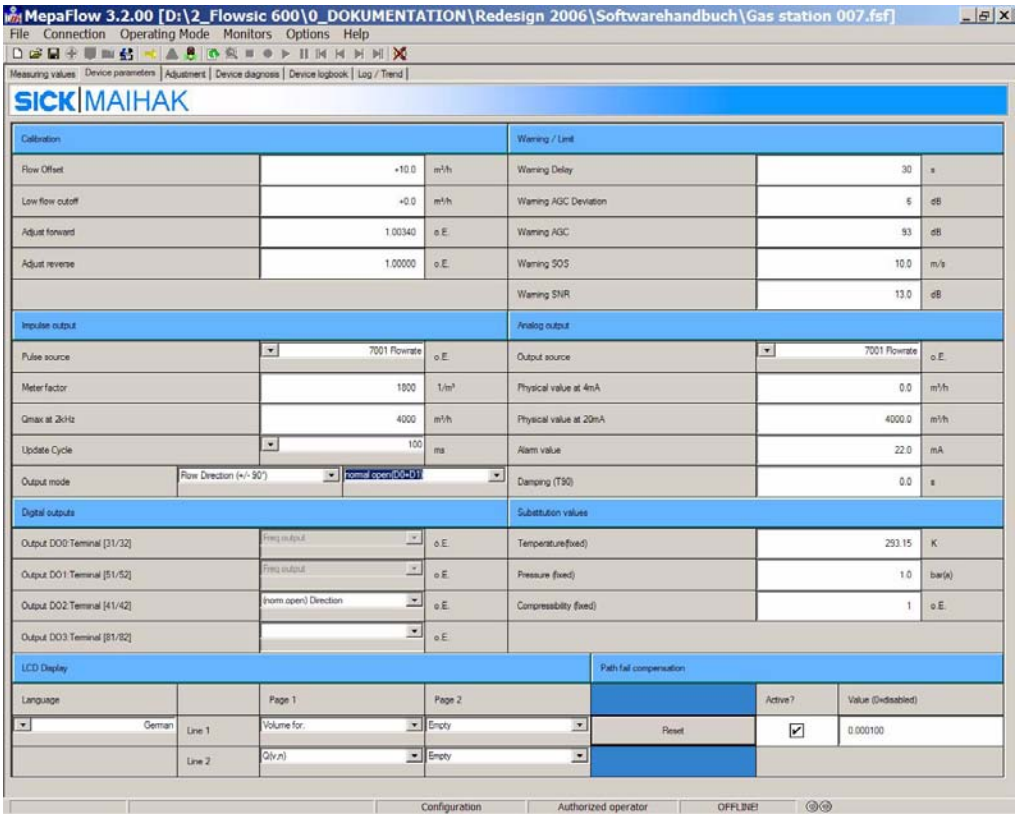

Fig. 3.3: “Device parameters” tab (“Authorised operator” password level)

The following table provides an overview of individual parameters and their functions.

Group of parameters	**Parameter**	**Description**
Calibration	Flow offset	Enter an offset for the flows
	LowFlowCutoff	Limit for low flow rates which shall not be indicated
	AdjustFactorForward	Linear correction factor in positive direction of flow
	AdjustFactorReverse	Linear correction factor in negative direction of flow
Frequency output	Output value	Measured variable which shall be output as a frequency through the pulse output channel
	Pulse value	**Adjustment (variant 1)** Pulse value to adjust the output frequency $f = \frac{Q_{a..c.} \cdot K}{3600}$ f: Output frequency in Hz K: Pulse value $Q_{a.c.}$: Flow rate under operating conditions
	Q max at 5 kHz	**Adjustment (variant 2)** Maximum flow rate at the upper frequency limit of the pulse output $Q_{max} = \frac{5\ kHz}{K} \cdot 3600$ f: Output frequency in Hz K: Pulse value Q_{max}: Maximum flow rate under operating conditions
	PulseUpdateRate	Update rate of the pulse output

Group of parameters	Parameter	Description
Frequency output	Output mode	Configuration of the digital outputs DO0 and DO1 The following configurations are available: **Not active** DO1 = Status output, configurable DO0 = Status output, configurable **Flow direction (+/- 90)** DO1 = Pulse output based on the flow DO0 = Pulse output based on the flow Directional shifted to DO1 (positive flow +90 , negative flow -90) **DO0 no frequency when invalid** DO1 = Pulse output based on the flow DO0 = Pulse output based on the flow Behaviour susceptible to errors (no error: inverse (180 shifted) to DO1, error: not active) **Flow vw (DO1) and flow rw (DO0)** DO1 = Pulse output based on the flow Only active when flow positive DO0 = Pulse output based on the flow Only active when flow positive **DO0 as status output** DO1 = Pulse output based on the flow DO0 = Pulse output based on the flow In addition, you can chose between “normally opened “NO““ and “normally closed “NC““.
Digital outputs	Output 0:	Configured output value of output channel 0 (clamps 31, 32)
	Output 1:	Configured output value of output channel 1 (clamps 51, 52)
	Output 2:	Configured output value of output channel 2 (clamps 41, 42)
	Output 3:	Configured output value of output channel 3 (clamps 81, 82)
Warning limits	Warning delay	Delay between occurrence of the event and signalling through the output channel
	AGC deviation warning	Warning limit for the maximum permitted variation among the individual path AGC values (AGC – **A**utomatic **G**ain **C**ontrol).
	AGC warning	Warning limit for maximum permitted AGC
	Warning VOS	Warning limit for maximum variation among the individual path‘s velocity of sound
	SNR warning	Warning limit for minimum permitted **S**ignal-**N**oise **R**atio
Analog output	Output value	Measured variable which shall be output as a measured value through the analog output channel
	Physical value at 4 mA	Lower range limit AOLow
	Physical value at 20 mA	Upper range limit AOHigh
	Output current in case of an alarm	Output current must be outside the measuring range (4-20 mA), recommendation: 22 mA
	Attenuation (T90)	Response time T90 in s for the output of the analog signal
Replacement values	Temperature (fix)	Gas temperature – value is used for the Reynolds correction after initialisation
	Pressure (fix)	Gas pressure – value is used for the Reynolds correction after initialisation
	Compressibility (fix)	Gas compressibility – value is used after initialisation (if normalisation function is implemented)
LCD	Language	Language selection for the display at the SPU
	Line contents	Assignment of measured values to the display lines

Group of parameters	Parameter	Description
Path failure compensation	Active?	Activation switch

“Service” password level

This password level grants access to all device parameters. The parameters are shown in a tree structure. The parameter groups can be expanded by clicking on the + symbol. You now have access to the individual parameters of that group. The selected parameter is shown in the right section of the screen together with additional information (ModBus register no., unit of measurement, access rights) (see **Fig. 3.4**) and can be modified there in the “Configuration” mode. The parameter is applied to the FLOWSIC600 by clicking on “Write register”.

