

# **OPERATION MANUAL**

## **High-Precision Resistance Decade 1406, 1407**

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Manufacturer:

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## EU-Konformitätserklärung (nach EN ISO/IEC 17050-1:2010)

*EU-Declaration of conformity (in accordance with EN ISO/IEC 17050-1:2010)*

**Name des Ausstellers:** burster präzisionsmesstechnik gmbh & co kg  
*Issuer's name:*

**Anschrift des Ausstellers:** Talstr. 1-5  
*Issuer's address:* 76593 Gernsbach, Germany

**Gegenstand der Erklärung:** Präzisions-Widerstands-Dekade  
*Object of the declaration:* High-Precision Resistance Decade and Calibrator

Modellnummer(n) (Typ): 1406; 1407  
*Model number / type:*

Diese Erklärung beinhaltet obengenannte Produkte mit allen Optionen  
*This declaration covers all options of the above product(s)*

**Das oben beschriebene Produkt ist konform mit den Anforderungen der folgenden Dokumente:**  
*The object of the declaration described above is in conformity with the requirements of the following documents:*

<b>Dokument-Nr.</b> <i>Documents No.</i>	<b>Titel</b> <i>Title</i>	<b>Ausgabe</b> <i>Edition</i>
2011/65/EU	<i>Richtlinie zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten</i> <i>Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment</i>	2011
2014/35/EU	<i>Richtlinie zur Harmonisierung der Rechtsvorschriften der Mitgliedsstaaten über die Bereitstellung elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen auf dem Markt</i> <i>Directive on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits</i>	2014
2014/30/EU	<i>Richtlinie zur Harmonisierung der Rechtsvorschriften der Mitgliedsstaaten über die Elektromagnetische Verträglichkeit</i> <i>Directive on the harmonization of the laws of the Member States relating to electromagnetic compatibility</i>	2014
EN 61010-1	<i>Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte – Teil 1: Allgemeine Anforderungen</i> <i>Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements</i>	2010 + Cor.:2011
EN 61326-1	<i>Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 1: Allgemeine Anforderungen</i> <i>Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements</i>	2013

Gernsbach  
*Ort / place*

20.04.2016  
*Datum / date*

i.V. Christian Karius  
*Quality Manager*

Dieses Dokument ist entsprechend EN ISO/IEC 17050-1:2010 Abs. 6.1g ohne Unterschrift gültig  
*According EN ISO/IEC 17050 this document is valid without a signature.*

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## **1. Application**

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The field of application of the precision decade models 1406 and 1407 reaches from general precision measuring to simulation of a variety of measuring transducers. They can be used to control complex applications, for the development in resistance networks and in circuits and also as a reproducible variable in the laboratory and test applications. These decades meet the requirements of all those diverse functions and the resulting demands. Traceability according to DIN ISO 9000 is therefore guaranteed.

## **2. Description**

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The decade resistors are wire-wound resistors and consist of low-capacity and low-conductivity wire coiling made of MANGANIN<sup>®</sup> resp. ISAOHM<sup>®</sup>

An especially developed precision stepping switch with high-quality contact materials and optimal brush construction guarantees very good reproducibility.

**Please note, that the rotary switch before starting a calibration measurement a number of times have to be moved to the left and right stops.**

The high-precision resistance decades model 1406, 1407 are designed to meet the highest demands with regard to precision, temperature and long-term stability.

### 3. Technical Data

Resistance ranges:	model 1406	10 x 10 mΩ ... 10 x 10 kΩ
	model 1407	10 x 100 mΩ ... 10 x 100 kΩ
Zero resistance of the complete resistance box:		< 10 mΩ
Resistance tolerance:		± 0.02 % in the main steps, see table below
Please note, that the rotary switch before starting a calibration measurement a number of times have to be moved to the left and then the right stops.		
Resolution model 1406:		approx. 0.025 °C
Resolution model 1407:		approx. 0.250 °C
Calibration:		in Ohm absolute at 23 °C
Resistance material:		MANGANIN® or ISAOHM®
Temperature coefficient:		< 10 ppm/K
Construction of winding:		according Chaperon
Zero point (model 1406, 1407):		400 ppm/K
Long-term stability (model 1406, 1407):		< 0.02 % over years
Power dissipation:		0.4 W/per step = 4 W/decade
Operating voltage:		max. 500 V
Test voltage:		2800 V DC
Design and construction:		according to DIN EN 60477
Switching arrangement:		short-circuiting between two neighbouring
Switch positions:		T = 12, limited to 11 steps
Contact material:		Ag plated on E-Cu, slider pack, solid silver
Operating moment:		approx. 0.1 Nm
Dimensions (L x H x D):		433 x 95 x 120 [mm]
Weight:		approx. 2.8 kg

