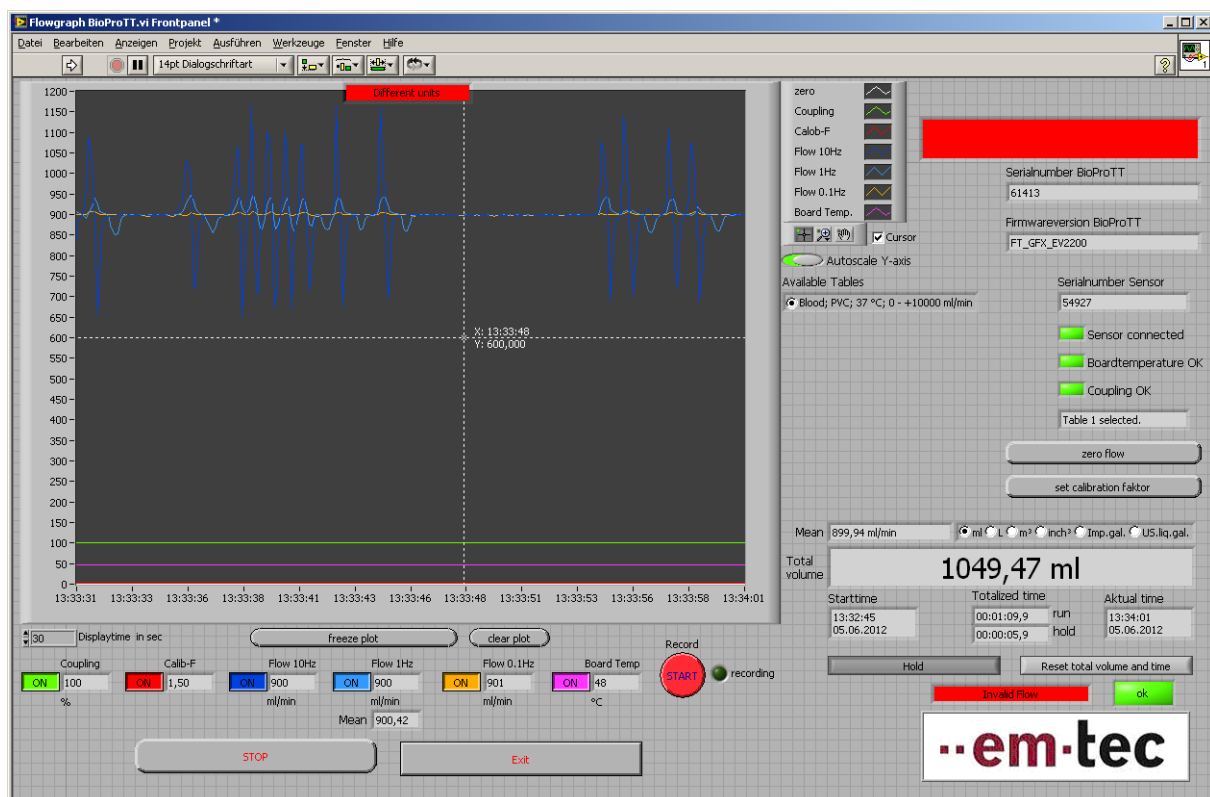


Flowgraph Demo Software
for BioProTT™ Flow Measurement System
Quick Guide for Software Version V1.0.1

1. Quick Install and Start-up Guide

1. Copy / Extract all files into an empty folder.
2. Run „Setup.exe“ and follow National Instruments' specific installation instructions that might appear during the installation. It might be necessary to restart the PC during the installation process several times.
3. Connect a working flow measurement setup consisting of a
 - BioProTT™ flow meter with
 - Clamp-On Transducers and
 - flow loop to your PC (USB / RS-232)
4. Once the drivers are installed and the flow measurement system is connected, open and run Flowgraph Demo Software for BioProTT™ flow measurement system and choose Measure/Record.
5. Choose correct COM port and settings, as per BioProTT™ manual
6. On the right hand side of the GUI, the program will show
 - serial number and firmware version of the flow meter,
 - serial number of the transducer and selected calibration table,
 - along with a green indicator bar to show that a sensor is connected,
 - board temperature and
 - coupling
 - Note: indicators will turn red if there is a problem
7. The available calibration tables of the sensor are shown on the screen. The correct table can be selected via “radio button”.
8. Use the button “zero flow” to zero the flow in a now flow condition as per user manual.
9. The calibration factor is set to 1; this assumes that the setup is used with original calibration settings of the selected calibration table, i.e. using same fluid, temperature and tubing.
10. All measurement values (“channels”) are displayed in the bottom section beneath the graph and can be shown in the graph or in addition recorded and saved into a file:
 - Coupling, which is an indicator of received signal strength

