



OXYGEN / NITROGEN / HYDROGEN ANALYZER

ELEMENTRAC ONH - ps

The new ELEMENTRAC ONH-ps is a powerful and robust elemental analyzer for the simultaneous determination of oxygen, nitrogen and hydrogen concentrations in inorganic samples such as steel, iron, copper or ceramics. The highly sensitive NDIR cells without moving parts and the thermal conductivity detector for nitrogen measurement reliably detect element concentrations from the low ppm range to the high percentage range.

Thanks to the novel sample lock with pulsed chamber purging and vertical fall channel, user-friendly and convenient analysis of rod-shaped, granular or powdery samples with a weighed portion of up to 2 grams is easily possible. The ELEMENTRAC ONH-ps elemental analyzer meets or exceeds the requirements of all common international standards, such as ASTM E 1019 or DIN EN 3976.



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- | Parallel determination of the three elements oxygen, nitrogen and hydrogen
- | New sensitive infrared measuring cells without moving parts
- | Low gas consumption and high sensitivity due to closed gas system
- | Easy application of pins, powders and granules
- | Inexpensive argon possible as carrier gas
- | Short analysis time
- | Powerful impulse furnace with 8.5 kW
- | Optional autocleaner and autoloader
- | Reliable ONH analysis for a wide range of inorganic samples such as steel, non-ferrous metals, ceramics, slags, ores, etc.

ELT

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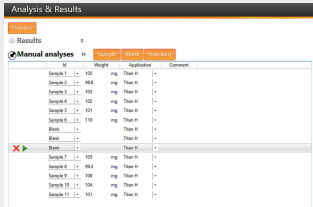
TYPICAL SAMPLE MATERIALS

*steel, copper, alloys, refractory metals, cast iron, ceramics, carbides, ferroalloys, iron, metals, aluminum, silicon,
...*



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OPERATION AND ANALYSIS PROCESS



Step 1: Logging the sample into the ELEMENTS software

The sample ID is logged into the software and the weight is automatically transferred (see step 2).



Step 2: Weighing and introduction of sample into the port

The ELEMENTRAC ONH-ps analyzes volumes from a few mg up to 2 grams safely and precisely. Rod-shaped or granular samples can be applied directly. For the elemental analysis of powders, a capsule is recommended which does not have to be sealed.



Step 3: Analysis

The empty graphite crucible is then placed on the lower electrode and the elemental analysis is started via the ELEMENTS software. The software controls all subsequent process steps.



Step 4: Data output and export

120 to 180 seconds after the analysis has started, the measured concentrations are available for export as a report or via LIMS.

THE NEW MEASUREMENT PROCEDURE

Common O/N/H analysis for inert gas fusion analyzers mean that a thermal conductivity cell is used for both hydrogen as well as for nitrogen analysis. This means that two independent measurements have to be performed when determination of nitrogen and hydrogen is required. The ELEMENTRAC ONH-ps utilizes a new designed water IR cell without moving parts which allows a reliable measurement of hydrogen as water even in the lower ppm concentration range. This allows the simultaneous measurement of oxygen, nitrogen and hydrogen in one sample.

Elements	Measured as	Detector
Oxygen	CO ₂	IR
Nitrogen	N ₂	TCD
Hydrogen (common technique)	H ₂	TCD
Hydrogen (new technique)	H ₂ O	IR

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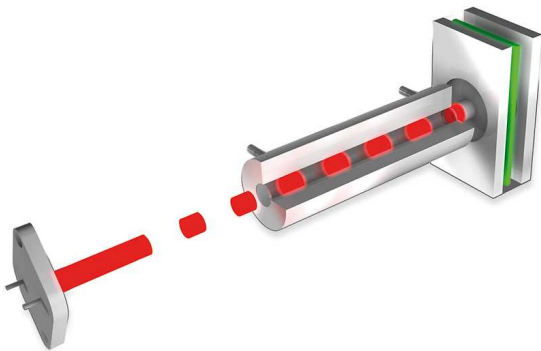
CONFIGURATIONS

The ELEMENTRAC ONH-ps is a multi-element analyser for the parallel determination of oxygen, nitrogen and hydrogen (ONH). While oxygen is detected as CO₂ and hydrogen as H₂O in infrared measuring cells, nitrogen is determined in elemental form using a thermal conductivity cell. The ELEMENTRAC ONH-ps uses helium or, alternatively, argon as the carrier gas.