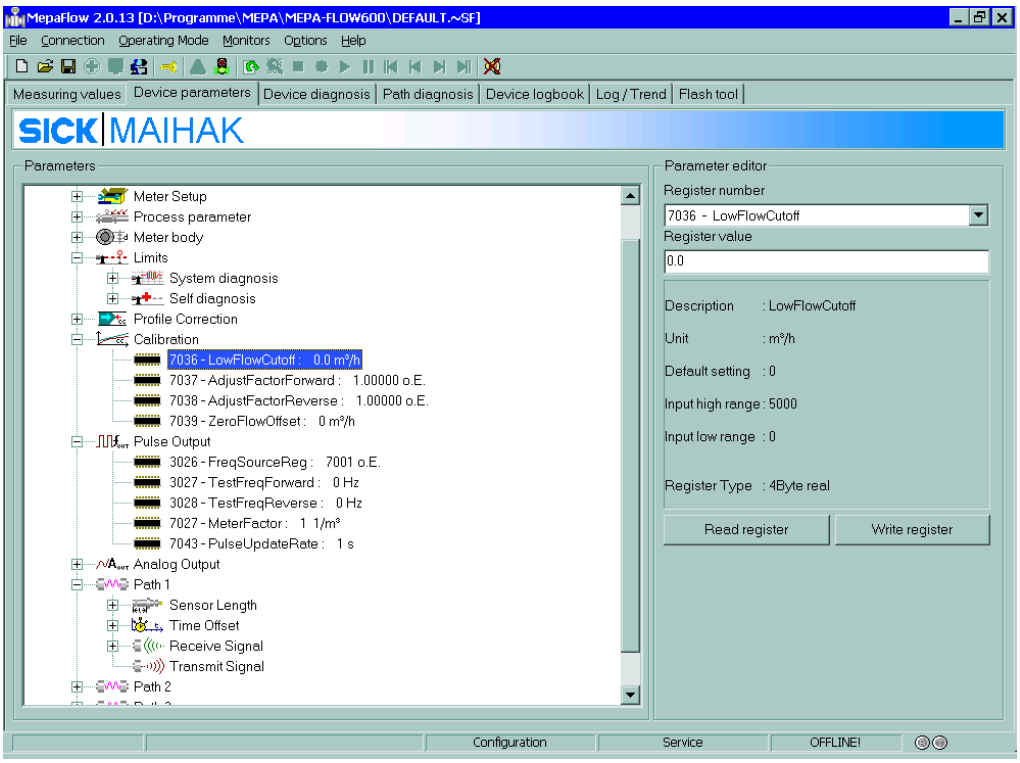

Fig. 3.4: “Device parameters” tab (“Service” password level)

3.1.3 “Adjustment“ tab

In this tab, the adjustment values which shall be used for the FLOWSIC600 error correction, can be calculated. To adjust the FLOWSIC600 there are three different methods:

- Adjustment by a constant factor
- Adjustment by an error polynomial
- Adjustment by piece wise linearisation

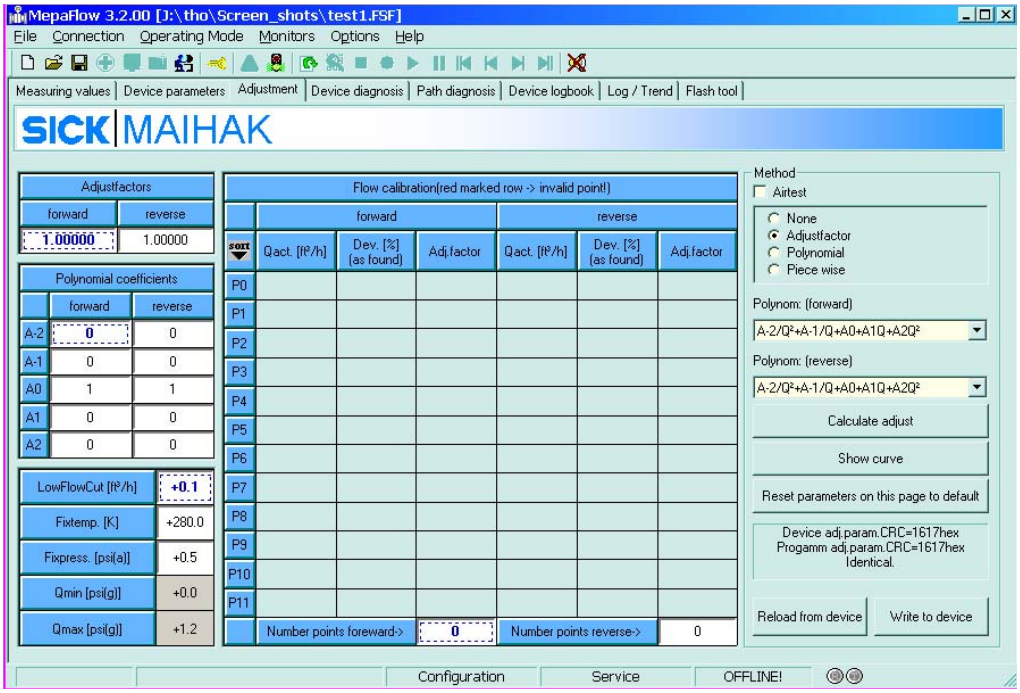

Fig. 3.5: “Adjustment“ tab (here shown the selection of the constant factor calculation)

All of the three methods are based on calibration data. For the calculation, the recorded variations of the tested flows must be entered into the “Flow calibration“ table.

After entering the number of calibration points, a corresponding number of fields is displayed in the table.

After entering Q_{act} and the corresponding deviation [%], chosing the favoured adjustment method and pressing the button “Calculate adjust“ the corrected values are calculated. The mentioned adjustment methods can be used for the forward and the backward direction. The calculated values are valid after pressing the button “Write to the device“. Whith this action the output characteristic of the FLOWSIC600 is changed.

Adjustment by a constant factor

At the adjustment with a constant factor the complete error kurve is shifted vertically by a constant value. The adjustment factor can be calculated either external or with the help of the “Adjustment“ tab.

An externally calculated adjustment factor can be entered in the field “Adjust factors“ after changing to parameterization mode (for details of calculation the adjust factor see the Service Manual section 7.3 or the Manual).

For calculating the adjust factor (forward) by help of the MEPAFLOW600 activate the ‚Adjust factor‘-button within the window ‚Method‘, enter the number of measuring points into the field ‚Number points forward ->‘ and also enter the flowrates (‚Qact.‘ column) and the measurement deviations (‚Dev.[%]‘ column).

