

instruction manual | The Soft-Pumping Bundle



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Important information

Dear Customer,
we are very pleased that you have chosen our product. memetis offers you the highest precision through ultra-compact miniature valves in fluidic systems.
In order to take full advantage of the performance of this product, please read these operating instructions carefully. Familiarize yourself with the controls and proper use. The operational safety can only be guaranteed if both the general safety instructions, accident prevention regulations and the safety instructions in the operating manual are observed. Avoid risks and dangers due to improper use. Keep the operating instructions in a safe place for future needs.

CAUTION
Please ensure that all persons operating the product have read and understood the instructions.

For your safety

Observe instructions

Any commissioning and handling of the device require the exact knowledge and observance of these operating instructions. The device is only invented for the use described.

Explanation of the safety instructions

In these operating instructions, particularly important remarks are highlighted as follows.

Warning
"Warning" indicates a potentially hazardous situation which may result in death or serious injury.

Note
"Note" indicates a situation which may result in property damage or minor injury.

Liability for function and damage

The liability for the function of the device reverts to the owner or operator if the device is improperly maintained, repaired or modified. The device must be maintained and operated in accordance with these operating instructions. memetis GmbH is not liable for any damage caused by failure to observe the above instructions. Warranty and liability conditions of memetis GmbH are not extended by the foregoing instructions.

NOTE
Ensure that the operating instructions are always accessible and that they are read and understood

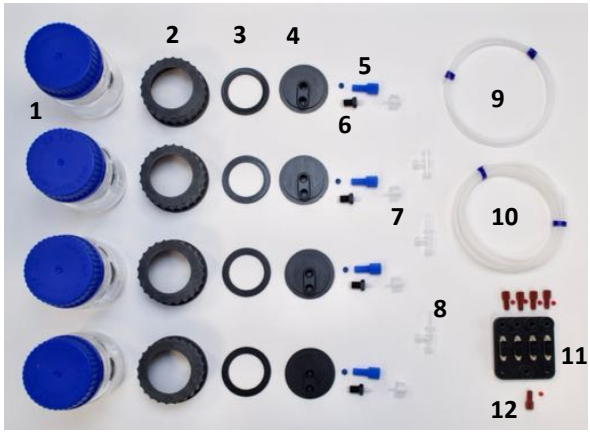
Description of Product

Intended Use

The memetis Soft-Pumping Bundle is an application example for the use of memetis miniature valves in microfluidic systems. Up to four different liquids or air can be controlled. The product can be used in life science applications, such as tissue engineering, in fluidic 3D cell cultures or organ-on-a chip. The product should only be used in controlled environments according to these instructions.

Bundle Overview

The following components are included in the scope of delivery of this product.



scope of delivery 1/2: fluidic components



scope of delivery 2/2: housing, electronics

1. 4 x liquid container with lid
2. 4 x lid closure (open)
3. 4 x sealing ring
4. 4 x lid with 2 x UNF ¼"-28 threads for connectors
5. 4 x IDEX®– UNF ¼“-28 connector for PFTE-hose
6. 4 x Screw connector for air pressure
7. 5 x Luer-adapter for pressure distributor
8. 3 x component for pressure distributor
9. 1 x hose for fluids (2m, OD 1.6mm, PTFE)
10. 1 x hose for air pressure (2m, OD 3mm, ID 2mm, silicon)
11. 1 x 4i/1o-Manifold (UNF 10.32 interface)
12. 5 x IDEX® – UNF 10-32 connector for PTFE-hose (manifold)
13. 1 x housing cover
14. 1 x housing bottom
15. 6 x housing wall
16. 3 x M3x16 screw connection (screw, nut)
17. 2 x memetis Electronic Control Unit (ECU)
18. 4 x ECU-valve connection cable
19. 2 x Micro-USB cable Typ B for ECU (without power adapter)

Additionaly Required Components

1. matching power plug / Laptop
2. allen keys
3. scissor

NOTE

Check the scope of delivery for completeness. Keep the packaging until the warranty period expires.

Technical Data

All product-related data sheets are available on our homepage.

