PAUL GOTHE BOCHUM

PAUL GOTHE – GMBH

Instruction for the assembling of the suction tubes

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Instruction for the assembling of the suction tubes for dust and gas measurement

The suction tubes by Paul Gothe have to a large extent a structural similarity so that the handling is as simple as possible. Basically there are three versions of each suction tube:
An unheated, an electrically heated and a water-cooled modification respectively one heated by a fan heater.
These are again divided into suction tubes with a firmly welded interior tube and such ones for removable interior tubes.

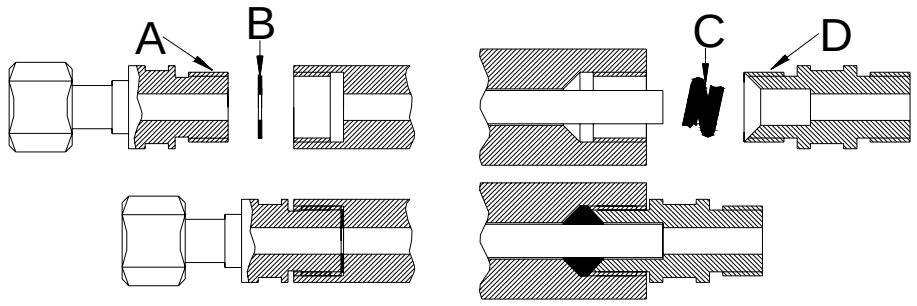
1. Assembly of suction tubes with firmly welded interior tube (10 x 1 mm)

Valid for standard suction tubes: 4.1 (lance), 4.2 (electrically heated), and 4.51, 4.61 & 4.71 (combination probe).

These suction tubes can be used without further assembly. They are checked for tightness ex works. The suction tubes have an internal thread G ½ as their input to connect the nozzle with elbow fitting and adapter. The output has an external thread G ½. A hose connecting quick-coupler is ex works installed with a plug for a ½"-hose (12 mm). Further adapters can be screwed onto this thread in order to attach adsorption systems (e.g. washing bottles). In the entire system the internal width is 8 mm so that the filter device can be installed both in front of the suction tube and behind it.

For the G ½ screw connections seal type Di 8 is put into the internal thread.

The heated suction tubes with firmly welded interior tube 10 x 1 have a double nipple at the output. If this is screwed out, the assembly has to be performed as follows:
Put the packing cord between the fixed interior tube and the internal thread of the suction tube. Press tight with screwdriver until approx. 3 mm of the internal thread can still to be seen. Tightly screw the double nipples into the internal threads.



Picture 1: Design of the suction tube with fixed inner tube.
A: Adapter 3.01; B: Seal Di-8; C: Packing Cord; D: double nipple

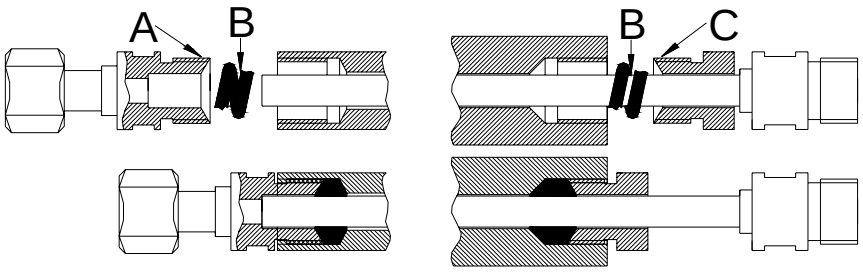
2. Assembly of suction tubes with exchangeable interior tubes 10 x 1 mm

Electrically heatable suction tubes

These suction tubes have internal threads G ½ at the input and output to screw in stuffing boxes there. Around the welded interior tube 14 x 1 mm there is wounded the spiral cartridge heater. This tube is not sealed in the rear section opposite of the suction tube so that the interior tube can execute the length extension during the heating process. Therefore this tube cannot be used as interior tube but there must always be installed an interior tube 10 x 1 mm. This is also important for keeping a continuous internal diameter of 8 mm from the nozzle to the end of the interior tube. When using an interior tube with G ½ at the output, the filter device can be installed both before and after the suction tube.
The installation of the exchangeable interior tube always takes place according to the same principle. Stuffing boxes are used when the suction tube is to exceed over the stuffing box (usually at the output of the suction tube). The stuffing box at the output of the suction tube is not meant to seal the gas but only to adjust the interior tube. The interior tube must still be able to shift during the heating process, due to its length extension. At the input adapter (Item No: 3.01) or a stuffing box are used. The adapter has a drilling so that the interior tube exactly fits inside. Thus it is made sure that no cleft develops and the internal diameter is constantly 8 mm. Here it must be ensured that the stuffing boxes and the adapter are screwed to the input of the suction tube in a gas-tight way.

