

# ACTUATOR 18

International Conference and Exhibition  
on New Actuators and Drive Systems

**Bremen, Germany**  
**25–27 June 2018**



1988 – 2018

**Exhibition Catalogue**



[www.actuator.de](http://www.actuator.de)



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# **ACTUATOR 18**

**16th International Conference on New Actuators**

**Exhibition and Congress Center Bremen, Germany  
25–27 June 2018**

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**Location**

Exhibition Center Bremen, Hall 4.1

**Opening Hours of Exhibition**

Monday 25 June 2018 9:00 – 18:00

Tuesday 26 June 2018 9:00 – 18:00

Wednesday 27 June 2018 9:00 – 15:00

**Organiser & Publisher**

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This catalogue has been carefully compiled according to the information received from the exhibitors. Nevertheless, we apologize for any occurring mistake. No responsibility is assumed by the publisher for any claim referring to incorrect entries.

## Invitation

Welcome to

# ACTUATOR 18

16th International Conference on New Actuators

Exhibition and Congress Center Bremen, Germany  
25–27 June 2018

Organised by



MESSE BREMEN / M3B GmbH

**Event Sponsor**

- ▶ Physik Instrumente (PI) GmbH & Co. KG, Karlsruhe, Germany

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- ▶ **A. Ando**, Murata Manufacturing Co. Ltd., Kyoto, Japan
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- ▶ **J.C. Lötters**, Bronkhorst High-Tech B. V., Ruurlo, The Netherlands
- ▶ **J. Maas**, Technische Universität Berlin, Berlin, Germany
- ▶ **H.P. Monner**, DLR e. V., Braunschweig, Germany
- ▶ **P. Müllner**, Boise State University, Boise, USA
- ▶ **E. Pagounis**, ETO MAGNETIC GmbH, Stockach, Germany
- ▶ **J. Perret**, Haption GmbH, Aachen, Germany
- ▶ **P. Pertsch**, PI Ceramic GmbH, Lederhose, Germany
- ▶ **A. Preumont**, Université Libre de Bruxelles, Brussels, Belgium
- ▶ **H.F. Schlaak**, Technische Universität Darmstadt, Darmstadt, Germany
- ▶ **S. Seelecke**, Universität des Saarlandes, Saarbrücken, Germany
- ▶ **K. Uchino**, The Pennsylvania State University, University Park, USA
- ▶ **E. Vander Poorten**, Katholieke Universiteit Leuven, Heverlee, Belgium
- ▶ **G. Vergani**, SAES Getters S.p.A., Lainate, Italy
- ▶ **U. Wallrabe**, Albert-Ludwigs-Universität Freiburg, Freiburg, Germany

Organiser:

- ▶ **H. Borgmann**, MESSE BREMEN, Bremen, Germany

## Welcoming Remarks



Welcome to the 16th International Conference on New Actuators. Since 1988, this series of conferences has always been held in Bremen, Germany, every two years. Always in June of the even years, while the football actors compete for the European or even the World championship, experts from science and industry have met here in Bremen to present and discuss the latest results and to show new products based on smart actuators.

And for 30 years now, it has been a good tradition to present an accompanying exhibition demonstrating the industrial relevance of the event topics. We feel that this is a perfect moment to express our sincere thanks not only to the authors of conference contributions – but also to the exhibitors having been faithful companions of the conference, some of them for the whole time since the beginning.

In the comfortable atmosphere of the Bremen Exhibition and Congress Center the 350 experts from more than 25 countries find a comprehensive conference programme with 85 lectures and 56 poster contributions. This time, the poster session, the accompanying exhibition as well as the catering area will be located in the adjacent Hall 4.1., which hereby is an excellent place for networking within the worldwide experts' community present here, for creating visions on new inter-research co-operations or starting business co-operations with industrial partners. We are sure you will find excellent opportunities and competent candidates.

Of course, such an event cannot be realised without highly qualified partners. In this concern we thank all the members of the Programme Committee, the current ones as well as the past ones, for their excellent work and valuable assistance in compiling the programmes. Furthermore, we are particularly grateful to the endorsing institutions, the media partners and to all others who have always supported our public relations work. Of course, our special thanks also include the teams behind the scenery, all the colleagues involved in the organisation and all the external service partners who managed to maintain the quality standards throughout the decades.

