

Operation Manual

Gas Sampling Fitting with MK2.1 and L-Probe



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For Distributor



Content The instruction manual gas sampling fitting with measurement chamber MK2.1 and L-probe documents the construction, measurement principle, functionality and installation of the device as well as failure diagnosis.
The instructions address all users (owner) and operators of the device. It must be accessible to these persons and must be read carefully before using the device

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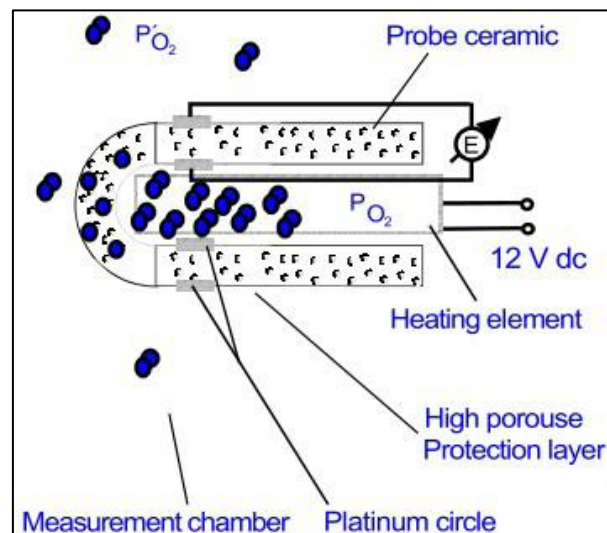
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1. Construction and functionality

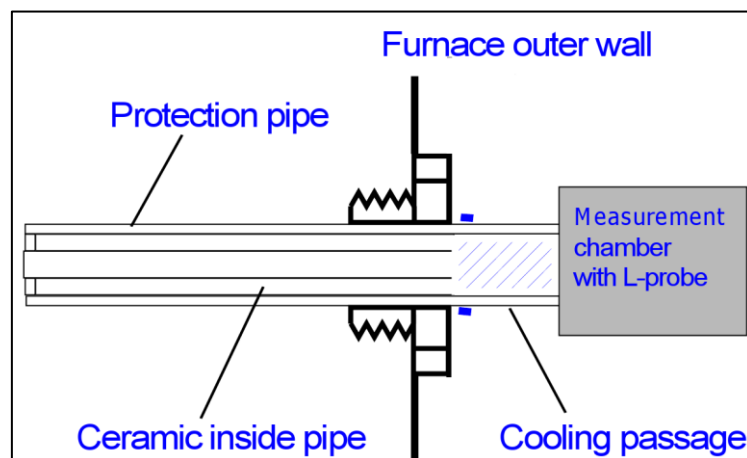
The Lambda probe (L-probe) is constructed as depicted in picture 1:

- Unilateral sealed ceramic tube
- The inner and outer surface are coated with a micro-porous platinum layer which serves as a electrode ring
- External the platinum layer is protected by a highly porous ceramic layer
- A ceramic nickel heating element inside the L-probe is used for heating which is necessary for ionic conduction
- Due to the PTC characteristics a fast heating of the probe is ensured



Picture 1: Construction of the L-probe

The L-probe is screwed in a measuring chamber at the end of the gas removal fitting. The construction is done in a way that the fitting can be screwed directly into a conventional O₂-probe slot without further mechanical effort in most cases. The right assembly (picture 2) is very important for an accurate measurement of the oven atmosphere.



Picture 2: Construction of the gas sampling fitting

The furnace gas is guided in a ceramic tube to the outer wall of the furnace. The steel conduit of the valve is marked where the inner ceramic tube ends. The remaining piece of the steel protective pipe serves as a cooling passage.

Important:

Ceramic inner tube :

- The gas does not encounter the steel parts of the sampling tube in a hot, reactive state. A temperature drop and therefor sooting will be avoided.
- By adequate thermal insulation of the gas up to reaching a "cooling section", a change into another state of equilibrium is prevented.
- In addition, the gas flow rate increases by reduction of the cross section in the ceramic tube

Upon reaching the furnace outer wall:

- The thermal insulation is not applicable, the implied ceramic tube
- The flow rate is reduced by the larger cross-section
- Exiting the oven insulation results in rapid cooling of the gas and therefor "freezing" of the gas components
- A change into another equilibrium state is avoided (see methods for gas generators with water cooling at the output). Another equilibrium state of the gas would falsify the calculation of the C-level and lead to the sooting of the sampling tube.