Instruction for the installation of the exchangeable interior tube (electrically heatable suction tubes).

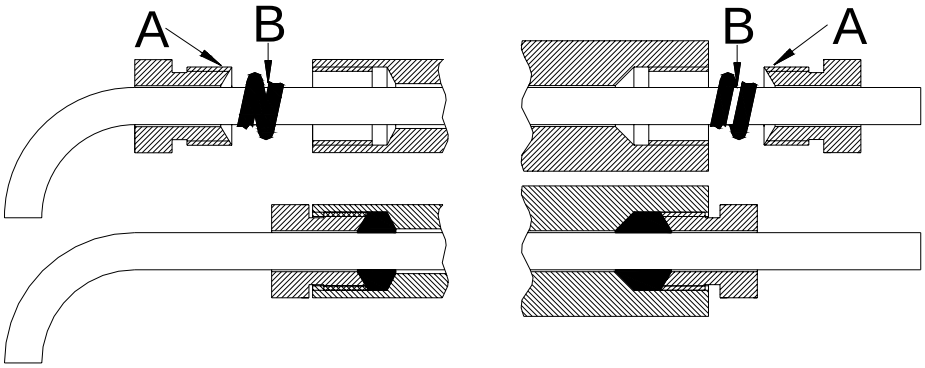
1) Shove the back stuffing box over the interior tube and insert the exchangeable interior tube from the rear into the suction tube so that it sticks about 5 mm out of the suction tube.
2) Now spirally turn approx. 100 mm graphitized mineral fiber packing cord around the interior tube at the output of the suction tube and push this into the internal thread of the suction tube. With the stuffing box the graphitized mineral fiber packing cord is pressed against the interior tube which is thus fixed. The stuffing box must not be tightened too much for the interior tube has to keep movable.
3) Now a second graphitized mineral fiber packing cord (approx. 100 mm) is spirally turned around the outsticking interior tube at the other side of the suction tube (entry) and pushed into the internal thread of the suction tube. Then adapter No. 3.01 or the stuffing box is screwed into the internal thread of the suction tube through the interior tube (it is possible that the interior tube is shifted to the back thereby). Thus the interior tube is fixed in a gas-tight way (attention with glass!). Absolutely make sure that the interior tube presses firmly against the adapter so that the interior tube pushes to the end of the adapter's drilling without a transitition.
4) After that the interior tube is fixed by a further tightening of the stuffing box at the output of the suction tube. The interior tube must still be able to shift during the heating process, due to its length extension.
According to the structure, either the filter device or the elbow fitting are screwed in. At the front there is the suction nozzle.
The interior tube can be supplied with a smooth output, with a G ½ external thread for the connection of the filter device OUT-STACK or for the hose fast connector respectively with ball KS 19 for the connection of washing bottles.



Picture 2: Design of the suction tube with exchangeable inner tube.
A: Adapter 3.01; B: Packing Cord; C: stuffing box

Assembly instruction for the application of 90°-curved glass tubes:

Before inserting the curved interior tube into the suction tube, the front stuffing box must be shifted over the suction tube from the rear. Only then should the interior tube installed. Now a graphitized mineral fibre packing cord (approx. 100 mm) is spirally turned around the interior tube and pushed into the internal thread of the suction tube. With the stuffing box the packing cord is pressed against the interior tube which is thus fixed. The stuffing box must not be tightened too much for the interior tube has to keep movable. Now, at the other side of the suction tube, a second graphitized mineral fibre packing cord (approx. 100 mm) is spirally turned around the interior tube, pushed into the internal thread of the end of the suction tube while the stuffing box is screwed in as far as possible. Subsequently, the interior tube is fixed by a further tightening of the stuffing boxes at the entry of the suction tube. The interior tube must still be able to shift during the heating process, due to its length extension.



