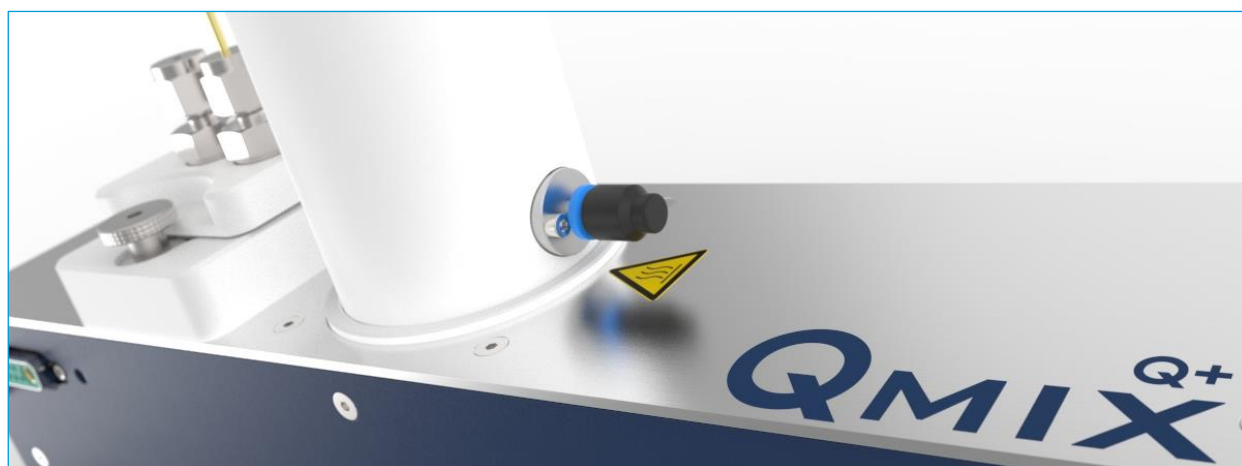
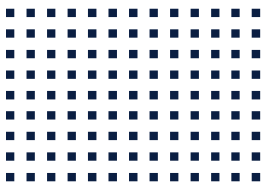


CETONI

CE QMIX Q+ Hardware Manual Heating Column



ORIGINAL MANUAL 2.00 – JANUARY 2016



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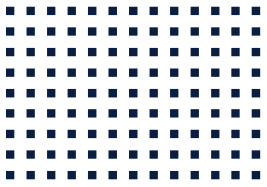
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1.2 Change History

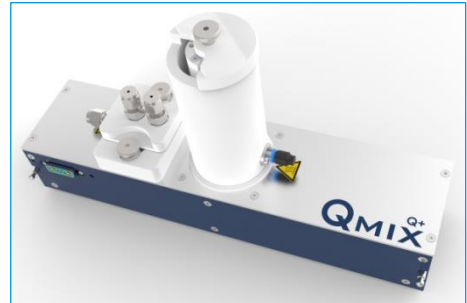
REV	DATE	CHANGES
1.00	18.12.2015	First version of Qmix hardware manual
1.01	05.02.2013	Various minor changes
1.10	12.09.2013	Added Qmix BaseXT and TC, power consumption Q+
1.11	21.08.2014	Adaptation of the maximum heating temperature of the Reaction module Q+ heating column and the High temperature T-mixer due to material changes.
2.00	04.01.2016	Separation into module-specific manuals

2 Scope of Supply

The following items should be included in the scope of supply:

QMIX Q+ MODULE WITH TUBE COIL

- Chip holder or mixer as ordered



CD-ROM QMIXELEMENTS WITH:

- Device drivers for the USB interface
- QmixElements Software
- Qmix SDK (optional)
- Qmix device configuration



HARDWARE MANUAL



3 Technical Data

3.1 Environment

OPERATING TEMPERATURE	0°C ~ 50°C
STORAGE TEMPERATURE	-20°C ~ 75°C
OPERATING HUMIDITY	20% ~ 90%, non-condensing
STORAGE HUMIDITY	20% ~ 90%, non-condensing

3.2 General Data

DIMENSIONS (L X W X H)	310 x 75 x 175 mm
WEIGHT	1,8 kg
MAXIMUM HEATING TEMPERATURE	200°C

3.3 Electrical Data

SUPPLY VOLTAGE	24 VDC
POWER CONSUMPTION	250 W max.

