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# Measurement and Control of Humidity and Moisture in Industry

Tuesday 10th April 2018

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			Transport and Electric Systems					

# Danish Technological Institute – Metrology in short

**Staff:** approx. 50

**Facilities:** Humidity, Moisture, Temperature, Flow, Air-velocity  
Geometry, Length, Pressure, Force, Mass, Electrical,  
Frequency  
+ 17 Mobil laboratories for on-site

- All services accredited by DANAK (ILAC-MRA) according to ISO 17025 (Calibration) and ISO 17043 (Proficiency testing)
- Designated Institute (covered by CIPM-MRA) and maintains Danish measurement standards within Contact Thermometry, Water- and energy flow, air-velocity and geometry (length)
- Participates in EURAMETs Technical Committees and its key-comparisons
- CMC's in BIPM database: approx. 50



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DANIA<sub>met</sub>



 DANAK  
CAL. Reg.nr. 200

# Facilities Moisture and Humidity



- Chilled mirror hygrometers (3xMBW 373, 1xMBW573HX, 1xMichell 4000)
- Dewpoint generators (2xThunder 2500 + 1xThunder 3900)
- Climatic chamber (Heraeus)
- Flowmixing set-ups (Home-made)
- Relative humidity: from 0.2 %rh to 95 %rh (5 °C to 90 °C)
- Dewpoint temperature: from -75 °C til +70 °C (0 bar to 7 bar)
- Air temperature: from -40 °C to +90 °C
- Set-up for SI traceable measurement of water content in materials
- Set-up for SI traceable measurement of water activity
- Set-up for SI traceable measurement of sorbption isotherms – see later presentation



# Scope of this conference:



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- To discuss challenges in measuring relative humidity at high temperatures and transient condition as well as the calibration of humidity sensors under these conditions are discussed
- To discuss in-line measurement of water activity and how to relate these to traditional standardized measurements with laboratory analysers.
- To provide a forum for networking and knowledge exchange

Acknowledgement to:

**EMPIR**



The EMPIR initiative is co-funded by the European Union's Horizon 2020 research and innovation programme and the EMPIR Participating States

# Programme



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**10:00 - 10:10 Opening the workshop**

*Jan Nielsen Danish Technological Institute*

**10:10 - 10:30 Metrology for Humidity at High Temperatures and Transient conditions – the challenge**

*Dr. Martti Heinonen VTT MIKES*

**10:30 - 10:55 Pitfalls when using air humidity sensors in dynamic conditions**

*Kim Albert Schmidt FORCE Technology*

**10:55 - 11:10 Coffee**

**11:10 - 11:35 GEA managing humidity**

*Søren Juhl Pedersen GEA Process Engineering A/S*

**11:35 - 12:00 Improving the efficiency of humidity calibrations in a lab and on site**

*Dr. Martti Heinonen VTT MIKES*

**12:00 - 13:00 Lunch & Networking**



## Programme - 2



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**13:00 - 13:25 A New Acoustic Method for Relative Humidity Measurement Demonstrated in a Dairy**

*Wilhelm van Schaik van Schaik Innovation Handling B.V.*

**13:25 - 13:50 A Climatic Chamber for dew-point temperatures up to 150 °C**

*Andrea Peruzzi, VSL Dutch Metrology Institute*

**13:50 - 14:15 Using isotherms for determination of shelf life of milk powder**

*Mikka Stenholdt Hansen Arla Foods amba.*

**14:15 - 14:30 Coffee**

**14:30 - 14:55 The significance of water activity and sorption isotherms**

*Dr. Jens Risbo University of Copenhagen*

**14:55 - 15:20 Progress towards traceable inline measurement of water activity**

*Henrik Kjeldsen Danish Technological Institute*

**15:20 - 15:45 Automatic Quality Analyzer System for in-line measurement of water activity in feed**

*Jens Erik Stengaard Source Technology ApS*

**15:45 - 15:55 Summary and close**

*Jan Nielsen Danish Technological Institute*