thinXXS MICROTECHNOLOGY

## Micro Nano Breakthrough conference

**July 28-29, 2004 Portland, OR**

# Micro Diaphragm Pumps for High Volume and Low Cost Production

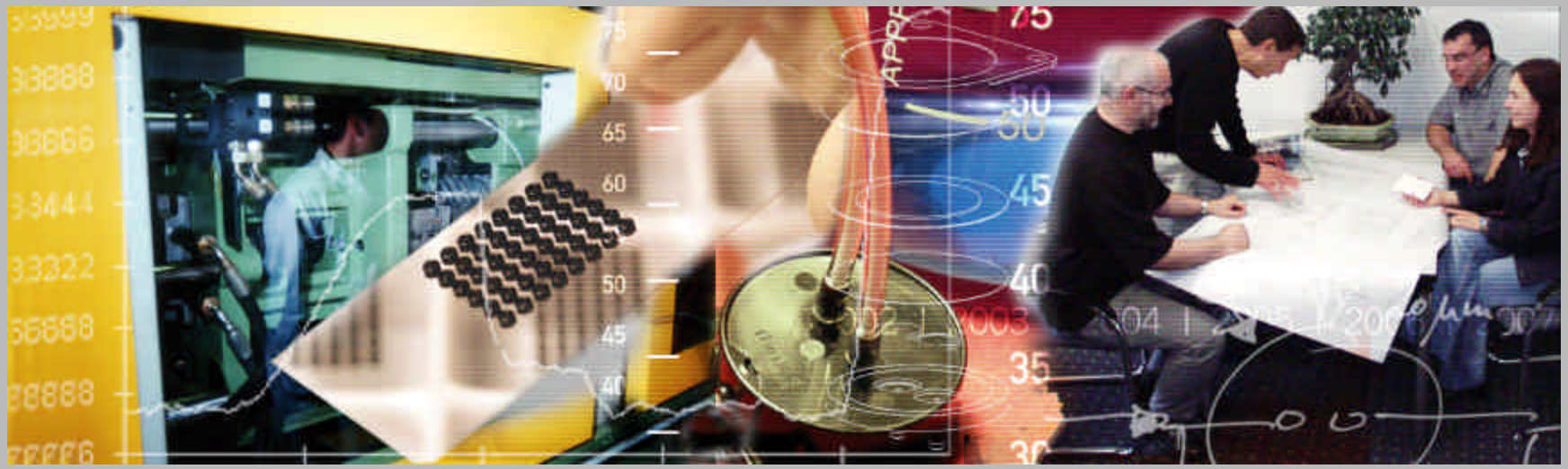
**Miniaturization of Medical Devices session**

**July 28, 2004**

**Robert Pischler**
**Sales Manager**
**thinXXS GmbH**
**Mainz/ Zweibrücken Germany**

**www.thinxxs.com**

# the small thinXXS in life...



# miniaturization

# pump miniaturization

# 25 years in the development of microscale devices for pumping fluids

TOPICAL REVIEW

## A review of micropumps

D J Laser and J G Santiago

Department of Mechanical Engineering, Stanford University, Stanford, CA 94305,

E-mail: juan.santiago@stanford.edu

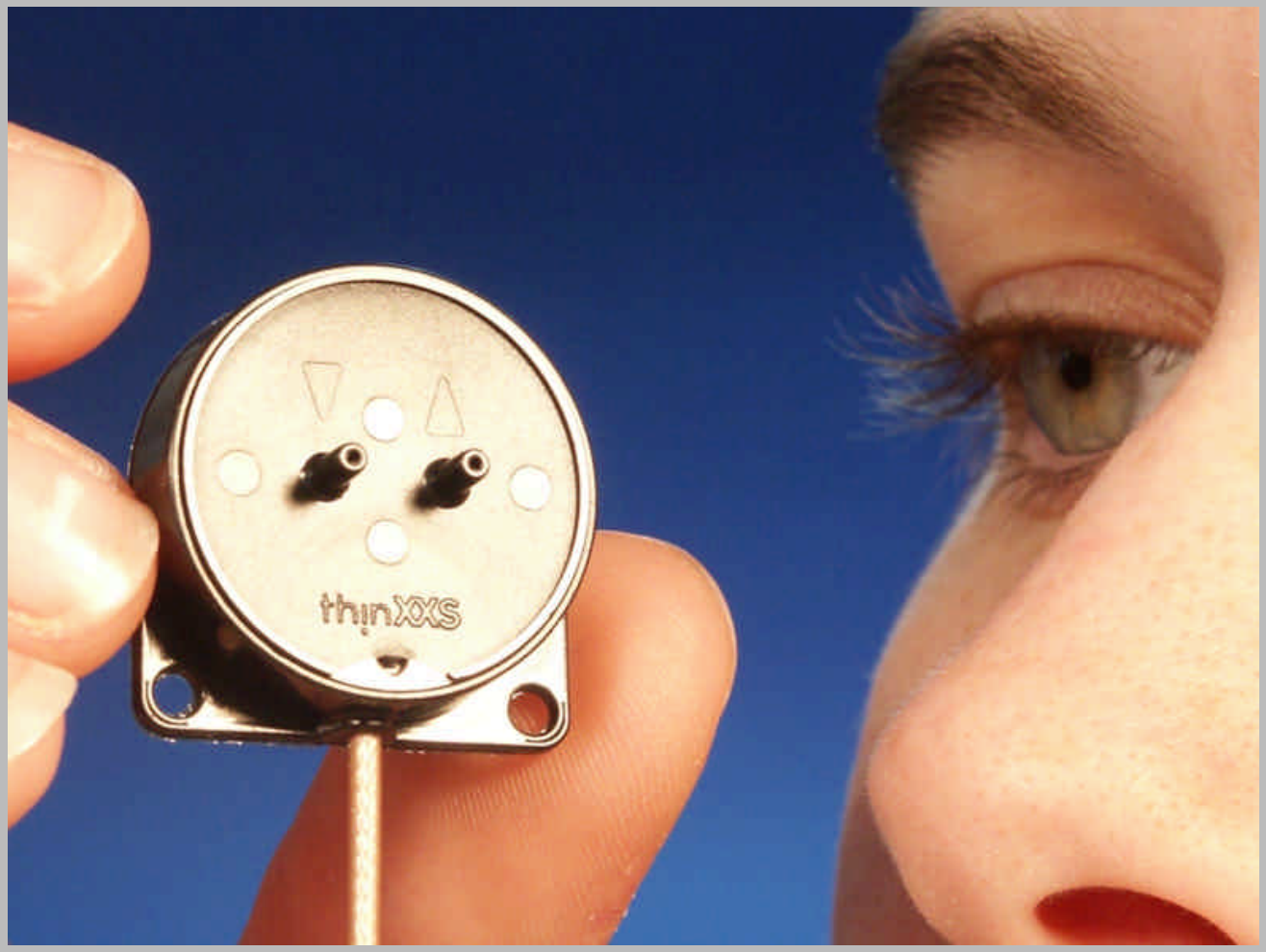
Received 30 September 2003
Published 19 April 2004
Online at stacks.iop.org/JMM/14/R35 (DOI: 10.1088/0960-1317/14/6/R0

