

ON - 900

Oxygen / Nitrogen
Determinator

ELTRA

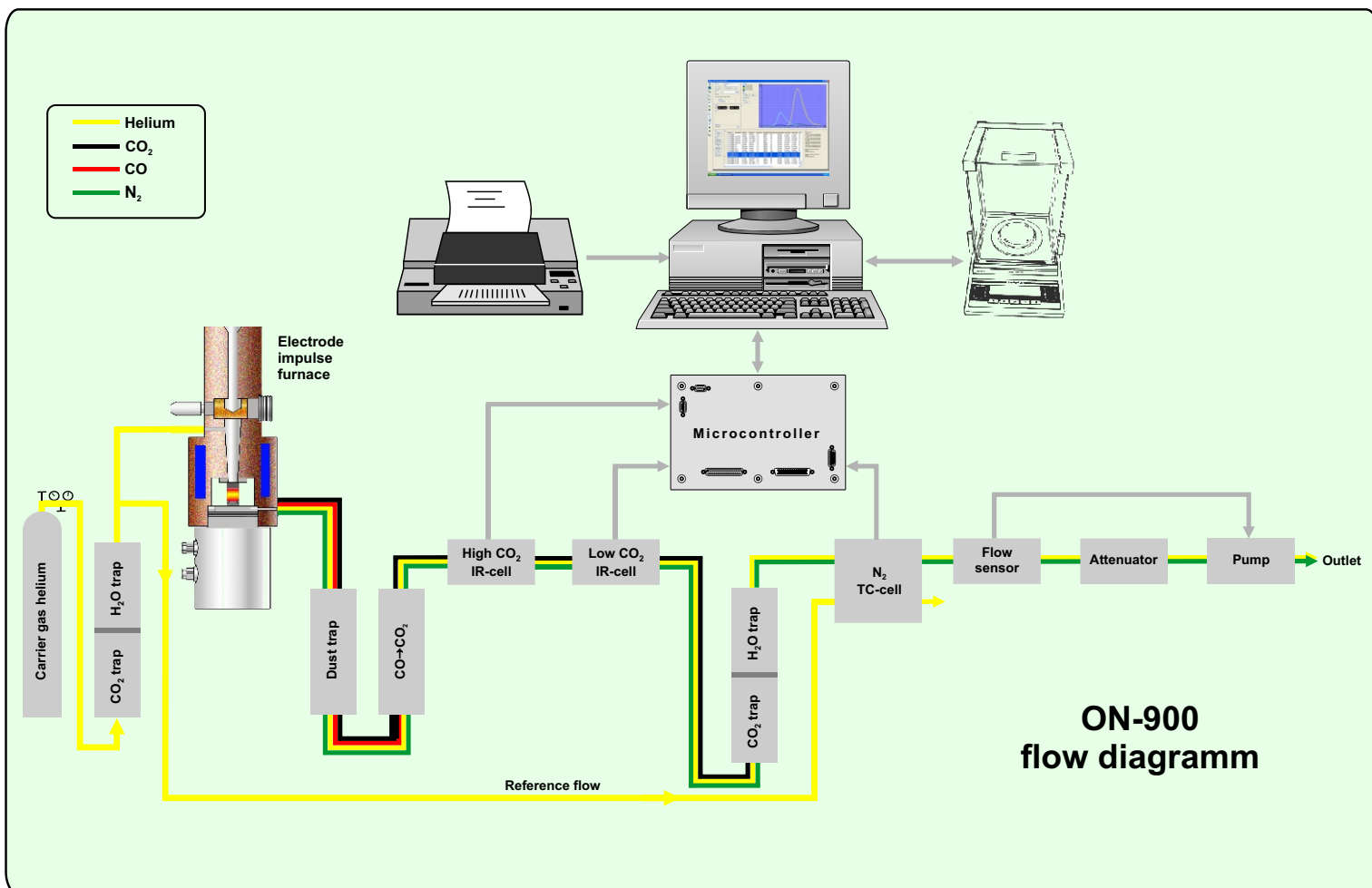
Analysers made in Germany



- Total and fractional analysis for oxides and nitrides separation
- Easy to replace economic upper electrode insert
- Hot zone at the crucible's bottom due to graphite tip
- Grain and drillings analysis without tin capsules
- PC controlled
- High temperature electrode impulse furnace for metals and ceramics analysis