The temperature inside the L-probe (<600 ° C) is still high enough to obtain ion conductivity of the zirconium oxide. In contrast to the oxygen probe the lower temperature is sufficient. This results from the differences in construction. The platinum electrodes are different in the L-probe than the oxygen probe, mounted as rings on the extent of the ceramic probe. In the measuring chamber the temperature is so low that the change of the gas to be measured is excluded.

2. Installation

The gas sampling fitting is crucial for success of the measurement. It must be placed in a way that the withdrawn gas is representative for the events in the oven.. Therefor the following must be noted:

- On the steel protective tube of the gas fitting is a mark which shows its nominal mounting length. The probe must be mounted into the chamber until the mark coincides with the chamber.
- Leakages at the gas removal must be avoided.
- The probe should be mounted close to components (representative gas).
- The probe should not be mounted in the proximity of the oven door, gas input (lance), quench bath or any other place without representative gas.

Please note the following while installing:

- When mounting the gas fitting horizontally pay attention that the L-probe is assembled vertically inside the measuring chamber to avoid pollution.
- Install the supply unit VE02 (respectively the power supply) in the vicinity of the L-Probe and connect the cable plug leads.
- The gas outlet of the measuring chamber should be connected with a silicone tube to the gas input of the supply unit (see user manual of the supply unit VE02). The gas outlet of the supply unit VE02 comes with a 6 mm tube leading to the furnace torch.

3. Operation details

For each probe two correction factors K1 and K2 are determined. These factors can be gathered from the unit label. For correct calculation of the C-level it is very important to enter these factors into the C-level controller or computer.

Essential to high accuracy and reproducibility of the measurement with the L-probe is an exact constant filament voltage. The power supply MESA NTV44P supplies a constant filament voltage in 4 - wire of 12,00 Vdc at an output current between 0 .3 A. To eliminate the internal resistance change of the L-probe (20 .. 120 kOhm) an impedance converter is installed. In addition the power supply "NTV44P" possesses the option to regulate the temperature of the L-probe at a constant value.

A gas flow of 30-40 l/h is recommended. Heating the L-probe with constant voltage a flow rate of more than 50 l/h should be avoided. If the temperature of the L-probe is regulated by the power supply NTV44P, flow rates of up to 80 l/h are feasible resulting in lowering of the reaction time.

Reference gas is not needed. Flushing the probe with nitrogen during the heating phase makes sense if covering paste is being used or parts are not clean (oil and detergent residues). Flushing should occur from the beginning until a temperature of approximately 800 °C. The flow of the flushing gas depends on the furnace pressure. From experience a value of approximately 100 l/h is sufficient.

Soot production in the atmosphere and therefor sooting of the L-probe should be avoided by all means.

4. Malfunction of the L-probe

Should a malfunction of the probe occur check the following:

- Is the gas flow in order?
- Is there condensation or soot in the gas tubes ?
- Is the probe mounted at the indicated mark?
- Is the L-probe bolted solidly in the measuring chamber?
- Does the power supply provide a voltage of 12 Volt? (NTV44P should be switched to the modus „constant voltage” before testing. See user manual power supply NTV44P).

Should the error exist continually, please forward the probe to us for inspection respectively repair.

5. Replacement of the L-probe

The L-probe should be replaced in continuous operation only under special arrangements due to the fact that the carburizing atmosphere contains toxic gas components. Inhalation of carburizing gas should be avoided by all means. Therefore it is recommended that exchanging the unit should take place when the furnace is flooded with nitrogen.

Caution!

Exchange during continuous operation always holds the risk of a burning hazard by exiting of hot furnace gas. Therefore an exchange is recommended during a cold furnace condition.

When replacing the L-probe proceed as follows:

- Turn off supply unit VE02
- Disconnect the connecting cables to the power unit VE02 (respectively power supply)
- Unscrew L-probe from the measuring chamber
- Screw new L-probe firmly into the measuring chamber MK2.1
- Connect the cables with the power supply unit
- Turn supply unit on

6. Accessories

Supply unit VE02 (Art. No. 820-0170)

Supply unit VE02 with flow meter control (Art. No. 820-0140)