**Abstract**

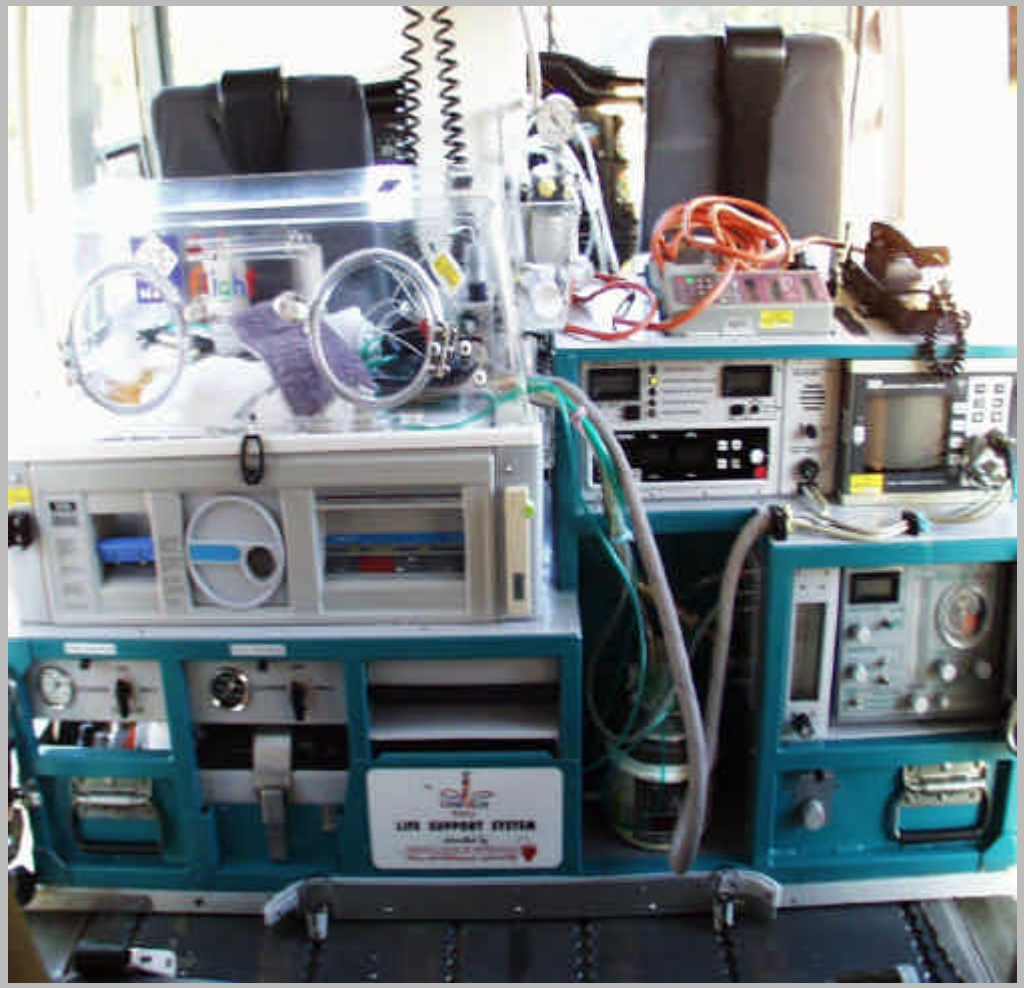
We survey progress over the past 25 years in the development of m

"Improvements in techniques for fabricating precision components from plastic have led to increasing use of plastics in reciprocating displacement pumps. **Indeed, the only micropump currently in widespread commercial distribution [is] produced by thinXXS GmbH** of Germany..."

