Institut de la Corrosion
French Corrosion Institute

nke INSTRUMENTATION

AIRCORR I

System for real-time monitoring of indoor corrosivity and air quality

Real-time information on the actual air corrosivity is crucial for effective corrosion protection of valuable equipment and objects. AIRCORR I measures and registers the change over time in the electrical resistance (ER) of a thin metal track applied on an insulating substrate. If the metal corrodes, the cross-sectional area of the track decreases and the ER increases. The changes in ER can be directly translated into corrosion depth and corrosion rate.

The AIRCORR monitoring system is comprised of four principal parts:

- Electronic logger for measuring and recording ER, AIRCORR I;
- Metal sensor that actually corrodes in the environment;
- Non-contact communication interface between the logger and computer, Data pencil;
- User-friendly software programme, WINAIRCORR.

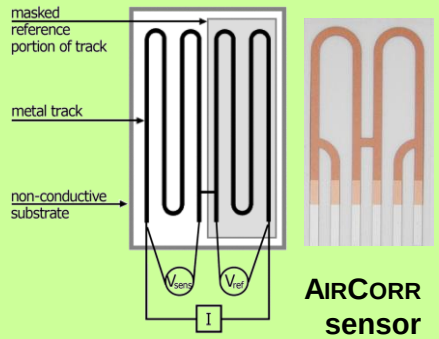
Main features

- AIRCORR I logger is **small and can be placed virtually anywhere**.
- AIRCORR I is **battery-driven** and designed to be **autonomous for up to five years**.
- Due to the great precision of the electronic device and the geometry of the metal track, both **a quick response time and a highly sensitive measurement are achieved**.
- **A wide range of sensors, including ultra-sensitive ones for low-corrosivity environments** with sensitivities below 10^{-10} m (1 Å), is available.
- The **metal sensors are easily replaceable,** which reduces operational costs.
- **Non-contact data reading** allows the logger to remain in place while also allowing the data to be monitored.
- User-friendly WINAIRCORR software provides **rapid interpretation of results** in terms of corrosion depth and corrosion rate and classifies the air quality and corrosivity with the help of four **standards and recommendations**.

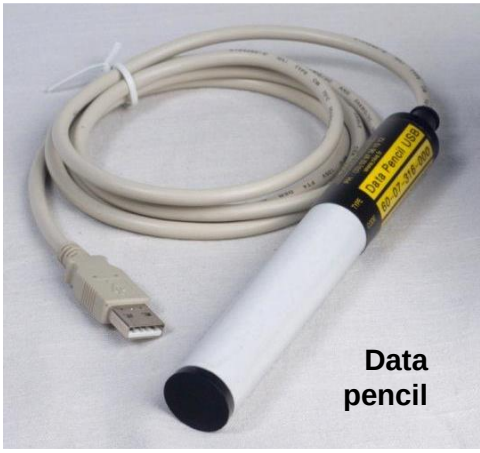
Examples of applications

- *Cultural heritage*. Control of the air quality is vital to the protection of the valuable, culturally-significant objects in museums, exhibitions, depositories, and archives.
- *Electronics*. Protection of electronic equipment in clean rooms, GSM stations, pulp & paper industry, cars, and ships.
- *Research and development*. Understanding of corrosion mechanisms.

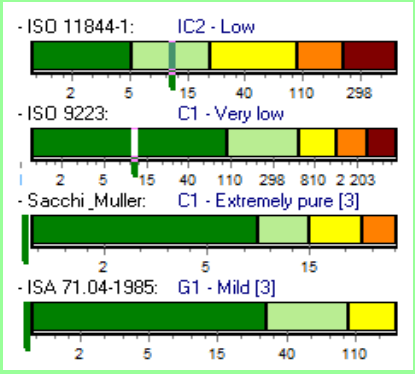
Logger AIRCORR I



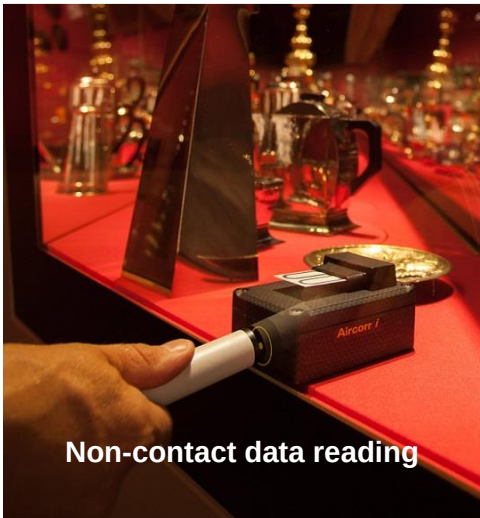
AIRCORR sensor



Data pencil



Corrosivity classification



Non-contact data reading

Specifications

AirCorr I logger

- Indoor logger with an exchangeable sensor with water tightness IP44.
- Polycarbonate box of 100×65×50 mm, weight 185 grams.
- Optimal / Maximal operating temperature range: from 0 to 30 °C / from –5 to 45 °C.
- Measurement frequency: Adjustable from 1/second to 1/day.
- Accuracy of corrosion depth measurement at temperatures from 0 to 30 °C: <0.3% of sensor thickness.
- Resolution of corrosion depth measurement at temperatures from 0 to 30 °C: <0.01% of sensor thickness.
- One lithium battery LS14500 (3.6 V / 1.8 Ah). Lifetime of over 3 years at measurement frequency of 1 hour at temperatures from 5 to 30 °C.
- Capacity of memory: Over 10 years with measurement frequency of 1 hour.

Sensors

- Exchangeable, ceramic or glass-fibre reinforced epoxy resin substrate.
- Size 55×31 mm.

Data pencil

- USB non-contact data reader.
- Data reading from maximal distance of about 10 mm.
- Drivers for Windows provided on a USB flash drive.

Sensor	Sensing material	Resistance range [Ω]	Life span [nm]	Resolution [nm] [1]
Pb-25µm	Lead	1–10	12500	5
Al-14µm [2]	Aluminium	1–10	7000	6
Sn-10µm [2]	Tin	1–10	5000	5
CuSn6-5µm	Bronze Cu-6Sn	1–10	2500	1
Cu-500nm	Copper	1–10	250	0.1
Ag-500nm	Silver	1–10	250	<0.1
CuSn8-400nm [2]	Bronze Cu-8Sn	10–100	200	0.3
Pb-400nm [2]	Lead	10–100	200	0.1
Fe-800nm [2]	Iron	10–100	400	0.5

[1] Minimum measurable change in the corrosion depth assessed in laboratory conditions. [2] Available upon request.

WinAirCorr software

- Installation version provided on a USB flash drive.
- Works from Windows XP to Windows 10.
- Air quality and corrosivity classification according to ISO 11844-1 (indoor, IC1–IC5 for Ag, Cu, Fe and Zn), ANSI/ISA S71.04-2013 (indoor, G1–GX for Cu), Sacchi and Muller (indoor, S1–S5 for Ag, C1–C5 for Cu) and ISO 9223 (outdoor, C1–CX for Fe, Zn, Cu and Al).
- Data exportable in txt format.

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