High performance dispensing system

2. iNNOVATION FORUM MicroTechnology

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Motivation

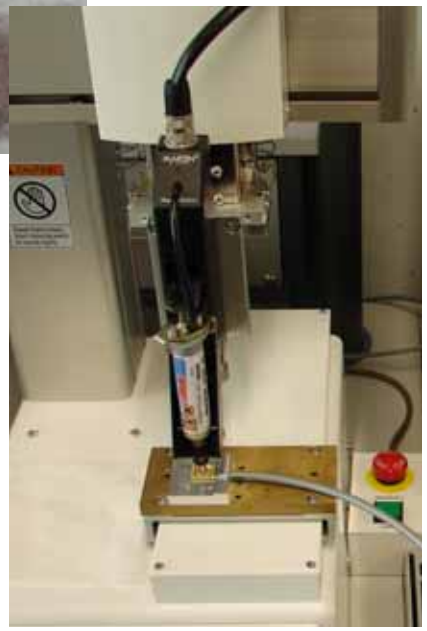
Development of a fluid dispenser with

- Contamination free handling of the fluid
  - Contact free actuation unit
  - Low-cost disposable pump element
- High reproducibility of the dispensed amount
- Low energy consumption

State of the art dispensing systems with disposable pump element

Syringe pump

laboratory equipment



SMD dispenser