- Flow Values with 3 different output rates: 10 Hz, 1 Hz and 0.1Hz
 - Board Temperature
11. Per default, channels are displayed initially ("on" next to the channel). Either channel can toggled between on and off.
 12. For recording and saving measurement values to a file, the red "Start" recording button needs to be used. At beginning of recording a file needs to be entered. The recording can be ended by using the "Stop" button. While recording, the green "light" will flash.
 13. With the button "freeze plot" the graph can be frozen e.g. if there is a specific area of interest. The "clear plot" button erases the graph.
 14. Changing the "display time" (on the left, under the graph) will change the time scale of the x-axis providing more or fewer measurement points. This will stretch or compress the waveform.
 15. The unit of the flow measurement is selected with a "radio button".
 16. There is also a totalizer available. The features provided with the on screen buttons are similar to the display of the flow meter.



2. Main Functions of Demo Software

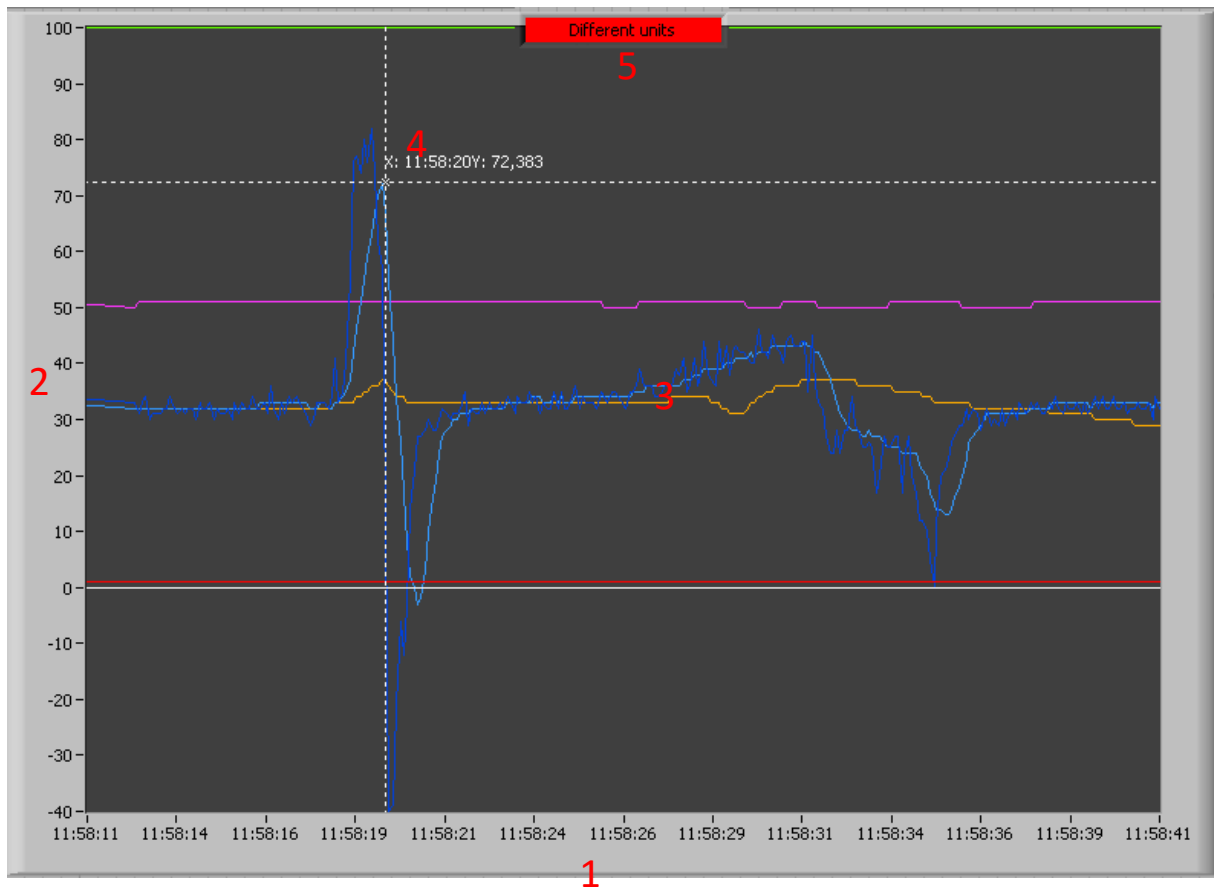
2.1. GUI Overview



- Area A: Graph area
- Area B: Values in diagram
- Area C: Control of values displayed in graphical format
- Area D: Button for recording data to a text file
- Area E: Status of BioProTT™ flow meter
- Area F: Status of connected Clamp-On Transducer and parameters of current measurement
- Area G: Totalizer und flow measurement units