3.4 Interfaces

MOUNTING FOR CHIP HOLDER AND MIXER

4 Use

4.1 General Description of the Device

The Qmix Q+ module with tube coil is a part of the Qmix micro reaction and analysis system. It enables the heating of microfluidic chips and mixers as well as a retention loop.

4.2 Intended Use

The Qmix Q+ module with tube coil is used to perform microfluidic reactions under defined temperature conditions. It is intended only to be used in a Qmix micro reaction system from CETONI GmbH. The application is usually carried out in laboratory-like rooms.

4.3 Reasonably Foreseeable Faulty Application

A use for applications distinct from the intended purpose can lead to dangerous situations and is to be omitted.



CAUTION. The unit must not be used as a medical device or for medical purposes!

4.4 Safety Advice

For the safe operation of Qmix Q+ module it is necessary to observe the safety measures from the general section of the manual for the Qmix micro reaction system.



IMPORTANT. Please read this manual, the general part for the Qmix system, as well as the related software manual carefully and completely before putting your Qmix Q+ module into operation.

5 Transportation and Storage

The individual modules must not be lifted or transported plugged-together. Transportation of plugged-together devices is only allowed in the original packaging.

Use the original packaging for transportation or shipping of the module.

Concerning the storage conditions, please observe the data from chapter “Technical data”.



CAUTION. Risk of damaging the device. Do not transport the modules plugged-together.



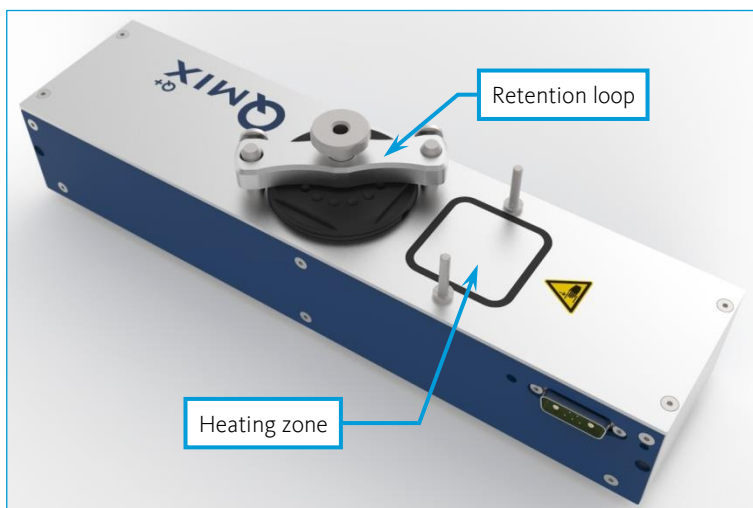
CAUTION. Transportation, storage or operation of the modules below 0°C with water in the fluid passages may cause damage to the module.

6 Operation



The Qmix Q+ module provides two separately controllable heating zones for temperatures up to 200°C. The operation concerning the software is treated in the related software manual.

The first heating zone can be equipped with chip holders for microfluidic chips and with mixers. The second heating zone is a column that allows winding up a retention loop with a variable length.



The assembly of chip holder or mixer as well as the operation of the detention section are described in the following chapters.

6.1 Mounting the Chip Holder

Each chip holder is individually designed to fit your chip layout. The following instructions are for chips whose connections are simple holes on one of the big flats. Flanged PTFE tubes are pressed on the connections of the chip. O-Rings behind the flange of the tube serve as a preload of the connection and as a compensation of tolerances.