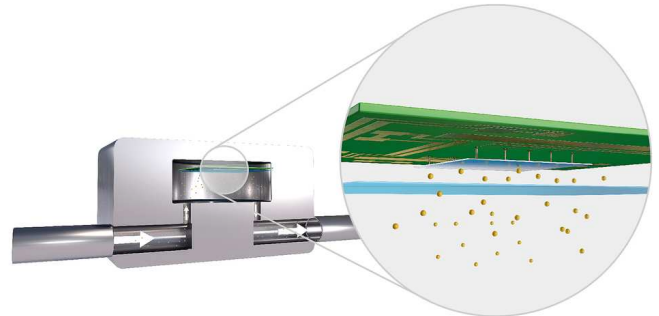
The ELEMENTRAC ONH-ps uses our newly developed infrared measuring cells without moving parts. These measuring cells are characterised by a very good signal-to-noise ratio and high stability.

The ELEMENTRAC ONH-ps elemental analyzer is available as a single-element analyzer for hydrogen only, or in a multi-element configuration for measuring ONH. Whereas oxygen and hydrogen are determined as CO₂ and H₂O in up to three infrared cells, nitrogen is detected in its elemental form in a thermal conductivity cell.

CUVETTE WITH VARIABLE LENGTH



THERMAL CONDUCTIVITY CELL WITH HIGH SENSITIVITY



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INTEGRATED STANDARD SOLUTIONS

The chemicals and filters required for operation of the elemental analyzer are arranged conveniently on the front panel and can be concealed behind a removable door during routine operation. This arrangement significantly reduces the time required for maintenance and increases user-friendliness. In addition, innovative details considerably improve the reproducibility of measurements.

Innovative sample port & pulsed chamber flushing

The new sample port of the ONH-ps elemental analyzer ensures comfortable operation and reproducible measured values. Differently shaped materials like solid pieces, granules or powder in capsules can be applied up to a weight of 2000 mg, and are quickly freed from the surrounding atmosphere with the help of pulsed carrier gas flushing in the sample port. Then they drop vertically into the preheated graphite crucible for analysis.

- | Robust against dust development
- | No closing of capsules required
- | Direct application of up to 2000 mg granulate
- | Low in maintenance and wear



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Powerful catalyst

During fusion of the sample CO is formed, whereas hydrogen and nitrogen are released in elemental form. The powerful catalyst furnace oxidizes CO to CO₂ and hydrogen to water, which are subsequently measured in the IR cells. The high temperature catalyst furnace with copper oxide filling guarantees the complete oxidation of CO to CO₂ and of course of H₂ to gaseous H₂O.



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Closed gas management

The ELEMENTRAC ONH-ps elemental analyzer series uses a closed gas system in overpressure. This ensures that always 100% of the released sample gas is fed to the detectors which guarantees low detection limits and good reproducibility.

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OPTIONS



Autocleaner

By melting the sample in a graphite crucible at temperatures of up to 3000 °C deposits are generated at the upper electrode and in the furnace chamber which may affect the reproducibility of ONH measurements in a negative way.

The new optional Autocleaner reliably removes these deposits, enabling precise elemental analysis even for high throughputs. Additionally, an efficient gas calibration and cleaning furnace for thorough carrier

gas pre-cleaning are available for the elemental analyzer.

NEW: Autoloader

High-capacity automated sample loading is becoming an increasingly important factor for fast and robust O/N/H analysis in metals. The new autoloader for the ELEMENTRAC ONH-ps features a sample carousel with 32 positions, as well as a correspondingly designed crucible magazine.



[Click to view video](#)

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FUNCTIONAL PRINCIPLE

The ELEMENTRAC ONH-ps uses a measuring principle with a wide operating range. To analyse the sample, it is weighed and placed in the sample lock. Flushing with carrier gas ensures that no atmosphere (e.g. nitrogen and oxygen) enters the analysis chamber.

The graphite crucible is then annealed in the pulse furnace to reduce any contamination, such as residual hydrogen. After a stabilisation phase, the sample falls into the graphite crucible and is melted. Elemental nitrogen, hydrogen and carbon monoxide are released from the sample melt into the carrier gas stream. The carbon monoxide comes from the reaction of the carbon in the graphite crucible with the oxygen in the sample. The carrier gas (helium) and the sample gas pass through a dust filter before entering a copper oxide catalyst, where CO is converted to CO₂ and elemental hydrogen to H₂O.

The resulting CO₂ and H₂O are then detected in the infrared cells. CO₂ and H₂O are chemically removed and the nitrogen content is measured in the heat conduction cell.

Optionally, inexpensive argon can be used instead of helium as the carrier gas for determining oxygen and nitrogen.

