

FIELD OF APPLICATION

The **smoke pump** determines the soot spot number in combustion.

Basic safety instructions

!!! Warning !!!

- Before using the smoke pump, warm it up to room temperature.
- After approx. 10 measurements, check the withdrawal probe up to the valve for soot deposit and, if present clean it. Apply the same to all the others pump parts; this operation should be done regularly (See chapter: "Maintenance of the pump").
- Occasionally test the smoke pump for leaks (see chapter: "Testing the pump for leaks"). It is recommended to keep the soot picture comparison scale always in its wrapper and thus clean.

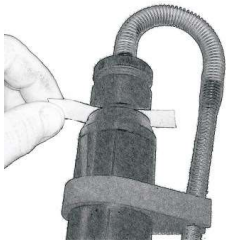
!!! Read carefully !!!

- It is precondition that the smoke pump is exclusively used according to the intended use.
- Do not apply excessive force to the testing instrument. (It may break)

TEST OPERATION. SMOKE SAMPLING

Before taking the smoke sample, the burner should already be in operation for at least 5 minutes.

A. Insert the filter paper in the opening on the pump head and clamp it with a clockwise rotation of the probe head.



B. Bring the probe tube through the measuring vent of the exhaust pipe in the middle of the flue-gas flow.

C. Perform 10 full suction strokes;

draw slowly and uniformly (suction stroke), shortly pause at the stop (pressure equalization), than move back fast. According to the prescription, $1.63 \pm 0.07 \text{ dm}^3$ exhaust gas are thereby drawn through the filter paper.

The operation time of the 10 strokes has to be 40-60 seconds.

D. Release the probe head with a left-hand rotation and extract the filter paper stripe. A measuring spot with the corresponding coloring remains on the filter paper.

To define the exact soot number, you have to take at least 3 samples! The soot spot number is averaged out of them.

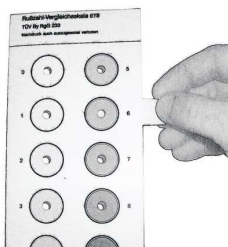
In case of a sluggish operation of the pump, lubricate the piston packing (see the chapter: "Lubrication of the soot pump")!

TEST FOR OIL DERIVATE

A. Test the measuring spot for oil-derivate. For that purpose, drop some acetone solvent next to the measuring spot. If there is no grey coloration, no oil is contained in the sample, which is correct.

Otherwise

If there is a grey coloration of the measuring spot: The exhaust gas contains oil! Inspect the oil burning installation! Hold the filter paper with the measuring spot behind the grey scales of the soot picture comparison scale until the spot appears fully in center and read off the soot spot number. The shade of grey looking more likely to the measuring spot density shows the soot spot number.



C. Now average over the soot spot numbers of all samples taken. This value, rounded up to the next whole number, is the value respectively the soot spot number of the installation.

MAINTENANCE

Cleaning of the smoke pump.

Remove lightly adhering soot particles:

- For this purpose, make some firm pump strokes, the probe head slightly drawn and no filter paper inserted. Lightly adhering dirt will peel away also from the valve.

Disassembly of the smoke pump:

- A. Unscrew the cylinder cap with left-hand rotation.
- B. Carefully pull the piston out of the cylinder. Pay attention not to damage the piston packing on the thread inside of the cylinder!

When cleaning the piston package, do not take it off the piston rod!

- C. Unscrew the probe head with left-hand rotation.
- D. Screw off the valve using the supplied key through a left-hand rotation. Put the key securely into the keyhole.

To remove lubricant excesses, use only cleaning agents not affecting plastic material!

- Very dirty piston rods may be cleaned with fine-grained sandpaper.
- Clean the pump components with a cloth or a suitable brush.

Lubrication of the smoke pump

Before lubricating, the pump has to be cleaned (see chapter: "Cleaning of the smoke pump").

To lubricate the pump only use the provided lubricating oil!

Do not apply too much lubricant oil!

Do not use lubricants containing mineral oil!

- A. Drop some lubricant in the cylinder. Spread the lubricant oil on the piston packing and then put the piston back in.
- B. Move the piston in the cylinder until it runs smoothly.
- C. Mount the remaining components.

TESTING THE PUMP FOR LEAKS

- A. Turn the probe head under slight pressure to the valve support (clockwise rotation - clamping position)
- B. Hold the pump with handle towards the body so that the probe tube may be closed with the thumb (Of course you may also use other accessories for closing the probe tube).
- C. Pull the pump piston on the handle out for approx. 3-5 cm and let it loose. The handle should spring back in its initial position: in this case the pump is sealed.
- D. If the handle does not spring back in its initial position, the pump is leaked.

Possible causes:

- rubber hose defect
- faulty valve or valve gasket
- crack in the piston packing

