Heraeus

ELECTRO-NITE

iM² Sensor Lab™

Analyzer for liquid steel and hot metal, featuring the innovative QUBE wireless system


iM² Sensor Lab™
Actual measurement
ROOM 1
ROOM 2
23/01/2012
11:30:39
Celox/
Temperature
23/01/2012
11:29:39
Heatnumber NoHeatnumber
TMP 1.702,9 °C
EMF -200,0 mV
aO 4,3 ppm
Al 0,1869 %
C no calc %
100%
Electro-Nite

*i*M² Sensor Lab™

Analyzer for liquid steel and hot metal, featuring the innovative QUBE wireless system

The intuitive Molten Metal (*i*M²) Sensor Lab™ is a versatile and previse measuring instrument. Its range of applications depends on the sensor attached.

- **Hot metal**: Measures temperature and determines sulfur and silicon content.
- **Primary steelmaking**: Measures temperature and oxygen levels and determines carbon content.
- **Ladle metallurgy**: Measures temperature, oxygen, and bath level and determines aluminium and FeO content, as well as slag thickness.

*i*M² Sensor Lab™
Features

- Easy-to-use controls with intuitive, menu-driven navigation.
- Wired operation, with the option of wireless operation using the QUBE Wireless unit mounted at the end of a handlance or autolance
- Support for one or two measurement locations, using either wired or wireless operation.
- USB ports for uploading and downloading data with a USB memory stick.

The *i*M² Sensor Lab is available in two versions:

- with a built-in 8.4-inch colour touchscreen (external screen optional)
- without a built-in screen (external screen required)

An external screen can be connected to the *i*M² Sensor Lab via a VGA cable. Multiple HMIs can also be connected via Ethernet. An HMI provides full control of the *i*M² Sensor Lab.

Both versions:

- Display measurement curves.
- Perform immersion-lance insulation checks.
- Store up to 3,000 measurements
- Support customised calculation formulas that can be programmed by the operator
- Display measurement-curve history.
- Provide programmable data-transmission capabilities.

The *i*M² Sensor Lab also supports bath-level determination in steel-casting and hot-metal ladles. This requires PLC travel-controlled autolances, standard Heraeus Electro-Nite lance hardware, Positherm® or Celox® sensors, or special Delta-Dist L (DDL) sensors for high-precision measurements.

*i*M² Sensor Lab™
Interfaces

Standard connections

- Two dual measurement inputs for thermocouple/ EMF measurements, with DDL capability.
- One Ethernet port
- Three USB ports: one on the front and two on the back
- One RS232/TTY serial Sub-D 25-pin male connector
- Eight AC relay/triac outputs: 230 V AC/2 A, with active or passive lighting.
- Optional 16-channel DC input/output: 24 V DC/0.5 A, PLC-compatible.

Optional fieldbus connections

- Second RS422/RS485 and RS232/TTY serial interface.
- Profibus DP slave, Profinet IO device, Modbus RTU, Modbus TCP/IP, or EtherNet/IP, using an additional real-time Ethernet connection.
- Digital outputs organised as BCD output: five digits plus decimal point.
- Four-channel analogue milliampere input and four-channel analogue milliampere output.

Wireless interface

A QUBE Wireless unit can be attached to handlances or autolances to provide a wireless connection between the lance and the *i*M² Sensor Lab. The QUBE Wireless unit is mounted at the end of the lance and eliminates the need for external compensation-lance cabling, improving usability, safety, and reliability.

The battery-powered unit is compact and rugged. It is protected by a specially formed handle and digitises and transmits temperature and EMF values to the *i*M² Sensor Lab.

Safety benefits

- No cables on the shop floor, reducing potential trip hazards.
- No cabling maintenance in restricted or dangerous locations.
- No need to lift heavy cables or cable spools.

Cost benefits

- No cabling or connectors are required between the lance and the instruments.
- No conduit installation or maintenance is required for the cabling.
- No need to diagnose cabling-related problems.

Measuring using the wireless unit

Measurement mode is activated when the handlance is picked up, and the status of the wireless link is displayed. The sensor type attached to the handlance is detected automatically.

The unit continues measuring for a predefined period after values have been detected. It then enters sleep mode if no movement is detected.

The handlance with its wireless unit is portable and can be used at multiple locations. The operator only needs to select the new measurement location on the unit. No cable needs to be run between the handlance and the *i*M² Sensor Lab in the pulpit.

Measuring using the QUBE unit on an autolance

When mounted on an autolance, the QUBE is configured for continuous operation and does not use sleep mode.

The QUBE Wireless Suite

The QUBE Wireless Suite eliminates the need for expensive cabling between the measuring lance and the instrument in the control room. This improves safety and measurement reliability while reducing overall costs.

The *i*M² Sensor Lab can use any of the following three transmitters in the QUBE Wireless Suite:

- QUBE-T for temperature only measurements in the steel plant or foundry
- QUBE-O for temperature, oxygen, and carbon measurements in the steel plant.
- QUBE-L for temperature, oxygen, and carbon measurements as well as wireless bath level and DDL probe (slag thickness) measurements in the steel plant.

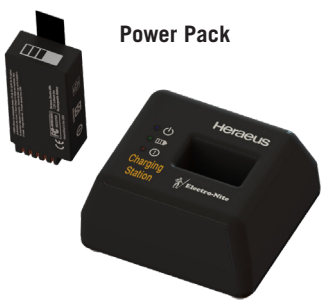
Each QUBE transmitter is rugged, lightweight, and sealed to IP65. Its built-in Location ID (channel) display includes a push button for changing the location. Advanced electronics ensure reliable transfer of measurement data, while a programmable motion sensor helps extend battery life.