# the art of micro pumping



# portable medical devices



source: NETS, NSW Australia

**Home Healthcare Devices for:**

- **testing**
- **treatment**
- **monitoring**

**Worn or carried by patients:**

- **compact**
- **travel friendly**

# “portable” medical devices

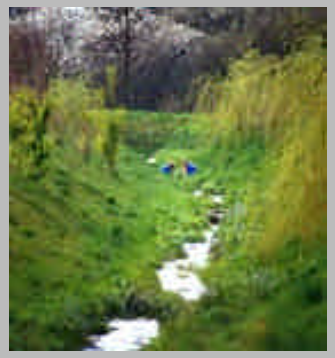
# applications

**other examples:**

**life sciences**

**chip cooling**

**monitoring**



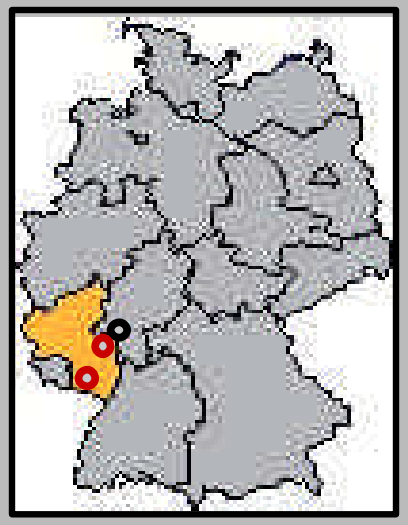
**lubrication**

**portable fuel cells**

# thinXXS locations in Germany

HQ / Production Site, Zweibrücken