We hope you will again enjoy this interesting event with lots of stimulating discussions and inspirations, and, of course, once again have a pleasant stay in the Hanseatic City of Bremen.

*Hans Peter Schneider*

Hans Peter Schneider  
MESSE BREMEN  
General Manager

*Hubert Borgmann*

Hubert Borgmann  
MESSE BREMEN  
Project Manager ACTUATOR 2018



## **CeramTec at ACTUATOR 2018 Meet the Piezoceramic Experts**

Advanced ceramics expertise in piezo applications:

- Multilayered PZT piezo actuators
- PZT actuators with active moisture suppression
- SONOX<sup>®</sup>P piezoceramic materials
- Piezoceramic bending elements, plates, discs or rings

**[www.ceramtec.com/actuators](http://www.ceramtec.com/actuators)**



## Alphabetical List of Exhibitors

### B

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#### **Boréas Technologies Inc.**

45 Boul. de l'Aéroport, Bromont, Quebec J2L 1S8, Canada  
 Tel.: +1 450 53 48 00 0  
[www.boreas.ca](http://www.boreas.ca)  
[info@boreas.ca](mailto:info@boreas.ca)

**Stand A02**

### C

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#### **CEDRAT TECHNOLOGIES S.A.**

59, Chemin du Vieux Chêne, 38246 Meylan, France  
 Tel.: +33 456 58 04 00  
[www.cedrat-technologies.com](http://www.cedrat-technologies.com)  
[actuator@cedrat-tec.com](mailto:actuator@cedrat-tec.com)

**Stand C01**

Cedrat Technologies is an internationally recognized mechatronics specialist and manufacturer of piezo and magnetic actuators offering a wide range of standard products: amplified (APA), pre-stressed piezo actuators, XY piezo stages, stepping motors, shutters, magneticactuators, the associated electronics and also customised products. The company has a strong experience in developing compact, precise and dynamic solutions for demanding applications (air & space, optronics, biomed, instrumentation, production machine...).

#### **CeramTec GmbH**

Luitpoldstraße 15, 91207 Lauf, Germany  
 Tel.: +49 9123 77 12 658  
[www.ceramtec.com/actuators](http://www.ceramtec.com/actuators)  
[actuator@ceramtec.de](mailto:actuator@ceramtec.de)

**Stand C02**

CeramTec GmbH is one of the largest international manufacturers of ceramics for technically demanding applications and amongst others also a specialist in piezoceramics. Piezoceramic actuators made by CeramTec use a voltage of up to 200V. Stroke and blocking force can be designed to customers needs.

#### **CTS Corporation**

4800 Alameda Blvd NE , Albuquerque, NM 87113, USA  
 Tel.: +1 505 24 92 47 7  
[www.ctscorp.com](http://www.ctscorp.com)  
[piezosales@ctscorp.com](mailto:piezosales@ctscorp.com)

**Stand B03**

Founded in 1896, CTS Corporation is a leading designer and manufacturer of sensors, actuators and electronic components. CTS aims to be at the forefront of technology, delivering innovative sensing, connectivity and motion solutions for the creation and advancement of products and services around the world. With manufacturing locations throughout North America, Asia and Europe, CTS focuses on providing advanced technology, exceptional customer service and superior value to industry partners throughout the globe.

CTS holds strong capabilities in the three piezoelectric technologies: multilayer, bulk and single crystal, providing a comprehensive range of piezoelectric products. CTS acquired Noliac A/S in May 2017.

## E

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### **Elektronik / WEKA FACHMEDIEN GmbH**

**Stand A03**

Richard-Reitzner-Allee 2, 85540 Haar, Germany  
Tel.: +49 89 25 55 61 00 0  
[www.elektroniknet.de/elektronik](http://www.elektroniknet.de/elektronik)  
[redaktion@elektronik.de](mailto:redaktion@elektronik.de)

#### Elektronik

The bi-weekly technical journal Elektronik, the web service [www.elektroniknet.de](http://www.elektroniknet.de) as well as the elektroniknet.de newsletter report about all aspects of industrial electronics.

The editorial content ranges from components and devices to test & measurement and automation. It also covers communications technologies, power supplies, power management, hardware and software and computer aided design engineering, as well as manufacturing and testing.

Elektronik is the mediabrand for the target group of developers and industrial users of electronics products.

Issue frequency:

bi-weekly, 26 issues + 24 special issues per year + the official daily at embedded world.