## 4. Error tolerance, load

Model 1406	Model 1407	Value	Tolerance	Nominal current
x	no	10 x 0.01 Ω	± 5 %	2000 mA
x	x	10 x 0.1 Ω	± 0,5 %	2000 mA
x	x	10 x 1 Ω	± 0.1 %	600 mA
x	x	10 x 10 Ω	± 0.05 %	200 mA
x	x	10 x 100 Ω	± 0.02 %	60 mA
x	x	10 x 1 kΩ	± 0.02 %	20 mA
x	x	10 x 10 kΩ	± 0.02 %	6 mA
no	x	10 x 100 kΩ	± 0.02 %	2 mA



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## **5. Manufacturer Calibration Certificate**

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### **DAkkS Calibration Certificate**

The calibration laboratory D-K-15141-01-00 from burster präzisionsmess-technik is accredited and monitored by the office DAkkS (Deutsche Akkreditierungsstelle) according ISO 17025. It can prove his status by an accreditation certificate and is authorized to issue a calibration certificate with the logo DAkkS and with the logo DKD (Deutscher Kalibrierdienst).

The Calibration Certificate shows the values for the resistance a total of 56/70 values in 10 switch positions of each decade and the inherent relative uncertainty. As experience has show, the relative uncertainty in the upper decades amounts to only 1/5 resp. 1/10 to 1/20 of the respective error tolerance. More precise knowledge of resistance values thus means a veritable increase in value of the instrument.

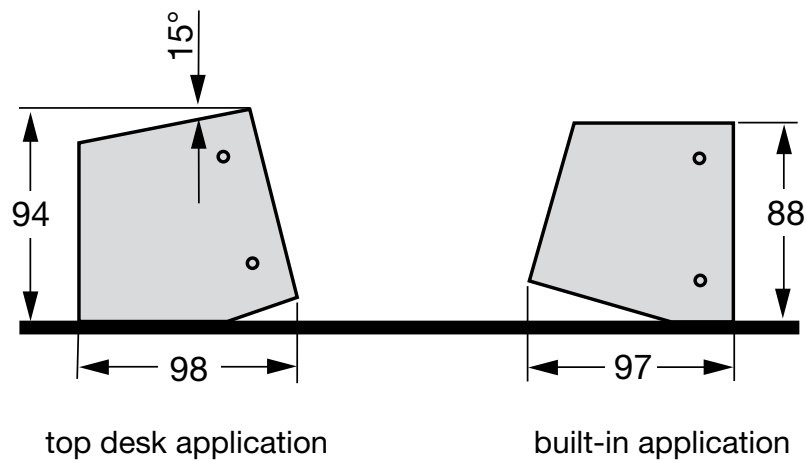
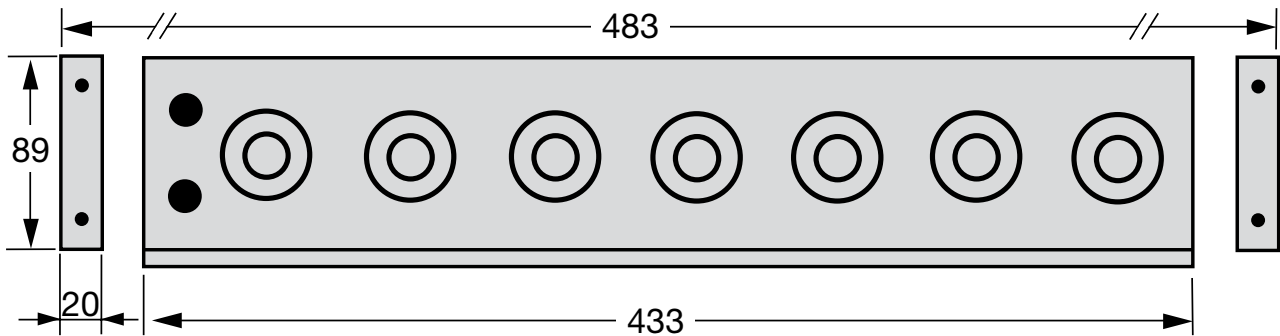
**Order code**                      **14 DKD-1406**  
**Order code**                      **14 DKD-1407**

### **Manufacturer Calibration Certifiacte**

Please refer to DAkkS Calibration, but with a higher uncertainly.

**Order code**                      **14WKS-1406**  
**Order code**                      **14WKS-1407**

## 6. Housing



*Dimensions given in mm*

## 7. Maintenance

For the preservation the small contact resistance and to the prolongation of service life should the switch contacts from time to time be cleaned. After this should be cared with contact protective fat.