After this inputs activate the the button ‚Calculate adjust‘. The calculated factor is taken over into the field ‚Adjust factor‘. For a graphic display press ‚Show curve‘ (see **Fig. 3.6**).

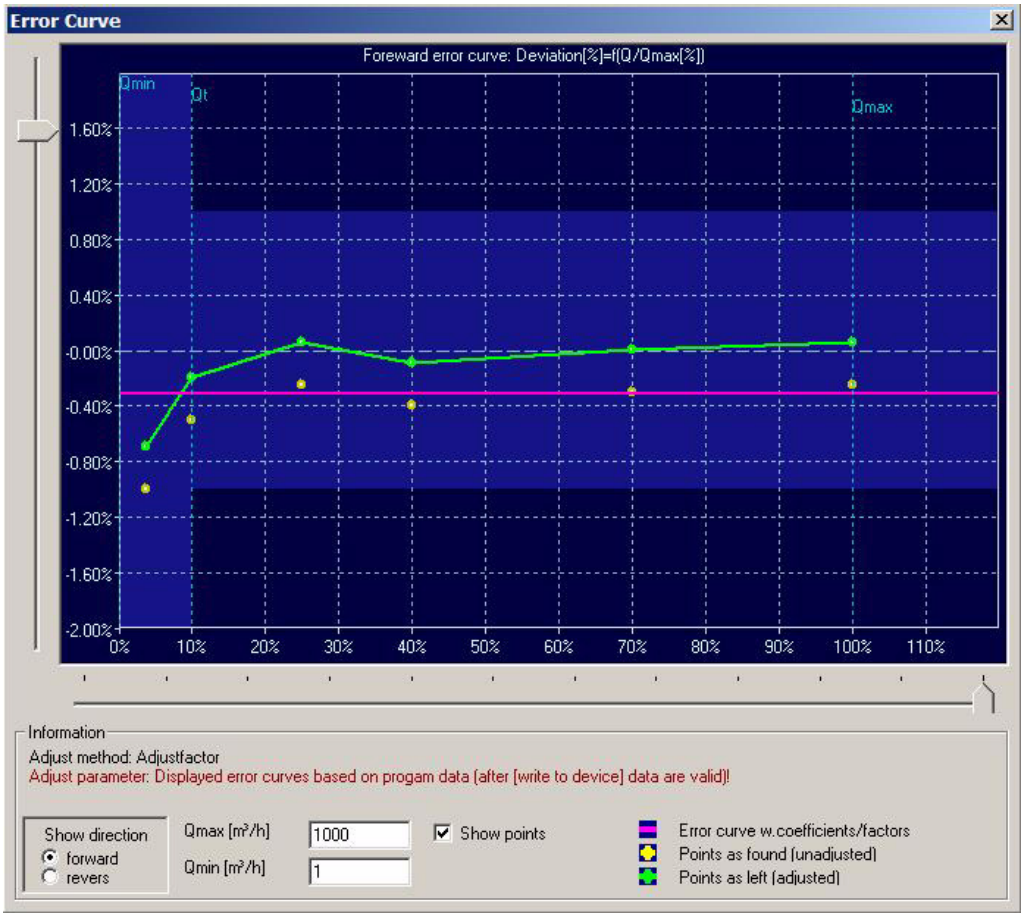

Fig. 3.6: Graphic display of error adjustment by a constant factor

Adjustment using a polynomial

The following polynomials are implemented in the FLOWSIC600 firmware in order to provide for a flow-specific adjustment of the error characteristic:

$E'(Q) = a_{-2}Q^{-2} + a_{-1}Q^{-1} + a_0 + a_1Q + a_2Q^2$ (1) 8 sample points

$E'(Q) = a_{-1}Q^{-1} + a_0 + a_1Q + a_2Q^2$ (2) 7 sample points

$E'(Q) = a_0 + a_1Q + a_2Q^2$ (3) 6 sample points

The adjustment using a polynomial must only be used if the minimum number of sample points for finding the polynomial coefficients in the range to be calibrated have been determined. Activate ‚Polynomal' in the ‚method' window, enter the parameters into the appropriate fields as decribed above and activate the ‚Calculate adjust' button. The button ‚Show curve' creates an image like **Fig. 3.7** .

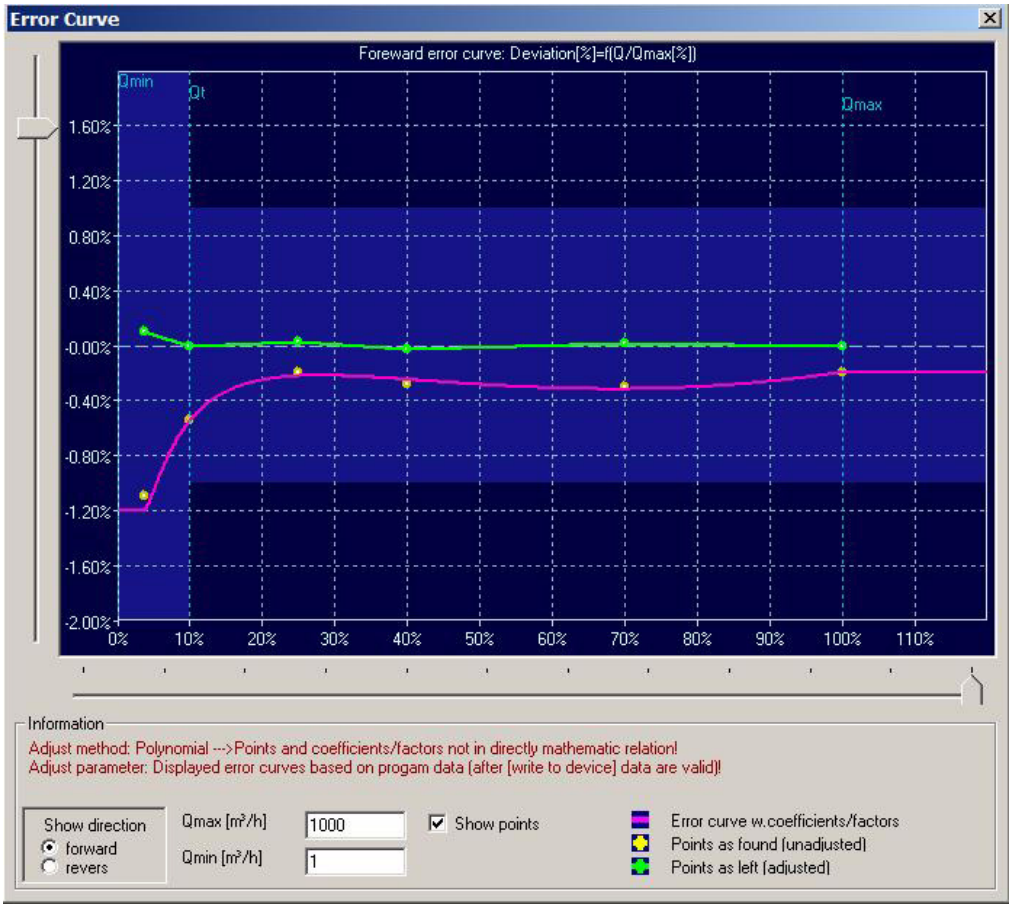

Fig. 3.7: Graphic display of error adjustment by polynomal correction

Adjustment using piece wise linear adjustment

This adjustment method is carried out just as the polynomial adjustment. In this method, the error is corrected exactly to zero at the individual calibration points. Now, a linear interpolation and error correction is carried out between the individual calibration points.

