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INFORMATION FOR CUSTOMERS AND PARTNERS OF PALAS® GMBH December 2017

PALASCOUNTS

Fidas® Fly collects data for cloud research

Measurement campaign in the Arctic with KIT researchers in the Pallas Cloud Experiment

The research station of the Finnish Meteorological Institute in the Pallas National Park in the Arctic

Clouds play a major role in shaping weather patterns, so the study of clouds plays a pivotal role in connection with climate research. In September, together with Dr. Ottmar Möhler from the Institute of Meteorology and Climate Research of the Karlsruhe Institute of Technology (KIT), Palas® took part in the „Pallas Cloud Experiment 2017“, where unmanned aircraft and drones were used to collect measurement data from different cloud layers in the north of Finland as part of the European ACTRIS-2 research project. **Page 2**

Other topics in this issue:

Dear Readers,

With our Fidas® fine dust measurement devices, we have developed a product that has given Palas® GmbH a mighty push forward. The Fidas® devices are now used in many countries in Europe, Asia and in America in national environmental monitoring networks for fine dust measurements. Our most recent order for 44 units came to us from Ireland.

A few years ago, we were happy and satisfied if we managed to sell 20 to 30 of our welas® aerosol spectrometers in a year. Today, we are selling around 300 Fidas® units a year. Of course, the prerequisite for this success was certification, and through this approval for regulatory measurements. We were also able to demonstrate in practice that the very high availability of Fidas® that is required in the standard is indeed met in reality. This has also impressed our customers.

But we also had to learn to manage rapid growth. Production areas have been more than doubled in size, and many new employees have been hired. New production processes have been set up. We are now in the process of optimizing these processes.

To safeguard the future of the company, we have now also set up an Advisory Board with experts from the areas of Controlling, Marketing and Sales, as well as Quality Management. The Advisory Board, on which the daughters of company founder Leander Mölter are also represented, advises the Management Board.

Yours truly, the

Palas® Management
Leander Mölter and Dr.-Ing. Maximilian Weiß

Fidas® Fly collects data for cloud research

Measurement campaign in the Arctic with KIT researchers in the Pallas Cloud Experiment

"Why does it rain or snow from a cloud, and why does it not just fall out of the sky as a whole?" Questions like this are what motivate physicist Dr. Ottmar Möhler, who works at the Karlsruhe Institute of Technology (KIT) in the Institute of Meteorology and Climate Research in the department Atmospheric Aerosol Research. Here, Dr. Möhler heads the group "Aerosol Cloud Processes." Clouds play a major role in shaping weather patterns, and research in this specialist field is of paramount importance in relation to climate research.

In September, Dr. Möhler was able to take part in the measurement campaign as part of the 7th Pallas Cloud Experiment in the Arctic, together with Palas® Managing Director Dr.-Ing. Maximilian Weiß and Gerd Schaufelberger, Managing Director of Airclip GmbH. The main focus of this measurement campaign in the north of Finland was on vertical profiling of clouds with unmanned aircraft and drones and ground measurements at the research station operated by the Finnish Meteorological Institute (FMI), the Finnish counterpart to the German Meteorological Service (Deutscher Wetterdienst, DWD), in the Pallas-Yllästunturi National Park. Teams of researchers from Finland, Cyprus, UK and Germany carried out measurements with balloons, fixed-wing unmanned aircraft and flying drones in the different cloud layers. The HORUS multicopter from Airclip with the Fidas® Fly 100 aerosol spectrometer from Palas® was used to collect data on the size distribution and number concentration of particles under, in and above the clouds. At the same time, measurement data was also collected with another Fidas® Fly at the research station. The Pallas Cloud Experiment, which Palas® took part in under its own initiative, forms part of the European ACTRIS-2 research project, in which data is collected from research stations all around Europe on transient reactive trace gases, aerosols and clouds and made available for research.

