



## INTRODUCTION

The Environmental Module (PS-EM) is an accessory product for the PICO SCALE. It monitors the environmental parameters such as temperature, relative humidity, and air pressure. With these data the PICO SCALE controller is able to correct the recorded displacement data for changes in the refractive index of air and thus virtual drifts of the target mirror. In the following the specifications of the three individual sensors that are built into the Environmental Module are given.

## TEMPERATURE SENSOR

The temperature sensor is specified as shown in table 1.

**Table 1.** Specifications of temperature sensor.

Property	Value	Conditions
Accuracy	0.1 °C	-5..50 °C
	0.5 °C	-40..125 °C
Resolution	0.01 °C	
Long term drift	0.02 °C/year	

## RELATIVE HUMIDITY SENSOR

The relative humidity (RH) sensor is specified as shown in table 2.

**Table 2.** Specifications of relative humidity (RH) sensor.

Property	Value	Conditions
Accuracy	1.8 %RH	0..80 %RH
Resolution	0.04 %RH	
Long term drift	0.25 %RH/year	

## PRESSURE SENSOR

The pressure sensor is specified as shown in table 3.

**Table 3.** Specifications of pressure sensor.

Property	Value	Conditions
Accuracy	1.5 mbar	25 °C, 750 mbar
Resolution	0.02 mbar	
Long term drift	1 mbar/year	

## OVERALL ACCURACY

The overall accuracy of the refractive index calculation is given by the uncertainties of the three sensors. It is given by

$$\frac{\Delta n}{n} = 4 \times 10^{-7}. \tag{1}$$

Please note, that the environmental data can only be measured at a single point along the optical path. Gradients of the environmental parameters can have significant influence on the accuracy of the displacement data.

## Contact

### Germany

**SmarAct Metrology  
GmbH & Co. KG**

Rohdenweg 4  
D-26135 Oldenburg  
Germany

T: +49 (0) 441 - 800879-0  
Email: metrology@smaract.com  
www.smaract.com

### France

**SmarAct GmbH**

Schuetten-Lanz-Strasse 9  
26135 Oldenburg  
Germany

T: +49 441 - 800 879 956  
Email: info-fr@smaract.com  
www.smaract.com

### USA

**SmarAct Inc.**

2140 Shattuck Ave. Suite 302  
Berkeley, CA 94704  
United States of America

T: +1 415 - 766 9006  
Email: info-us@smaract.com  
www.smaract.com

### China

**Dynasense Photonics**

6 Taiping Street  
Xi Cheng District,  
Beijing, China

T: +86 10 - 835 038 53  
Email: info@dyna-sense.com  
www.dyna-sense.com

**Natsu Precision Tech**

Room 515, Floor 5, Building 7,  
No.18 East Qinghe Anning  
Zhuang Road,  
Haidian District  
Beijing, China

T: +86 18 - 616 715 058  
Email: chenye@nano-stage.com  
www.nano-stage.com

**Shanghai Kingway Optech  
Co.Ltd**

Room 1212, T1 Building  
Zhonggong Global Creative Center  
Lane 166, Yuhong Road  
Minhang District  
Shanghai, China

Tel: +86 21 - 548 469 66  
Email: sales@kingway-optech.com  
www.kingway-optech.com

### Japan

**Physix Technology Inc.**

Ichikawa-Business-Plaza  
4-2-5 Minami-yawata,  
Ichikawa-shi  
272-0023 Chiba  
Japan

T/F: +81 47 - 370 86 00  
Email: info-jp@smaract.com  
www.physix-tech.com

### South Korea

**SEUM Tronics**

# 1109, 1, Gasan digital 1-ro  
Geumcheon-gu  
Seoul, 08594,  
Korea

T: +82 2 - 868 10 02  
Email: info-kr@smaract.com  
www.seumtronics.com

### Israel

**Optics & Motion Ltd.**

P.O.Box 6172  
46150 Herzeliya  
Israel

T: +972 9 - 950 60 74  
Email: info-il@smaract.com  
www.opticsmotion.com

SmarAct Metrology GmbH & Co. KG develops sophisticated equipment to serve high accuracy positioning and metrology applications in research and industry within fields such as optics, semiconductors and life sciences. Our broad product portfolio – from miniaturized interferometers and optical encoders for displacement measurements to powerful electrical nanoprobers for the characterization of smallest semiconductor technology nodes – is completed by turnkey scanning microscopes which can be used in vacuum, cryogenic or other harsh environments.

We maintain the complete production in house for a high level of customization so that we can always provide you the optimal individual or OEM solution. We also offer feasibility studies, measurement services and comprehensive support to accompany you along your projects.

## Headquarters

### **SmarAct GmbH**

Schuetze-Lanz-Strasse 9  
26135 Oldenburg  
Germany

T: +49 441 - 800 879 0  
Email: [info-de@smaract.com](mailto:info-de@smaract.com)  
[www.smaract.com](http://www.smaract.com)

## USA

### **SmarAct Inc.**

2140 Shattuck Ave. Suite 302  
Berkeley, CA 94704  
United States of America

T: +1 415 - 766 9006  
Email: [info-us@smaract.com](mailto:info-us@smaract.com)  
[www.smaract.com](http://www.smaract.com)