ON-900 Simultaneous Oxygen / Nitrogen Determinator



Description

The ON-900 is designed for the rapid and accurate determination of oxygen and nitrogen in steel, cast iron, alloys, copper, zirconium, titanium, molybdenum, nickel, ceramics and other inorganic materials. The ON-900 can be supplied with two independent infrared cells to provide optimum precision for the analysis of high and low levels of oxygen. Nitrogen is detected with a dual range thermal conductivity cell. The change over from the low to the high ranges is done automatically during the analysis and does not require any pre-setting by the operator. The ON-900 features a microcontroller and solid state infrared detectors with auto zero and auto range control. The water-cooled high power electrode impulse furnace uses a graphite crucible to heat the sample up to a temperature of 3000° C. On request the ON-900 measuring ranges can be optimized in the factory to suit your requirements, without additional charges. The sensitivity of the detectors can be designed to provide maximum accuracy in ranges from low ppm up to high percentage concentrations.

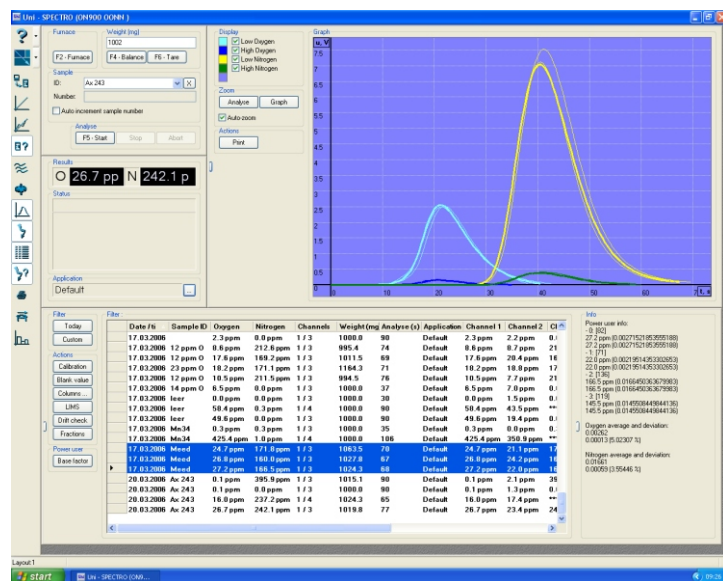
Analysis procedure

The sample is weighed on an electronic balance which is interfaced to the PC. By pushing a button the sample weight is transferred to the PC. If required the sample weight can also be entered manually. The sample is placed into the loading head and the graphite crucible is put on the lower electrode tip. The start key is pressed and the analysis cycle runs automatically.

The furnace closes, the crucible is outgassed, the sample is dropped into the crucible and the analysis proceeds. At the end of the cycle, the analysis results appear on the screen of the PC. A manual loading of the sample is also possible. The manual loading is necessary for the analysis of powders.

PC control with Windows 2000/XP software

Comprehensive analyser control and easy operation are provided by the PC and software connected to the computer.