### **ETO MAGNETIC GmbH**

**Stand B04**

Hardtring 8, 78333 Stockach, Germany  
Tel.: +49 7771 80 90  
[www.etogruppe.com](http://www.etogruppe.com)  
[magnetoshape@etogruppe.com](mailto:magnetoshape@etogruppe.com)

Since 1948 customers around the world rely on ETO GRUPPE's innovative spirit and passion – both are roots for the worldwide recognized competence of ETO regarding electromagnetic actuator and sensor technology. With more than 2,200 employees at eight locations in Europe, America and Asia the companies of the ETO GRUPPE research, develop and produce customer specific innovative valves, actuators and sensors. They are the impulse generators in the customer system – the heart of the machine, so to speak – and ensure safe braking or efficient acceleration and clutch operation in cars, trucks and trains.

As a highlight, we present our MAGNETOSHAPE technology with actuator solutions based on proprietary magnetic shape memory materials. These are single crystalline alloys of Nickel, Manganese and Gallium, which are able to produce 6% strain under more than 2 N/mm external load with moderate magnetic fields.

ETO – THE HEART OF MOTION

## F

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### **FGL-Netzwerk**

**Stand A01**

Nöthnitzer Straße 44, 01187 Dresden, Germany  
 Tel.: +49 351 47 72 23 20  
[www.fgl-netzwerk.de](http://www.fgl-netzwerk.de)  
[andrea.boehm@iwu.fraunhofer.de](mailto:andrea.boehm@iwu.fraunhofer.de)  
 Contact person: Dr. Andrea Boehm

Today shape memory alloys (SMAs) are not that well established in technical applications as for instance conventional structural materials. Therefore the network -Efficient added value in the manufacturing and application of shape memory alloys- was founded. Experts for material production, research and development as well as users of the SMA technology participate. Thus the network establishes a platform for companies which apply SMAs or are generally interested in this technology. Hence the main objective is the spacious establishment of the multi-functional material SMA with its outstanding properties and benefits. It is further aimed to connect the currently separated process steps in manufacturing, processing and adapting SMA-components. The network offers innovative proceedings, consulting services and new products using SMA to interested users of all sectors.

### **Fraunhofer-Allianz Adaptronik**

**Stand B01**

Bartningstraße 47, 64289 Darmstadt, Germany  
 Tel.: +49 6151 70 52 36  
[www.adaptronik.fraunhofer.de](http://www.adaptronik.fraunhofer.de)  
[info@adaptronik.fraunhofer.de](mailto:info@adaptronik.fraunhofer.de)

Welcome to Fraunhofer Adaptronics Alliance

7 Fraunhofer institutes, being engaged in complementary research areas, cooperate within the Fraunhofer Adaptronics Alliance. The alliance partners work together in scientific as well as in industrial research projects, according to demand. Due to the interdisciplinary cooperation of the institutes, the Fraunhofer Adaptronics Alliance offer complete solutions in the field of smart structures. Our competencies cover the following fields of research:

- vibration & noise reduction
- shape control
- structural health monitoring
- energy harvesting

This year the alliance is represented by Fraunhofer Institute for Structural Durability and System Reliability LBF and Fraunhofer Institute for Ceramic Technologies and Systems IKTS.

## H

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### **hivolt.de GmbH & Co. KG**

**Stand B02**

Oehleckerling 40, 22419 Hamburg, Germany

Tel.: +49 40 53 71 22 0

[www.hivolt.de](http://www.hivolt.de)[info@hivolt.de](mailto:info@hivolt.de)

hivolt.de is an internationally operating specialist for professional High Voltage Components: HV-Power Supplies, HV-Amplifiers, HV-Cables & Connectors and customized solutions. Products which are delivered by hivolt.de are being used in a variety of applications, both in industry as well as in research. Due to our inhouse design capabilities and our close cooperation with several leading manufacturers we are able to offer custom-made HV-Products, that match our customer's specific applications, including variations of standard products or full custom designs.

## J

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### **Johnson Matthey Piezo Products GmbH**

**Stand A05**

Bahnhofstraße 43, 96257 Redwitz, Germany

Tel.: +49 9574 81 46 6

[www.piezoproducts.com](http://www.piezoproducts.com)[piezoproducts@matthey.com](mailto:piezoproducts@matthey.com)

Johnson Matthey Piezo Products is a specialist for piezo bending actuators. We focus on development, production and sales of piezoceramic actuators, sensors, energy harvesting generators and ultrasonic atomizers as well as engineered piezoelectric systems and modules with electronics and mechanics for industry applications, textile machines, medical devices, automotive and other markets.