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TECHNICAL DATA

Measured elements	hydrogen, nitrogen, oxygen
Samples	inorganic
Furnace alignment	vertical
Sample carrier	graphite crucibles
Field of application	automotive, aviation, metal production, metallurgy, quality control, research
Furnace	electrode impulse furnace (max. 8,5 KW*), temperatures in excess of 3,000 °C
Detection method	infrared absorption for oxygen and hydrogen, thermal conductivity for nitrogen
Typical analysis time	120 - 180 s
Chemicals required	copper oxide, magnesium perchlorate, sodium hydroxide
Gas required	compressed air, helium 99.995 % pure, argon 99.995% pure (if required), all gases with (2 - 4 bar / 30 - 60 psi)
Power requirements	3~ 400 V, 50/60 Hz, max. 8,500 W
Dimensions (W x H x D)	56 x 78 x 64 cm
Weight	~ 165 kg
Required equipment	PC, monitor, balance (resolution 0.0001g)
Optional accessories	autocleaner, autoloader, carrier gas purification, external chiller
-	* limited to 6.8 kw in application settings

www.eltra.com/onhps

ORDER DATA

ELEMENTRAC ONH-PS

(Please order PC, monitor, balance and consumables (starter-kit, anhydron, sodium hydroxide, schuetze reagent, copper II oxide) separately)

Measuring ranges at 1,000 mg sample weight (further measuring range combinations on request)

88200-2300		ONH-ps	2xO	0.04 ppm – 1 % O
			+ 1xN	0.12 ppm – 3% N
			+ 1xH	0.10 ppm – 0.25 % H

REQUIRED ACCESSORIES

PC, MONITOR, BALANCE

71015-1000 Computer with Intel Core i5-8400 Processor, 256 GB SSD; 8 GB RAM; Windows 10 operating system; keyboard; mouse

88400-0584 Monitor, TFT (23.8")

88400-0645 Balance (resolution 0.0001 g)

90200  Anhydron (magnesium perchlorate), 454 g 1)

90210  Sodium hydroxide, 500 g 1)

90289  Copper II oxide, 100 g, for ON-p and ONH-p 1)

88600-0021 Copper oxide wire (for older ONH 2000 analyzer) 1)

FURTHER OPTIONS AND CONSUMABLES

ACCESSORIES (HARDWARE)

88200-2400 ONH-p Autoloader (incl. autocleaner and vacuum cleaner)

88200-2401 ONH-p Autocleaner (incl. vacuum cleaner)

88400-0467 Chiller (SMC, 5900 W)

27000-2021 Gas calibration unit ELEMENTRAC series (for calibrating hydrogen)

88200-9000 Carrier gas purification furnace, without filling (please order filling and quartz wool separately)

72080 Nitrogen regulator, 1 piece

72081 Pressure regulator, 1 piece

88400-0610 Barcode scanner

CRUCIBLES

88400-0471 Graphite crucibles, 400 pieces (recommended for autoloader operation)

90190  Graphite crucibles, 400 pieces (for copper, brass and steel analysis)

90180  Inner graphite crucibles, 100 pieces (requires outer graphite crucible 90185)

90185  Outer graphite crucibles, 50 pieces

TIPS

31360  Graphite tip, 1 piece (for crucibles 90190 and 90185)

CAPSULES (REQUIRED FOR ANY KIND OF POWDER ANALYSIS)

90257  Nickel capsules, 3.2 x 7 mm, 100 pieces

90256  Nickel capsules, 4.5 x 10 mm, 250 pieces

88400-0066  Nickel capsules, pressed, 12.5 x 5 mm, 100 pieces

90252  Tin capsules, 5 x 18 mm, 100 pieces

BASKETS (REQUIRED FOR OXYGEN AND NITROGEN DETERMINATION IN REFRACTORIES)

90250  Nickel baskets, 100 pieces, 1 g each

88600-0012  Nickel baskets, high purity (low oxygen), 100 pieces, 1 g each

FLUXES (REQUIRED FOR SOME APPLICATIONS)

90251		Tin pellets, 454 g (for determination of hydrogen in titanium)
90800		Graphite, 50 g (improves oxygen determination)
90258		Nickel accelerator, 100 g (for analysis of high amount of refractories)

CHEMICALS (FILLINGS FOR GLASS AND QUARTZ TUBES)

88600-0028		Eltrasorb, 500g (black coloured sodium hydroxide)
90200		Anhydron (magnesium perchlorate), 454 g l)
90210		Sodium hydroxide, 500 g
90270		Schuetze reagent, 100 g, for OH-p and ONH-p
90289		Copper II oxide, 100 g, for ON-p and ONH-p
90426-1001		Filling for carrier gas purification furnace (suitable for one filling, ONH series)
90330		Quartz wool, 50 g
90331		Glass wool, 454 g
90332		Glass wool, 50 g
92610		Tube of high vacuum grease, 35 g

ELEMENTRAC - ADDITIONAL TOOLS

All ELEMENTRAC analyzers are equipped with a set of necessary tools

The following list provide part numbers for replacement of worn tools and some new tools to improve handling.