The multilingual software provides the user with the following features:

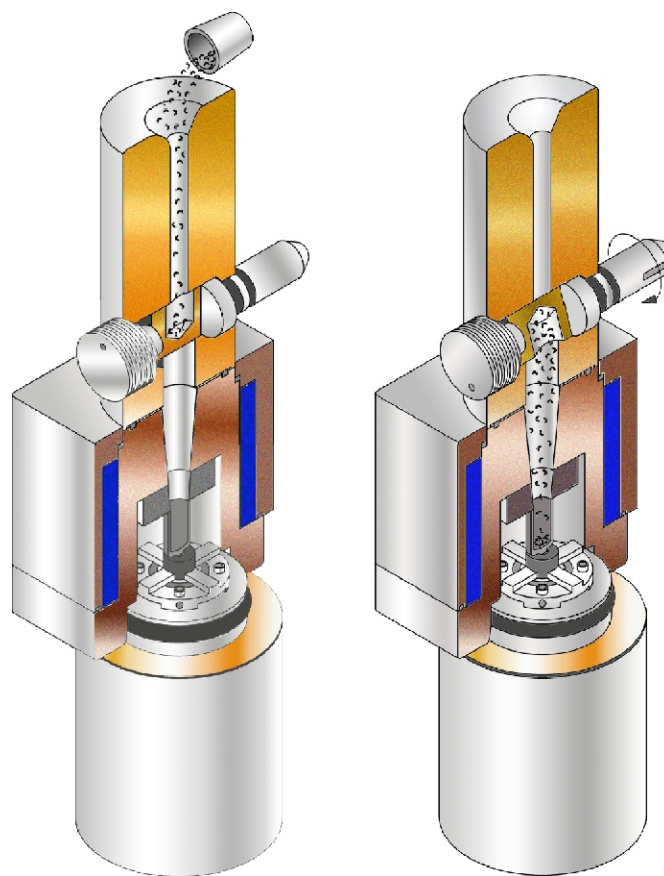
- Optional display layout - adjustable screen appearance of the program windows.
- User profiles with multi-level access - parameter changes protected by unauthorized access.
- Sample ID memory - supplemented with running analysis number.
- Data base (analysis results storage) - all data for each analysis is stored and can be recalled later for review, report creation, statistical calculations or results recalculation with modified parameters.
- Optional data base configuration - displays only results meeting specified conditions, for example, certain date/time period, specific sample I.D. etc.
- Visualisation of the results consistency.

ON-900 Simultaneous Oxygen / Nitrogen Determinator

- Peak separation calculation procedure for fractional analysis.
- LIMS communication and data export (Notepad, Excel etc.).
- Basic one-point and advanced multi-point calibration.
- Barometric pressure compensation.
- Simultaneous calibration of more than one measuring range.
- Procedure for automatic linearity correction calculation.
- Applications memory and deficiency checks - adjustable analysis counters to prompt the changing of reagents, cleaning of filters and other maintenance procedures.
- Hardware diagnostics display and technical report printouts.

Grain and drillings analysis without tin capsule

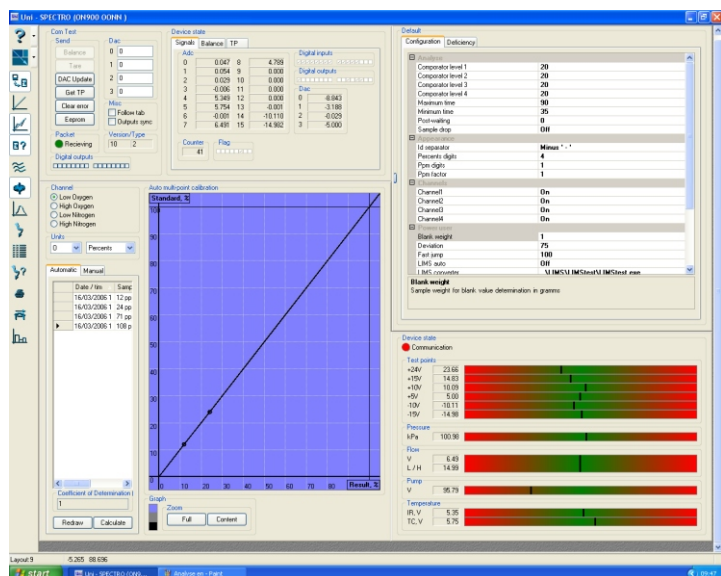
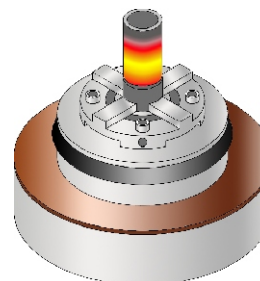
The design of the sample drop mechanism enables the analysis of grains and drillings without the risk of blockages. Therefore the grains can be put into the furnace without the need of a tin or nickel capsule. The elimination of the need for a capsule has the following advantages:



- No blank values of the capsule material.
- No blank values due to the air enclosed in the capsule.
- No contamination of the furnace and of the gas flow system due to evaporation of the capsule material when analysing with high power, especially for nitrogen compounds requiring high temperature.
- No costs and delays for maintenance due to the capsule evaporation.
- No costs and delays due to the time required to tare, to handle the capsule and to fill it with grains.
- No expenses for capsules.

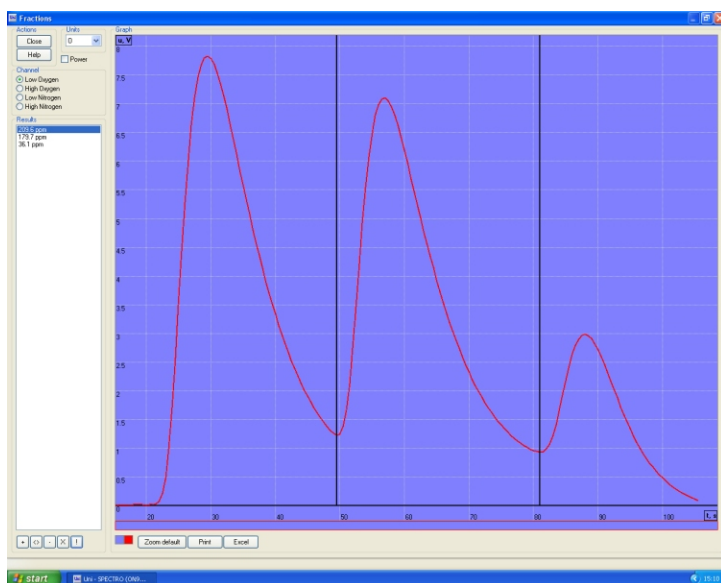
Graphite tip

The crucible is placed on a graphite tip. Due to the electrical resistance of the graphite, there is a power dissipation in it, so that the graphite tip heats up the bottom of the crucible. This effect moves the hot zone from the middle of the crucible down to the bottom where the sample is.



Fractional analysis

Every oxide and nitride has a characteristic decomposition temperature. The furnace power can be raised slowly until a particular oxide or nitride breaks its bond. Continually increasing the temperature will separate the various oxides and nitrides.



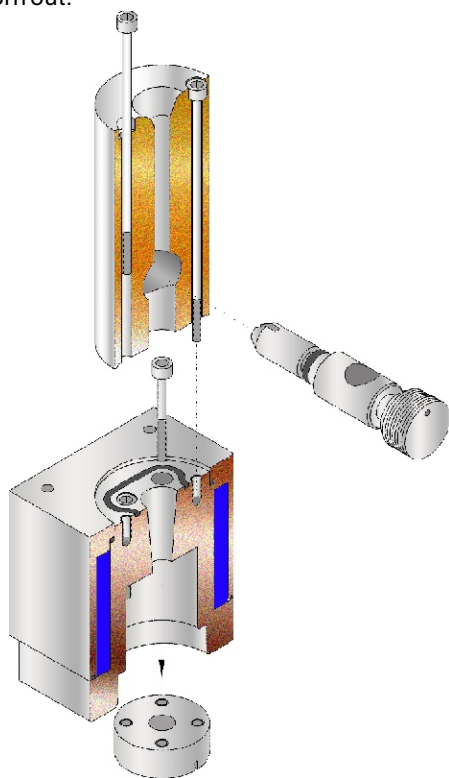
For this purpose the software can control the furnace power, either by ramping or in steps up to a maximum of 3000° C. The peaks are individually integrated by the software and the individual values of the different oxides or nitrides are displayed.