- Area H: Basic Controls

2.2. Individual Screen Areas

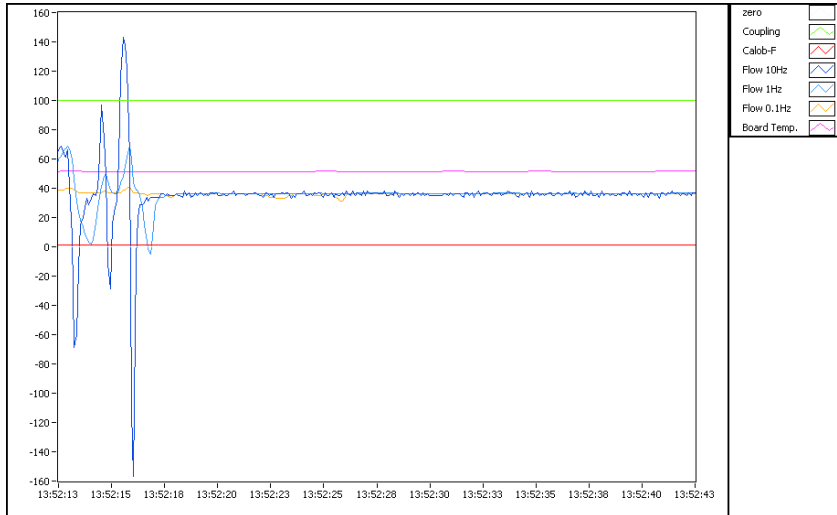
2.2.1. Area A: Graph Area



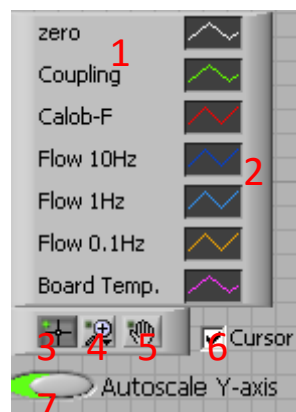
- Area A1: Automatic scaling of time axis (system time)
- Area A2: Value Axis for all measurement values
- Area A3: Area for all plotted graphs for the different measurement values
- Area A4: Cursor (can be moved freely) for exact determination of measurement value. Only visible if B6 is active. Marking (Time/Value) according to position.
- Area A5: Note: the indicator appears if the measured values shown have different units. This happens when it is operated in the operation G1. It will automatically disappear if all measured values shown again have the same unit. For example, the values exceed the maximum of the display area or by pressing of „clear plot“ (C3).

Note: → Right-click on the diagram background brings up additional options on the screen. Very useful is the function "export simplified image ..."

Example:



2.2.2.Area B: Options for the Graph



- B1: Labeling of the displayed curves A
- B2: Display of each measurement curves area A3; right-clicking allows adaptation of color, line, interpolation, type of diagram, interpolation method, fill option ...
- B3: Used to move cursor around freely in Area A4
- B4: Zoom Options A (horizontal and vertical magnification, segment, ...); works only if „Autoscale Y-axis“ is inactive.