Activate ‚Piece wise' in the ‚method' window, enter the parameters into the appropriate fields as decribed above and activate the ‚Calculate adjust' button. The button ‚Show curve' creates an image like **Fig. 3.8**.

The method ‚Piece wise linear adjustment' is not approved for use at custody transfer applications by the german PTB.

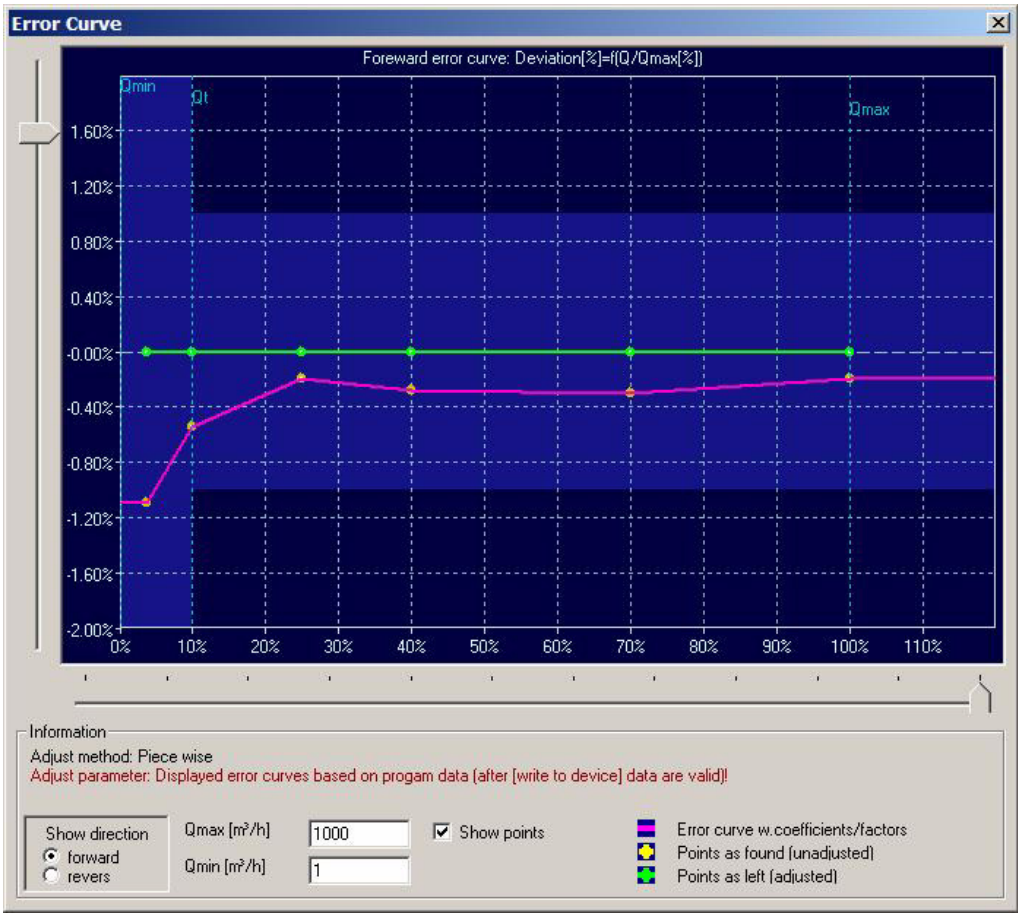

Fig. 3.8: Graphic display of error adjustment by piece wise linear correction

3.1.4 "Device diagnosis" tab

Any password level

This tab contains a voltage indicator of the FLOWSIC600 power supply ("Power supply" field), I/O testing functions and a display of all device identification data.

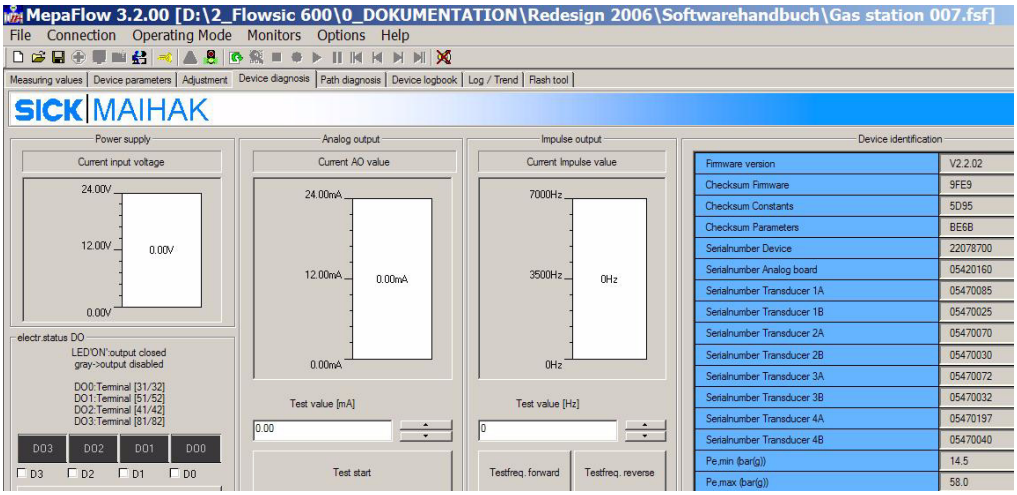

Fig. 3.9: "Device diagnosis" tab

Analog and pulse output can be tested as follows:

- ▶ Switch the FLOWSIC600 to the configuration mode.
- ▶ Enter a test value in mA in the input box in the "Analog output" field.