## M

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### **Microfine Materials Technologies Pte Ltd**

**Stand A03**

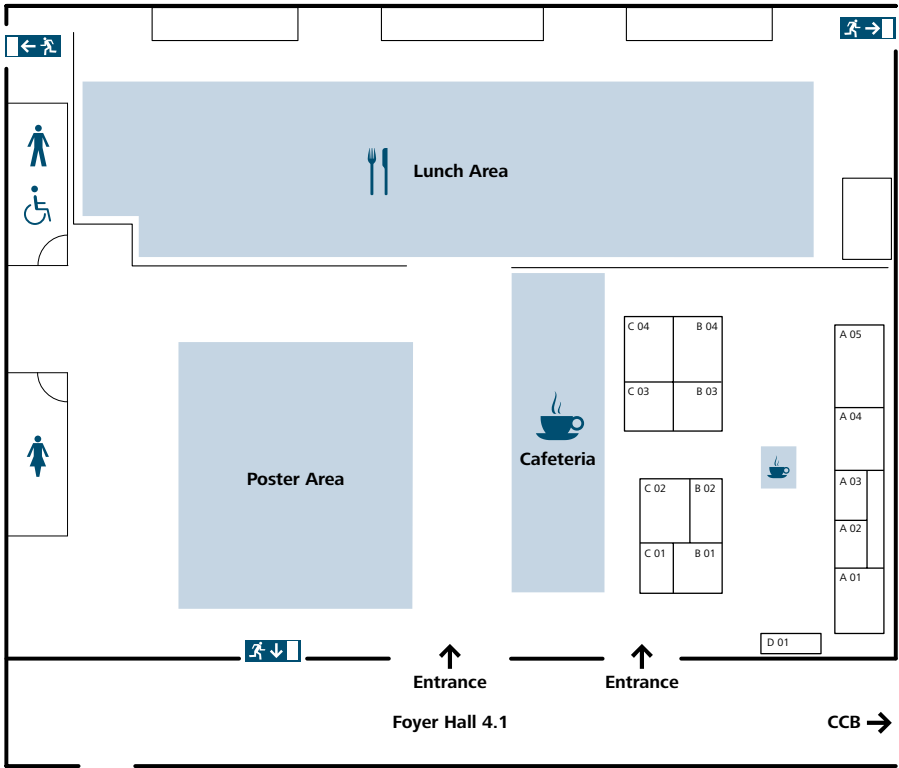
10 Bukit Batok Crescent, #06-02, 658079 Singapore, Singapore

Tel.: +65 6264 0112

[www.microfine-piezo.com](http://www.microfine-piezo.com)[sales@microfine-piezo.com](mailto:sales@microfine-piezo.com)

Microfine Materials Technologies Pte Ltd, a spin-off of the National University of Singapore, started operation in 1995. Since then, Microfine has maintained its strong R&D tradition and evolved from a piezo crystal supplier to a serious developer, manufacturer and technology provider of cutting-edge piezoelectric devices. In addition to being the world "only supplier" of high-performance  $\text{Pb}(\text{Zn}_{1/3}\text{Nb}_{2/3})\text{O}_3\text{-PbTiO}_3$  (PZN-PT) piezo single crystals, we have successfully developed many high-end piezo single crystal devices, including a range of underwater transducers (TP16, TP26, AVS, mHY, SAS array, etc.), ultra-high-sensitivity accelerometers (SIA1, etc.), "Hi-Fi Stake" piezo single crystal actuators, HAPA (high-authority piezoelectric actuators), etc. Despite based in the tiny Singapore, we are technology partner to key players in the trade and our customers include technology leaders in USA, Europe, China, Japan and Australia.