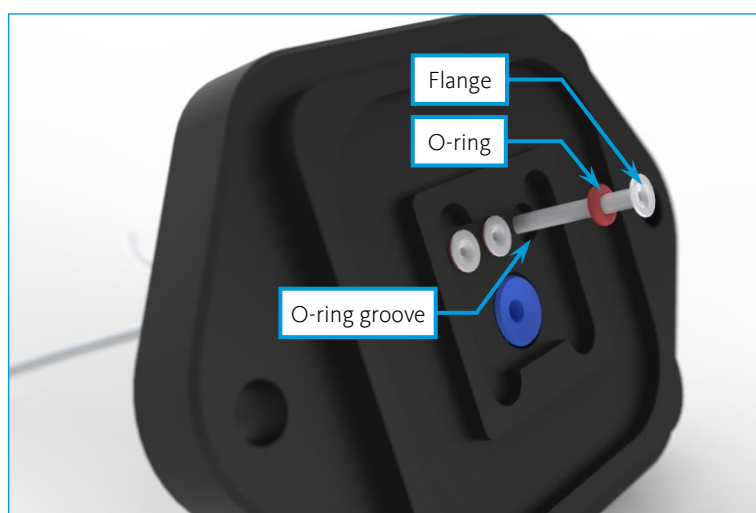
CAUTION. Check the chemical resistance of the wetted parts (chip and tubing) against the used chemicals before using the device.



CAUTION. The chip holder is suitable for a maximum operating pressure of 10 bar.

Proceed as follows to insert a chip into the chip holder:

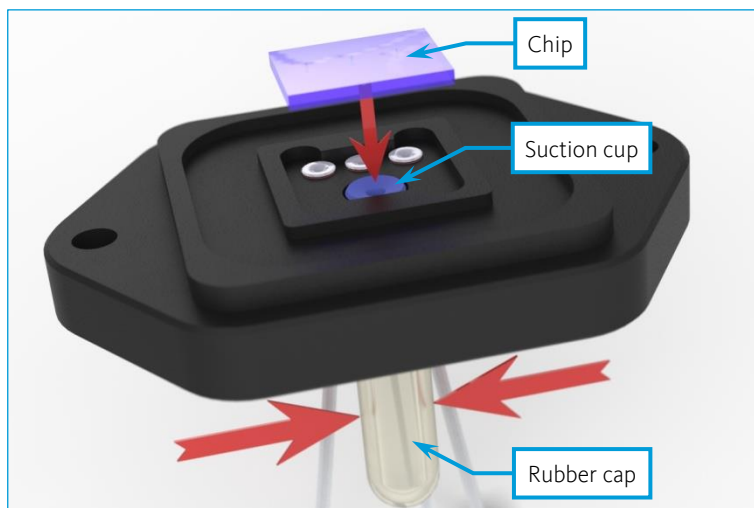
- (1)** Cut the tubes of the inputs and outputs so that they extend to the previous or subsequent interfaces.
- (2)** Flange one end of the tube. The diameter of the flange should be about 3-4mm. A tool kit to make the flanges can be purchased from CETONI. Try to produce a flange as even as possible, to achieve a good sealing effect.
- (3)** Thread an O-ring on the tube and plug it through one of the connecting holes of the chip holder from the inside. Press the O-ring into the corresponding groove of the chip holder.



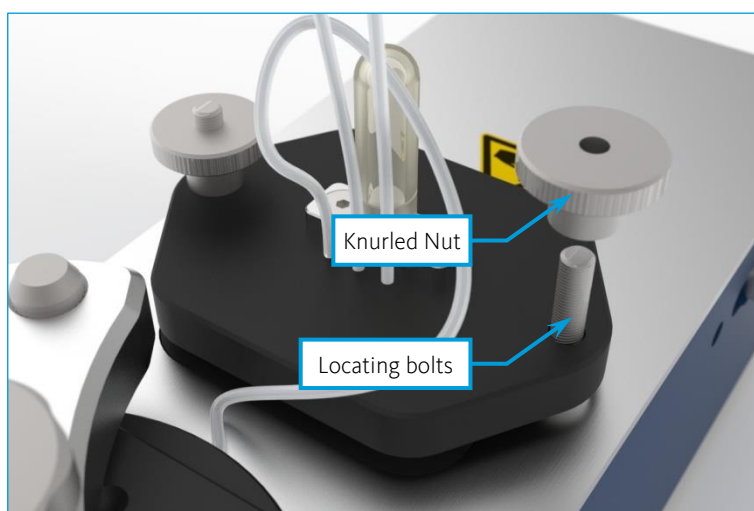
- (4) Compress the rubber cap on the top side of the chip holder and insert the chip so that the connection openings of the chip and the flanged tubes align. Press the chip down on the suction cup and then release the rubber cap. The chip is now fixed and you can mount the chip holder onto the Qmix Q+ module.



IMPORTANT. Moisten the suction cup or the chip to improve the suction effect.