- Test the output current at the analog output with an ammeter.
  Take care for the hardware configuration and wiring of the analog output (passive or active, see also Service Manual).
- Enter a test value in Hz in the input box in the “Pulse output” field.
- Test the output frequency at the pulse output with an a frequency tester or oscilloscope. Take care for the wiring specifications of the pulse output depending on the hardware configuration (NAMUR or OpenCollector). In both cases the output acts as a non-potential contact and does not produce an active signal without additional connection (see also Service Manual).
- Using the test buttons of the ‚Electr. Satus DO’ window you can check the switch satus of the diital outputs (DO). The following states are possible:
  - green = closed
  - black = open
  - grey = Output is not assigned as a status output

3.1.5 “Path diagnosis” tab

“Service” password level only

This tab provides all information that characterises the condition of a measuring path. This tab is divided into the fields “Status”, signal display, “Measured values” and “Parameters” Measured values and parameters are only shown for one path at a time. Select the desired path in the “Set diagnosis for …” field in the bottom right corner of the screen.

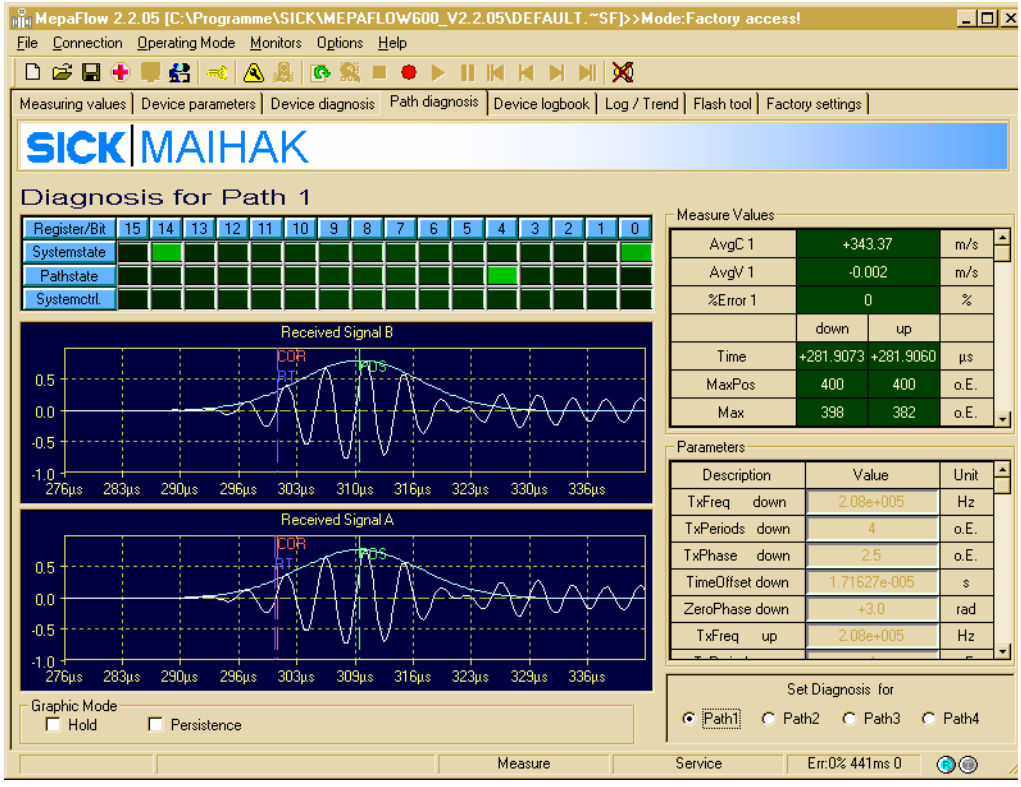

Fig. 3.10: “Path diagnosis” tab

Status information

Warnings, errors and events are signalled as the corresponding indicators will turn on. The description of an indicator will be shown if you move the mouse pointer over it and click the left mouse button. The meaning of the individual event messages are explained in the Service Manual.

Signal display

The signal display field shows the signals received by the ultrasonic transducers of the selected measuring path. The update rate of the signal display does not correspond with the measuring rate of the FLOWSIC600. It is set to 1–2 Hz in the software.

Note

Received signal A, received signal B, up and down are important terms for the interpretation of the displayed measured values and signals. The following definitions apply to the FLOWSIC600.

The arrangement of the transducers in relation to the direction of flow is explained in the Operating Manual, Section 2.

- Received signal A:
  This signal is transmitted by transducer B and received by transducer A.
- Received signal B:
  This signal is transmitted by transducer A and received by transducer B.
- Up:
  Relates to the ultrasonic transducer arranged against the direction of flow (upstream, transducer B).
- Down:
  Relates to the ultrasonic transducer arranged along the direction of flow (downstream, transducer A).

The following diagrams and functions are implemented in the signal display:

- Zoom:
  Click into one of the diagrams to zoom in.
- Indication of the detected zero intersection.
  The “COR” (corrected) and “RT” (runtime) cursors indicate which zero intersection was calculated in the runtime measuring process of the FLOWSIC600 in the respective received signal (see also Service Manual).
- Hold signal
  The current received signal display is frozen, which enables a comparison of the frozen signal and the following signals.
- Persistence
  The received signals are not deleted in the diagram, which allows an analysis of the spread.

Measured values

The following measured values are displayed:

Measured variable	Unit	Description
AvgC	m/s	Average velocity of sound in the path
AvgV	m/s	Average path velocity
% Error	%	Number of invalid measurements
Time	m/s	Running time of the signals
MaxPos	sample	Position of the upper signal peak within the received signal window
Max	digit	Maximum signal amplitude
AGC	dB	Reception amplification
MSE	o.E.	Adaption error
SNR	dB	Signal-to-noise ratio

Parameters

The following table provides an overview of all parameters shown on this tab and their meanings.

Parameter	Unit	Description
TxFreq Down	Hz	Frequency of the signal transmitted downstream (transducer A) Range: 100,000.00 … 300,000.0
TxPeriods Down	no unit	Total number of signal periods to be transmitted downstream Range: 3.0 … 6.0
TxPhase Down	no unit	Point of time (periods) at which a phase swap occurs in the signal transmitted downstream Range: 3.0 … 6.0
TimeOffset Down	s	Transit time downstream
TxFreq Up	Hz	Frequency of the signal transmitted upstream Range: 100,000.00 … 300,000.0
TxPeriods Up	no unit	Total number of signal periods to be transmitted upstream (transducer B) Range: 3.0 … 6.0
TxPhase Up	no unit	Point of time (periods) at which a phase swap occurs in the signal transmitted upstream Range: 3.0 … 6.0
Time Offset Up	s	Transit time upstream
ZeroPhase Up	no unit	Zero phase position of the received signal upstream
ZeroPhase Down	no unit	Zero phase position of the received signal downstream
Path disabled	no unit	Path function turned on/ off
Path check mode	no unit	Check mode enabled
Continuous mode	no unit	Continuous alternating operation of the measuring path in both directions enabled/ disabled

Data recorder function for signal recording

Parameters and measured values shown on the “Path diagnosis” tab can be recorded and saved using the recorder function implemented in the MEPAFLOW600 program (see *Section 3.2*). The content of this tab can thus be analysed afterwards in two different ways:

1. Export to a structured ASCII file
   Export of a data log through the item “Session history” in the “File” menu (see page *28*).
2. Replaying recorded tab contents in the MEPAFLOW600 program
   The log can be replayed with the help of the data recorder integrated into the MEPAFLOW600 program (see Section *3.2*).