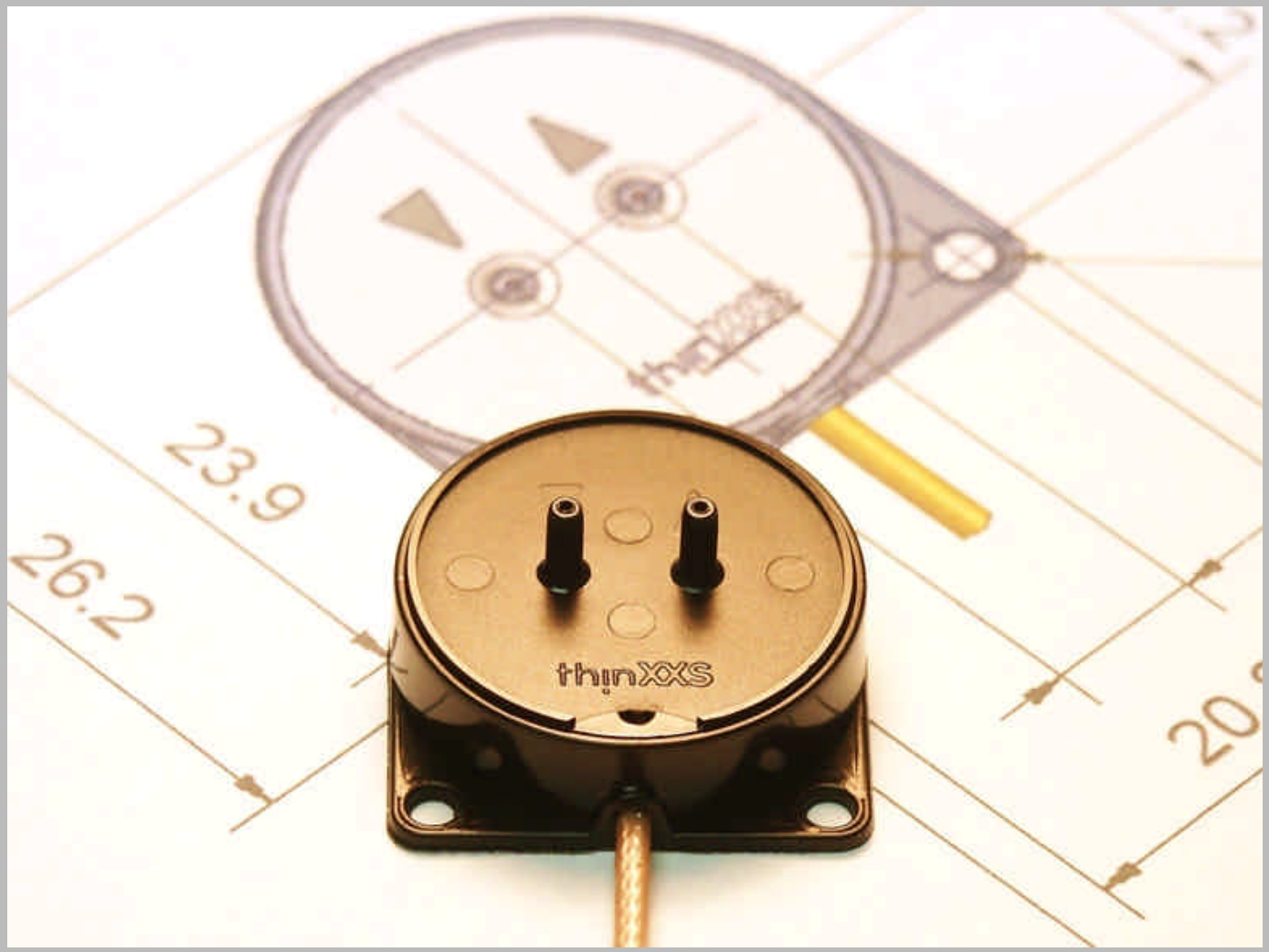
Sales & Marketing / R&D, Mainz



Frankfurt

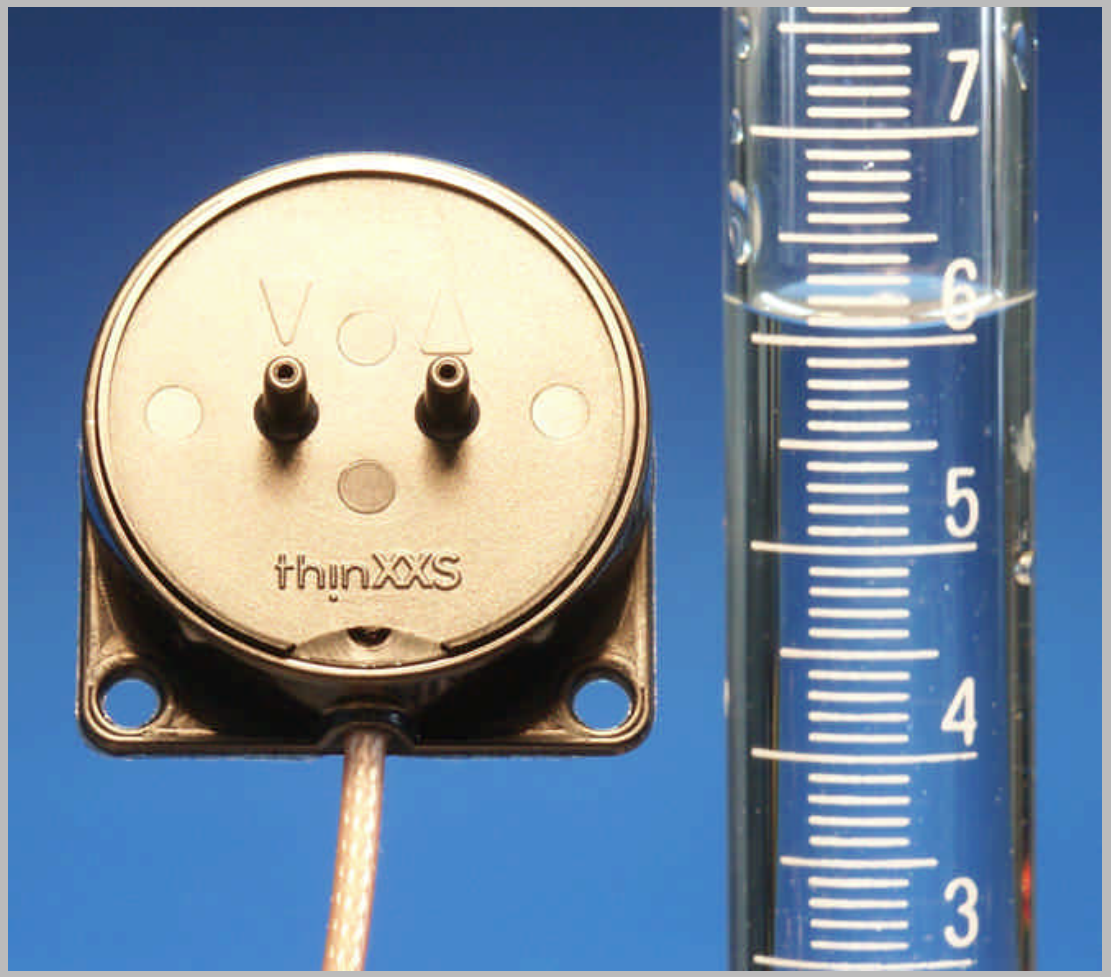
100km

# MDP1304 micro diaphragm pump

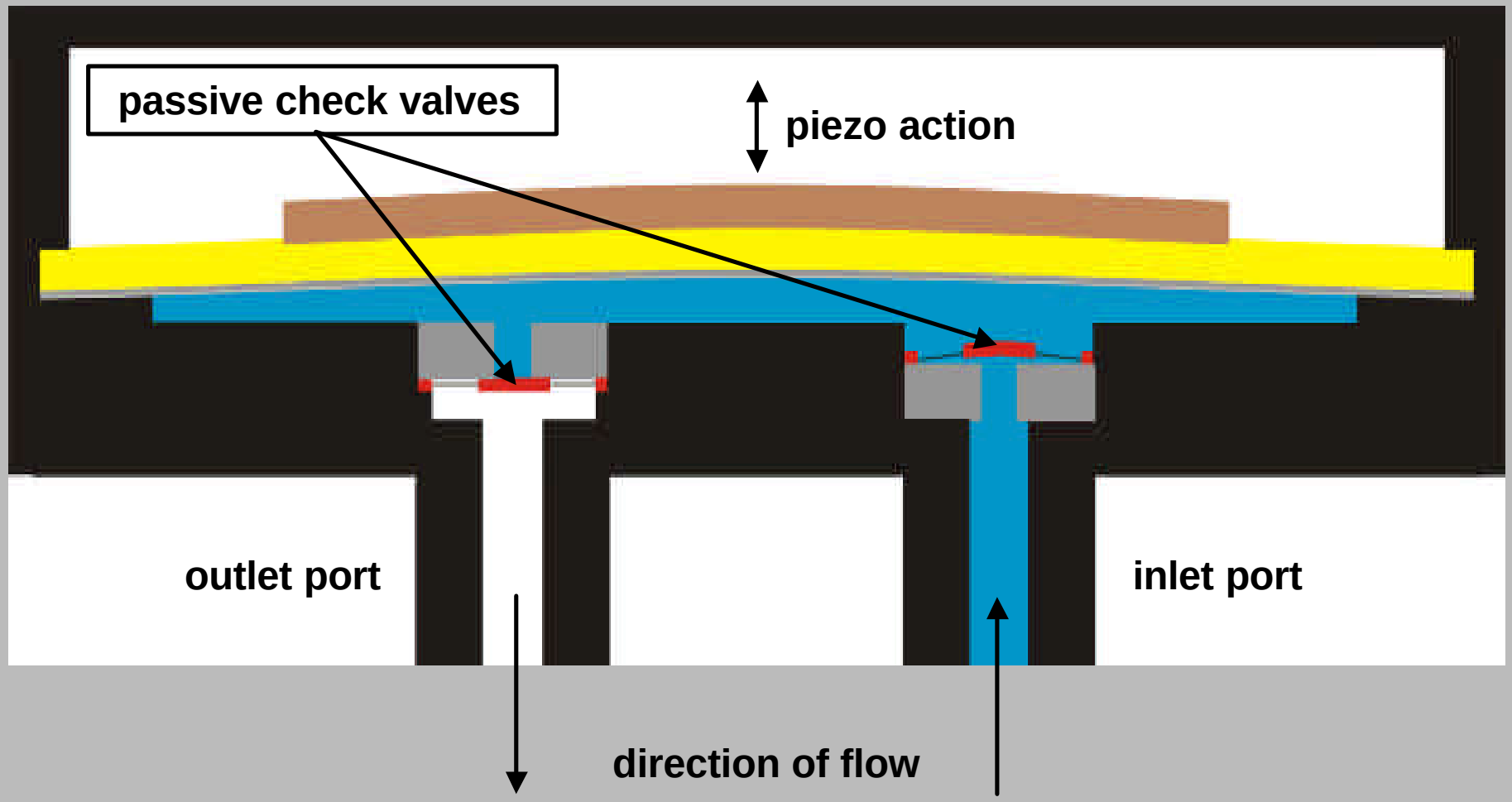


# main features MDP1304

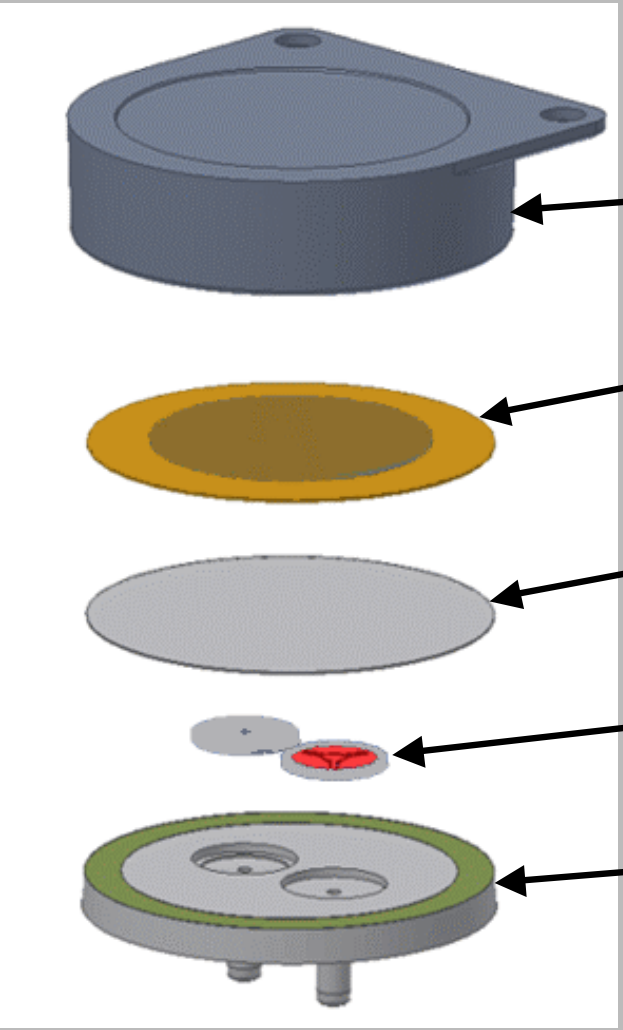
- small dimensions
- extremely light
- low power consumption piezo-actuated
- pumps gases and liquids
- tolerant of gas bubbles
- single wetted material: COC / Topas®
- custom specific adaptations
- lifetime ~ 20,000 h