# Floor Plan



Exhibitor	Stand
<b>B</b>	
Boréas Technologies Inc.	A02
<b>C</b>	
CEDRAT TECHNOLOGIES S.A.	C01
CeramTec GmbH	C02
CTS Corporation	B03
<b>E</b>	
Elektronik / WEKA FACHMEDIEN GmbH	D01
ETO MAGNETIC GmbH	B04
<b>F</b>	
FGL-Netzwerk	A01
Fraunhofer-Allianz Adaptronik	B01
<b>H</b>	
hivolt.de GmbH & Co. KG	B02
<b>J</b>	
Johnson Matthey Piezo Products GmbH	A05
<b>M</b>	
Microfine Materials Technologies Pte Ltd	A03
Mikroproduktion / MIKROvent GmbH	D01
<b>P</b>	
Physik Instrumente (PI) GmbH & Co. KG	C03
PI Ceramic GmbH	C03
piezosystem jena GmbH	A04
<b>R</b>	
G.RAU GmbH & Co. KG	C04
<b>S</b>	
SENSOR MAGAZIN/LASER MAGAZIN	D01
c/o Magazin Verlag	
Hightech Publications KG	

## **Mikroproduktion / MIKROvent GmbH**

Salvatorberg 2, 84048 Mainburg, Germany

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[www.mikroproduktion.de](http://www.mikroproduktion.de)

[info@mikroproduktion.de](mailto:info@mikroproduktion.de)

**Stand A03**

Mikroproduktion is the German speaking special interest magazine for applied micro technology such as lithography, micro milling, micro laser processing, micro injection moulding, EDM, micro assembly and micro robotics, Nanotechnology, clean room technology and micro metrology. Mikroproduktion describes the whole process chain for the manufacturing of micro components, functional micro structures and micro systems. Main application fields can be found in micro optics, micro sensors and MEMS, micro fluidics and micro mechanics.

## **R**

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## **G.RAU GmbH & Co. KG**

Kaiser-Friedrich-Straße 7, 75172 Pforzheim, Germany

Tel.: +49 7231 20 80

[www.g-rau.de](http://www.g-rau.de)

[info@g-rau.de](mailto:info@g-rau.de)

**Stand C04**

### **METALS ARE OUR WORLD**

G.RAU is a globally active supplier of metal engineering and has become an established preferred supplier to several distinguished enterprises of automotive supply, electrical engineering, measurement and control technology and medical engineering. Founded in 1877, today G.RAU is an expert in manufacturing strips, tubes and wires made of precision metals, special alloys and composite materials. Furthermore G.RAU also uses these prematerials to manufacture precision parts and complex assemblies. G.RAU has three production sites in Germany, one in Costa Rica and a subsidiary in the USA.

## **P**

---

## **Physik Instrumente (PI) GmbH & Co. KG**

Auf der Roemerstrasse 1, 76228 Karlsruhe, Germany

Tel.: +49 721 48 46 0

[www.pi.ws](http://www.pi.ws)

[info@pi.ws](mailto:info@pi.ws)

**Stand C03**

Well-known for the high quality of its products, PI (Physik Instrumente) is one of the leading players in the global market for precision positioning technology for many years. PI has been developing and manufacturing standard and OEM products with piezo or motor drives for 40 years. In addition to four locations in Germany, the PI Group is represented internationally by fifteen sales and service subsidiaries.

## **PI Ceramic GmbH**

Lindenstrasse, 07589 Lederhose, Germany  
Tel.: +49 36604 88 20  
www.piceramic.de  
info@piceramic.de

**Stand C03**

PI Ceramic is one of the global leaders for actuator and sensor piezo products. A broad range of expertise in the complex development and manufacturing process of functional ceramic components combined with state-of-the-art equipment ensure high quality, flexibility and adherence to supply deadlines. The company supplies piezoceramic solutions for all important high-tech markets from industrial automation and the semiconductor industry, medical engineering, mechanical engineering and high-precision engineering through to the aeronautics industry and the automotive sector.

## **piezosystem jena GmbH**

Stockholmer Str. 12, 07747 Jena, Germany  
Tel.: +49 3641 66 88 0  
www.piezosystem.com  
info@piezोजना.com

**Stand A04**

piezosystem jena is a world leading company in the development, design and engineering of piezo electric actuators. The highly precise positioning systems are ideal for manual and automated micropositioning task down to the nanometer level. Besides an outstanding performance in the sub-nanometer range that is capable of achieving precise poisoning in microseconds, forces of up to several thousands of Newton can be generated as well. piezosystem jena offers solutions for one to five axis positioners, grippers, mirror tilting systems, optical fiber switches, shutters, rotary stages, objective positioning systems, high load piezo actuators and piezo composites for material testing and shock generation. piezosystem jena also supplies electronics for low and high voltage piezos. These complete systems can be easily integrated into many existing applications for e.g. optics, life science and dynamic scanning applications.