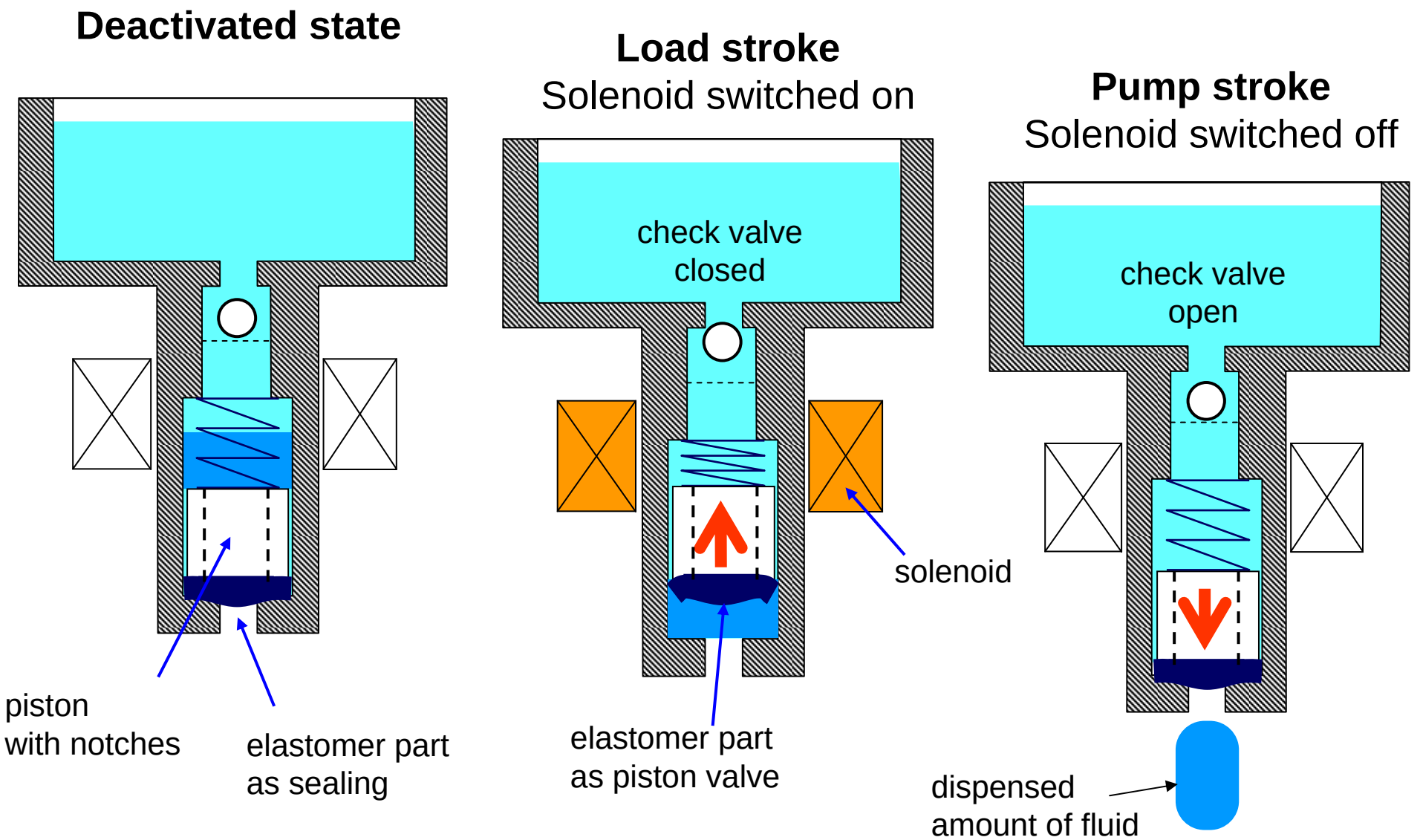
Peristaltic pump

touchless soap dispenser

+ high dispensing accuracy
- limited pump volume

+ unlimited pump volume
- high energy consumption
- tube is not a „real“ disposable

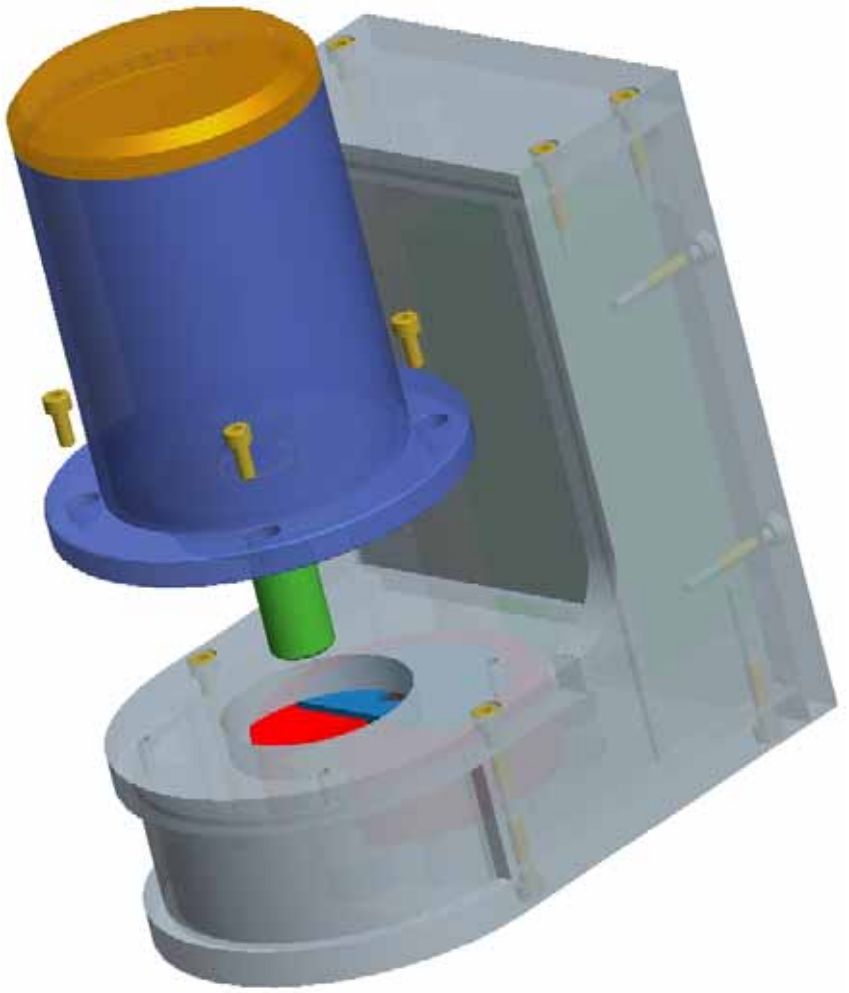
Principle of operation



Demonstrator design

2-part assembly

- Reservoir with integrated pump unit
  - pump chamber
  - piston
  - spring
  - elastomer part as piston valve
  - check valve
- Wall-holder
  - fixation for the reservoir
  - solenoid
  - system electronics
  - power supply



