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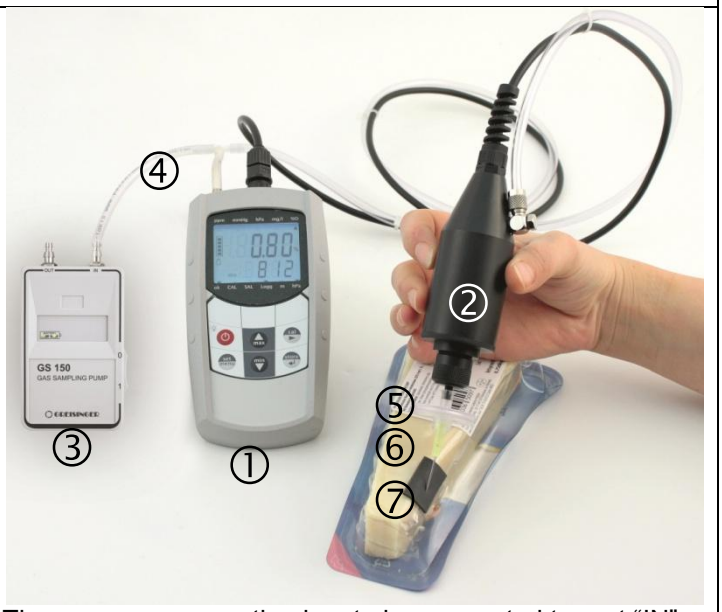
Application Instructions
ResOx5695 – Measuring oxygen in protective atmospheres

For quick and comfortable measuring of residual oxygen in food packaging in modified atmosphere packaging (MAP).

Scope of Supply

Nr	#	
①	1	Instrument GMH 5695 incl. battery
②	1	Sensor housing with pressure compensation connection incl. Sensor GOEL
③	1	Gas sampling pump GS 150 incl. battery
④	1	Tube set (3 tubes, T-piece)
⑤	2	GDZ Filter
⑥	2	GOG-N insertion needles Ø 0,9 mm
⑦	1	GOG-B: 40 pieces sampling stickers
	1	Case GKK 1420
	1	Operating and Short form manuals for GMH 5695, operating manual GS 150
	1	Application instructions ResOx 5695

Connection scheme acc. to intended use



The pressure connection has to be connected to port “IN” of the gas sampling pump. Correct connections are necessary for pressure compensation in stiff packages

The measurement assembly is optimized for needles of Ø0.9mm. Using smaller needles may reduce the necessary sampling volume. Attention: This may have an influence at the measuring precision

DANGER

The sharp needles are causing a risk of injury! Handle carefully!

Sampling time: ca. 15 s
Sampling volume: Min. 20 ml (with filter GDZ 29)

Choosing the sensor element

Sensor element		**GOEL 381** Standard at ResOx 5695-L	**GOEL 370 (Rev 2)** Standard at ResOx 5695-H
Application range		**Protection gases in general, precise measuring at low O_2 (e.g. <0,5 % Vol. O_2) or concentrations > 35 % Vol. O_2**	**Protection gases with CO_2 concentrations and O_2 concentrations below < 35 % Vol. O_2**
Permanent operation with high CO_2 conc.		**-**	**+++**
Short time exposition to CO_2		**+**	**+++**
Use up to 100 % Vol O_2		**+++**	**-**
Use below 0.5% Vol O_2		**+++**	**+**
Speed /t_{90}		**++ / <10 s**	**++ / <10 s**
Life time /hours per % Vol O_2, / at air		**+** **/500.000 %h/ >2 years**	**++** **/1.200.000 %h/ max. 6 years**
Measuring range	O_2 partial pressure	**0 ... 1100 hPa**	**0 ... 350 hPa**
	O_2 concentration	**0.0 ... 100.0 % Vol. O_2**	**0.0 … 35.0 % Vol. O_2** (reduced precision above)

Measurement accuracy and calibration

Measurement accuracy of the overall system with careful calibration and measurement:
1-point calibration: ± 0.2% O2 ± 1 digit for concentrations <10% O2
2-point calibration: ± 0.1% O2 ± 1 digit for concentrations <10% O2
This must be selected in the menu in advance, depending on the type of calibration that should be used.
Two-point calibration can be conducted with GMH 5695 for the most accurate measurements. A second reference medium is required in addition to air. Pure nitrogen (in cylinders, minimum recommended purity 3.5: 99.95%) is recommended for checking protective atmospheres with little oxygen (<1% O_2 vol.). This corresponds to 0.0% O_2 vol.
Please refer to the GMH 5695 operating manual for detailed information about 2-point calibration.

Checking the calibration

In order to assure measurement accuracy, we recommend checking the calibration at the beginning of the work day. A simple check can take place with normal environmental air.
The sensor must assume the environmental temperature before the check and/or calibration. Therefore, we recommend storing the device in the installation location so that it is ready for use quickly. To check the calibration, remove the protective cover of the needle and draw in environmental air with the help of the gas pump (‘flushing’).

The sensor housing may contain residual gas. Incorrect calibrations can occur if the sensor housing cannot be flushed!

The device should display an oxygen level of 20.7 to 21.2 % vol. O_2 after approximately 10 seconds. If the value deviates by more than 0.3 % vol. O_2, we recommend calibrating the devices as specified in the GMH 5695 operating manual (chapter: Calibration of the oxygen sensor).

Measurement

Preparation

Prior to taking measurements, ensure that the device has been calibrated correctly (see above) and is ready for use – e.g. sensor needle not clogged / filter not contaminated, etc.
Prior to conducting the measurement, apply a GOG *) seal sticker on the package (refer to the figure on page 1).
This assures that the package is not torn when punctured with the needle and it prevents external air from being drawn in between the needle and package, which would falsify the measurement.
This is essential for measurement accuracy for stiff packages with low gas volumes, in particular.

Procedure:

1. Puncturing: Puncture the seal sticker with the needle of the oxygen sensor until it reaches a hollow space in the package.

   When puncturing the package, ensure that no particles or fluids are drawn in. The filter prevents contamination of the sensor. However, the puncturing needle / filter can become clogged if particles/fluids are drawn in.
2. Suctioning: Switch on the gas pump with at the right side. Now the gas mixture in the package is suctioned for measurement of the residual oxygen.
3. Measuring: The T_{90} response time is < 10 s. It becomes recognisable that the device is approaching the minimum value as the value begins to drop increasingly slowly (or increases for O2 > 21%) and stabilises. The minimum value (or maximum value for O2 > 21 % vol. O_2) reflects the residual oxygen content.
   Recommendation: Use the min/max function with the appropriate buttons for the recording. Press and hold the appropriate button for 2 seconds to reset the sensor prior to each new measurement.
4. Storing: If you would like to store measurements, activate the individual value logger. Now you can store any arbitrary measurements by pressing the Store button (insert figure).
   If a suitable data transmission cable is present, the stored values can be conveniently transmitted to a PC via the data logger.
5. Cleaning: After the measurement, the sensor and puncturing needle should be flushed using a gas pump for approximately 30 seconds. This will clear the gas mixture out of the sensor.

*) GOG-A for predominantly soft package material
GOG-B for stiff and compact package trays

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