## **S**

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### **SENSOR MAGAZIN / LASER MAGAZIN c/o Magazin Verlag Hightech Publications KG**

Winklerstraße 4, 31542 Bad Nenndorf, Germany  
Tel.: +49 5723 55 34  
www.magazin-verlag.de  
kontakt@magazin-verlag.de

**Stand A03**

SENSOR MAGAZIN provides information to engineers and scientists who develop, manufacture and use sensors and actuators. The trade journal reports on the application of sensor and actuator technology in all branches of industry as well as in institutes and laboratories. The industry's latest technological developments are highlighted in the MAIN TOPIC of each issue. The journal focuses on practice-oriented articles under the headings of Practice, Market and Trade Fair Reports as well as Products. Future trends are reflected under the headings of Research, Innovations, Patents and Micro-Nano Integration. Exclusive interviews with key people from research and industry round off the spectrum of articles. The content, design and service meet the high requirements placed on a high-tech journal worth reading and promoting sales. [www.sensormagazin.de](http://www.sensormagazin.de)



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## Actuator systems

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### **CTS Corporation**

4800 Alameda Blvd NE , Albuquerque, NM 87113, USA  
Tel.: +49 505 24 92 47 7  
piezosales@ctscorp.com  
www.ctscorp.com

**Stand B03**

### **Fraunhofer-Allianz Adaptronik**

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www.adaptronik.fraunhofer.de

**Stand B01**

### **Johnson Matthey Piezo Products GmbH**

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piezoproducts@matthey.com  
www.piezoproducts.com

**Stand A05**

### **Physik Instrumente (PI) GmbH & Co. KG**

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Tel.: +49 721 48 46 0  
info@pi.ws  
www.pi.ws

**Stand C03**

### **PI Ceramic GmbH**

Lindenstrasse, 07589 Lederhose, Germany  
Tel.: +49 36604 88 20  
info@piceramic.de  
www.piceramic.de

**Stand C03**

### **G.RAU GmbH & Co. KG**

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Tel.: +49 7231 20 80  
info@g-rau.de  
www.g-rau.de

**Stand C04**

## Actuators with thermobimetal

---

### **G.RAU GmbH & Co. KG**

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Tel.: +49 7231 20 80  
info@g-rau.de  
www.g-rau.de

**Stand C04**

## List of Exhibitors upon Product Groups

### Adaptronics

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**Fraunhofer-Allianz Adaptronik**

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Tel.: +49 6151 70 52 36  
info@adaptronik.fraunhofer.de  
www.adaptronik.fraunhofer.de

**Stand B01****Johnson Matthey Piezo Products GmbH**

Bahnhofstraße 43, 96257 Redwitz, Germany  
Tel.: +49 9574 81 46 6  
piezoproducts@matthey.com  
www.piezoproducts.com

**Stand A05****Physik Instrumente (PI) GmbH & Co. KG**

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Tel.: +49 721 48 46 0  
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www.pi.ws

**Stand C03****PI Ceramic GmbH**

Lindenstrasse, 07589 Lederhose, Germany  
Tel.: +49 36604 88 20  
info@piceramic.de  
www.piceramic.de

**Stand C03**

### Bimorph actuators

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**CeramTec GmbH**

Luitpoldstraße 15, 91207 Lauf, Germany  
Tel.: +49 9123 77 12 658  
actuator@ceramtec.de  
www.ceramtec.com/actuators

**Stand C02****Physik Instrumente (PI) GmbH & Co. KG**

Auf der Roemerstrasse 1, 76228 Karlsruhe, Germany  
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www.pi.ws

**Stand C03****PI Ceramic GmbH**

Lindenstrasse, 07589 Lederhose, Germany  
Tel.: +49 36604 88 20  
info@piceramic.de  
www.piceramic.de

**Stand C03**

## Electromagnetic actuators

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**ETO MAGNETIC GmbH** **Stand B04**  
Hardtring 8, 78333 Stockach, Germany  
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magnetoshape@etogruppe.com  
www.etogruppe.com

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Tel.: +49 721 48 46 0  
info@pi.ws  
www.pi.ws

**PI Ceramic GmbH** **Stand C03**  
Lindenstrasse, 07589 Lederhose, Germany  
Tel.: +49 36604 88 20  
info@piceramic.de  
www.piceramic.de