- (5) Mount the chip holder on the Qmix Q+ module. For this, remove the two knurled nuts from the locating bolts. Then slide on the chip holder onto the bolts and reassemble the knurled nuts. Tighten the nuts alternating and equally until they are finger-tight.



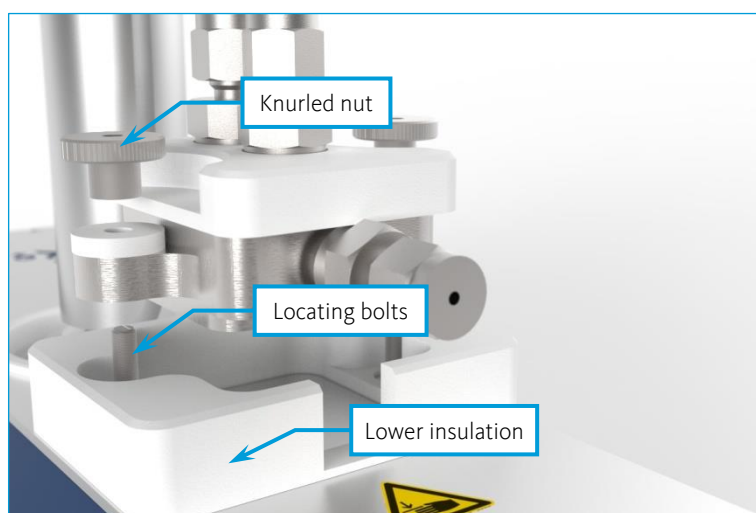
CAUTION. The chip holder can become very hot during operation. Do not touch it during operation and let it cool down before you carry out any assembly work.



CAUTION. After connecting, check the tightness of all fluidic connections on a regular basis.

6.2 Mounting the High Temperature Mixer

Mount the mixer on the Qmix Q+ module. For this, remove the two knurled nuts from the locating bolts and place the lower insulation on the device as shown in the picture. Then slide the mixer onto the bolts and reassemble the knurled nuts. Tighten the nuts alternating and equally until they are finger-tight.



CAUTION. The mixer can become very hot during operation. Do not touch it during operation and let it cool down before you carry out any assembly work.

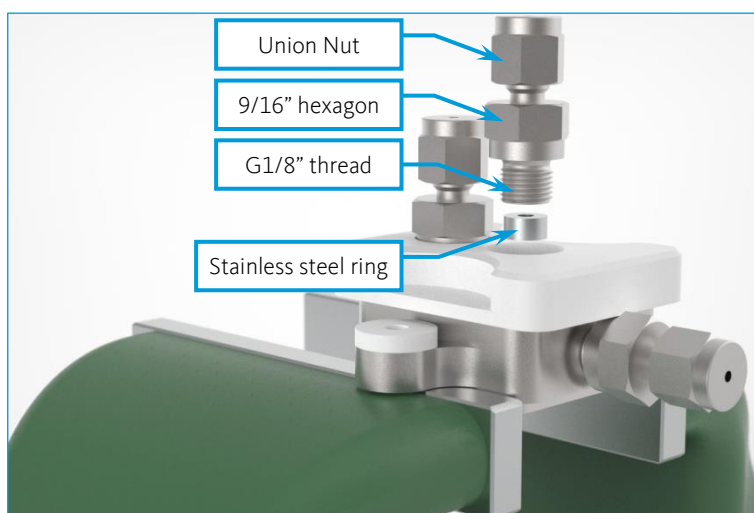
Screw-in fittings with a Swagelok® tube fitting are used for the fluidic connection. They are suitable for using capillaries made from metal (e.g. stainless steel, titanium) and plastic (e.g. PTFE, PEEK). Please refer to information provided by the respective manufacturer with respect to maximum pressure.

For the assembly and disassembly of the fittings you need a 9/16"-open-end wrench. Place the stainless steel ring in the tapped hole before mounting the fittings. Then screw in the fittings and tighten them to a torque of about 45 Nm.



CAUTION. Clamp the Mixer in a vice to exchange the fittings. The following picture shows how this should be done. The mountings on the devices only serve for fixation and are not designed for the forces occurring during fitting exchange. Tighten the union nuts

in a vice as well, if possible.