"During the fall and winter months, so-called Arctic Layer Clouds form there. These are layers of cloud formed of liquid droplets that lie very low," explains Dr. Möhler as he talks about the special conditions at the research station in Finland. "Once the sun no longer shines quite as strongly, the convection currents from below are reduced, because of which the so-called planetary boundary layer is formed at a lower altitude." In Central Europe, this boundary layer forms at an altitude of around two kilometers, but it is less than one kilometer in the north of Finland, so this part of the world offers particularly good conditions for the measurements. "In some cases, the cloud base is also lower," adds Dr. Möhler, "so that the station, which is not really all that high up, often finds itself in the clouds."

Focusing on ice-forming particles

The cloud researchers are particularly interested in ice-nucleating particles that contribute to the formation of ice in these clouds. They form a very small subset of the aerosols that are measured overall with Fidas® and are particularly relevant for the development of precipitation. "The beauty of performing measurements with the Fidas® Fly 100 aerosol spectrometer on the HORUS octocopter lies in the fact that it enables us to fly up and down at the same spot in the cloud, time and time again," says Dr. Möhler. He explained that this was a particularly important addition for the researchers that helped them to broaden their normal options.

For the measurements, particles were also collected on filters at the measurement station in the Arctic. From the data, a new method developed by Dr. Möhler and his group at KIT was used in the laboratory to filter out from the total collected aerosol particles the few ice-forming particles as a function of temperature. Afterwards, this data was then compared with the total aerosol amounts measured with Fidas® Fly in order to find out what proportion of ice-forming aerosols contributes to the formation of snow and precipitation. "The question is, how does the aerosol change further into the cloud, and are there different size distributions or amounts of aerosols under the cloud, in the cloud or above the cloud?" Dr. Möhler suspects that the larger particles in particular contribute to ice formation. In Karlsruhe, two students are currently working at the KIT Institute on an analysis of the collected filter samples. Dr. Möhler himself is evaluating the Fidas® data and will then amalgamate the data. On account of the fact that the "data and information are very new", the results are due to be published.

Drone pilot Gerd Schaufelberger with the Fidas® Fly 100 on the HORUS multicopter from Airclip

The cloud researcher was particularly impressed with the combination of the Fidas® aerosol spectrometer with the HORUS multicopter from Airclip. "It looked really professional, and I think it is exactly the right kind of development that the people who are developing flight systems are getting together with the people who develop the measurement devices so that both developments can be coordinated." According to Dr. Möhler, all the participants benefited from the international exchange during the measurements in Finland. "There were absolutely no secrets, everyone was really open in the way they worked together, and we were all interested in developing these things for science because we understand that we can break new ground here."

Dr.-Ing. Maximilian Weiß and Dr. Ottmar Möhler out and about at the research station in Finland

Atmospheric aerosol research at KIT

The department for Atmospheric Aerosol Research of the Institute of Meteorology and Climate Research (IMK-AAF) at the Karlsruhe Institute of Technology (KIT) is headed by Professor Dr. Thomas Leisner. The Institute is conducting research particularly into the role of aerosols in climate systems, the water cycle and the environment. It operates the internationally renowned AIDA Aerosol and Cloud Simulation Chamber, which is used to investigate the impact of aerosols on climate, weather and the environment. In addition, the Institute also operates laboratories for aerosol and cloud research, takes part in field campaigns and performs numerical modeling of atmospheric aerosol processes.

Karlsruhe Institute of Technology

Further information can be found here: www.imk-aaf.kit.edu

MFP 3000 HF – The all-in-one filter media test rig

Determination of the separation efficiency in a size range from approx. 20 nm to 20 µm

■ The MFP 3000 HF was developed at Palas® in order to meet the highest requirements for filter media testing. On this test rig, it was possible for the first time to determine the separation efficiency in a wide size range from approx. 20 nm to 20 µm.

In close cooperation with the largest filter manufacturer from Baden (Germany), Palas® has developed a new, intelligent testing concept for filter media. It meets the most stringent requirements not only in terms of measuring technology and climate control, but also in terms of occupational health and safety in accordance with the Machinery Directive.

The combination of the Promo® 3000 aerosol spectrometer (measuring range 200 nm to 40 µm) and the Palas® U-SMPS system (measuring range 5 nm to 1200 nm) in the MFP 3000 HF enables the clear and unambiguous determination of the separation efficiency of filter media across the entire size range that is relevant for the filter.

