Bartels mikrotechnik

microComponents^m

Flow Controlled System – "mpSmart–Lowdosing"

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Content

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General

This operating manual contains all necessary instructions for the installation, commissioning, operation and maintenance of the evaluation board mpSmart-Lowdosing controller. The manual is intended to help you achieving optimal results in a short time and shall assist avoiding possible sources of errors. The operating manual of the micropumps and other controllers are available separately.

The products have been designed with state-of-the-art technology and in accordance with all relevant safety regulations. However, a risk of damage to the units, other property, the operator and/or other persons cannot be fully excluded.

Always ensure that specialized and trained personnel will comply with the following general instructions.

Therefore, please keep this manual and hand out copies as required.

Bartels Mikrotechnik GmbH rejects any responsibility for damages to persons or property resulting from non-compliance with the instructions in this manual. In this case all warranties shall be void.

Declaration of conformity.

Bartels Mikrotechnik GmbH declares that the products are compliant to the RoHS directive 2011/65/EU. The controller comply with the requirements of EMV 2014/30/EU and CE markings have been affixed to the devices. Additionally, the controllers are also compliant to the EU Low Voltage Directive 2014/35/EU.

Description of function.

The mpSmart-Lowdosing have been developed for the transport of liquids. The controller has been developed for operating the micropump. Bartels Mikrotechnik can assume no liability for damages resulting from the pump media. This applies especially for hazardous fluids.

The pump must be operated with Bartels Mikrotechnik electronics. Bartels Mikrotechnik GmbH cannot guarantee the proper work of the units with customer specific electronics. If other controllers than the ones from Bartels Mikrotechnik are used, Bartels Mikrotechnik disclaims any warranty.

Moreover, please note that components of the controller and pump are operating with high-voltage. Therefore, persons wearing pacemakers are recommended to avoid the operating system.

Bartels Mikrotechnik assumes no liability for abnormal handling, improper or negligent use of the micropump and the controller that is not conform to the specified purpose of the system. This applies especially for micropump controllers, components and systems of other manufacturers, which have not been certified by Bartels Mikrotechnik.

We guarantee that the micropumps comply with the actual state of scientific and technical knowledge and due to this, the operational risks are limited to a minimum.

Do not open the housing of the micropump and the controllers. In those cases, Bartels Mikrotechnik cannot issue a guaranty anymore. Please keep this manual safe and give a copy to all users.

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Proper use

Intended purpose.

The micropump is intended for pumping liquids with varying flow rates controlled by the electronics. The controllers are intended for operating the micropumps. Any other use of the micropump or controller unit is deemed improper.

Do not make any modifications or extensions to the pump or controller without the prior written consent of the manufacturer. Such modifications may impair the safety of the unit and are prohibited! Bartels Mikrotechnik GmbH rejects any responsibility for damage to the unit caused by unauthorized modifications to the pump and risk and liability are automatically transferred to the operator.

Misuse.

The use of liquids, which may alone or in combination create explosive or otherwise health-endangering conditions (including vapors) is not permitted.

Staff selection and qualification.

All work in connection with the installation, assembly, commissioning/decommissioning, disassembly, operation, servicing, cleaning and repairing of the pump and the controller must be carried out by qualified, suitably trained and instructed personnel. Work on electrical components and assemblies must be carried out by personnel with the necessary qualifications and skills.

About this operating manual.

Warnings and important notes are clearly identified as such in the text. The relevant text sections feature a specific sign. However, this icon cannot replace the safety instructions. Therefore, carefully read all safety instructions in this manual. Warnings and important notes in this text are highlighted as shown below, according to the severity of the damage that might result from non-compliance.

⚠ **DANGER**
DANGER indicates a hazard with a high level of RISK THAT, if not avoided, will result in death or serious injury.

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The flow-controlled system: mpSmart-Lowdosing

Flow Controlled System – „mpSmart-Lowdosing"	
This Flow Control System is a smart module for precise and regulated dosing of liquids. An onboard Arduino reads out a flowmeter made by Sensirion, comparing it to a target value and operates the mp6 micropump corresponding to a PID-regulator. The attached PC-software can be used to monitor, control and log the flowrate	
Components	mp6-hyb micropump Damper Flowmeter (Sensirion SLF3s-0600F) Tubing Tubing connectors Driver Board Software with GUI
min. Flowrate	5 µl/min[1]
max. Flowrate	1000 µl/min[1]
Accuracy	<±5%
Software calibration	Water
USB-port	one
Input Voltage	5V
Operating temperature	+5°C bis +45°C
Materila in Contact with Fluid	PPSU, silicon, PP, PPS, stainless steel, Tygon, epoxy based adhesive
Lifetime	5000 h
Self-priming	yes
Dimensions	9.5 cm x 9.5 cm x 3.5 cm
Pumping media	Liquid (water)

[1]   Bedingung: Destilliertes Wasser (25°C), Raumtemperatur 23°C

[2]   Bedingungen: Saugdruck < 10 mbar, DI-Wasser, max. Förderleistung wird erst nach wenigen Minuten Betriebszeit erreicht

[3]   Bedingungen: Luft, Raumtemperatur 23°C, mp-x: 100 Hz, 250 V, SRS

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Getting started with GUI

The mpSmart-Lowdosing includes 3 main components:

A mp6 micropump, a mp-damper and a SFL3s-0600F flowrate sensor.