Applications memory

The settings for different applications can be stored in memory and they can be recalled for later analysis of the corresponding material. Due to this feature, the operator does not need to enter new settings every time he has to analyse a sample of a material different to that of the sample before. Also every time new settings are found for a new kind of samples, the operator can memorize them in the PC software. This facility is practically a must, especially for fractional analysis.

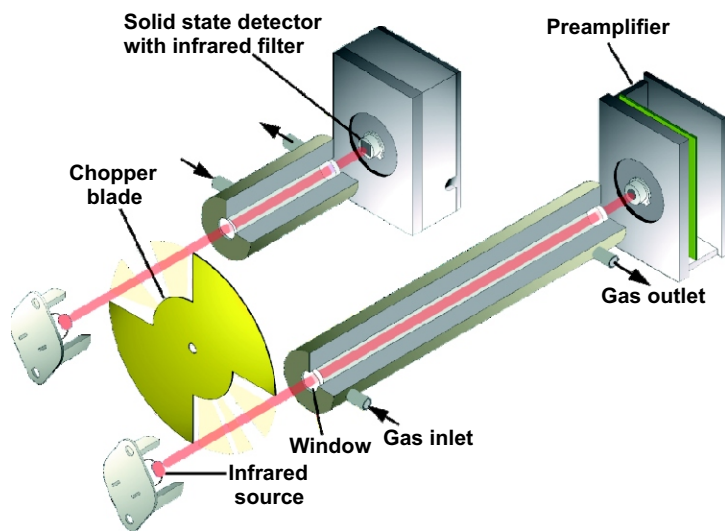
Upper electrode insert

The furnace of the ON-900 features an upper electrode insert. It can be easily and quickly replaced by the operator. It is therefore a very economic solution when the upper contact surface to the crucible is worn out.



Infrared cells

The infrared cells of the ON-900 do not require any manual zero adjustments. The zero and sensitivity adjustments of the infrared cells are permanently and automatically controlled by the electronics. The detectors utilize solid state sensors combined with infrared filters. The sensors are not gas filled, thus eliminating long term problems due to gas leakage. The ON-900 can be equipped with up to two independent infrared cells for oxygen determination.



The lengths of both cells can be individually optimized, to obtain maximum precision for the target analysis levels of each customer. Each of the cells can be installed with infrared absorption lengths ranging between 1 mm and 320 mm.

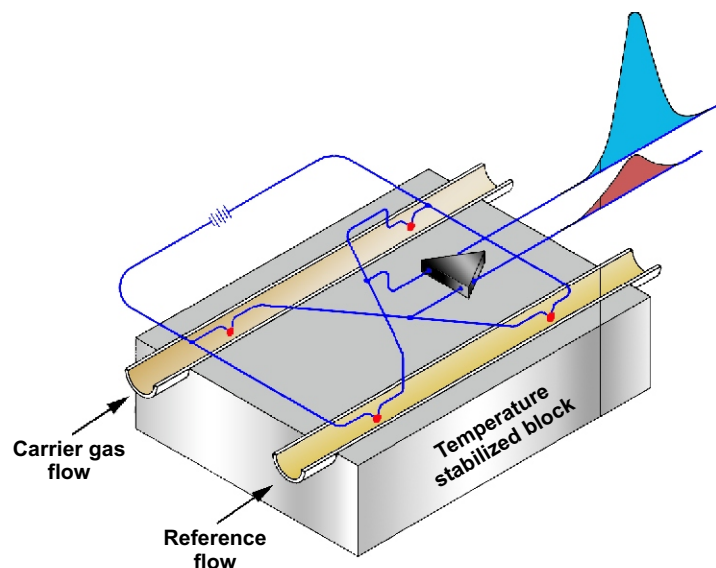
Saving carrier gas

When the ON-900 is in analysis mode, but it has not been used for a while, the gas consumption will automatically be reduced to a very low level. This low flow keeps the gas flow system flooded with carrier gas, preventing the air from penetrating the system.