Depending on the type of tube fitting, capillaries with an external diameter of 1/16" or 1/18" can be used. For the Assembly or Disassembly of the tube fittings of the 1/16" version, you need a 5/16" open-end wrench and for the 1/8" version you need a 7/16" open-end wrench.

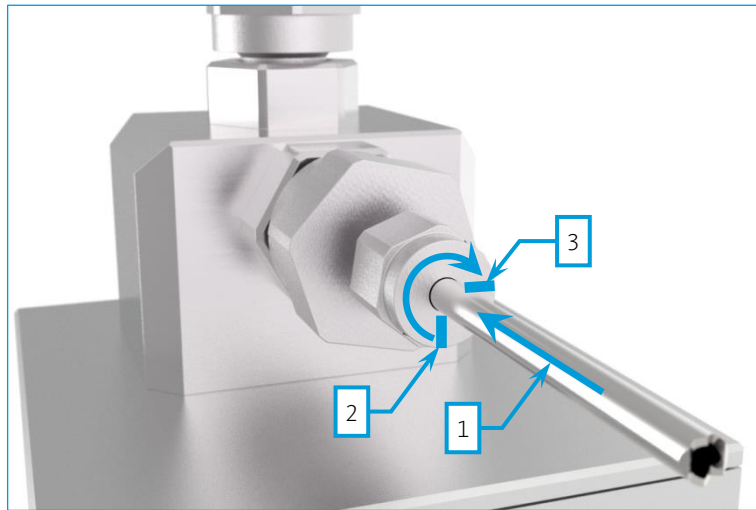
The operation of the tube fitting is explained in the following sections.



CAUTION. Make sure that the capillary tubes or hoses, you want to use, are suitable for the expected temperatures and pressures. Check the tightness of all fluidic connections after connecting and on a regular basis.

6.2.1 Tube Fitting First-Time Installation

- (1)** Fully insert the tube or hose into the fitting and against the shoulder. Then rotate the nut finger-tight.
- (2)** Mark the nut at the 6 o'clock position.
- (3)** Tighten the nut three-quarters turn to the 3 o'clock position with an open-end wrench.

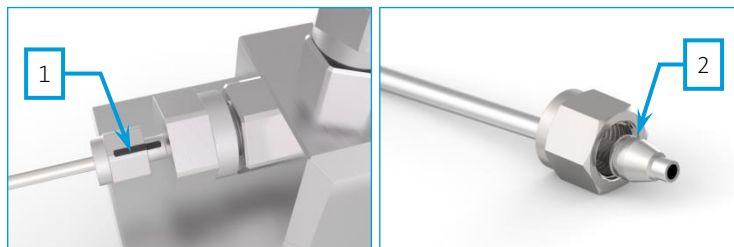


6.2.2 Tube Fitting Disassembly



CAUTION. Release pressure from the system before loosening the fittings.

- (1) Before dismantling, draw a marker line across the union nut and the fitting body. In this way you create a reference for retightening the union nut to exactly the same position it was in before.
- (2) Pull out the capillaries. The nut and the ferrules remain on the capillary.



6.2.3 Tube Fitting Reassembly

- (1) To reassemble, insert the capillary with preassembled ferrules into the fitting body until the front ferrule seats against the fitting body.
- (2) Rotate the nut with open-end wrench to the previously pulled-up position as indicated by the marks you made before; at this point you will feel a significant increase in resistance.
- (3) Retighten the nut slightly.

6.2.4 Tube Fitting Spare-Parts

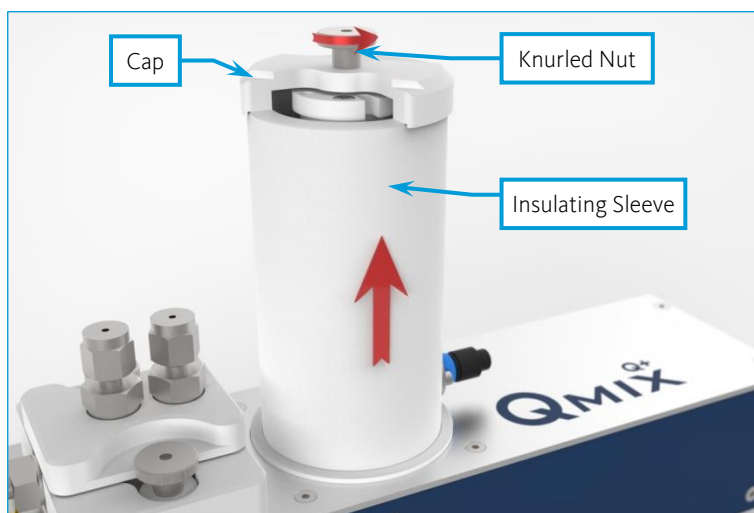
You can purchase Spare-parts for the tube fittings directly from Swagelok®.