- B5: Sliding hand is used to shift measurement curves; only possible if B7 is inactive; it is used also in conjunction with zoom option B4.
- B6: Activates cursor in A4; the starting point is always right center
- B7: Switch for automatic scaling of axis A2 (measurement values)

2.2.3. Area C: Display Options



- C1: Time interval for time axis A1 (default 30 seconds)
- C2: On / Off switch for freezing the graph (readings are still being recorded and buffered).
- C3: Button to delete all buffered readings; the chart is reset.
- C4: On / Off switch for display of the current coupling value in %.
- C5: On / Off switch for display of the current calibration factor.
- C6: On / Off switch for display of 10Hz flow reading in chosen unit (G2).
- C7: On / Off switch for display of 1Hz flow reading in chosen unit (G2).
- C8: On / Off switch for display of 0.1Hz flow reading in chosen unit (G2).
- C9: On / Off switch for display of board temperature in °C.
- C10: Average of 1Hz flow values.

2.2.4. Area D: Recording



- D1: On / Off switch for the recording of all measured values. When a recording is started, a window opens, requesting a file name. If an existing file is selected, overwriting of the file needs to be confirmed.
- D2: When recording is active, the green light is blinking

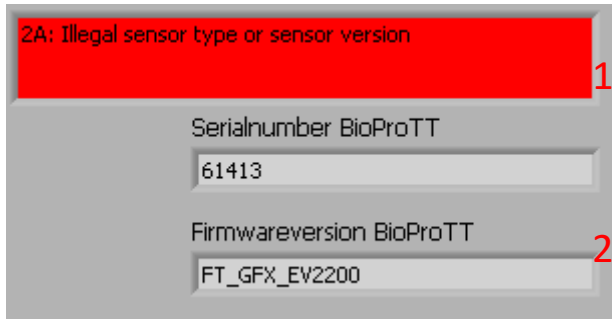
Example:

<i>Date</i>	<i>Time</i>	<i>Coupling</i>	<i>Calib-F</i>	<i>Flow 10Hz</i>	<i>Flow 1Hz</i>	<i>Flow 0,1Hz</i>	<i>Board Temp</i>
04.06.2012	13:41:15,665	100	1,1	37	36	37	51
04.06.2012	13:41:15,790	100	1,1	36	37	37	51
04.06.2012	13:41:15,899	100	1,1	36	37	37	51
04.06.2012	13:41:16,009	100	1,1	36	37	37	51
04.06.2012	13:41:16,102	100	1,1	35	36	37	51
04.06.2012	13:41:16,196	100	1,1	38	37	37	51
04.06.2012	13:41:16,290	100	1,1	35	36	37	51
04.06.2012	13:41:16,399	100	1,1	37	36	37	51
04.06.2012	13:41:16,509	100	1,1	36	36	37	51
04.06.2012	13:41:16,587	100	1,1	36	37	37	51
04.06.2012	13:41:16,696	100	1,1	37	37	37	51
04.06.2012	13:41:16,790	100	1,1	36	37	37	51
04.06.2012	13:41:16,899	100	1,1	36	37	37	51
04.06.2012	13:41:17,009	100	1,1	37	37	37	51
04.06.2012	13:41:17,087	100	1,1	36	37	37	51
04.06.2012	13:41:17,196	100	1,1	37	37	37	51
04.06.2012	13:41:17,306	100	1,1	37	37	37	51

Notes

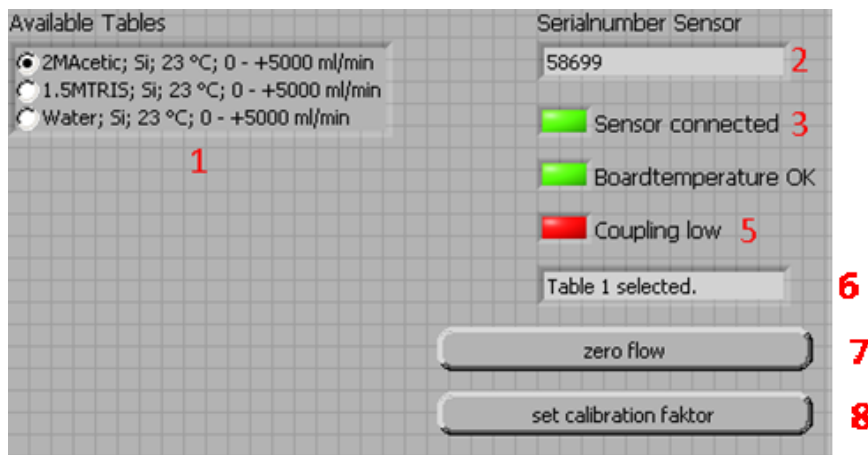
- The values are separated with „tabulator“; this allows for easy import, e.g. into Excel.
- The timestamp is in milliseconds because several records are received per second.
- There is no conversion of values; the values are recorded as provided by the BioProTT™ flow meter.