The dependency of the filter efficiency on the ambient conditions, relative humidity and temperature is also supported by the MFP 3000 HF in a straightforward manner. The wide-ranging temperature control from -10 to +50 °C and the control of relative humidity from 10 to > 80 % can be realized for inflow velocities of 4 cm/s to 2 m/s with the highest consistency. With individually controlled heating and cooling zones, it is possible to simulate effects such as particle condensation or icing.

The large selection of different test aerosols like DEHS, NaCl and KCl plus dusts (ISO A2 Fine and ISO A4 Coarse) round off the options for filter media testing in accordance with a wide range of standards and under the widest operating conditions.

Filter media test rig MFP 3000 HF

New KCl aerosol generator according to ISO 16890

■ **The development of a new KCl aerosol generator that meets the requirements set out in ISO 16890 is now completed. This generator (LSPG 16890), another innovation from Palas®, can generate salt particles in a size up to 10 µm with the highest consistency. And this at the low aerosol concentrations that are required for filter media testing with small air volume flows.**

In the past, the special requirements for salt aerosols (KCl) in accordance with the new ISO 16890 could only be realized on large complete filter test rigs with air volume flows between 800 and 5000 m³/h. With the new KCl aerosol generator, Palas® is closing the gap in demand for application in filter media testing for small volume flows up to 72 m³/h.

In addition to high dosing consistency, the LSPG 16890 also stands out with simple operation and ease of cleaning when using KCl solutions.

Small and flexible: PAG 1000

■ **The autonomous PAG 1000 (Portable Aerosol Generator) newly developed by Palas® for generating droplet aerosols of e.g. DEHS offers maximum flexibility, particularly also for low concentrations. The generator is small, and at a weight of just 5 kg it is easy to handle and independent of power/compressed air supplies thanks to its battery operation. A single battery charge is enough for a whole working day, but if necessary the unit – which does not require compressed air – can also be powered from the mains.**

Thanks to the switching mode of the internal pump for aerosol generation, the PAG 1000 offers a wide setting range for adjusting the concentration. Electric closed-loop control via the internal display enables reproducible adjustment of the particle concentration.

Applications for the PAG include, for example, the testing of laminar flow boxes and other laboratory applications.

PAG 1000

New dilution system for droplets up to 8 µm

■ Dilution systems that can be used in particular to make highly concentrated solid particle aerosols for particle measurement devices measurable in terms of the particle concentration have been used successfully in practice for around 40 years now. However, all conventional dilution systems share the problem that they are not able to dilute droplet aerosols in the required manner. The reason for this is that the conventional dilution systems act here as a separator for droplets larger than 3 µm.

This is why Palas® has developed a further dilution system in addition to the tried-and-tested models DC 10000, KHG 10, PMPD 100 and the VKL system in the form of the **LDD (Large Droplet Diluter)**, which solves this problem.

The technical basis of this device is a well-known principle that has now been optimized for the first time for the dilution of highly concentrated droplet aerosols. With the aid of this system it is possible to dilute droplets with a size of 8 µm with a factor of 10 or 100 and to make them available for measuring devices.

Applications for this include, for example, the testing of oil separators in air compressors or oil separators that are used in crankcases in engine construction. Here, the particle spectrum of the oil mists can range up to a size of 8 µm. As they are present in very high concentrations, they need to be reliably diluted in order to make their particles measurable at all.

Palas® Air Filtration Seminar 2017 (AFiS)

With Prof. Eberhard Schmidt as a new moderator and a new international outlook for the event, the first Palas® Air Filtration Seminar took place on November 21 and 22, 2017 in Karlsruhe and met with an excellent response. The high number of participants alone – over 70 people from industry and research – demonstrated the level of interest in current investigations and developments in the field of filter testing.

The core topics for the Palas® Filtration Day on November 21 were the new developments in connection with the new ISO 16890 for room air filters and the changes in relation to the previously valid EN 779, as well as the latest findings in the field of compressed air filtration.