For the fluid channel, use the included Tygon tubing in the kit to connect them as shown in the following figure.
As for the tube lengths between mp6 micropump & mp-damper or mp-damper & SLF3s-0600F we recommend at least 50 mm.
To make sure that there is no air in the fluid channel, we recommend priming the system with a syringe by pulling the fluid through the channel.
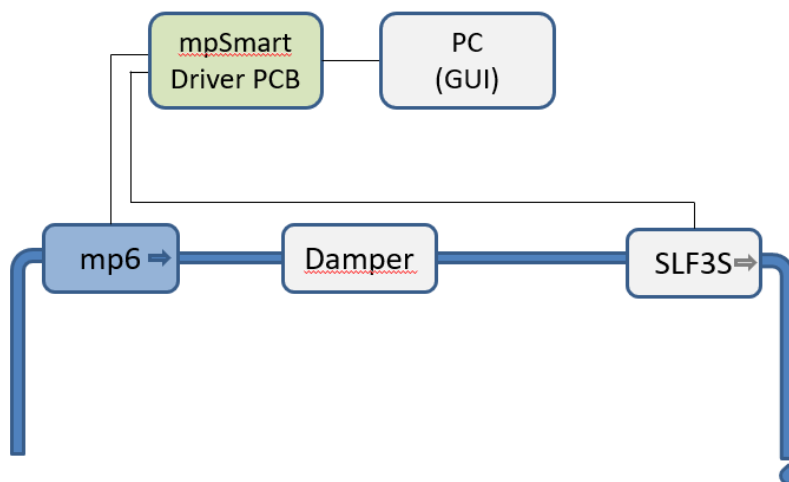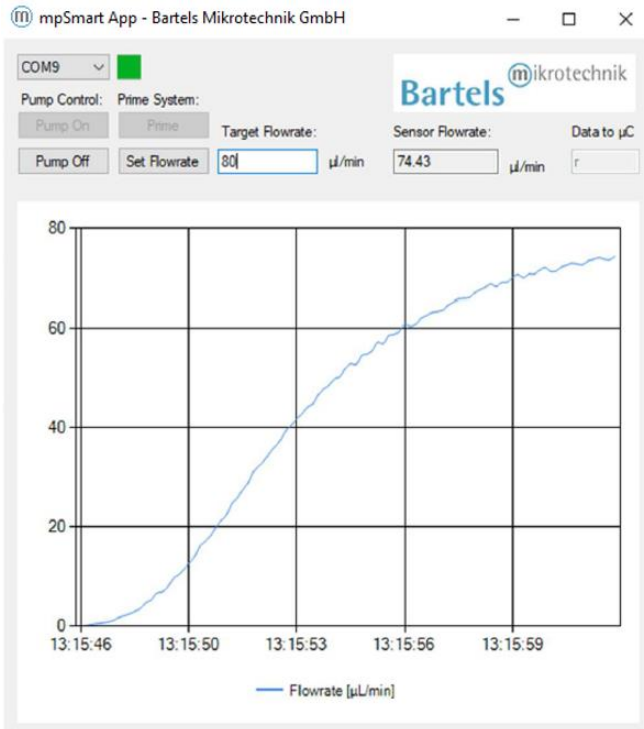