## Electrorheological actuators

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**CEDRAT TECHNOLOGIES S.A.** **Stand C01**  
59, Chemin du Vieux Chêne, 38246 Meylan, France  
Tel.: +33 456 58 04 00  
actuator@cedrat-tec.com  
www.cedrat-technologies.com

## High Volt Amplifier

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**hivolt.de GmbH & Co. KG** **Stand B02**  
Oehleckerring 40, 22419 Hamburg, Germany  
Tel.: +49 40 53 71 22 0  
info@hivolt.de  
www.hivolt.de

## Integrated drive systems

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**Boréas Technologies Inc.** **Stand A02**  
45 Boul. de l'Aéroport, Bromont, Quebec J2L 1S8, Canada  
Tel.: +1 450 53 48 00 0  
info@boreas.ca  
www.boreas.ca

## List of Exhibitors upon Product Groups

### Layout and simulation tools

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**Fraunhofer-Allianz Adaptronik**

Bartningstraße 47, 64289 Darmstadt, Germany  
Tel.: +49 6151 70 52 36  
info@adaptronik.fraunhofer.de  
www.adaptronik.fraunhofer.de

**Stand B01**

### Magnetostrictive actuators

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**ETO MAGNETIC GmbH**

Hardtring 8, 78333 Stockach, Germany  
Tel.: +49 7771 80 90  
magnetoshape@etogruppe.com  
www.etogruppe.com

**Stand B04**

### Micro-/nanomanipulators

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**Physik Instrumente (PI) GmbH & Co. KG**

Auf der Roemerstrasse 1, 76228 Karlsruhe, Germany  
Tel.: +49 721 48 46 0  
info@pi.ws  
www.pi.ws

**Stand C03****PI Ceramic GmbH**

Lindenstrasse, 07589 Lederhose, Germany  
Tel.: +49 36604 88 20  
info@piceramic.de  
www.piceramic.de

**Stand C03**

### Micro-/nanopositioning systems

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**Physik Instrumente (PI) GmbH & Co. KG**

Auf der Roemerstrasse 1, 76228 Karlsruhe, Germany  
Tel.: +49 721 48 46 0  
info@pi.ws  
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**Stand C03****PI Ceramic GmbH**

Lindenstrasse, 07589 Lederhose, Germany  
Tel.: +49 36604 88 20  
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www.piceramic.de

**Stand C03****piezosystem jena GmbH**

Stockholmer Str. 12, 07747 Jena, Germany  
Tel.: +49 3641 66 88 0  
info@piezोजना.com  
www.piezosystem.com

**Stand A04**

## Microactuators

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### **CEDRAT TECHNOLOGIES S.A.**

59, Chemin du Vieux Chêne, 38246 Meylan, France  
Tel.: +33 456 58 04 00  
actuator@cedrat-tec.com  
www.cedrat-technologies.com

**Stand C01**

### **Physik Instrumente (PI) GmbH & Co. KG**

Auf der Roemerstrasse 1, 76228 Karlsruhe, Germany  
Tel.: +49 721 48 46 0  
info@pi.ws  
www.pi.ws

**Stand C03**

### **PI Ceramic GmbH**

Lindenstrasse, 07589 Lederhose, Germany  
Tel.: +49 36604 88 20  
info@piceramic.de  
www.piceramic.de

**Stand C03**

## Microactuator systems

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### **Physik Instrumente (PI) GmbH & Co. KG**

Auf der Roemerstrasse 1, 76228 Karlsruhe, Germany  
Tel.: +49 721 48 46 0  
info@pi.ws  
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### **PI Ceramic GmbH**

Lindenstrasse, 07589 Lederhose, Germany  
Tel.: +49 36604 88 20  
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**Stand C03**

## Piezoelectric actuators

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### **CEDRAT TECHNOLOGIES S.A.**

59, Chemin du Vieux Chêne, 38246 Meylan, France  
 Tel.: +33 456 58 04 00  
 actuator@cedrat-tec.com  
 www.cedrat-technologies.com

**Stand C01**

### **CeramTec GmbH**

Luitpoldstraße 15, 91207 Lauf, Germany  
 Tel.: +49 9123 77 12 658  
 actuator@ceramtec.de  
 www.ceramtec.com/actuators

**Stand C02**

### **CTS Corporation**

4800 Alameda Blvd NE , Albuquerque, NM 87113, USA  
 Tel.: +49 505 24 92 47 7  
 piezosales@ctscorp.com  
 www.ctscorp.com