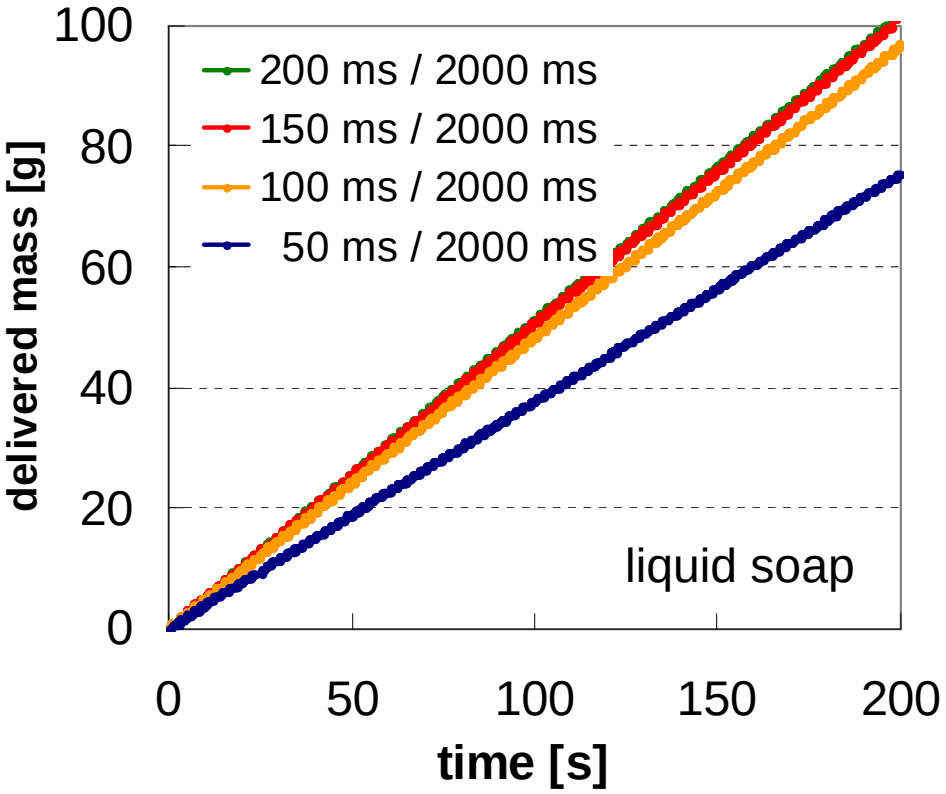
Set-up

Features

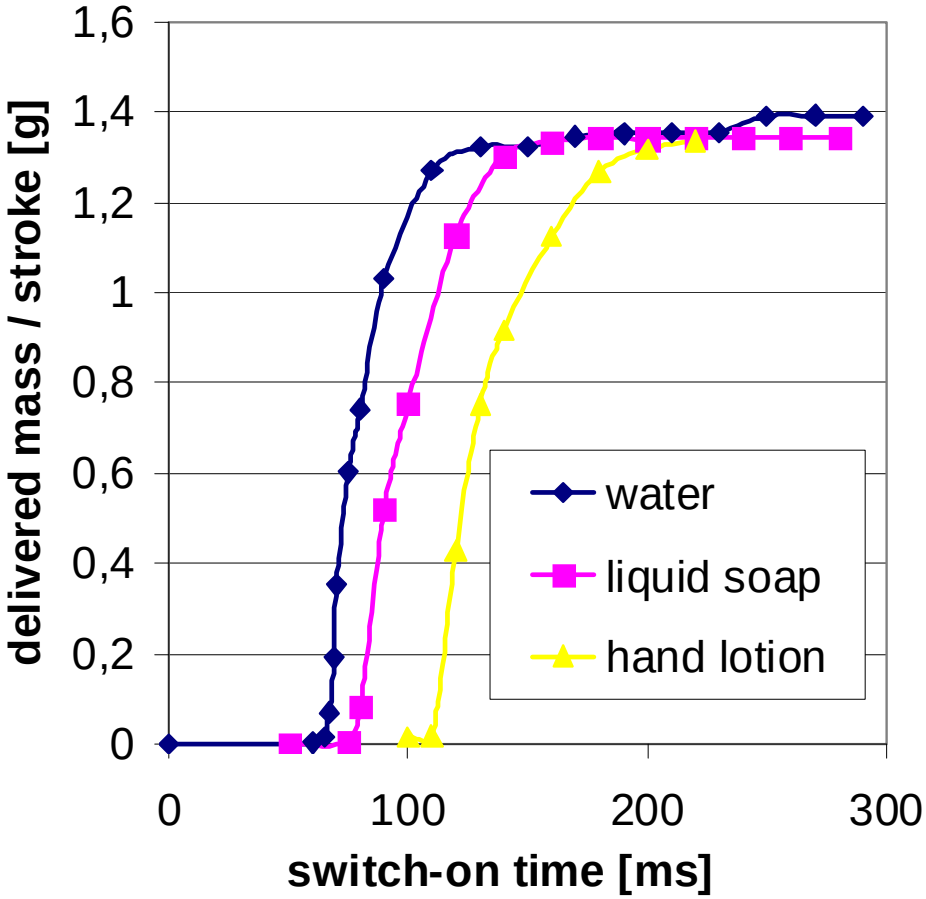
- Separation of the actuation unit from the delivered fluid
- Constant delivery volume for fluids with various viscosities
- Very high dispensing accuracy
- Low energy consumption
- Battery powered actuation is possible
- Self-priming, self-deairing of the pump chamber
- Totally sealed in deactivated state

Dispensing characteristics

linear increase of the delivered mass
subject to switch-on time



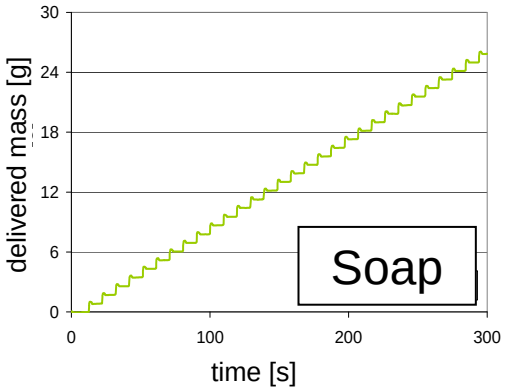
delivered mass per stroke
independent of fluid viscosity