Picture 3: Design of the suction tube with exchangeable inner tube.
A: stuffing box 3.01; B: Packing Cord

3. Assembly of coolable suction tubes for exchangeable interior tubes 10 x 1 mm

These suction tubes do not have further interior tubes so that the cooling water can directly get into contact with the gas-leading interior tube. Also a heater can be attached to the connections for the water cooling.
Exchangeable quartz -, duran glass or titanium tubes can to be used. Inside the suction tube are guide applications through which the interior tubes can be pushed quite easily.
Concerning their structure, the suction tubes are alike.
If the suction tube is cooled, the temperature area of application is independent of the material of the suction tube. If the cooling water flows through the outside tube first and is afterwards led into the tube which is inside, even measurements in temperature areas up to approx. 1000°C can be executed. For these high-temperature measurements special elbow fittings with firmly welded nozzles made of material 1.4841 must be used. Likewise 90°-curved quartz tubes can be inserted at the input. Therefore please consider the information below.

Assembly

Particularly during the water cooling process the interior tube must be sealed well. Thus, there are stuffing boxes at the in- and output of the suction tube or adapter 3.01 is used at the input of the suction tube.

Instruction for the installation of the exchangeable interior tube with water-cooled suction tubes

1) Shove the back stuffing box over the interior tube and insert the exchangeable interior tube from the rear into the suction tube so that it sticks about 5 mm out of the suction tube.

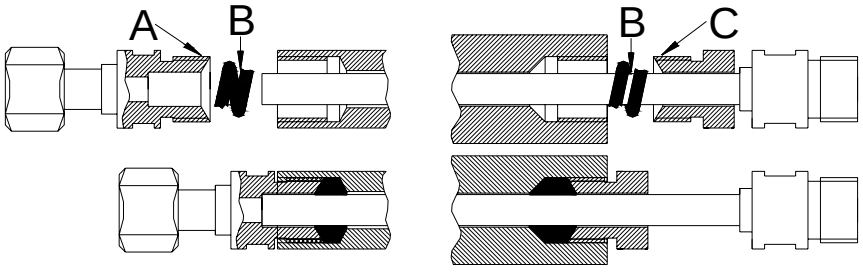
2) Now spirally turn approx. 100 mm teflon packing cord around the interior tube at the output of the suction tube and push this into the internal thread of the suction tube. With the stuffing box the teflon packing cord is pressed against the interior tube which is thus fixed. The stuffing box must not be tightened too much for the interior tube has to keep movable.

3) Now a second teflon packing cord (approx. 100 mm) is spirally turned around the outsticking interior tube and pushed into the internal thread of the suction tube. Then adapter 3.01 or the stuffing box are screwed into the internal thread of the suction tube through the interior tube (it is possible that the interior tube is shifted to the back thereby). Thus the interior tube is fixed in a gas-tight way (attention with glass!). Absolutely make sure that the interior tube presses firmly against the adapter so that the interior tube pushes to the end of the adapter's drilling without a transition**.**

4) After that the interior tube is fixed by a further tightening of the stuffing box at the output of the suction tube and thus sealed against water escape (attention with glass!).

According to the structure, either the filter device or the elbow fitting are screwed in. At the front there is the suction probe.

The interior tube can be supplied with a smooth output, with a G ½-external thread for the connection of the filter device OUT-STACK or for the hose connecting quick-coupler respectively with ball KS 19 for the connection of washing bottles.



Picture 4: Design of the suction tube with exchangeable inner tube.
A: Adapter 3.01; B: Packing Cord; C: stuffing box

Assembly instruction for the application of 90°-curved glass tubes:

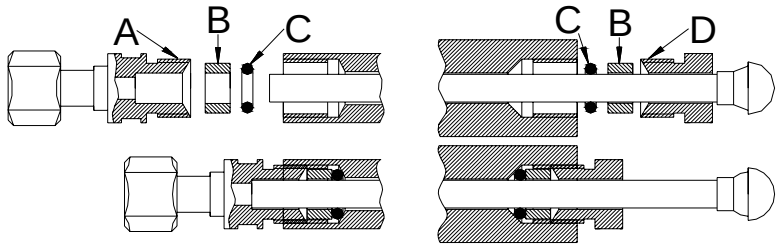
Before inserting the curved interior tube into the suction tube, the front stuffing box must be shifted over the suction tube from the rear. Only then should the interior tube installed. Now a teflon packing cord (approx. 100 mm) is spirally turned around the interior tube and pushed into the internal thread of the suction tube. With the stuffing box the packing cord is pressed against the interior tube which is thus fixed. The stuffing box must not be tightened too much for the interior tube has to keep movable. Now, at the other side of the suction tube, a second teflon packing cord (approx. 100 mm) is spirally turned around the interior tube, pushed into the internal thread of the end of the suction tube while the stuffing box is screwed in as far as possible. Subsequently, the interior tube is fixed by a further tightening of the stuffing boxes at the entry of the suction tube. The interior tube must still be able to shift during the heating process, due to its length extension.

