



## Falcon™

Manless, on-demand temperature and oxygen measurements for EAF process optimization

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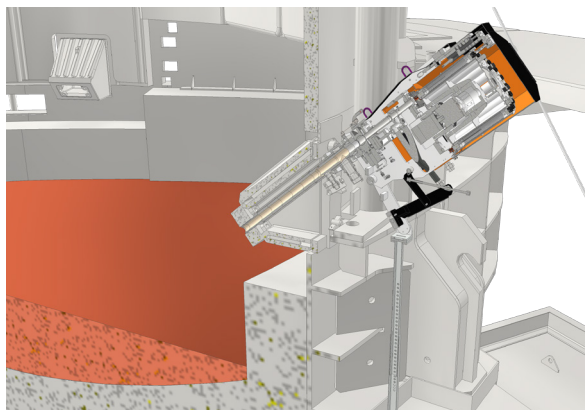
### Introduction

Falcon™ is an automated measuring system capable of delivering accurate temperature, oxygen and carbon readings of liquid steel during the operation of electric furnaces. It is the fastest oxygen and temperature combined measurement on the market, developed to withstand the harsh environment around the electric arc furnace.

Safe and fast measurement helps an EAF operator accurately determine when temperature and oxygen end points will be reached to maximize EAF efficiency.

### Falcon Installation

The system is designed to inject the sensors through the existing carbon injector without compromising its function. This eliminates the need for expensive modifications to the EAF shell or watercooled panels.



### Benefits

- **Safety:** Operated from the EAF control room the system perfectly fits to the modern safety standard of no man on the floor
- **Time savings:** The measurement time of the system is 2 seconds, while a repeat measurement requires only 20 seconds, which is several times faster than a measurement using a robot, that can reduce tap-to-tap time by several minutes per heat.
- **Increased efficiency:** The system allows to perform much early measurement compared to classic robot/manipulator. Due to the high risk of hitting unmelted scrap all operators try to postpone to do a robot measurement, while Falcon system doesn't have such limitations. Early measurement allows for timely determination of temperature/carbon/oxygen, which enables to prevent overheating and overoxidation of the melt.
- **Ease of use:** Measurement doesn't require to open slag door or tilt the furnace which can lead of losing slag thus losing efficiency of the EAF
- **Bath homogeneity detection:** A distinctive feature of the system is the ability to work together with the Chameleon system, that allows to detect the homogeneity of the steel bath (determine the presence of unmelted scrap)
- **Improved steel quality:** The system gives on time insight regarding dephosphorization conditions
- **High up-time:** The system does not have direct contact with molten steel, thus the system more robust and requires less maintenance compared to classical robot.

## System Information

The Falcon™ system consists of several components:

- **The manipulator**, which is a pneumatic based system that holds and, at the operator's request, launches measuring sensors into the EAF.
- The **Pneumatic unit** powers the manipulator, providing the necessary pneumatic force to operate the system smoothly and reliably.
- The **PLC control unit** controls and manages all system components with the ability to be accessed remotely by multiple users.

## Drum mechanism

- Designed to hold and supply 20 Falcon probes
- Quick reloading capability: A new drum with probes can be reloaded in just one minute, ensuring minimal downtime and continuous operation.

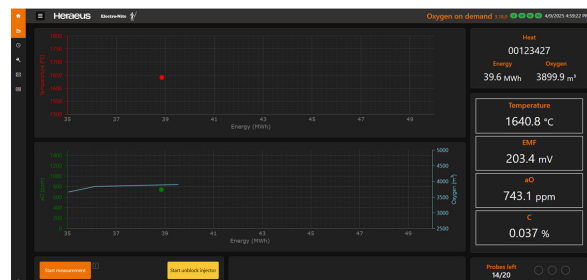


## Falcon Probe

- Each probe consists of a Celox cell and a thermocouple embedded into a durable copper head. This combination allows the probe to accurately measure both oxygen levels and temperature in the liquid steel.
- The measurement head of the probe is connected to a coiled cable.
- The system launches the measurement head by means of pneumatic pressure through the carbon injector.

