ONH836 Oxygen/Nitrogen/Hydrogen

Specification Sheet

This instrument now supports either Helium or Argon carrier gas. The type of carrier gas used may affect some instrument specifications, as indicated below.

Instrument Range* (1 g sample)			
Oxygen:	0.00005** to 50 mg		
Nitrogen, He Carrier Gas:	0.00005** to 30 mg		
Nitrogen, Ar Carrier Gas:	0.0002** to 30 mg		
Hydrogen:	0.0001** to 2.5 mg		
Precision†			
Oxygen:	0.000025 mg or 0.3% RSD, whichever is greater		
Nitrogen, He Carrier Gas:	0.000025 mg or 0.3% RSD, whichever is greater		
Nitrogen, Ar Carrier Gas:	0.0001 mg or 0.3% RSD, whichever is greater		
Hydrogen:	0.00005 mg or 2% RSD, whichever is greater		
Analysis Time (including outgas, purge, and analysis delay)			
Oxygen, He Carrier Gas:	85 seconds	Oxygen, Ar Carrier Gas:	95 seconds
Nitrogen, He Carrier Gas:	100 seconds	Nitrogen, Ar Carrier Gas:	130 seconds
Hydrogen, He Carrier Gas:	90 seconds	Hydrogen, Ar Carrier Gas:	100 seconds
Cycle Time, He Carrier Gas	180 seconds	**Cycle Time, Ar Carrier Gas**	210 seconds
Calibration	Standards (single or multi-point); manual; gas dose		
Sample Size	1 g (nominal)		
Detection Method	Non-Dispersive Infrared Absorption; Thermal Conductivity		
Chemical Reagents	• Anhydrous Magnesium Perchlorate ($MgClO_4$) • Sodium Hydroxide on an Inert Base	• Copper Oxide, Copper Turnings • Oxygen/Moisture Indicating Tube	
Gas Requirements			
He Carrier Gas:	Helium (99.99% pure), 22 psi (1.5 bar) ±5%		
Ar Carrier Gas:	Argon (99.999% pure), 22 psi (1.5 bar) ±5%		
Pneumatic:	Compressed Air, 40 psi (2.8 bar) ±10%, source must be oil and water free		
Gases Optional			
Gas Dose:	Carbon Dioxide, 99.99% pure, 20 psi (1.4 bar) ±10%		
Gas Dose:	Nitrogen, 99.99% pure, 20 psi (1.4 bar) ±10%		
Gas Flow Rates			
Carrier:	490 cc/minute		
Pneumatic:	280 cc/analysis		
Furnace	Impulse furnace with current and power control 7500 Watts maximum, liquid cooled		
Coolant	3.2 L LECO Coolant		
Operating Conditions			
Temperature	15 to 35°C (59 to 95°F)		
Rel. Humidity	20 to 80%, non-condensing		
Dimensions††			
Height:	36 in. (91.5 cm) nominal; 39.25 in. (100 cm) with load head cover lift engaged		
Width:	27.75 in. (71 cm)		
Depth:	30 in. (76 cm) without monitor; 31.5 in. (80 cm) with attached touch-screen monitor		
Electrical Power	230 V~ (+10/-15%; at max load); 50A, 50/60 Hz, Single Phase; 12,500 BTU/hr‡		
Weight (approximate)	Analyzer: 410 lb. (186 kg) without touch-screen monitor		

**Use the following formula to calculate element concentration:*
*% element concentration = ((absolute element mass in mg)/(sample mass in mg))*100*
***Lower range is calculated as 2 σ instrument blank deviation. Method range may differ due to factors such as sample type and method parameters.*
†Calculated as 1 σ instrument blank deviation. Method precision may differ due to sample inhomogeneity or other external factors.
††Allow for a 6 in. (15 cm) minimum access area around all sides.
‡Average output based on nominal operating parameters.
V~ denotes VAC.