For the wiring, use the included cable to connect the mp6 micropump and SLF3s-0600F to the Flow Controller and the USB cable to connect the kit with your PC / Laptop.
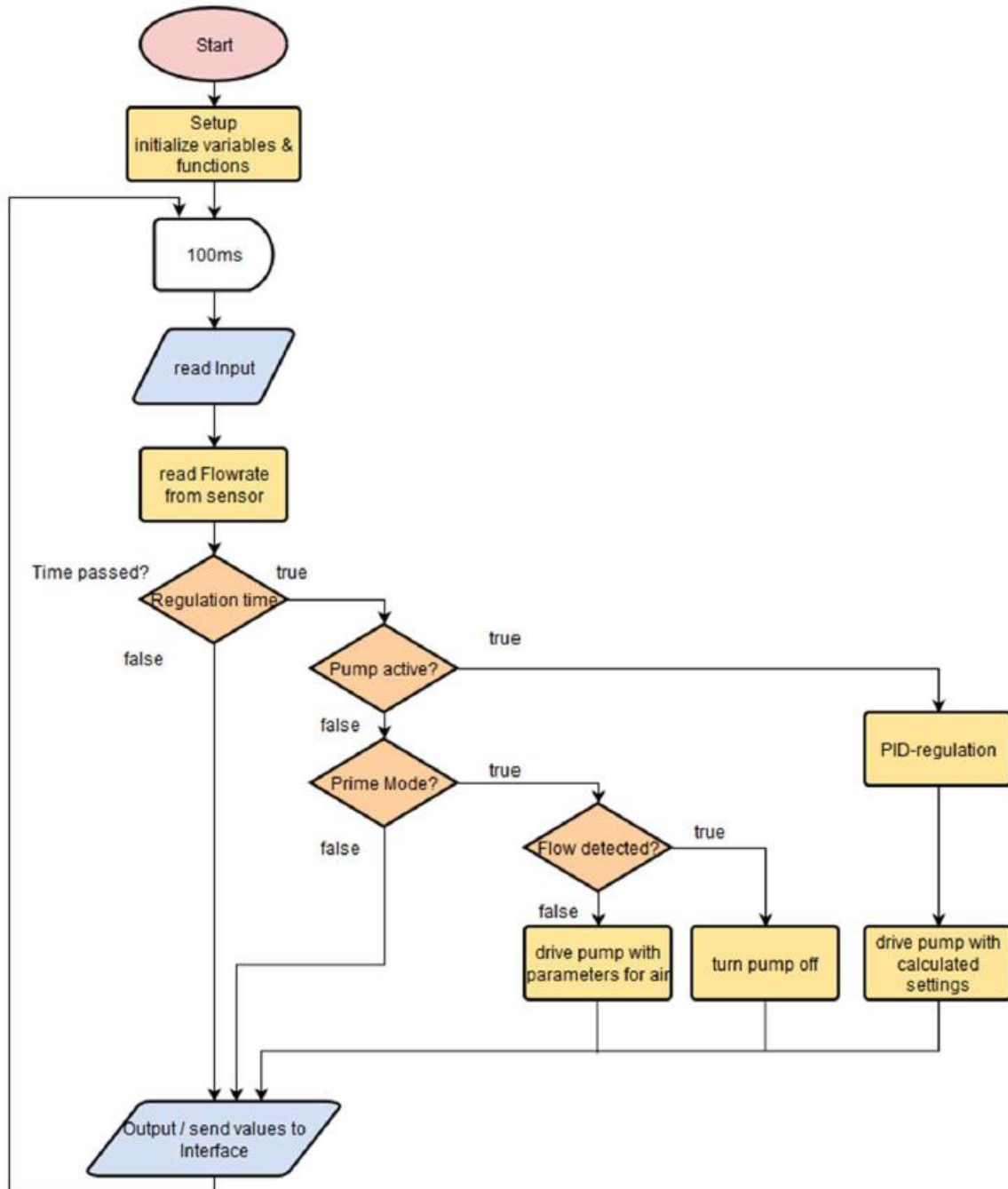
Starting the Evaluation Software

Get the mpSmart App from our Downloads/Driver-and-Software directory at https://www.bartels-mikrotechnik.de/.
The zip file contains the GUI and the Arduino code. Make sure the pump and sensor are connected to the mpSmart Lowdosing before connecting it to your PC via USB cable. Start the mpSmart App and choose the COM port your dosing system is connected at. If the device was not found you might need to install the driver for the Arduino nano microcontroller manually.

To start your mpSmart kit enter a flowrate inside the textbox e.g. 80 µl/min and hit the "Enter" key or click "Set Flowrate". Afterwards the mp6 can be started or stopped with the on or off buttons. The actual flowrate will be displayed inside the field under "Sensor Flowrate:" and as a time plot underneath the control elements.

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Flowchart

Flowchart with the following nodes:
- Start
- Setup: initialize variables & functions
- 100ms
- read Input
- read Flowrate from sensor
- Regulation time? (Time passed?) — false loops back; true continues
- Pump active? — true goes to PID-regulation; false continues
- Prime Mode? — true continues; false goes to Output
- Flow detected? — true: turn pump off; false: drive pump with parameters for air
- PID-regulation → drive pump with calculated settings
- Output / send values to Interface

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All values are approximate and no guarantee of specific technical properties.

Changes in the course of technical progress are possible without notice.

Contact Data:

Bartels Mikrotechnik GmbH

Konrad-Adenauer-Allee 11

44263 Dortmund Germany

www.bartels-mikrotechnik.de

info@bartels-mikrotechnik.de

Tel: +49-231-47730-500

Fax: +49-231-47730-501

Visit our Website

www.bartels-mikrotechnik.de/produkte/downloads

for further information on applications.

Tutorials and helpful answers to frequently asked questions can be found in our FAQ

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or on our YouTube channel

https://www.youtube.com/user/BartelsMikrotechnik

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