As soon as the operator starts using the analyser again, the normal flow will be automatically restored. The analyser will be again ready for operation in a very short time, due to the purging with the low flow during the break.

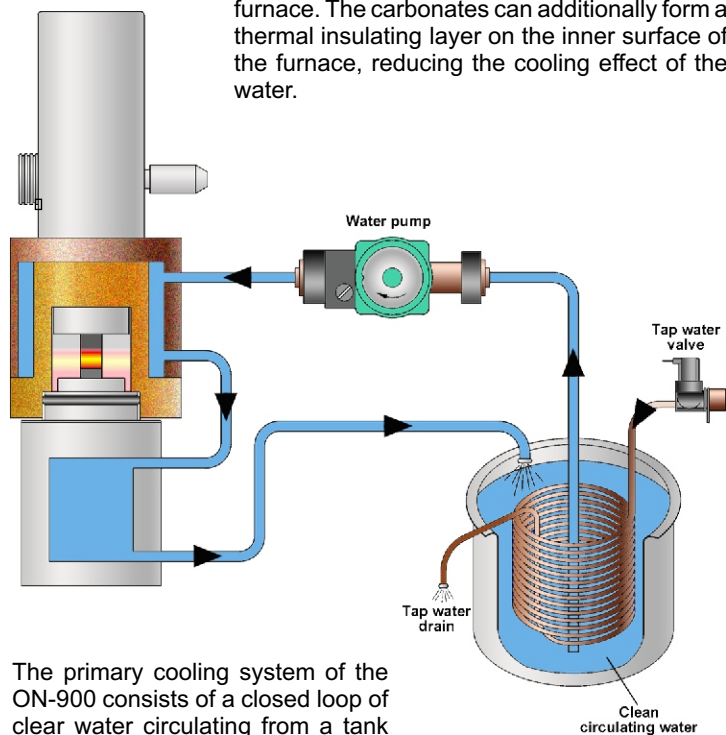
Thermal conductivity cell

Nitrogen concentrations are determined by a thermal conductivity detector. This detector was especially developed by ELTRA in order to guarantee low drift, high resolution and wide measuring ranges.



Cooling system

The ON-900 has a primary and a secondary cooling system. This is to prevent the tap water from passing through the furnace. Tap water can contain carbonates and, depending on the tap water quality of each location, it may contain contaminants which can attack and damage the internal cooling surface of the furnace. The carbonates can additionally form a thermal insulating layer on the inner surface of the furnace, reducing the cooling effect of the water.



The primary cooling system of the ON-900 consists of a closed loop of clear water circulating from a tank through the furnace, utilizing a water pump within the ON-900.

The secondary cooling system is connected to tap water which flows through a coil of metal tube, cooling the water in the tank as a thermal exchanger. There is no mixing of the tap water with the clear water of the primary system. A thermostatic control opens the tap water valve at a certain temperature level of the water in the tank. The valve closes again when the water is cooled down. The water tank is not inside, but outside the analyser. This configuration reduces rapidly the risk of water problems with the analyser in case of leakages. The tank is made of very solid stainless steel. It can be placed under the desk underneath the analyser saving space on the desk. The analyser's size is small due to the tank being outside the analyser. The tank itself is big, accommodating a big quantity of water to ensure low variations of the water temperature during analysis.