Version 2:
Installation of a exchangeable interior tube with water-cooled suction tubes

An even simpler version is the use of O-ring seals with the provided spacer.

Sequence of the installation:

Shove the stuffing box, spacer and O-ring seal over the interior tube. Bring the interior tube into the suction tube. Shove the O-ring seal, spacer piece and adapter 3.01 over the interior tube. Firmly tighten the stuffing box. Check for tightness.



Picture 5: Design of the suction tube with exchangeable inner tube.
A: Adapter 3.01; B: Spacer; C: O-Ring Seal

Note:
Heating with fan heater: Only use mineral fiber cord.
With water cooling: Only use teflon cord or O-ring seals.

4. Instruction for the installation of a exchangeable interior tube when using suction tubes with fan heaters

If the suction tube is to be heated by fan heater, the sections of the water supply and removal have to be screwed off and the holder for the fan heater must be installed. All packing cord material must be mineral fiber!
The installation of the interior tube is performed in the same way as described below `cooling‘, except that now a mineral fiber cord is used.

5. General notes

Note for the cooled suction tubes:

The outermost end of the suction tube has a part with ¾-thread. If the glass interior tube breaks with its use and the glass fragments are to be removed, the end piece can be unscrewed here and the fragments can be removed through the G ¾ thread. The black Nyhalit-seal is to be checked for wear when assembling it and has to be renewed if necessary.

Demands on the heating controller

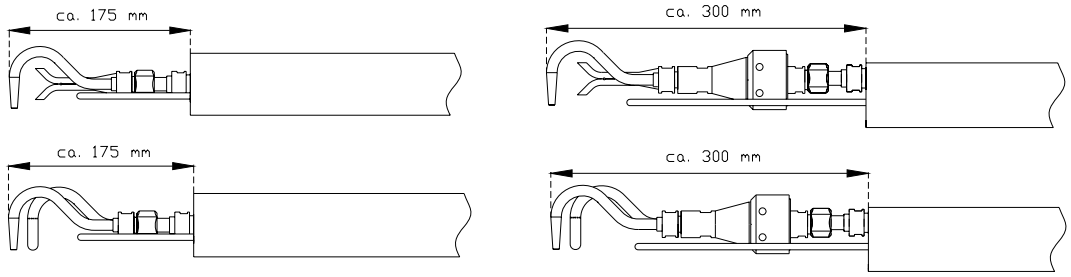
In order not to shorten the life span of the inserted heaters by overstressing, we recommend a heating controller with automatic soft-start function. By this function the existing humidity in the heaters can escape slowly.
The electrically heatable suction tubes should generally be stored with room temperature and dry. If this is not possible, it is absolutely necessary to slowly warm up the suction tube beforehand with small power (current limit!) and to heat it for ½ hours at 80 to 120°C. Only after this the electrically heatable suction tube can be used.

We recommend our heating controller with PID automatic control.

Note concerning the combination probe

Insertion of the S-Pitot or Prandtl-pitot-tube at the combination probe

In order to connect the Prandtl- or S-Pitot-tube at the combination probe use the compression type fitting. For each use (filter IN- or OUT-Stack can order a separate Pitot tube. According to the EN-Guidelines must be the tip of the Pitot tube 50 mm away from the tip of the nozzle.



6. Important note for the use of the suction tubes within the high temperature area !

In order to bring the cooling water into contact with the entire external tube and to prevent the building of bubbles, a complete filling of the suction tube with cooling water is necessary. This is achieved by holding the tube in a horizontal position and by directing the water supply and removel upwards. The water supply is fixed to the front connecting piece (the cooling water is first led to the external tube) and filled with water. The deareation is performed by the output tube connection. Finally, absolutely move the suction tube up and down at its ends so that all air can escape.

Absolutely consider:

Before inserting the suction tube into hot gases, the water cooling must be started up with a sufficient quantity of water (approx. 20 1/min).

On the side of the water inflow there should be used at least a 3/4 " pressure resistant hose to ensure the necessary quantity of water. In order to avoid a bending of the exit-water-hose and thus a backwater (of the warmed water), on the side of the water outflow there must likewise be used a 3/4 " pressure resistant hose with free outlet.