Further main points included new findings relating to the aging of filter media and the influence of the aerosol discharge systems used (X-ray sources versus radioactive krypton sources) in the filter testing of HEPA and ULPA filters on the measurement results.

The Filter Testing Workshop that was hosted on the following day at Palas® also met with great interest from the visitors. Here, various filter test rigs were demonstrated live, for example the DFP 3000 filter test rig for compressed air filters, the MFP Nano *plus* and the MFP 3000 for the new ISO 16890. The new in-house calibration system for aerosol spectrometers, with which both the size effects and counting effects of aerosol spectrometers can be clearly and reliably determined, was also presented.

We would like to thank all participants for the high level of interest and in particular for the exciting and open discussions.

Environmental technology cooperation in the Mexican market

In the spring of 2017, Franz Untersteller, Minister of the Environment, Climate and the Energy Sector of Baden-Württemberg, visited Mexico with a trade delegation of 40 persons. The main focus of the trip was to promote the cooperation between companies in the automotive industry, machine construction and environmental technology with the North American country. Members of the delegation included the Managing Director of Junker-Filter GmbH from Sinsheim, the Sales Director of Keller Lufttechnik GmbH + Co. KG from Kirchheim-unter-Teck and one of the Managing Directors of Palas® GmbH from Karlsruhe.

On the trip, entrepreneur Jürgen Junker had the idea that, instead of acting individually on their own behalf in Mexico, the three medium-sized companies – who have all known each other for a long time – should instead appear jointly with the Environmental Technology Agency of the federal state as a synergy alliance under the flag "Environmental Technology from Baden-Württemberg." The Mexican market offers interesting potential for all three companies to gain a long-term foothold here. However, this also means a high financial and organizational outlay, which is difficult for each of the companies to meet alone.

It soon became clear during the discussions in Mexico that this cooperation promised great success, particularly since the three companies are not in direct competition with each other. In the form of Eduardo Gil from Mexico, a consultant was brought on board who understands the local conditions. During the summer, Gil already spent 10 weeks in Germany to find out about the three companies' product portfolios. A joint office is due to be opened in Mexico in 2018.

PALAS® DATES

Up-to-date information about the dates of trade fairs and exhibitions where Palas® will be present can always be found on the Internet at www.palas.de/exhibition.

Here are some of our current trade shows:

- **Filtech 2018, Cologne, Germany**
  March, 13 – 15, 2018
- **IFAT 2018, Munic, Germany**
  May, 14 – 18, 2018
  Joint stand for SMEs from Baden-Württemberg
- **Achema 2018, Frankfurt/Main, Germany**
  June, 11 – 15, 2018
- **IAC 2018, Saint Louis, Missouri, USA**
  September, 2 – 7, 2018

New team members 2017

The Palas® team has grown again this year, and we would like to take this opportunity to briefly introduce our newest employees to you.

Left to right: **Ronja Schäfer** is our new Sales Management Assistant. **Jochen Stober** is supporting us as a Specialist in Precision Engineering and Optics. Dr.-Ing. **Stefan Hogekamp** has taken on the leadership of Fine Dust Measuring Devices. **Evelin Luzius** is Assistant to Production Management. **Ralf Emberger** is Head of Sales. **Franziska Farr** is a Laboratory Engineer in the area of Quality Assurance, and **Mara Pfeffinger** is responsible for the Technical Back Office. Not shown on the picture are HR Advisor **Philipp Biel** and **Tatjana Pavelev**, Production Employee.

Special print for CCE 3000

In September, an article on the subject of "Test aerosol system for the calibration of automatic fine dust measurement devices" appeared in the trade journal "Gefahrstoffe – Reinhaltung der Luft" (Hazardous Materials – Pollution and Clean Air). It describes the CCE 3000 system (calibration channel for environmental fine dust monitoring systems), which was jointly developed by Palas® together with the Air Monitoring Network of the Betriebsgesellschaft für Umwelt und Landwirtschaft (Operating Company for Environment and Agriculture, BfUL) in Saxony. If you are interested in a copy of this special print, please simply send an e-mail to n online@palas.de.

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