Electronic Control Unit (ECU)

memetis offers a pre-programmed electronic control unit (ECU-P2) that can be controlled manually or through a graphical user interface (GUI). It allows intuitive operation of the valves mounted on the manifold. The data sheet, user manual and the GUI are available on our download page.

Normally-Closed Valve (Series09)

The shape memory alloy of the memetis 2/2-way valve enables complex fluidic systems in small dimensions with very low power consumption and silent switching. The valve can be used in a wide variety of applications. Since all components in contact with the fluid are made of biocompatible material, it can also be used for applications in life science.
Further information and a data sheet can be found on our download page.

Manifold

The 3D-printed valve manifold from memetis combines different fluids with each other through the internal structures and four 2/2-way valves. Four fluid inputs lead to one output. The individual valves can be selectively actuated to control the smallest amounts of liquid. Contact us if customization of internal fluidic channels or a different number of outputs and inputs is desired. More information can be found on our download page.

The Soft-Pumping Bundle

dimensions (wide X length X height)	135mm x 200mm x 125mm
weight (net)	1255g
Container capacity	4 x 100ml
Working pressure	max. 1 bar
material housing	Polymethylmethacrylat (PMMA)
material hose liquids	Polytetrafluorethylen (PTFE)
material lid of container	Polyoxymethylen (POM)
material liquid container	Glass Schott Duran®
material valve	Polyetheretherketon (PEEK), Silikon oder FKM
energy consumption	< 30 W

NOTE

Subject to technical changes; further data on valve, manifold and ECU can be found in our data sheets.

Further information and documentation

If you encounter any problems or questions during installation or operation, please do not hesitate to contact our customer service team (support@memetis.com). Also, if you are interested in other products or customized solutions, contact us.

General precautions and safety instructions

Upon Delivery

Check the packaging and product for possible transport damage. Do not put a damaged device in operation but consult your supplier. Remove and dispose of the packaging material properly.

Before Commissioning the Product

Read the operating and assembly instruction carefully. They contain important information on the assembly, use and maintenance of the device.
First check the supplied accessories for completeness and assemble them according to the following installation instructions. Set up the product on a firm and level surface.

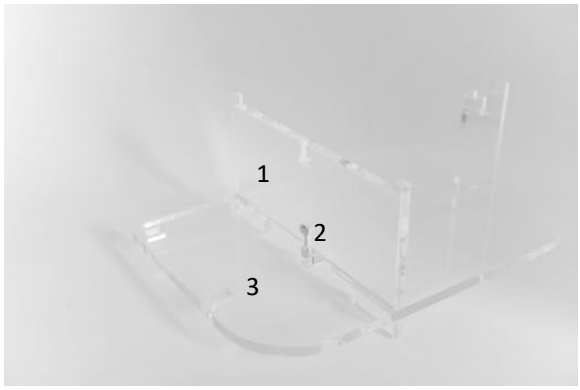
During Commissioning

Each commissioning and handling of the device requires the exact knowledge and observance of these operating instructions. The device is only intended for the use described.

Installation

Assemble Housing

- 1 x housing bottom
- 1 x housing cover
- 6 x housing wall
- 3 x screw connection
- 2 x memetis Electronic Control Unit (ECU)
- 4 x ECU-valve connection cable
- in addition: Allen key





1. Remove protective foil
2. Push the largest wall (1) section into the brackets provided as far as it will go. Place a nut in the rectangular wall cutout (2) and screw the screw into the wall from below.
3. Insert the four smaller wall sections into the cutouts provided. (3)
4. Place the two ECUs on top of each other.

   NOTE

   Lift the four smaller wall sections slightly and push them outward to allow better insertion of the ECUs.