3.1.6 “Device logbook” tab

Any password level

This tab allows to read out the device logbook, in which all events, warnings, errors, parameter modifications and operational mode changes are logged. The total number of events in the individual groups of events will be shown in the “Current logbook status” field.

The individual events are shown in a list. Select an entry in the list of events with the left mouse button to show the corresponding detailed information in the “Selected event details” field. Each entry in the list contains:

- Running number
- Group of events (Error, Warning, Information)
- Status (current event in active or not still active)
- Date and time
- Description of the event
- All counter readings at the point of time the event occurred
- Acknowledgement status

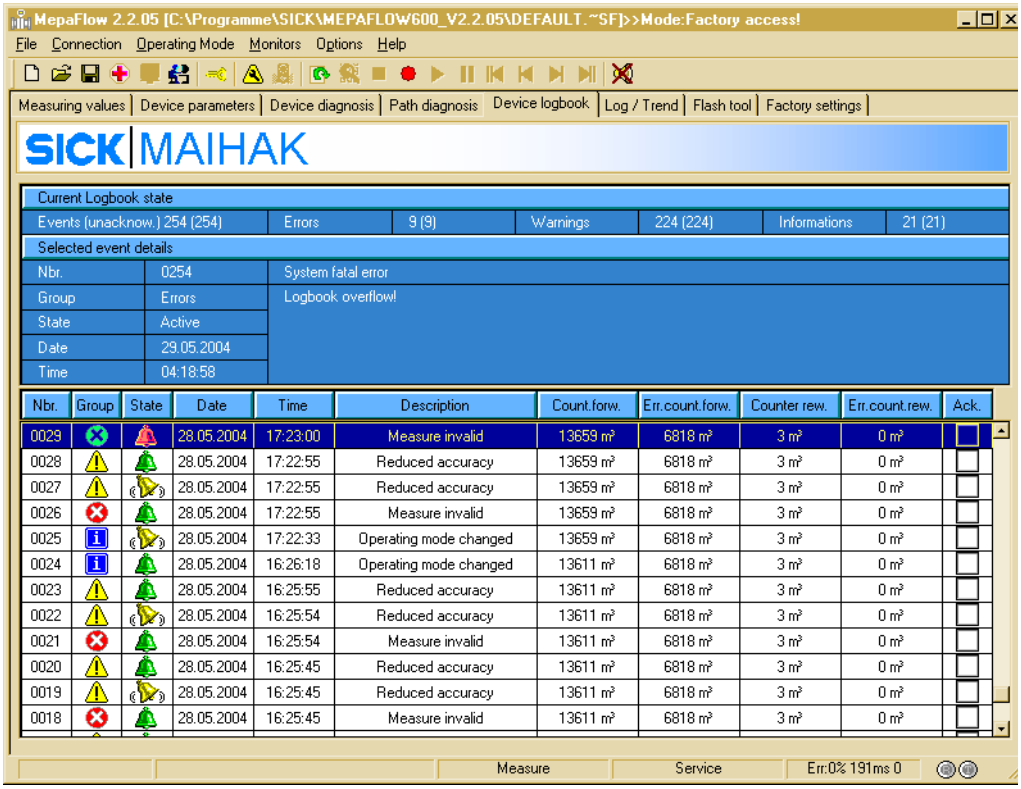

Fig. 3.11: “Device logbook” tab

After loading the logbook from the FLOWSIC600 to the MEPAFLOW600 program, the logbook entries will be saved in a session file automatically.

3.1.7 “Log/ trend” tab

Any password level

This tab allows to log device-internal measuring data. These measuring data are read out by the MEPAFLOW600 control program and saved in a session file. These data can be exported from the session file into a structured ASCII file by selecting the item “Session history” from the “File” menu (see page *30*).

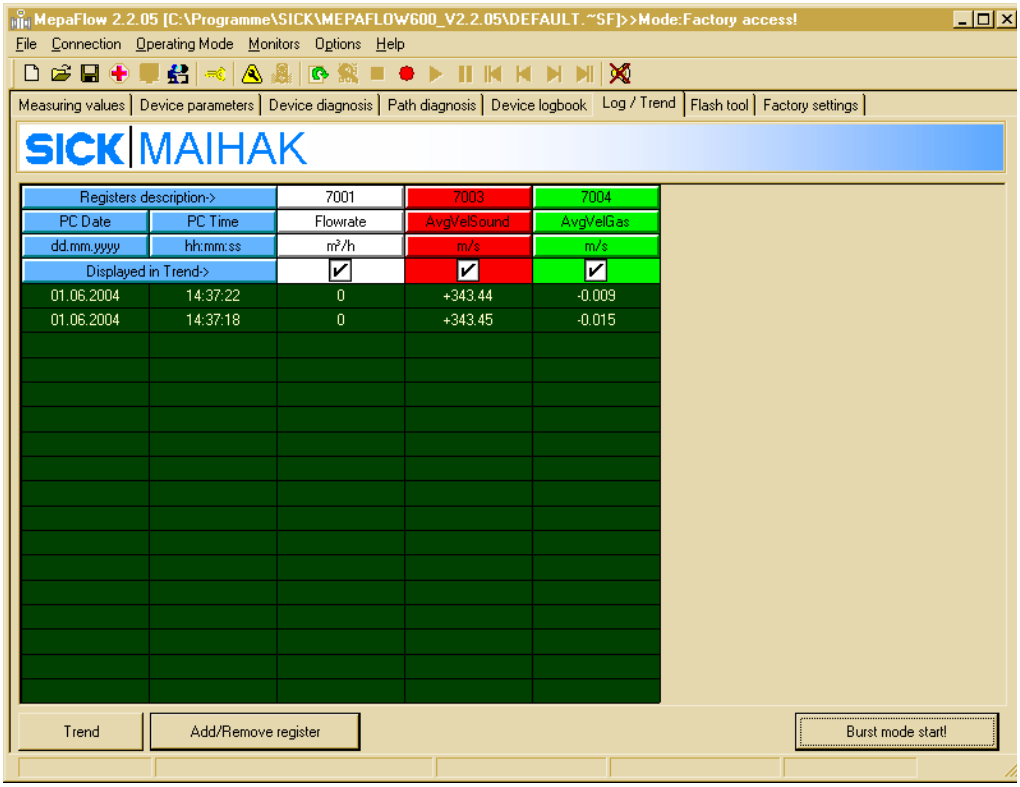

Fig. 3.12: “Log/ trend” tab

The inquired measuring data can be displayed in a table or trend diagram. Use the “Trend” / “Log table” button to switch between the two display modes.