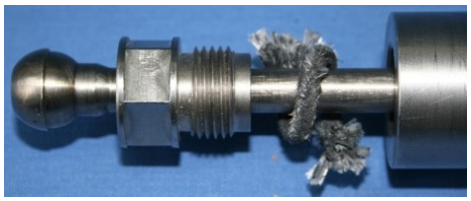
For example: Combi-Probe with exchangeable inner tube
Als Beispiel: Kombi-Sonde mit auswechselbarem Innenrohr

Bis 80°C (200°C bei Viton)
Messinghülse mit O-Ring.

Viton-O-Ring auf Anfrage

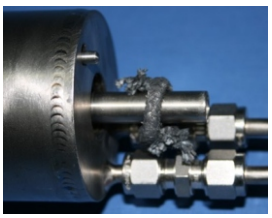
Up to 80°C (200°C if Viton)
Brass sleeve with O-ring.

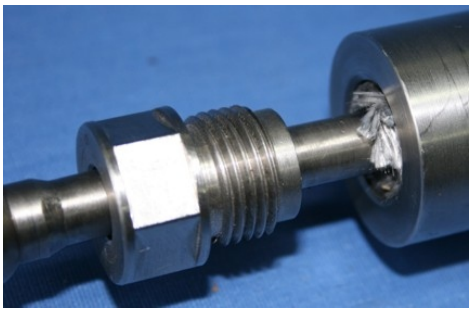
Viton O-ring on request

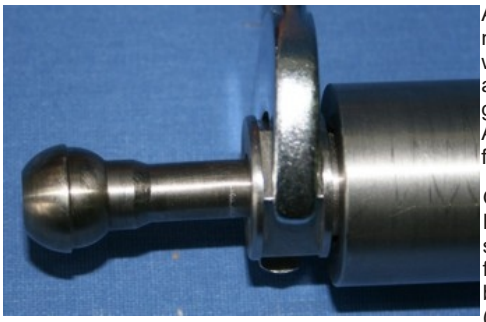


Für beheizbare Absaugrohre:
Packungsschnur (Mineralfaser)
in das Gewinde drücken und wie unten beschrieben Innenrohr fixieren.

For heated suction tube:
Use packing cord (mineral fibre)
press the cord into the thread
and fix the inner tube as describe below.

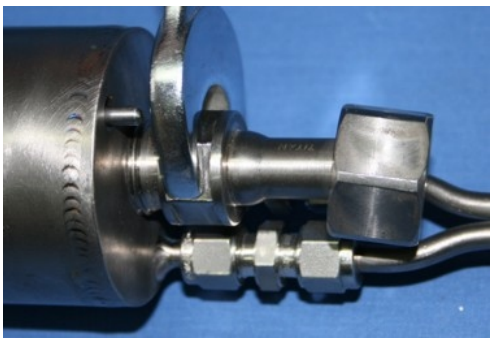






Allgemein:
Erst Stopfbuchse am Ausgang vom Absaugrohr einschrauben, Innenrohr nach vorne schieben, anschließend wird durch Einschrauben des Eingangs-adapters (3.01) das Innenrohr zurück-geschoben. Adapter 3.01 festschrauben. Am Ende Stopfbuchse am Ausgang festschrauben.

Generally:
First fix stuffing box at the exit of the suction tube, shove inner tube to the front and after it shove the inner tube back by screwing the front adapter (3.01) into the front thread.
In the end tighten the stuffing box at the exit.



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Zeichnungs-Nr.:

How to fix the inner tube in the suction tube
Fixieren des Innenrohres im Absaugrohr

Be/Rd

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Instruction and technical data

according EMVG v. 09.11.1992 and 1. EMVGÄndG

for

heated probe / heater for filter device

Before use check the electrical condition of the appliance. For your safety: Don't connect with the power supply if you can see any damage.

Use this heater only in combination with a regulator. Don't use it without any controlled power supply -also not a short period–.

How to use:

1. Connect the thermocouple at temperature regulator.
2. Connect plug to power supply of the temperature regulator.
3. Set the temperature at the regulator

Technical Data

power supply:	max 250 V; 48 ... 62 Hz
max. temperature:	600°C
isolation resistanze (cold):	≥ 5 MΩ at 500 V-DC
leading away current:	≤ 0,1 mA bei 253 V-AC
thermocouple:	NiCr-Ni: 20 ... 1200°C
material heater:	CrNi-Stahl
isolation heater:	MgO