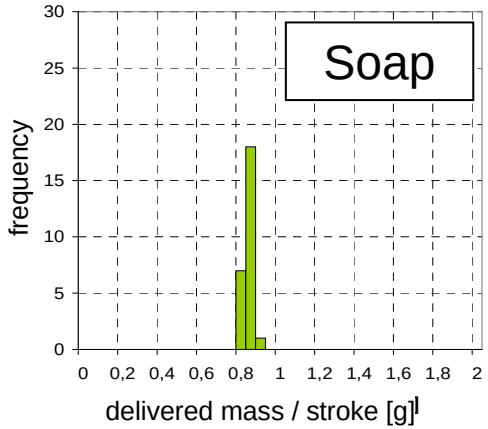
Dispensing accuracy

- Measurement in continuous operation

delivered mass against time



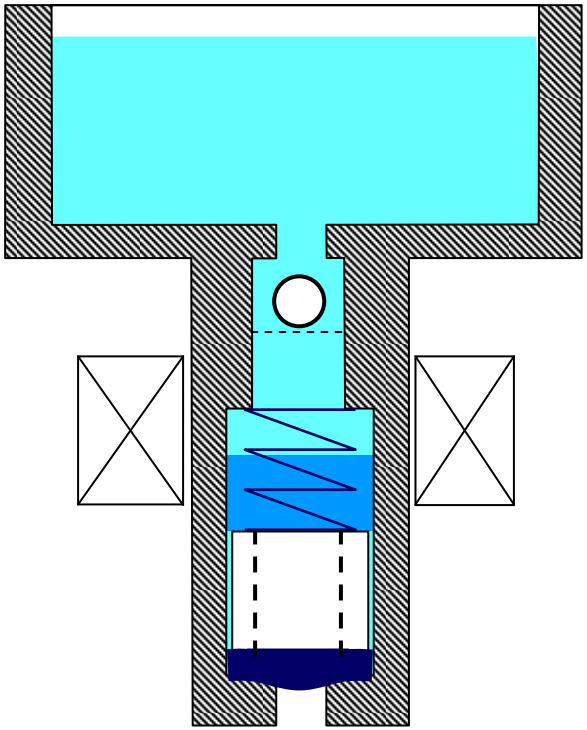
delivered mass / stroke



Fluid	variation per stroke
Liquid soap	0,62 %
Disinfectant	0,77 %
Hand lotion, higher viscosity	0,64 %
Soft wash lotion	0,91 %
Ketchup	1,06 %
Sunflower oil	1,06 %
Fabric softener	1,17 %

Sealing in deactivated state

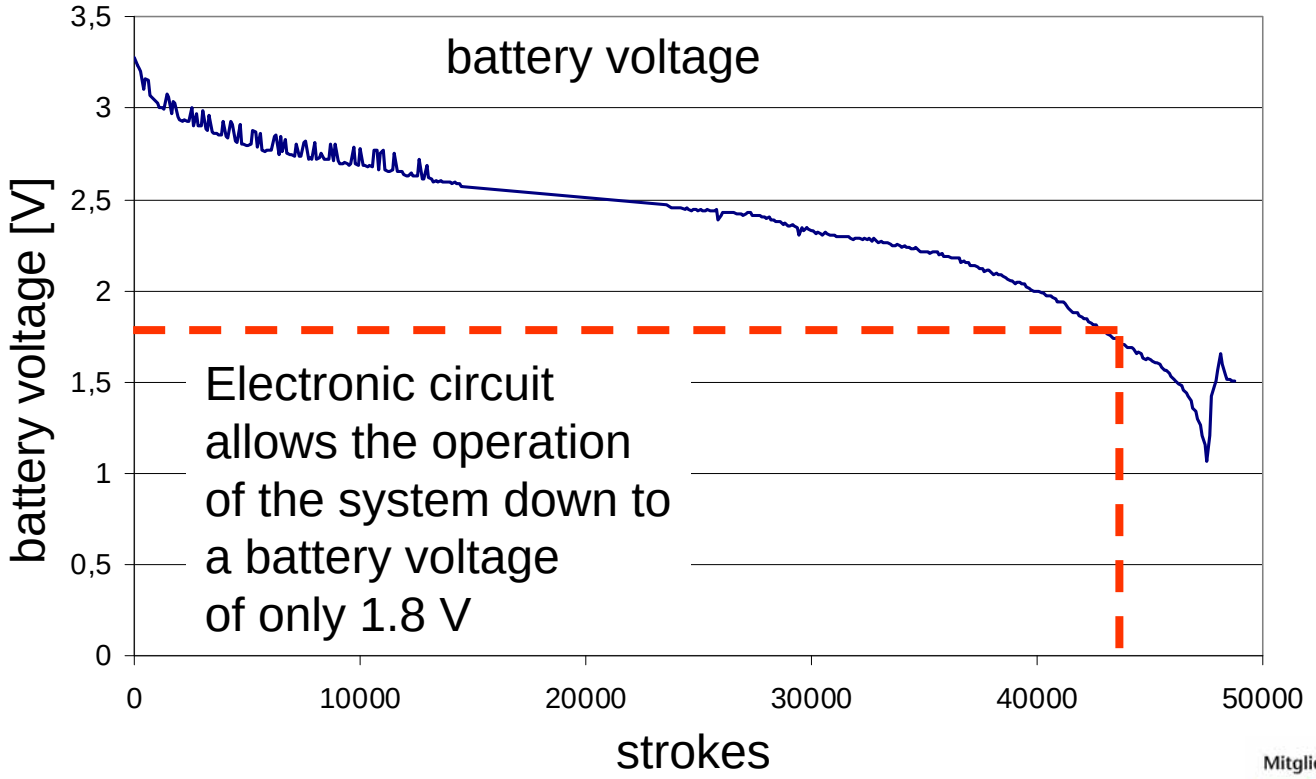
piston with elastomer part
is pressed against the outlet
by the spring