Configuring the data recorder

Click on the “Add/ remove register” button to select the measuring variables to be visualised (see **Fig. 3.13**).

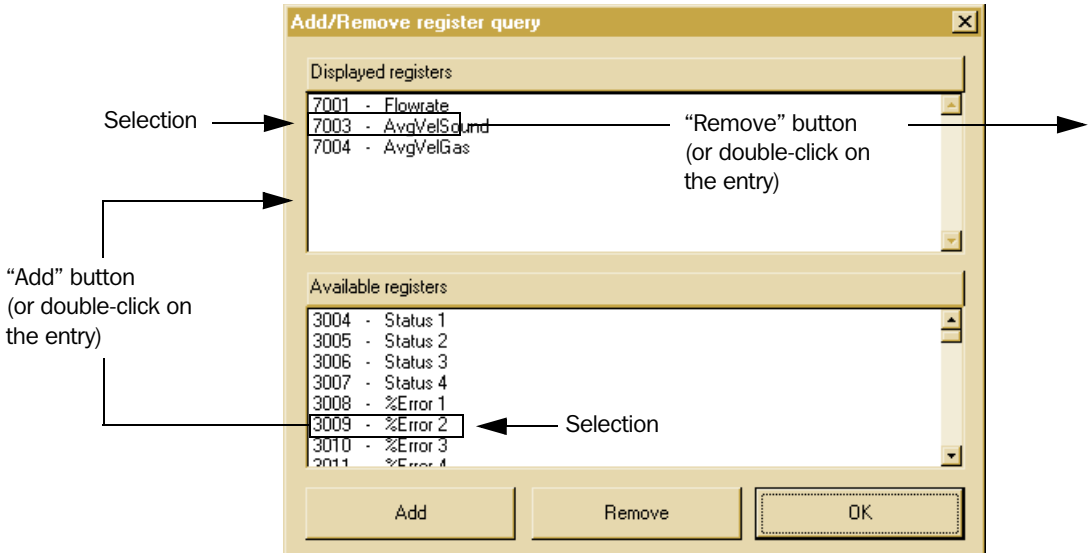

Fig. 3.13: Configuring the variables to be displayed (selected entries form an example)

Select a list entry and click on the "Add" or "Remove" button (or double-click on the entry) to add / remove the entry from the list of displayed registers. Confirm your settings with "OK". The data is now shown in the table or diagram, but not yet saved. Only after clicking on the "Start" button in the tool bar will the selected data be saved in the session file (see *Section 3.2*).

Start/ stop data logging

Start and stop the data recorder using the buttons in the tool bar (see also **Fig. 2.9** and **Fig. 2.21**).

Fig. 3.14: Buttons to start and stop data logging

Note: Do not change to another tab while data are being logged, otherwise the data of the new tab will be recorded.

3.1.8 Programming the flash memory

General

"Service" password level only

The "Flash tool" tab allows to update the device software and to replace an entire set of parameters. The entire program code is stored in a flash memory and protected from modification by means of a check sum. Physical memory elements do not need to be replaced.

A detailed description about updating the device software by help of the flash-tool and the Service Interface Adapter is to find in the Service Manual section *9.4*.

3.2 Data recorder

A data recorder is implemented in the MEPAFLOW600 program. The recorder functions are controlled through the icons shown in **Fig. 3.15**, which are designed like generally accepted pictograms for similar functions.

Fig. 3.15: Data recorder icons

Recorder functions can be used on any tab. Data records logged with the recorder are saved in the session file and can be analysed afterwards in two different ways:

1. Export into a structured ASCII file through the export function in the “Session history” in the “File” menu.
2. Replaying the tab contents on the user interface.

3.2.1 Data logging

To log the data content of a tab, call up the tab and click on the “Start logging” icon (red circle). The saving of the individual data records is indicated in the status bar of the program.

Click on the “Stop logging” icon to stop data logging.

The following table lists data which are automatically selected by the recorder for logging and saved.

Tab	Data content for logging
Measured values	• SystemControl, SystemStatus, Status 1, Status2, Status3, Status 4, • %Error 1, %Error 2, %Error 3, %Error 4, • AGC 1AB, AGC 1BA, AGC 2AB, AGC 2BA, AGC 3AB, AGC 3BA, AGC 4AB, AGC 4BA • Vbatt Level • ForwardVolume, ForwardVolumeErr, ReverseVolume, ReverseVolumeErr, EventRegister • Flowrate, FlowrateBase • AvgVelSound, AvgVelGas • AvgC 1AvgC 2AvgC 3AvgC 4 • AvgV 1AvgV 2AvgV 3AvgV 4 • SNR 1AB, SNR 1BA, SNR 2AB, SNR 2BA, SNR 3AB, SNR 3BA, SNR 4AB, SNR 4BA
Device parameters	• SystemControl, SystemStatus, Status 1, Status2, Status3, Status 4, • %Error 1, %Error 2, %Error 3, %Error 4, • AGC 1AB, AGC 1BA, AGC 2AB, AGC 2BA, AGC 3AB, AGC 3BA, AGC 4AB, AGC 4BA • Flowrate, FlowrateBase • AvgVelSound, AvgVelGas • AvgC 1AvgC 2AvgC 3AvgC 4 • AvgV 1AvgV 2AvgV 3AvgV 4 • SNR 1AB, SNR 1BA, SNR 2AB, SNR 2BA, SNR 3AB, SNR 3BA, SNR 4AB, SNR 4BA
Device diagnosis	• SystemControl, SystemStatus, Status 1, Status2, Status3, Status 4, • %Error 1, %Error 2, %Error 3, %Error 4, • AGC 1AB, AGC 1BA, AGC 2AB, AGC 2BA, AGC 3AB, AGC 3BA, AGC 4AB, AGC 4BA • TestFreqForward, TestFreqReverse, ActualFreq • Flowrate, FlowrateBase • AvgVelSound, AvgVelGas • AvgC 1AvgC 2AvgC 3AvgC 4 • AvgV 1AvgV 2AvgV 3AvgV 4 • SNR 1AB, SNR 1BA, SNR 2AB, SNR 2BA, SNR 3AB, SNR 3BA, SNR 4AB, SNR 4BA • AOTest, AOCurrent