ON-900 Specifications

MEASURING RANGES

| Oxygen at 1 gram sample | | Nitrogen at 1 gram sample | |
|---|---------------------------------------|--|---|
| Low oxygen 0.0 - 300 ppm ¹⁾ | High oxygen up to 2% ¹⁾ | Low nitrogen 0.0 - 300 ppm ¹⁾ | High nitrogen up to 2% ¹⁾ |
| Sensitivity 0.01 ppm oxygen Indicating range 0 - 100% oxygen ²⁾ | | Sensitivity 0.1 ppm nitrogen Indicating range 0 - 100% nitrogen ²⁾ | |

ACCURACY

| | |
|---|---|
| Low oxygen ± 0.1 ppm or ± 1% of oxygen present | Low nitrogen ± 0.1 ppm or ± 1% of nitrogen present |
| High oxygen ± 2 ppm or ± 1% of oxygen present | High nitrogen ± 2 ppm or ± 1% of nitrogen present |

GENERAL SPECIFICATIONS

| | |
|---|--|
| Normal sample weight 1 gram | Normal analysis time 2 minutes |
| Detection method Solid state infrared absorption for oxygen Thermal conductivity for nitrogen | Chemicals CO ₂ trap sodium hydroxide H ₂ O trap magnesium perchlorate Catalyst copper oxide |
| Gas required Helium ³⁾ at least 99.995% pure ⁴⁾ 2 to 4 bar (30 to 60 psi) | Compressed air 4 to 6 bar (60 to 90 psi) |
| Calibration Standard samples and gas dosing device on request | Furnace temperature up to 3000 °C Furnace power 0 to 8 kW |
| Interfaces serial and USB ⁵⁾ | Power requirements max 8500 Watts 50/60 Hz 400V AC ± 10% 3 phase + neutral or 230 V AC ± 10% single phase on request |
| Weight approximately 135 kg | Dimensions Width Height Depth 55 cm (21") 80 cm (31.5") 60 cm (23.5") |

ACCESSORIES

| |
|--|
| Balance 0.0001g to 60 g ± 0.0001 g ⁶⁾ |
| Computer PC with HDD, 3.5" drive, CD-ROM, TFT flat screen and keyboard ⁶⁾ |
| Color printer with automatic cut sheet feed, other options on request ⁶⁾ |

- 1) Other ranges on request. 2) Possible by reducing the sample weight. 3) For oxygen analysis only, nitrogen can be used as carrier gas.
4) 99.999% pure for low oxygen analysis. 5) Balance (serial - RS232) and printer USB are connected to the PC.
6) Visit our web site for further details (<http://www.eltragmbh.com/on900/information.shtml>).

Typical Results

Copper pins

| | | | | |
|------------------------------------|-------------|------------------------------------|-----------------|---------------|
| 14.03.2006 08:21 | Copper /095 | 1016.0 mg | 215.5 ppm O 1/0 | 9.1 ppm N 4/0 |
| 14.03.2006 08:25 | Copper /096 | 1014.9 mg | 214.9 ppm O 1/0 | 8.0 ppm N 4/0 |
| 14.03.2006 08:30 | Copper /097 | 1014.6 mg | 214.8 ppm O 1/0 | 8.8 ppm N 4/0 |
| average in the range O : 215.07 | | average in the range N : 8.63 | | |
| standard deviation : 0.400 / 1.87% | | standard deviation : 0.499 / 5.78% | | |

Steel pins

| | | | | |
|-------------------------------------|------------|------------------------------------|-----------------|----------------|
| 14.03.2006 08:43 | Steel /083 | 1007.2 mg | 205.3 ppm O 1/0 | 51.2 ppm N 4/0 |
| 14.03.2006 08:48 | Steel /084 | 1002.8 mg | 203.3 ppm O 1/0 | 50.1 ppm N 4/0 |
| 14.03.2006 08:55 | Steel /085 | 1006.4 mg | 205.6 ppm O 1/0 | 51.8 ppm N 4/0 |
| average in the range O : 204.733 | | average in the range N : 51.033 | | |
| standard deviation : 1.000 / 0.488% | | standard deviation : 0.757 / 1.48% | | |