5. Insert the medium wall section into the cutout provided and push it to the edge as far as it will go.
6. Insert the cover from above onto the wall parts. (4)
7. Mount the remaining 2 screws by placing both nuts in the rectangular cutout. Then screw the screw in the nut through the housing cover. (5)
8. Connect the ECU-valve-connection cable to the 2 ECUs by inserting 2 plugs into each ECU. (6)

Liquid containers

- 2.5m hose for air pressure
- 2.5m hose for liquids
- 4 x liquid container with lid
- 4 x lid closure (offen)
- 4 x sealing rings
- 4 x lid with 2 adapters
- 4 x IDEX® – connectors for fluids
- 4 x screw connector for air pressure





1. Cut the two hoses into 5 pieces each with the required length.
   CAUTION
   4 x hose (OD3mm): pressure distributor to container
   1 x hose (OD3mm): pressure source to pressure distributor
   4 x hose (1.6mm): container to manifold
   1 x hose (OD3mm): manifold to experiment

2. Unscrew the lids from the liquid container
   CAUTION
   The lids are not required during the experiment. However, they can be used again for sealing afterwards.

3. Attach the blue connector to the liquid hose. To do this, thread the connector onto the hose and attach the ferrule over the end of the hose. (1)
   CAUTION
   Make sure that the length between the end of the hose and the ferrule is equal to the height of the glass.
   ferrule: small cone-shaped component that must be placed on the hose with the tip pointing towards the IDEX® connector.

4. Screw the IDEX® connector hand-tight and straight into the thread of the cover. (2)
5. Push the hose for the air pressure onto the head of the black screw connector. Do this four times. (2)
6. Screw the connector hand-tight into the thread of the cover.
7. Pass both hoses through the open lid lock. Place the sealing ring on the rim of the container and close it with the lid lock. (3)
   CAUTION
   Lift the lid by taking the hoses in one hand and screw the lid tight from above. Do not bend the connectors

Pressure Distributor

- 3 x components for pressure distributor
- 4 x connectors for pressure distributor



1. Plug together the components of the pressure distributor. (1)
2. Screw the 5 Luer-adapters onto the outputs. (1)
3. Connect the tubing attached to the lid to 4 of 5 connectors.
   Slide the last free piece of tubing (OD3mm) onto the last free Luer adapter.

CAUTION
This is where the pressure source is connected.

Manifold

- 4i/1o-manifold
- 4 x liquid container for Manifold
-



1. Mount the IDEX® connectors on the fluid hose (OD3mm). To do this, thread the connector onto the free end and attach the ferrule so that the tip points towards the connector. (1)
2. Screw the IDEX® connectors (red) into the threads of the manifold.
3. Plug the ECU-cables onto the valves.

Handling of The Soft-Pumping Bundle

1. Fill up to four containers with liquid
   CAUTION
   The system must be switched off before filling. Do not unscrew the containers until they are pressure-free. The filling quantity must not exceed 100 ml.

3. Screw all containers hand-tight so that no air can escape.
   CAUTION
   There should be no noise from the lid. If there is a hiss, please tighten the cover and the connectors or remount them.

4. Connect the pressure source and pressure distributor with a hose.

5. Connect your experiment to the output of the manifold.
   CAUTION
   Make sure that all connections are tight.

6. Connect ECUs and power source with USB-cable
   CAUTION
   Have a look at the data sheet and the operating instructions of the ECU on our homepage.

   a. **option 1**: USB power plug as power source (up to 1500mA)
   b. **option 2**: PC/Laptop as power source (up to 100mA/500mA)

   CAUTION
   If there is an overcurrent condition, the outputs are immediately turned off for two seconds.

   WARNING
   Never connect a power source with higher electrical voltage.

   option 1: manual control of the ECU
   option 2: control of the ECU via Graphical User Interface (GUI)

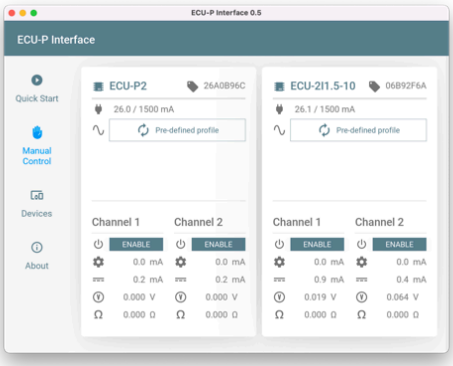
option 1: manual control of the ECU



ECU

Switch the valve from the basic state by pressing the button (1) on the ECU unit to which the valve is connected. The open valve remains supplied with 500 mA until the button is pressed again (toggle mode).

option 2: control of the ECU via GUI



A digital interface of the ECU-P2 is available via USB and I2C. This interface allows the de-/activation of output channels, as well as the adjustment of the output current and other configuration parameters. A detailed instruction manual and data sheet can be found on our download page.