QUBE Features

- Rugged aluminium enclosure with IP65 protection against dust and water
- Proprietary 2.4GHz internal antenna is protected against damage
- Long-life Lithium Ion rechargeable battery with built-in fuel gauge
- Reliable and fast battery charging station with feedback LEDs and self-cleaning blade contacts
- Designed for use with all Heraeus Electro-Nite immersion sensors
- Ergonomically designed handle with moulded, rubber grip
- Receiver box has built-in RS-232 and USB interfaces as well as long-range RS422 interface

Receiver Box

Power Pack



Charging Station

Technical data

***i*M² Sensor Lab™: Applications**	Bath temperature, oxygen, carbon measurement	Bath level determination
Additional calculation function	Aluminium and FeO determination in steel slag	
Measurement input	Two individual measurement channels both for temperature and EMF	Each measurement channel with automatic probe recognition
Temperature measurement	T/c types S, R, and B	°C/°F, resolution 0.1°C/0.18°F
EMF measurement	+/- 1000mV	Resolution 0.1mV
Sample rate	Maximum 250/sec	
Accuracy	+/- 0.5°C (0.9°F) for thermocouples, 0.2mV for EMF signals	
Display	8.4-inch TFT colour display Resolution 800x600	For measurement results and menu display
Operation	Touch screen (on instrument or on HMI)	Menu controlled
Result storage	3000 measurements	
Data interfaces	Serial interface (additional serial interface optional) with TTY 20 mA/RS232 and serial connection for wireless (only connection to Receiver Box) LAN (Ethernet)	Serial interface with modem and programmable data transmission Ethernet interface with TCP/IP protocol and programmable data transmission
Heat number entry	Eight digits, input using touch screen	External input as additional using serial interface or Ethernet
Optional relay signal outputs	Ready, Measurement, Complete, Error Celox, End of data communication, Bath level, TXD Complete	2 x 8 relays, allocation programmable, max. 48V DC, max. 100mA, max. 24VA
Solid state signal outputs	Ready, measurement, complete, horn for both measuring stations	2 x 4 solid state relays, 100 – 240V, 47 – 63Hz, 100VA per output channel
Housing, dimensions and weight	Metal housing, height 4 HU for 19 inch rack mounting, panel or bench mounting Protection front IP54, protection housing IP51, weight approximately 13kg (28.6lb)	Dimensions: h = 178mm (7“), w = 482mm (18.9“), d = 365mm (14.4“) built-in depth 450mm (17.7“), panel cut-out +1mm (0.039“) h and w
Connections	All instrument inputs and outputs with plugs	
Operating range	Power supply, ambient temperature	100 – 240V AC, 47 – 63Hz, 160VA, 0°C (32°F) to 50°C (122°F)
Storage range	Ambient temperature, relative humidity	-20°C (-4°F) to 75°C (167°F), max. 90% RH non-condensing
Bath level determination	By evaluation of the measurement curve slope or Delta-Dist L® function	Bath level contact output potential-free contact max. 48V DC, 24VA
Profibus-DP	Industrial field bus	Freely programmable data telegrams
Ethernet-IP	Industrial Ethernet field bus	Standard protocol
Profinet	Industrial Ethernet field bus	Freely programmable data telegrams
Modbus	Field bus	Freely programmable data telegrams
Optional BCD output, with four outputs with valid pulses (max seven outputs possible)	Five digits with decimal point Four take over (valid pulses) for the first four data outputs	Data output programmable potential-free output using reed relays, active/on max. 48V DC, 24VA
Optional analog output with 2/4 data outputs	0/4 – 20mA = output range, galvanically separated, dynamic or memorized, output range programmable, load (burden) 0 to maximum 500Ω	Programmable data output Accuracy: 0.1% full scale

***i*M² Sensor Lab™ and QUBE:**

Channel	Parameter	Positherm®	Celox®	Celox SLAC®	Tap-Tip®	Econ-O-Carb®
0/2	Input type	T/c S, R, B	T/c S, R, B	Short circuit	T/c S, R, B	Open circuit
1/3	Input type	EMF	EMF	EMF + 50kΩ parallel	T/c S, R, B	T/c S, R, B

QUBE:

Measurement channels:	T = 1, O and L = 2
Measurement channel modes:	Thermocouple (S,R,B) EMF (-1V to +1V)
Accuracy:	Thermocouple: better than +/-0.5ºC (0.9ºF) at ambient between 0ºC (32ºF) and 50ºC (122ºF) (actual ºC or ºF values depend on thermocouple type) EMF: better than 0.2mV at ambient between 0ºC (32ºF) and 50ºC (122ºF)
LED indicators:	Power pack status and wireless link status
Power pack life:	Typically 1000 measurements or three days of continuous use
Radio range:	Over 100 line-of-sight meters depending on location
Operating range:	-20ºC (-4ºF) to 75ºC (167ºF)
Storage range:	-20ºC (-4ºF) to 75ºC (167ºF), max. 90% RH non-condensing
Protection:	IP65 (whether connected to the lance or not)
Size:	mm: length = 175, width = 66.7, height = 66.7 Inches: length = 6.9, width = 2.625, height = 2.625
Weight (without power pack)	930g (2.05lbs)

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