## Falcon User Interface

The intuitive web-based user interface is available for use on any customer computer and allows to issue a command for measurements, display measured and calculated values, save all measurement results and remotely diagnose and control all system components.



## The parts of the system

The following shows the essential parts of the Falcon™ measurement system

**1** Falcon Machine

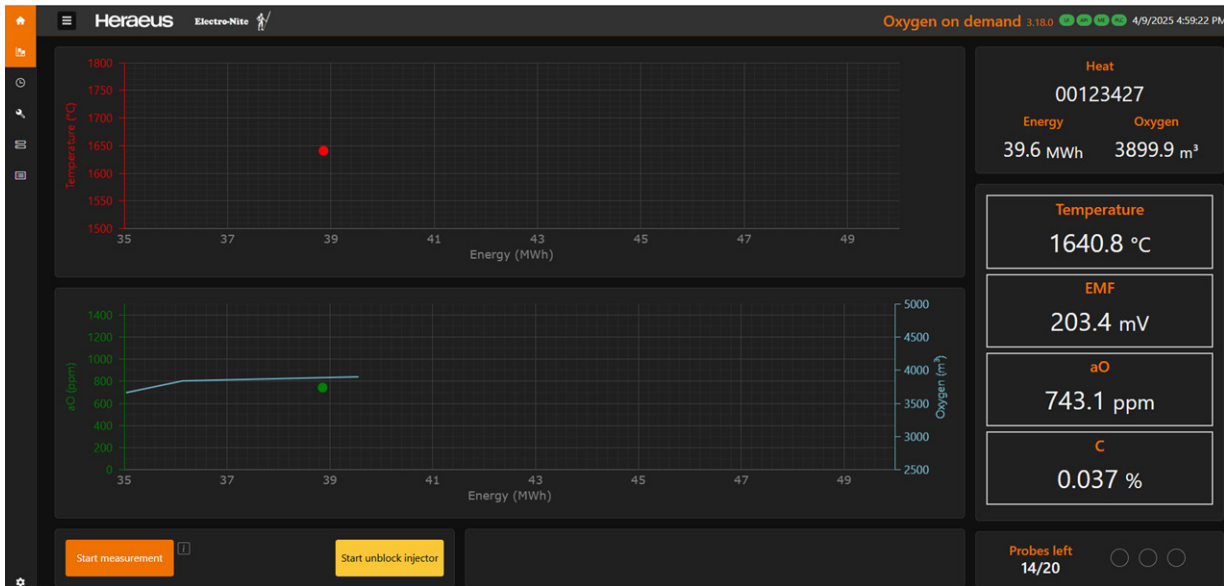


**2** Drum



**3** Falcon Probe





#### 4 Operator Interface



5 Pneumatic Unit



6 Control Unit

## Technical Data

	Description
<b>Application</b>	Temperature, oxygen and carbon measurement in EAF
<b>Measurement input</b>	Two analog inputs
<b>Measurement range</b>	
Temperature	1500...1850°C (2732 to 3362°F), type C
Oxygen	150...2000ppm
<b>Measurement accuracy</b>	
Temperature	± 10 °C
Oxygen	± 5 mV
<b>Calculated values</b>	carbon, aluminum in kg to kill steel, slag %FeO, amount of O2 to reach aO target, steel bath homogeneity (in combination with Chameleon)
<b>Different hardware components:</b>	
<b>Falcon launcher</b>	
Dimensions	701x1400x422 mm (HxWxD), 140 kg
Operating ambient temperature range	-20°C (-4°F) to 60°C (140°F)
Air flow: continuously for cooling	200 l/min
Air flow: during the probe launch	3200 l/min (2900...5000 l/min)
<b>Falcon Pneumatic Unit</b>	
Dimensions	1400x800x300 mm (HxWxD), 110 kg
Compressed air	3 to 6 bar
Power supply	24 V DC (from control unit)
<b>Falcon Control Unit</b>	
Dimensions	1200x800x400 mm (HxWxD), 120 kg
Power supply	3x400-480VAC+PE / 50-60Hz / 16 A / max. 4 KW
Dust/moisture protection class	IP 54
<b>Level2 communication protocols</b>	Profibus, Profinet, Ethernet IP, Modbus TCP