# pump principle



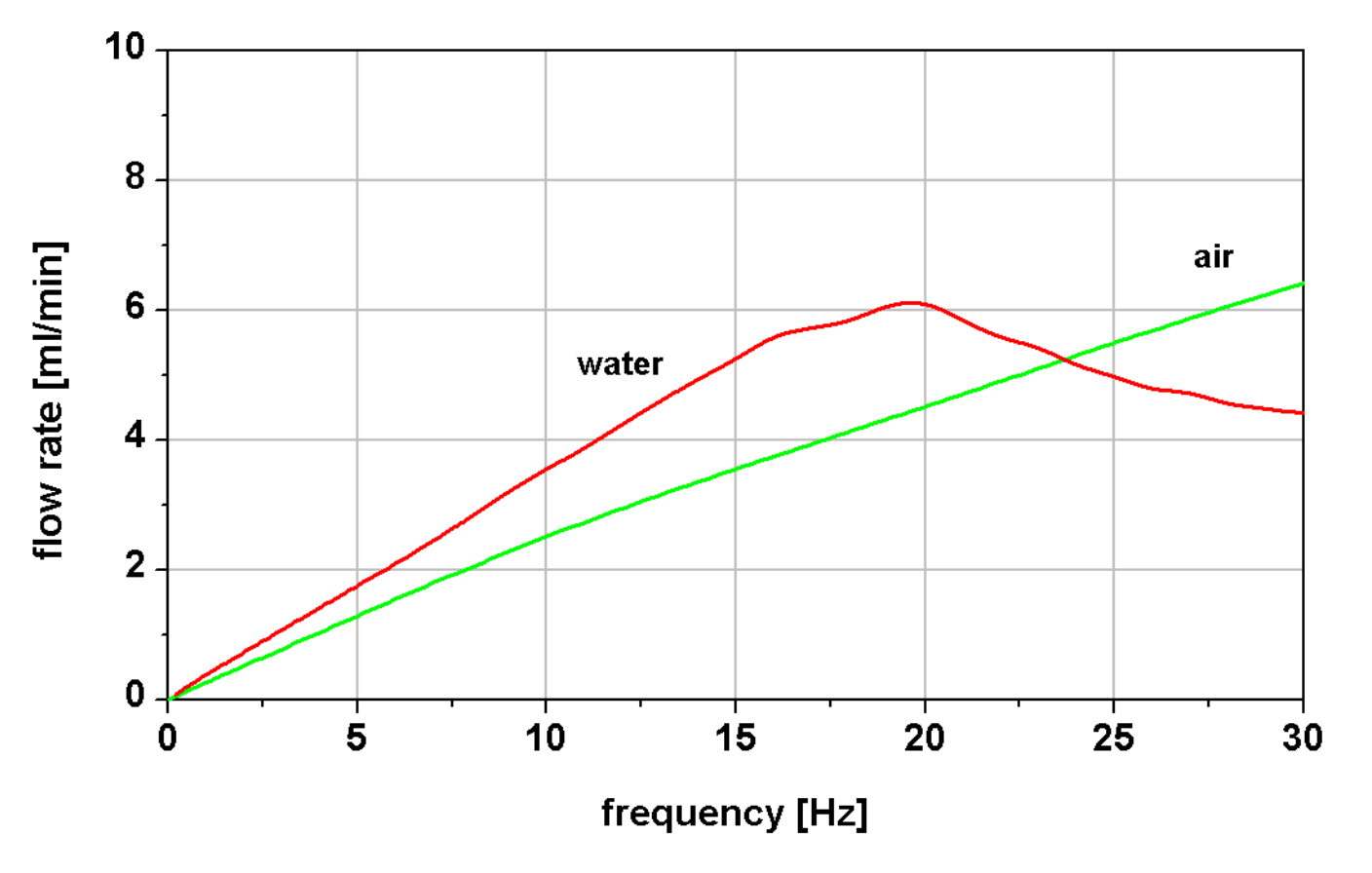
# pump design


housing
piezo actuator
diaphragm
micro valves
pump platform

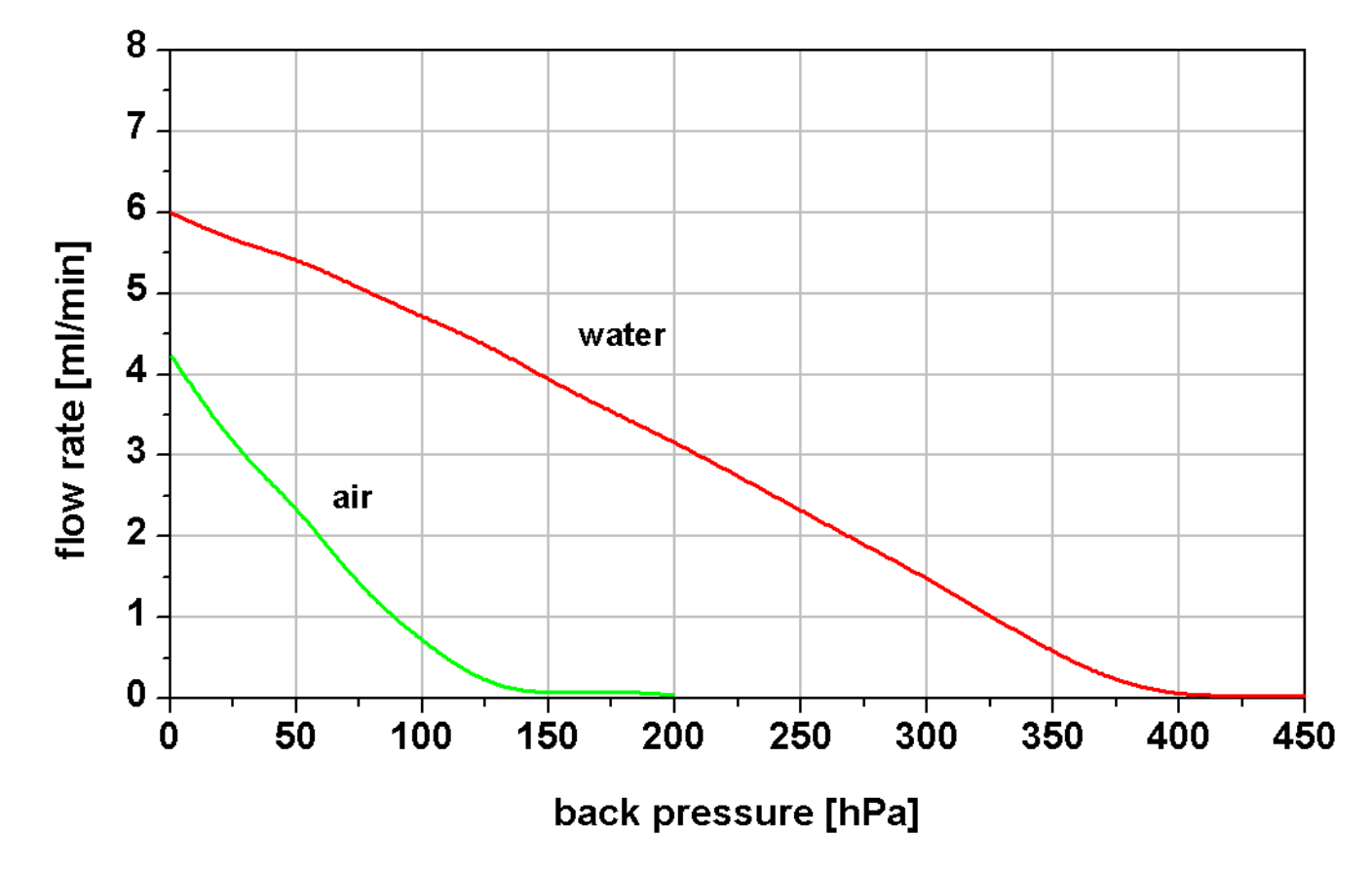
# assembly

assembly of plastic components by laser welding**:**

# technical data MDP1304



# technical data MDP1304

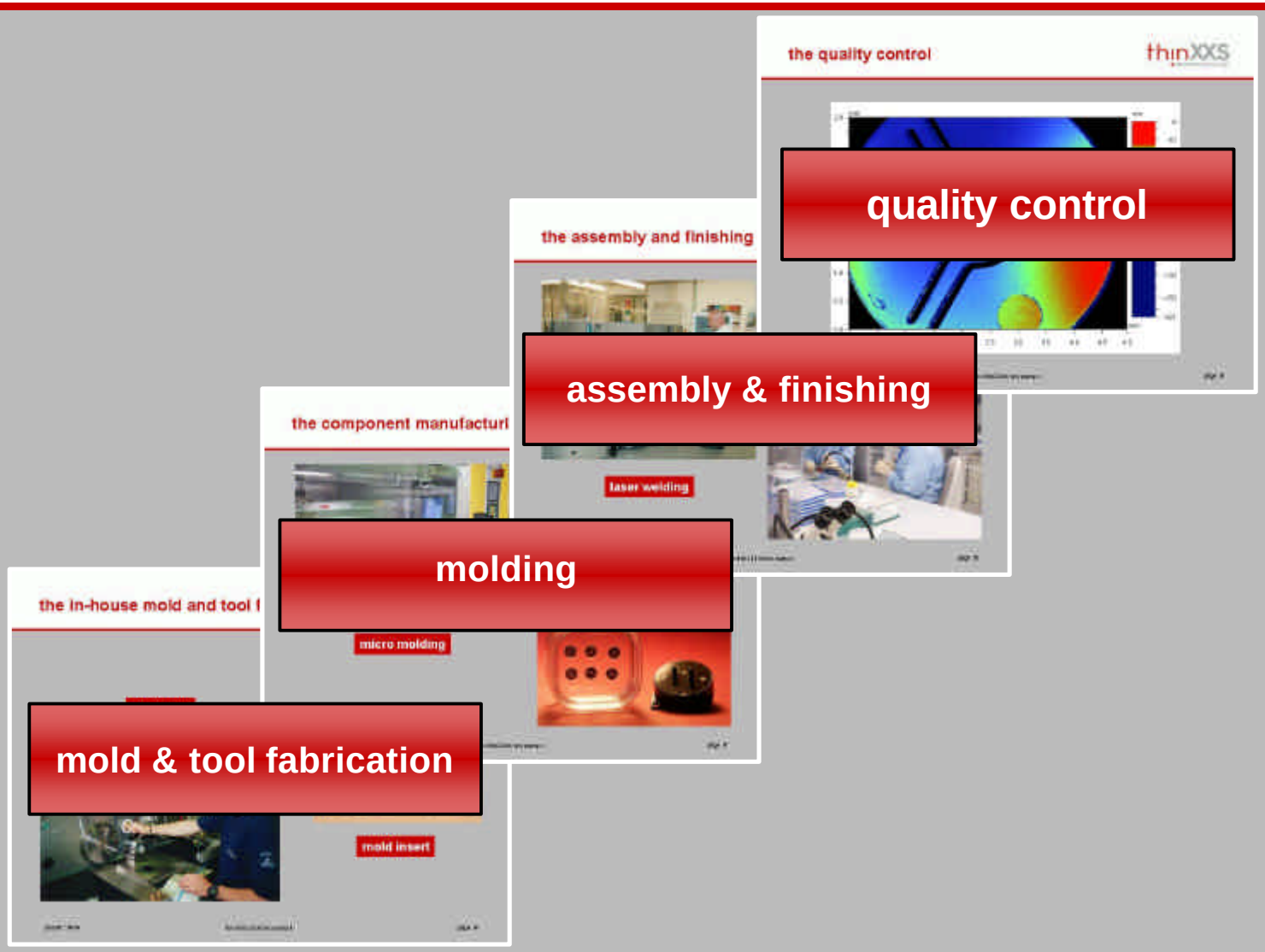


# electronic controls

## specifications for EDP0203 (OEM):

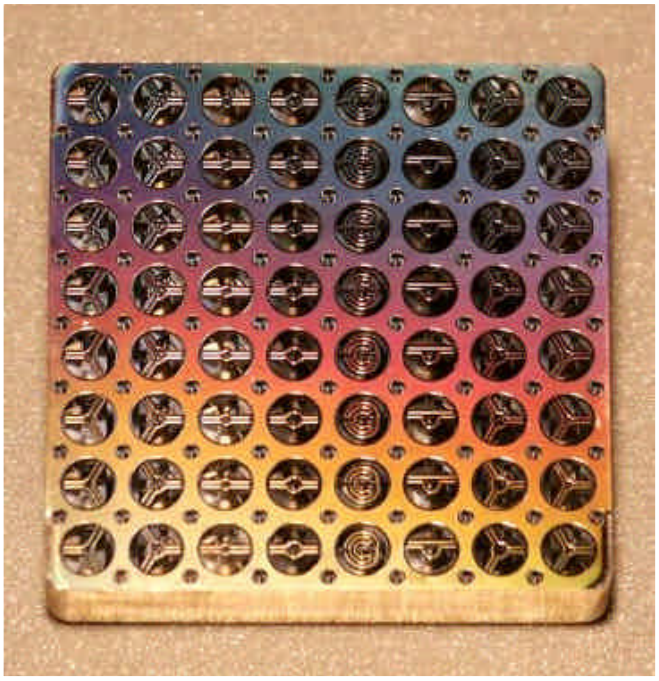
| | |
|---|---|
| supply voltage [V]: | 4.5 - 7 DC |
| current consumption [mA]: | 30 @ 1 Hz |