DESCRIPTION	1/16"	1/8"
Complete Fitting	SS-100-1-2RS	SS-200-1-2RS
Union nut and ferrule set	SS-100-NFSET	SS-200-NFSET
Ferrule set	SS-100-SET	SS-200-SET

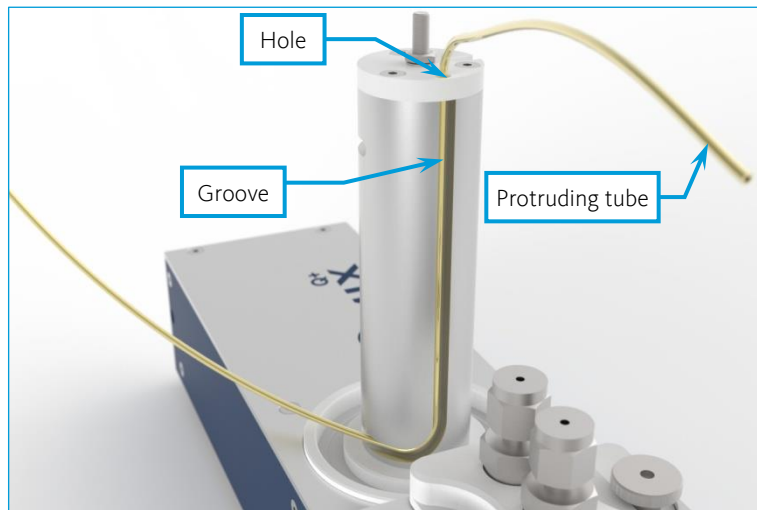
6.3 Mounting the Heating Column

The heating column is intended for use with flexible hoses as well as with thin metal capillaries. The handling is explained below:

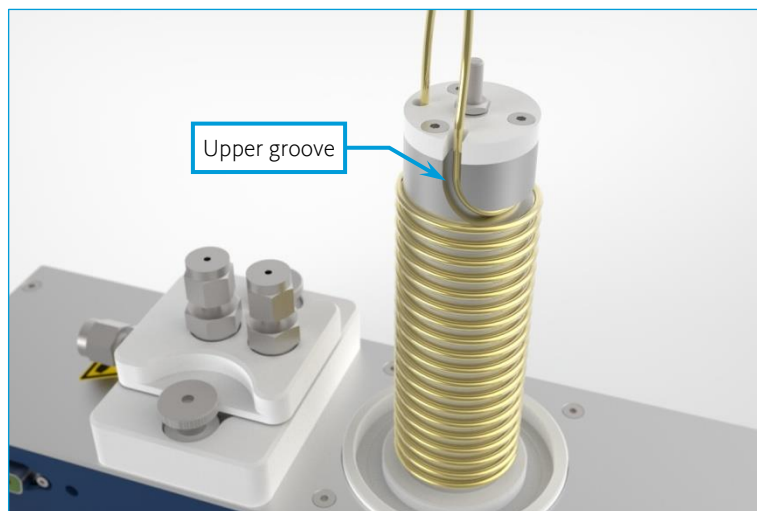
- (1)** Remove the knurled nut, take off the cap and the lift off the insulating sleeve.