**Stand B03**

### **Fraunhofer-Allianz Adaptronik**

Bartningstraße 47, 64289 Darmstadt, Germany  
 Tel.: +49 6151 70 52 36  
 info@adaptronik.fraunhofer.de  
 www.adaptronik.fraunhofer.de

**Stand B01**

### **hivolt.de GmbH & Co. KG**

Oehleckerring 40, 22419 Hamburg, Germany  
 Tel.: +49 40 53 71 22 0  
 info@hivolt.de  
 www.hivolt.de

**Stand B02**

### **Johnson Matthey Piezo Products GmbH**

Bahnhofstraße 43, 96257 Redwitz, Germany  
 Tel.: +49 9574 81 46 6  
 piezoproducts@matthey.com  
 www.piezoproducts.com

**Stand A05**

### **Microfine Materials Technologies Pte Ltd**

10 Bukit Batok Crescent, #06-02, 658079 Singapore, Singapore  
 Tel.: +65 6264 0112  
 www.microfine-piezo.com  
 dhlin@microfine-piezo.com

**Stand A03**

### **piezosystem jena GmbH**

Stockholmer Str. 12, 07747 Jena, Germany  
 Tel.: +49 3641 66 88 0  
 info@piezोजना.com  
 www.piezosystem.com

**Stand A04**

## Piezoelectric motors

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**CEDRAT TECHNOLOGIES S.A.** **Stand C01**  
59, Chemin du Vieux Chêne, 38246 Meylan, France  
Tel.: +33 456 58 04 00  
actuator@cedrat-tec.com  
www.cedrat-technologies.com

**Physik Instrumente (PI) GmbH & Co. KG** **Stand C03**  
Auf der Roemerstrasse 1, 76228 Karlsruhe, Germany  
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**PI Ceramic GmbH** **Stand C03**  
Lindenstrasse, 07589 Lederhose, Germany  
Tel.: +49 36604 88 20  
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www.piceramic.de

## Polymer actuators

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**Physik Instrumente (PI) GmbH & Co. KG** **Stand C03**  
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Tel.: +49 721 48 46 0  
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www.pi.ws

**PI Ceramic GmbH** **Stand C03**  
Lindenstrasse, 07589 Lederhose, Germany  
Tel.: +49 36604 88 20  
info@piceramic.de  
www.piceramic.de

## Power supplies

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**hivolt.de GmbH & Co. KG** **Stand B02**  
Oehleckerring 40, 22419 Hamburg, Germany  
Tel.: +49 40 53 71 22 0  
info@hivolt.de  
www.hivolt.de

## Research and development services

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**Fraunhofer-Allianz Adaptronik** **Stand B01**  
Bartningstraße 47, 64289 Darmstadt, Germany  
Tel.: +49 6151 70 52 36  
info@adaptronik.fraunhofer.de  
www.adaptronik.fraunhofer.de



**Shape memory actuators**

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**FGL-Netzwerk**

Nöthnitzer Straße 44, 01187 Dresden, Germany  
Tel.: +49 351 57 72 23 20  
andrea.boehm@iwu.fraunhofer.de  
www.fgl-netzwerk.de

**Stand A01****G.RAU GmbH & Co. KG**

Kaiser-Friedrich-Straße 7, 75172 Pforzheim, Germany  
Tel.: +49 7231 20 80  
info@g-rau.de  
www.g-rau.de

**Stand C04****Technical journals**

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**Elektronik / WEKA FACHMEDIEN GmbH**

Richard-Reitzner-Allee 2, 85540 Haar, Germany  
Tel.: +49 89 25 55 61 00 0  
redaktion@elektronik.de  
www.elektroniknet.de/elektronik

**Stand D01****Mikroproduktion / MIKROvent GmbH**

Salvatorberg 2, 84048 Mainburg, Germany  
Tel.: +49 8441 79 76 110  
info@mikroproduktion.de  
www.mikroproduktion.de

**Stand D01****SENSOR MAGAZIN / LASER MAGAZIN**

**c/o Magazin Verlag Hightech Publications KG**  
Winklerstraße 4, 31542 Bad Nenndorf, Germany  
Tel.: +49 5723 55 34  
kontakt@magazin-verlag.de  
www.magazin-verlag.de

**Stand D01**



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