LECO®
Delivering the Right Results

Part Numbers

ONH836-MC	O/N/H w/PC and touch-screen
ONH836-C	O/N/H w/PC
ONH836-HC	O/N/H w/PC and autocleaner
ONH836-HMC	O/N/H w/PC, touch-screen, and autocleaner

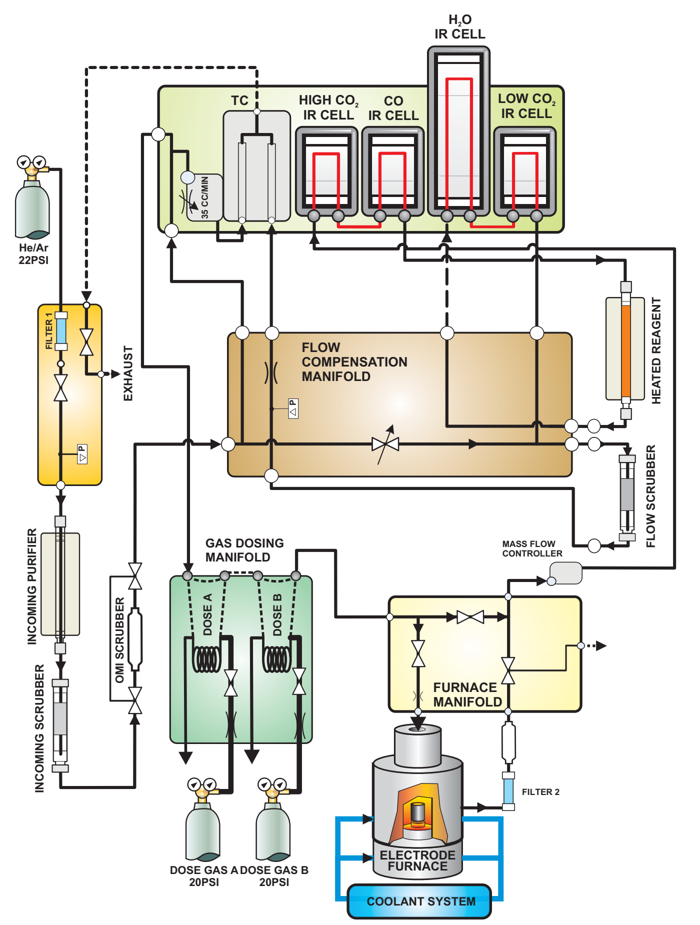
Theory of Operation

The ONH836 Oxygen/Nitrogen/Hydrogen system is designed for wide-range measurement of oxygen, nitrogen, and hydrogen content of steel, refractory metals, and other inorganic materials. The patented detection system supports the true simultaneous analysis of oxygen, nitrogen, and hydrogen during a single analysis, with one crucible and no carrier gas changeover. The instrument features custom MS Windows®-based software designed specifically for touch operation.

A pre-weighed sample is placed in a graphite crucible which is then heated in an impulse furnace to release analyte gases. An inert gas carrier, typically helium, sweeps the liberated analyte gases out of the furnace and through a Mass Flow Controller to a series of detectors. Oxygen present in the sample reacts with the graphite crucible to form CO and CO_2, which are detected using non-dispersive infrared (NDIR) cells. The gas then flows through a heated reagent, where the CO is oxidized to form CO_2, and H_2 is oxidized to form H_2O. The gas then continues through another set of NDIR cells where H_2O and CO_2 are detected. These analytes are then scrubbed out of the carrier gas stream. A patented Dynamic Flow Compensation (DFC) system is used to add carrier gas as a make-up for the gas lost during the scrubbing process. The final component in the flow stream is a Thermal Conductivity (TC) detector which is used to detect nitrogen.

The detection system is comprised of both NDIR and TC detectors. NDIR cells are based on the principle that CO, CO_2, and H_2O absorb infrared (IR) energy at unique wavelengths within the IR spectrum. Incident IR energy at these wavelengths is absorbed as the gases pass through the IR absorption cells. The complete set of CO and CO_2 NDIR cells is required to give the most accurate oxygen results for a wide range of sample types and concentrations. TC detection is based on the principle that heated filaments within a bridge circuit are maintained at a constant voltage in a flowing stream of carrier gas. Changes to the composition of the gas stream will cause a change to the resistance of the filaments. Nitrogen from the sample will cause this type of change, which is recorded as the analytical signal. The concentration of an unknown sample is determined relative to calibration standards. To reduce interferences from instrument drift, NDIR reference measurements of pure carrier gas are made prior to each analysis while TC reference measurements are made throughout each analysis.

Flow Diagram



Specifications and part numbers may change.
Consult LECO for latest information.
Windows® is a registered trademark of Microsoft Corporation.

LECO Corporation
3000 Lakeview Avenue • St. Joseph, MI 49085 • Phone: 800-292-6141 • Fax: 269-982-8977
info@leco.com • www.leco.com • ISO-9001:2008 HQ-Q-994 • *LECO is a registered trademark of LECO Corporation.*

Delivering the Right Results