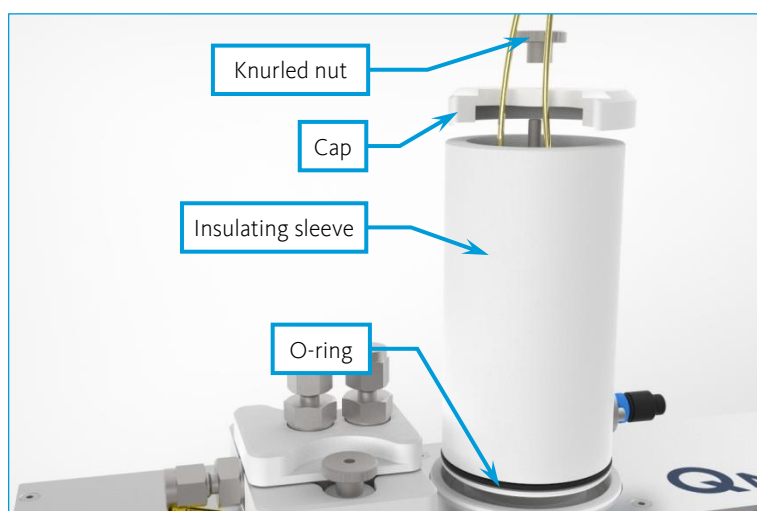
- (2)** Cut the tube so that its length allows to create the retention loop of the desired length and to extend further to the previous and subsequent interface.
- (3)** Thread the tube through the hole in the top piece of the heating column from above. The piece of tube, protruding from the hole must be long enough to extend further to the T-mixer or chip holder. Insert the other end into the groove leading down the column, as shown.



- (4) Wind the tube around the heating column until the retention loop reaches the desired length. Then insert it into the upper groove of the heating column.



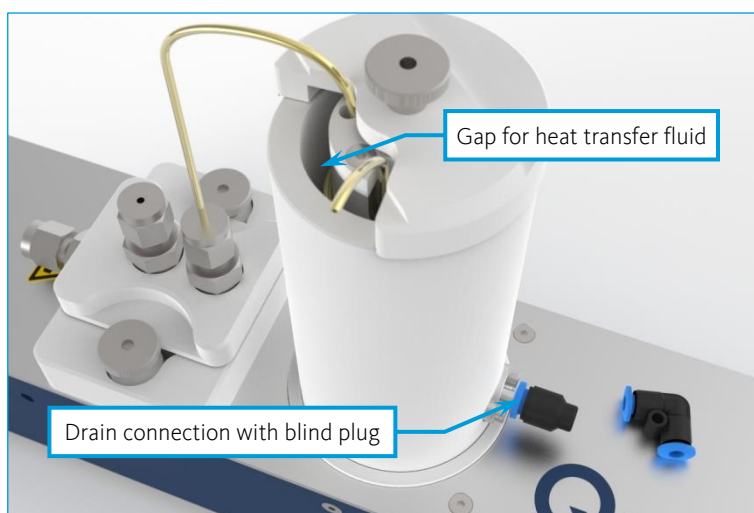
- (5) Put the insulating sleeve over the protruding tubes and the heating column. Push the insulating sleeve down until the O-ring in its lower part is no longer visible. Then put the cap back on the sleeve and fixate it with the knurled nut.



(6) Connect the protruding tube ends to the respective interfaces.

To optimize the heat transfer from the heating column to the tube, the gap between the heating column and the insulating sleeve can be filled with heat transfer fluid (e.g. silicone oil).

To drain the heat transfer fluid, use the drain connection. Therefore attach a tube to the drain connection or use the supplied connector for tubing with 4mm outer diameter. Connect a syringe to the other end of the tube and draw to remove the heat transfer fluid completely. Otherwise remaining heat transfer fluid can ingress the device when the insulation sleeve is removed, and cause damage.



CAUTION. The components on the device can be very hot during operation. Do not touch them during operation and let them cool down before you carry out any assembly work.



CAUTION. The heat transfer fluid can be very hot during operation. There is a risk of scalding! Let it cool down before you carry out any assembly work. The heat transfer fluid may not boil!



CAUTION. Use a tube and as syringe to drain the heat transfer fluid completely, before you remove the insulation cover.

7 Maintenance and Care

If used in accordance with intended purpose, the device is maintenance-free. Should there be a failure despite this, which you cannot eliminate yourself, or which requires opening the device, please contact CETONI GmbH to coordinate further actions. The device may only be opened by CETONI GmbH or thereby authorized service staff. Otherwise the warranty and guarantee claims are void.

Software-related troubles are dealt with in the Software Manual.

For cleaning it please rub the surface gently with a soft, damp cloth. The cloth must not be wet, so that no fluency can trickle into the device. In case of a heavier soiling you can also use a little bit of detergent or alcohol.