sealing test successfully passed
48 h @ 40°C

Measurement of the energy consumption

- Delivered fluid: Liquid soap
- Energy source: 2 batteries; 1,5 V; Type C („Varta High Energy“)
- 1 stroke every 10 seconds
- permanent logging of delivered amount and battery voltage



Measurement of the energy consumption

Total amount of strokes:	**44800**
Delivered amount of liquid soap:	**40 kg**
Dispensing accuracy: (average over 12.000 strokes)	**0,7%**
Battery voltage at the end of the measurement:	**ca. 1,8 V**

Dispensing technology of HSG-IMAT

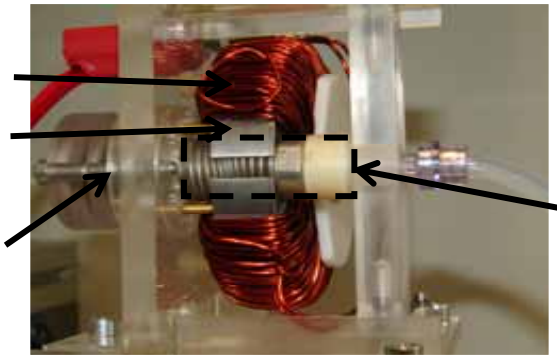
Use for different fluids

- Liquid soaps, lotions
  - bathroom, public sanitary facilities
- Detergents, disinfectants
  - “white goods“
  - hospitals
- Food & beverage
- Lubricants, advesives
- Pharmaceuticals

Patent granted in Europe; Patent pending in 8 states

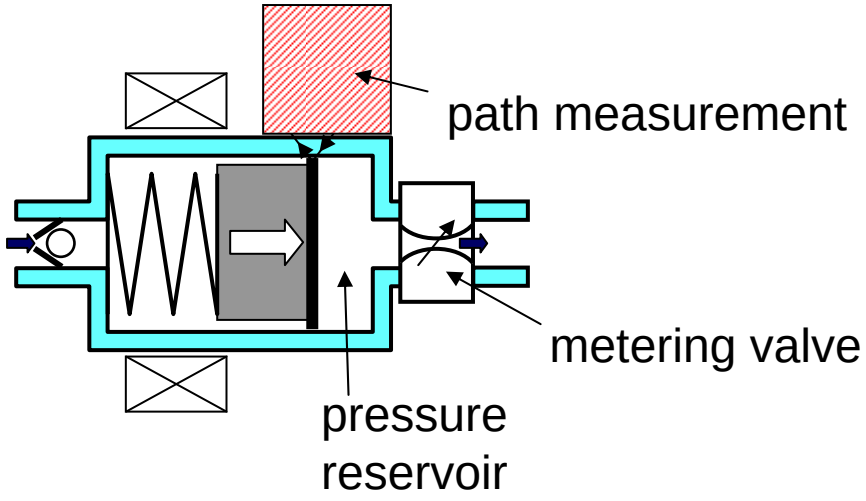
Future work
Controlled metering pump

- First demonstrator of a non-controlled metering pump



will be presented at ACTUATOR 10

- Public IGF research-project for a controlled metering pump (starts in 2010)



in cooperation with ito

You are welcome
to join the project commitee!

Thank you.

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