| (@ 6 VDC) | 50 @ 25 Hz |
| frequency range [Hz]: | 0 - 200 |
| operating temperature [°C]: | +5 - +40 |
| weight [g]: | 25 |

# production steps



# in-house mold and tool fabrication

up milling

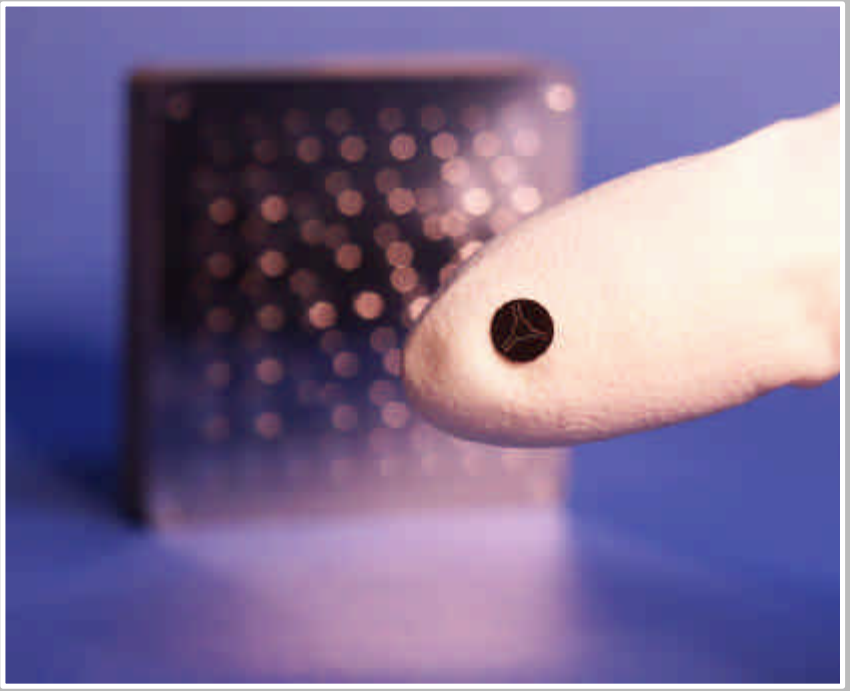


mold insert

# component manufacturing

injection molding

micro valve

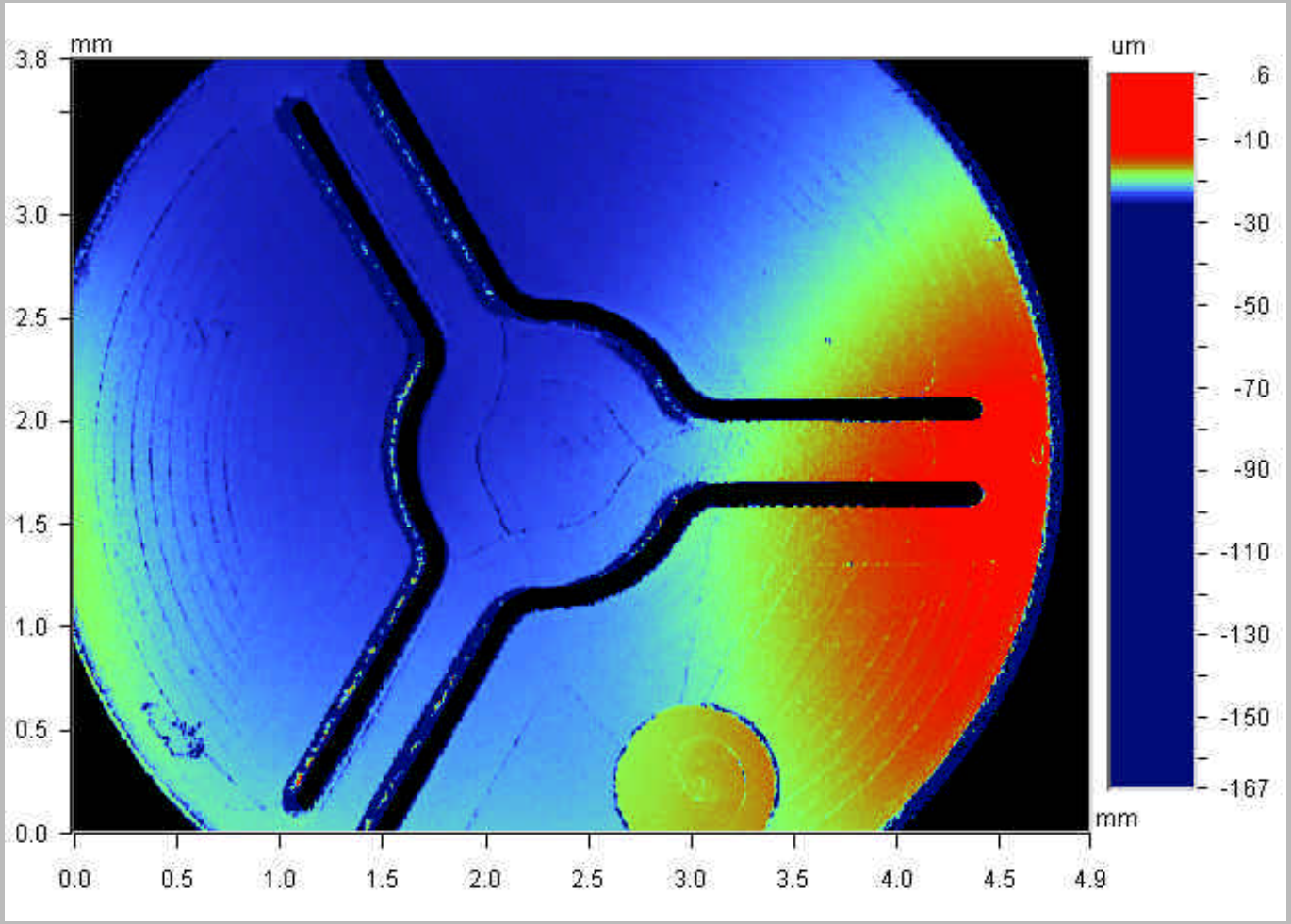


# assembly and finishing

laser welding

actuator testing

# quality control



# automobile platform concept

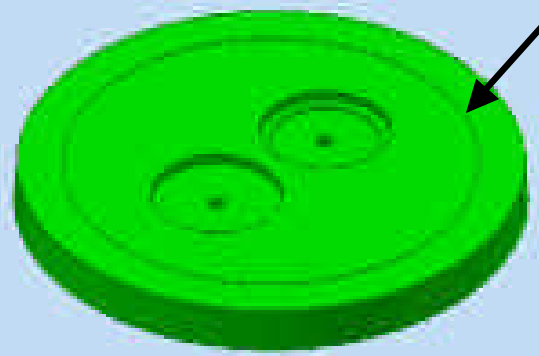
# thinXXS platform concept

the degrees of freedom:

- **check valves**

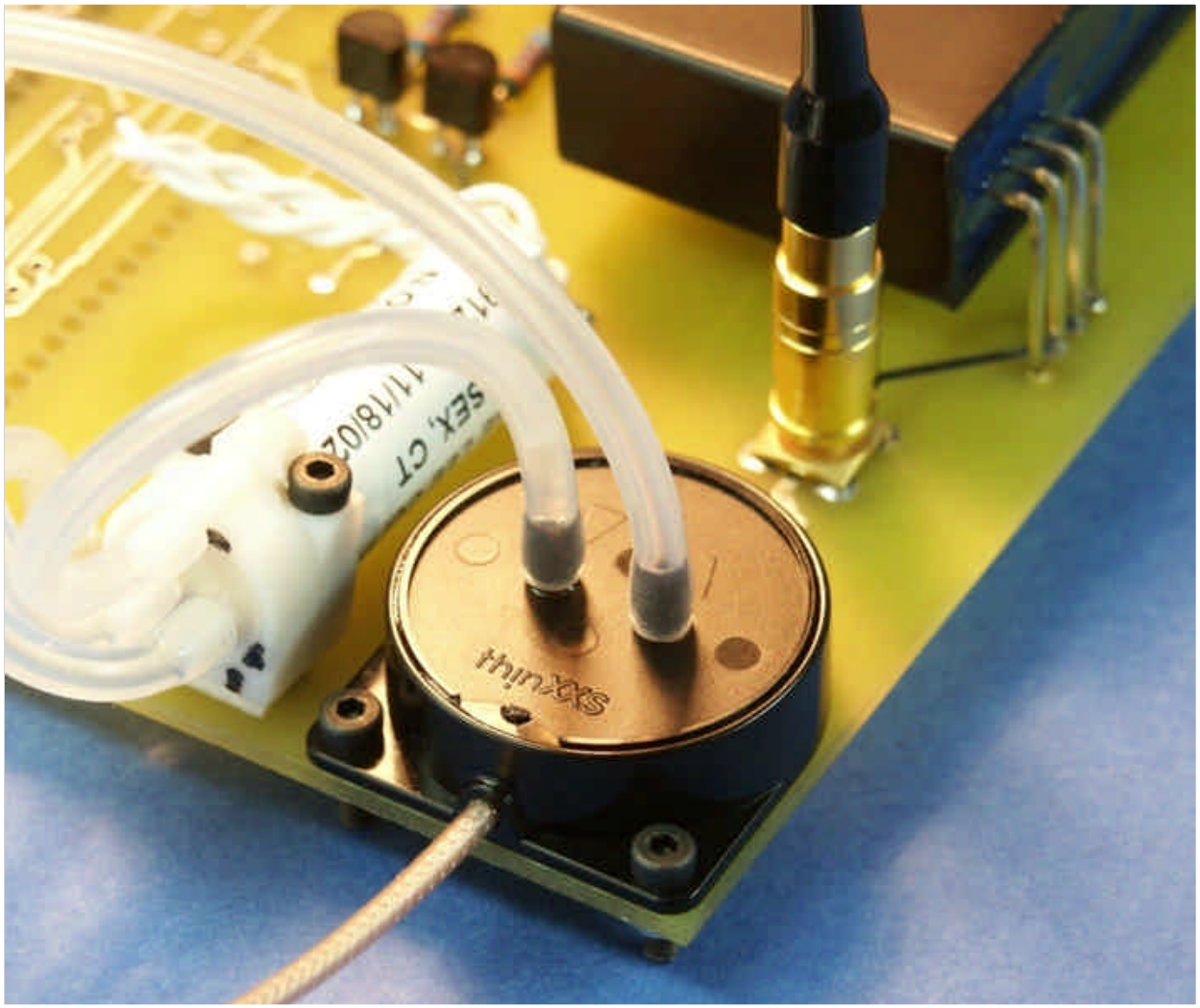
platform

- **diaphragm**



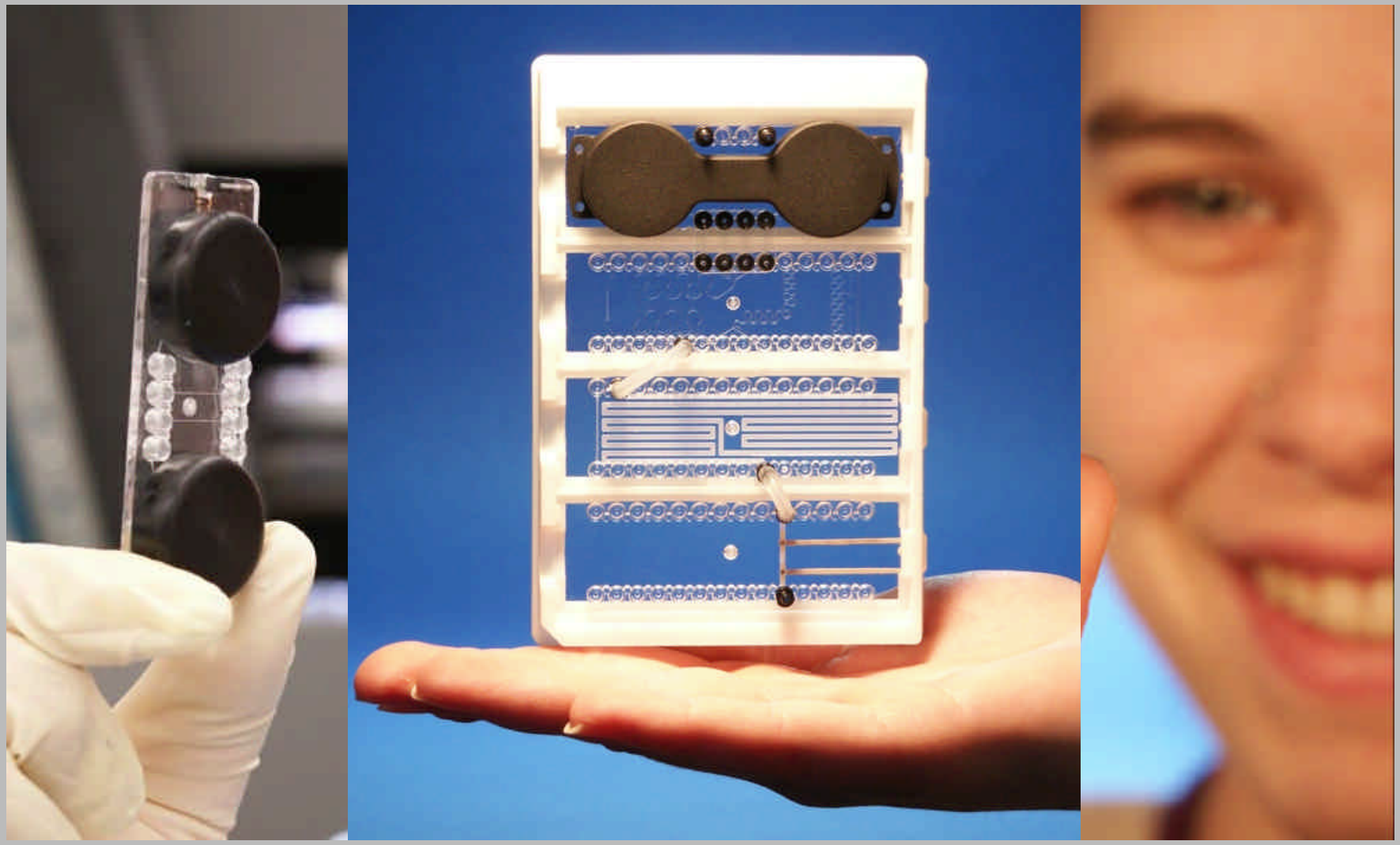
- **piezo**

# PCB mounting of MDP1304

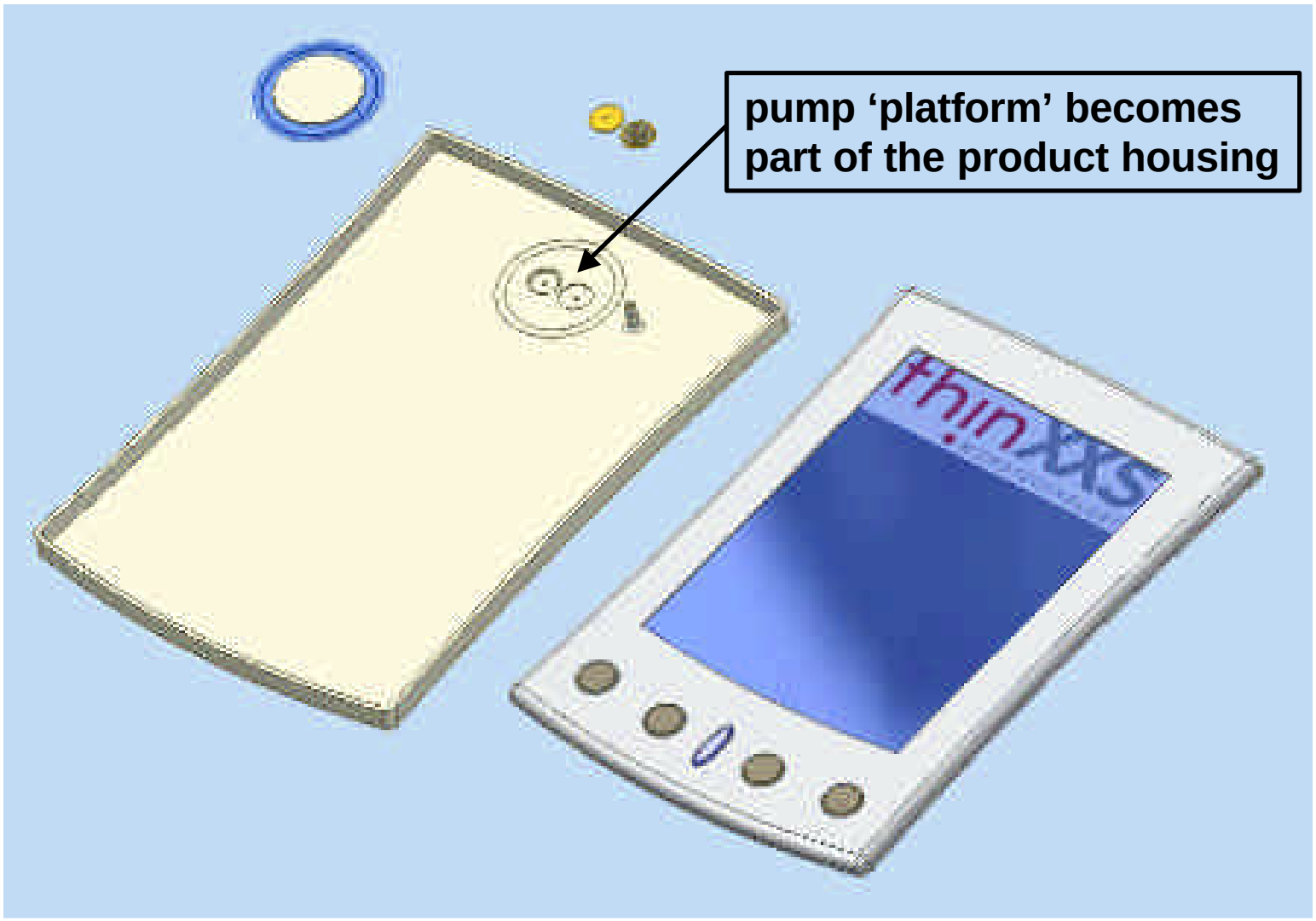



**integration of fluid and electronic components on PCB**

# system integration: e.g. “lab-on-a-chip”

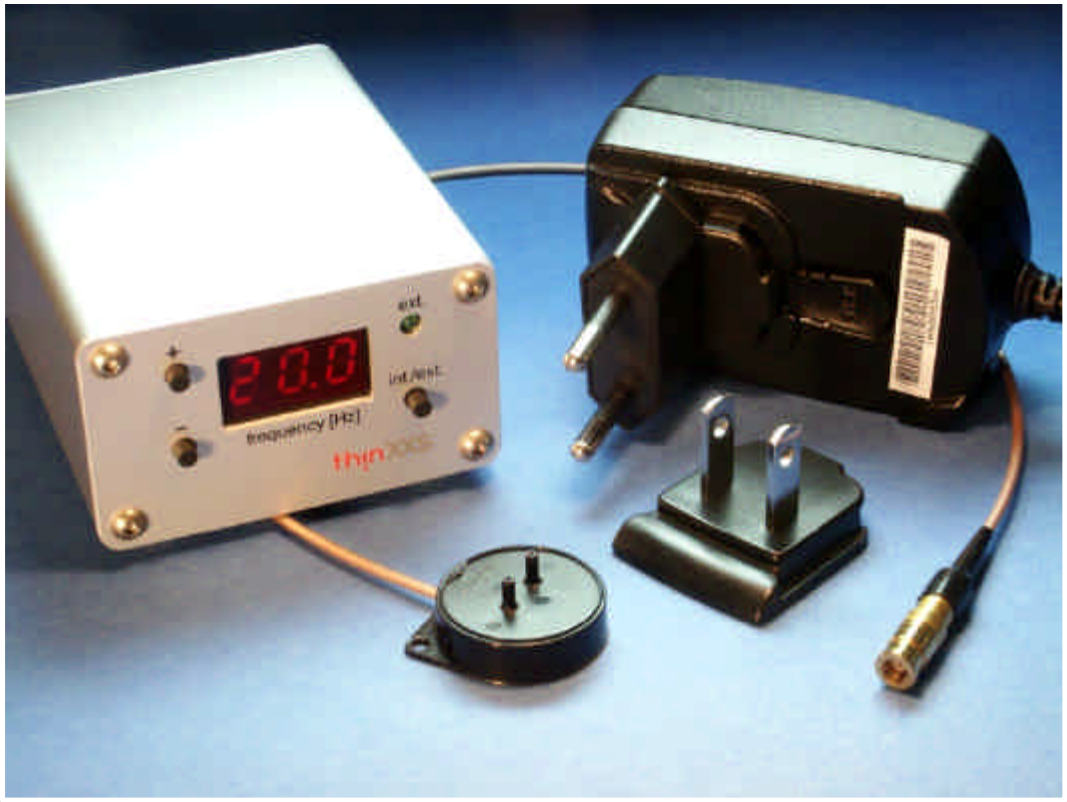


# total product integration



# MicroPump evaluation kit

**The kit is offered to first time customers and allows for an especially quick and easy set-up of the pump. It includes**




- **1 micro pump MDP1304**
- **1 electronic pump control EDP0303**
- **1 AC/DC converter**

**Interested? Contact: micropump@thinxxs.com**