Cast iron drillings

| | | | | |
|------------------------------------|----------------|------------------------------------|----------------|------------------|
| 14.03.2006 09:15 | Cast iron /086 | 502.2 mg | 72.5 ppm O 1/0 | 1148.0 ppm N 3/0 |
| 14.03.2006 09:20 | Cast iron /087 | 502.7 mg | 71.2 ppm O 1/0 | 1151.3 ppm N 3/0 |
| 14.03.2006 09:24 | Cast iron /088 | 499.6 mg | 71.7 ppm O 1/0 | 1146.2 ppm N 3/0 |
| average in the range O : 71.80 | | average in the range N : 1148.50 | | |
| standard deviation : 0.538 / 0.75% | | standard deviation : 4.768 / 0.41% | | |

Steel drillings

| | | | | |
|------------------------------------|------------|------------------------------------|-----------------|----------------|
| 14.03.2006 09:47 | Steel /080 | 500.0 mg | 219.2 ppm O 1/0 | 51.2 ppm N 4/0 |
| 14.03.2006 09:54 | Steel /081 | 503.0 mg | 210.4 ppm O 1/0 | 49.0 ppm N 4/0 |
| 14.03.2006 09:58 | Steel /082 | 502.0 mg | 217.8 ppm O 1/0 | 52.2 ppm N 4/0 |
| average in the range O : 215.80 | | average in the range N : 50.80 | | |
| standard deviation : 3.882 / 1.80% | | standard deviation : 1.343 / 2.64% | | |

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The contents of the catalogue are subject to change without prior notice for further improvement.

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The ON-900 can be supplied for glove box operation. In this case the furnace part of the instrument is installed inside the glove box and the remainder outside. By splitting the instrument we minimise the amount of contaminated material and improve access for maintenance.



The external gas purifier is used to remove residual oxygen in inert carrier gases.

Other ELTRA analysers



ONH-2000 Oxygen / Nitrogen / Hydrogen Determinator

- Oxygen, nitrogen and hydrogen analysis with one analyser
- Total and fractional analysis for oxides and nitrides separation
- Hot extraction analysis of residual hydrogen
- Easy to replace economic upper electrode insert
- Hot zone at the crucible's bottom due to graphite tip
- Grain and drillings analysis without tin capsules
- High temperature electrode impulse furnace for metals and ceramics analysis



OH-900 Oxygen / Hydrogen Determinator

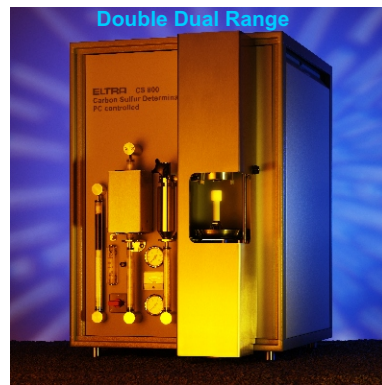
- Oxygen and hydrogen analysis with one analyser
- Total and fractional analysis for oxides separation
- Hot extraction analysis of residual oxygen
- Easy to replace economic upper electrode insert
- Hot zone at the crucible's bottom due to graphite tip
- Grain and drillings analysis without tin capsules
- High temperature electrode impulse furnace for metals and ceramics analysis



Dual Furnace Double Dual Range

CS-2000 Carbon / Sulfur Determinator

- Induction & resistance furnace in one system
- Four solid state infrared cells
- Infrared paths made of gold
- No halogen trap required
- Analysis of organics and inorganics
- Fractional analysis of free and bound carbon and sulfur
- Separation of inorganic and organic carbon
- Separation of sulfides and sulfates
- PC controlled
- Modular design



Double Dual Range

CS-800 Carbon / Sulfur Determinator

For metals and other inorganic materials

- Four solid state infrared cells
- No halogen trap required
- Automatic furnace cleaning
- Power controlled induction furnace
- PC controlled
- Up to 20 grams of copper samples without accelerators



H-500 Hydrogen Determinator

- Determination of residual hydrogen
- PC controlled
- Dual range TC-cell
- Electronic flow control



HTF-540 High Temperature Furnace

- Temperature up to 1550°C
- Temperature stability $\pm 1^\circ\text{C}$
- Tube inner diameter 27mm
- Very fast heating up
- With platform for hot boats