2.2.5.Area E: Status Information BioProTT™ Flow Meter



- E1: Area for error information which appears only when an error is detected. Error code and a descriptive text are provided.
- E2: Display of serial number of BioProTT™ flow meter.
- E3: Display of serial number of BioProTT™ flow meter.

2.2.6.Area F: Sensor Status and Measurement Parameters



- F1: Information about available calibration tables with radio button to select active table, if applicable
- F2: Display of the serial number of the sensor; the field is updated at startup and during sensor replacement and only filled if a sensor is connected.
- F3: The green field indicates a connected sensor; this information is continuously monitored.

- F4: The green field indicates that the board temperature is OK; this information is continuously monitored.
- F5: The coupling indicator consciously displays the received signal strength when a sensor is connected.
- F6: Display of the currently selected table, when a sensor is connected.
- F7: Button to zero flow at „no flow“ condition; this is only possible if a sensor is connected.
- F8: Button to adjust the calibration factor when a sensor is connected. The factor can be set in the range of 0.5 to 1.5. Invalid values will not be accepted.

2.2.7. Area G: Totalizer and Change of Units for Flow Measurement

The totalizer can only be invoked if a sensor is connected.



- G1: Average flow value during the during volume measurement in „Run“-mode.
- G2: Radio button for selecting the unit of the flow measurement; after a change allo new values will be displayed accordingly; see also C6, C7, C8, G3. If used during operation A5 appears

Conversion:

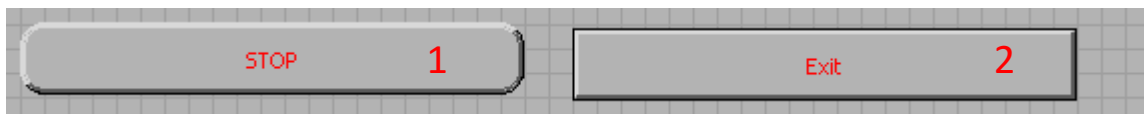
- 1L = 1000ml
- 1m³ = 1000L
- 1L = 61,023744inch³
- 1Imp.gal. = 4,54609L
- 1US.liq.gal = 3,7854115L
- G3: Display of volume during totalized time (G5) using the 1Hz flow values; unit according to G2; reset with G9.

Note: the volume calculated in the program can the derogates from BioProTT flow meter values. The BioProTT flow meter operates at a fixed time base. The flow meter assumes that a flow readings are taken in the same intervals (ca.100ms).

This application actually accounts for the different times between the readings.

- G4: Start time of totalizer. The time is update as long as the value of G3 is zero. It will be updated again after a reset with G9.
- G5: Display of elapsed time in „Run“-mode. Time count start with activation via G8; it is unchanged while in „Hold“ and the value is reset via G9.
- G6: Display of elapsed time in „Hold“-mode; Will be started when the button G8 is used during volume measurement; As long as „Run“-Mode, this time will not be updated; reset with G9.
- G7: Display of the current time and date.
- G8: Run / Hold switch; starts and pauses the totalizer G3; it is activated depending on the position G5 and G6.
- G9: Reset-button to set G1, G3, G5 und G6 to zero; if this button is used, G4 is updated.
- G10: Warning if there are invalid readings during the measurement; it appears in "Run"-mode, when insufficient coupling is detected (flashes).
- G11: "Failure" indicator. It appears when a volume measurement is running or in the "Hold"-mode. It shows that an error has occurred during the volume measurement. Unlike G10 the field is not automatically reset when the fault condition disappears. This field allows detection of inconsistencies during long or unattended measurements. It is reset with G9.

2.2.8.Area H: Application Control



- H1: Stop button to terminate the measurement. The port is released and the SW returns to the beginning of the application.
- H2: Exit button to. terminates the measurement, release the port and close the application.

3. Appendix: END-USER LICENSE AGREEMENT

**FREWARE
END-USER LICENSE AGREEMENT**

for em-tec's Flowgraph Demo Software

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