Service

The bundle is easy to maintain and does not require any special maintenance during normal operation. Depending on the frequency of use, attention should nevertheless always be paid to signs of wear and tear to prevent improper use.

CAUTION

Always disconnect the power plug before maintenance and cleaning work.

Cleaning

To always ensure smooth operation, the unit should be cleaned at regular intervals. The hoses and the manifold should be carefully flushed after each use. To do this, a rinsing liquid (e.g. distilled water) is filled into each of the four liquid containers, pressure is built up and the valves are opened individually and then all four simultaneously. To collect the rinsing liquid, connect a collection container to the outlet of the manifold.

WARNING

Make sure that the ECUs do not get wet.

Exchange manifolds

Disconnect the ECUs from the power source and valves. Switch off the pump and release any residual overpressure. Have a cloth ready to catch any residual fluid. Check to see if there is any fluid left in the hoses. Then unscrew the four IDEX connectors from the threads to disconnect the hoses from the Manifold. Mount the valves from the old manifold to the new one. Replace the old manifold, plug the ECU cables back onto the valves and twist the hose connectors into the new manifold.

CAUTION

Make sure that the ECUs do not get wet.

Exchange pressure distributor

Disconnect all Luer-adapters from the pressure manifold. Replace the pressure manifold and reconnect the hoses.

CAUTION

Contact our customer support (support@memetis.com) if spare parts are needed.

Disassembly, Storage and Transport

malfunctions and repair

malfunction	possible cause	possible solution
liquids flow slowly	incompatible fluid used, fluid contains particles, manifold clogged	pump flushing liquid (e.g., distilled water) through manifold/hoses, replace manifold
Pressure in bottles is not built up	tanks are leaking, connectors are not connected properly, pressure distributor is not tight, pressure source is not working, ferrule at connectors was forgotten, sealing ring not centered	check connectors and tighten hand-tight, close pressure manifold hand-tight, check pressure source independently of system and rectify faults, check seals on connectors, turn full containers individually and hold hoses upwards to check tightness of cover
Valve does not switch	wiring between ECU and valve is not correct, Further errors see ECU instructions (e.g., flashing lights), wrong USB connection.	use new cable, both ECU cable and USB cable
system is leaking	connectors between hose and manifold/glass/pressure distributor leaking	re-tighten the screws on the cover (hand-tight), check the ferrule, push the hose further in.

CAUTION

If the above measures do not remedy the situation, contact our customer service department (support@memetis.com). Repairs may only be carried out by trained specialist personnel. Only original parts should be used for replacement.

Warranty

The warranty period for our devices is 24 months. Should a defect occur in your device within this time, please report it to our customer service (support@memetis.com). The memetis Soft-Pumping Bundle may only be operated in technically perfect condition. In the event of defects that could endanger users, the device may only be used again after it has been repaired. Damage caused by improper use, external mechanical influences, normal wear and tear of wear parts, the influence of force majeure, transport, and unauthorized manipulation of the device by unauthorized persons are not covered by this warranty. Defects claimed by the customer will be remedied by memetis GmbH at its own discretion and at the customer's expense by repair or delivery of new or reconditioned parts. Replaced parts become the property of memetis GmbH. Repairs carried out after the expiry of the warranty period are subject to a charge.

Spare parts and accessories

Contact our customer service department (support@memetis.com).

Disposal of the product

Dispose of the product in an environmentally friendly manner. Disassemble the product into its individual parts. Dispose of the glasses in the used glass and the plastic components in the recyclable material. Do not dispose of the ECUs in the household waste. Electronic waste must be collected separately and recycled in an environmentally friendly manner. If you have any questions, please contact your local waste disposal company.

Contact

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