Tab	Data content for logging
Path diagnosis	• SystemControl, SystemStatus, Status 1, Status2, Status3, Status 4, • %Error 1, %Error 2, %Error 3, %Error 4, • AGC 1AB, AGC 1BA, AGC 2AB, AGC 2BA, AGC 3AB, AGC 3BA, AGC 4AB, AGC 4BA • SystemStatusActuel, Status 1 Actuel, Status 2 Actuel, Status 3 Actuel, Status 4 Actuel • MaxPos 1AB,MaxPos 1BA, MaxPos 2AB, MaxPos 2BA, MaxPos 3AB, MaxPos 3BA, MaxPos 4AB, MaxPos 4BA, Max 1AB, Max 1BA, Max 2AB, Max 2BA, Max 3AB, Max 3BA, Max 4AB, Max 4BA • Pretime 1AB, Pretime 1BA, Pretime 2AB, Pretime 2BA, Pretime 3AB, Pretime 3BA, Pretime 4AB, Pretime 4BA • Flowrate, FlowrateBase • AvgVelSound, AvgVelGas • AvgC 1AvgC 2AvgC 3AvgC 4 • AvgV 1AvgV 2AvgV 3AvgV 4 • SNR 1AB, SNR 1BA, SNR 2AB, SNR 2BA, SNR 3AB, SNR 3BA, SNR 4AB, SNR 4BA • C 1,C 2, C 3, C 4 • V 1, V 2, V 3, V 4 • Time 1AB, Time 1BA, Time 2AB, Time 2BA, Time 3AB, Time 3BA, Time 4AB, Time 4BA • MSE 1AB, MSE 1BA, MSE 2AB, MSE 2BA, MSE 3AB, MSE 3BA, MSE 4AB, MSE 4BA • TimeEdge 1AB, TimeEdge 1BA, TimeEdge 2AB, TimeEdge 2BA, TimeEdge 3AB, TimeEdge 3BA, TimeEdge 4AB, TimeEdge 4BA • TimeModel 1AB, TimeModel 1BA, TimeModel 2AB, TimeModel 2BA, TimeModel 3AB, TimeModel 3BA, TimeModel 4AB, TimeModel 4BA • RxFreq 1AB, RxFreq 1BA, RxFreq 2AB, RxFreq 2BA, RxFreq 3AB, RxFreq 3BA, RxFreq 4AB, RxFreq 4BA • RxWith 1AB, RxWith 1BA, RxWith 2AB, RxWith 2BA, RxWith 3AB, RxWith 3BA, RxWith 4AB, RxWith 4BA • RxAmp 1AB, RxAmp 1BA, RxAmp 2AB, RxAmp 2BA, RxAmp 3AB, RxAmp 3BA, RxAmp 4AB, RxAmp 4BA • ProfileFactor
Device logbook	• SystemControl, SystemStatus, Status 1, Status2, Status3, Status 4, • %Error 1, %Error 2, %Error 3, %Error 4, • AGC 1AB, AGC 1BA, AGC 2AB, AGC 2BA, AGC 3AB, AGC 3BA, AGC 4AB, AGC 4BA • Flowrate, FlowrateBase • AvgVelSound, AvgVelGas • AvgC 1AvgC 2AvgC 3AvgC 4 • AvgV 1AvgV 2AvgV 3AvgV 4 • SNR 1AB, SNR 1BA, SNR 2AB, SNR 2BA, SNR 3AB, SNR 3BA, SNR 4AB, SNR 4BA
Log/ trend	• SystemControl, SystemStatus, Status 1, Status2, Status3, Status 4, • ·%Error 1, %Error 2, %Error 3, %Error 4, • AGC 1AB, AGC 1BA, AGC 2AB, AGC 2BA, AGC 3AB, AGC 3BA, AGC 4AB, AGC 4BA • Vbatt Level • Flowrate, FlowrateBase • AvgVelSound, AvgVelGas • AvgC 1AvgC 2AvgC 3AvgC 4 • AvgV 1AvgV 2AvgV 3AvgV 4 • SNR 1AB, SNR 1BA, SNR 2AB, SNR 2BA, SNR 3AB, SNR 3BA, SNR 4AB, SNR 4BA

If you change to another tab while the data logging is in progress, the recorder changes to the data content of the new tab.

3.2.2 Replaying tab contents

All logged data records of the current session will be saved in a session file. If you click on the “Open log data” icon in the tool bar, a dialog box will appear in which all logs of the session are listed (see **Fig. 3.16**).

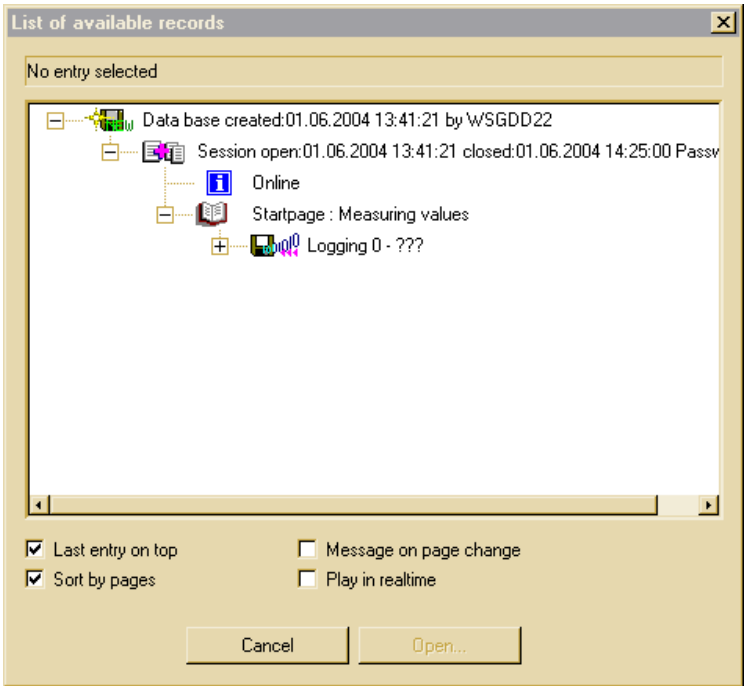

Fig. 3.16: Log selection dialog box

Select an entry with the mouse and open it to replay that log. The control program will change to the corresponding tab and shows an activity bar to control the replay functions.

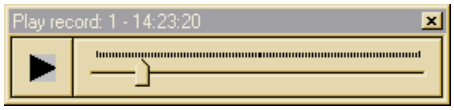

Fig. 3.17: “Replay log” activity bar

This activity bar allows you to navigate the data log. In addition, the tool bar provides icons to start the first, previous, next and last record (see **Fig. 2.10**).

The logged measured values will be visualised in the displays of the tabs when you play the log, so that you can simulate and analyse the device conditions afterwards, without a direct connection to the device. In addition, all monitors in the “Monitors” menu can be activated while you play a log, so that you can analyse major diagnosis data at the same time (e.g. velocity of sound, AGC).

These data can be exported into an ASCII export file by selecting the item “Session history” from the “File” menu (see page *30*).

FLOWSIC600

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