SPATULAS AND TWEEZERS

88400-0476		Micro spatula, 1 piece, XS size
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23110		Spatula, 1 piece, M size
23111		Spatula, 1 piece, L size
88400-0475		Set with 6 spatula and 1 tweezers, for multiple weighing procedures
88400-0229		Tweezers (160 mm), curved, 1 piece, for transporting pins and baskets
88400-0472		Tweezers (145 mm), straight, 1 piece, for removing samples out of the ONH-p furnace
88400-0213		Tongs for crucibles, 1 piece, for putting crucibles on the electrode tip

TOOLS FOR STORAGE, TRANSPORTING AND WEIGHING

88400-0477		Weighing boat, 1 piece, for weighing and usage of granulates
36121		Quartz boat, 74x22x10 mm, 1 piece, for weighing pins

TOOLS FOR CLEANING AND MAINTENANCE

27000-8007		O-ring set ONH-p (furnace)
27000-8008		Maintenance kit ONH-p
27000-8009		O-ring set ONH-p
71010		Brush, 16 mm, 1 piece, for cleaning balance from dust
88400-0500		Telescope mirror, 1 piece, for inspection of upper electrode of ONH-p/ONH-2000
88400-0473		Powder funnel (plastics), 1 piece, for easy filling of chemical tubes
88400-0489		Rubber plug 14x20x24 mm, 1 piece, for sealing small glass tubes like 88400-0006
88600-0027		Sodium hydroxide, Anhydron filter tube
71032		Composite brush, 1 piece, for cleaning upper electrode of ONH-p furnace

71035		Cleaning brush / furnace brush, 1 piece, for cleaning sample inlet of ONH furnaces
71031		Metal brush, 1 piece, for cleaning graphite tip and its holder
88400-0504		Cylinder brush, brass, for intensive cleaning of lower furnace
88400-0501		Micro brush, 1 piece, for cleaning of ONH series furnace outlet tube
61030		Allen key, 3 mm, 1 piece
61040		Allen key, 4 mm, 1 piece
61050		Allen key, 5 mm, 1 piece

CALIBRATION MATERIALS

Calibration materials may show slight variations depending on the current lot.

To see the current certification please visit www.ELTRA.com.

OXYGEN AND NITROGEN IN STEEL, PINS

91100-1001		Steel, 100 pins, 1 g each, 25 – 40 ppm N
91100-1002		Steel, 100 pins, 1 g each, 30 – 70 ppm N
91100-1003		Steel, 100 pins, 1 g each, 150 – 250 ppm N
91100-1005		Steel, 100 pins, 1 g each, 300 – 600 ppm N
91100-1007		Steel, 100 pins, 1 g each, 70 – 130 ppm N
91100-1010		Steel, 100 pins, 1 g each, >1000 ppm N
91100-1011		Steel, 100 pins, 1 g each, 600-1000 ppm N

HYDROGEN IN STEEL, PINS

91400-1001		Steel, 100 pins, 1 g each, 0.5 – 1 ppm H
91400-1002		Steel, 100 pins, 1 g each, 1.5 – 4 ppm H

STEEL, BALLS (H)

91110  Steel, 100 balls, gold plated, 1 g each, >1.9 ppm H

OXYGEN IN COPPER, PINS

91000-1003 Copper, 100 pins, 1 g each, ~200 ppm O

91000-1004  Copper, 100 pins, 1 g each, ~10 ppm O

OXYGEN, NITROGEN AND HYDROGEN IN TITANIUM, PINS

91205-1001  Titanium, 100 pins, 0.1 g each, 10 – 35 ppm H

91205-1002  Titanium, 100 pins, 0.1 g each, 20 – 70 ppm H

91205-1003  Titanium, 100 pins, 0.1 g each, 30 – 90 ppm H

91205-1004  Titanium, 100 pins, 0.1 g each, 60 – 120 ppm H

91205-1005  Titanium, 100 pins, 0.1 g each, 150 – 250 ppm H

91205-1006 Titanium, 100 pins, 0.1 g each, 120 – 150 ppm H

HYDROGEN AND CARBON IN TITANIUM, PINS (250 MG)

91305-1001 Titanium, 100 pins, 0.25 g each, < 50 ppm H

91305-1002 Titanium, 100 pins, 0.25 g each, 50 -100 ppm H

91305-1003 Titanium, 100 pins, 0.25 g each, > 100 ppm H