OPERATION MANUAL

High-Precision Resistance Decade and Calibrator Model 1405, 1406, 1407

Valid from: 09.07.2014

Manufacturer:
burster präzisionsmesstechnik gmbh & co kg
Talstraße 1 - 5 P.O.Box 1432
DE-76593 Gernsbach DE-76587 Gernsbach
Germany Germany

Tel.: (049) 07224 / 6450
Fax.: (049) 07224 / 64588
E-Mail: info@burster.com
www.burster.com

1504-BA14050607EN-5170-071521

Exclusion of warranty liability for operating manuals

All information in the present documentation was prepared and compiled with great care and reproduced subject to effective control measures. No warranty is provided for freedom from errors. We reserve the right to make technical changes. The present information as well as the corresponding technical data can change without notice. Reproduction of any part of this documentation or its processing or revision using electronic systems is prohibited without the manufacturer's prior written approval.

Components, devices and measured value sensors made by burster praezisionsmesstechnik (hereinafter referred to as "product") are the results of targeted development and meticulous research. As of the date of delivery, burster provides a warranty for the proper condition and functioning of these products covering material and production defects for the period specified in the warranty document accompanying the product. However, burster excludes guarantee or warranty obligations as well as any liability beyond that for consequential damages caused by improper use of the product, in particular the implied warranty of success in the market as well as the suitability of the product for a particular purpose. Furthermore, burster assumes no liability for direct, indirect or incidental damages as well as consequential or other damages arising from the provision and use of the present documentation.

Table of contents

1. Application

The field of application of the precision decade model 1406, 1407 reaches from general precision measuring to simulation of a variety of measuring transducers, such as for example strain gauge transducers, resistance thermometers, hygrometers and others.

The model 1405 tests and calibrates quickly and easily displays, in control and process technology which is working on a resistance thermometer basis.

2. Description

The decade resistors are wire-wound resistors and consist of low-capactiy and low-conductivity wire coiling made of ZERANIN®, MANGANIN® resp. ISAOHM® 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.

The design of the decade model 1405 enables its use not only as precision decade resistor but also precision calibration for all standard commercial thermometers. Two fixed series resistors of 1 kΩ serve the simulation of Pt1000 and Pt2000 resistance thermometers. The four connection socket provide the possibility of simple simulation of resistance thermometers operated in four-wire technology.

3. Technical Data

Resistance ranges:	model 1405	10 x (0.01 +0.1 +1 +10 +100) + (2 x 1000) Ω
	model 1406	10 mΩ ... 100 kΩ
	model 1407	100 mΩ ... 1MΩ
Supply line simulation (model 1405):		0 ... 40 Ω
Zero resistance of the complete resistance box:		< 10 mΩ
Resistance tolerance:		± 0.01 % 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 1405):	10 mΩ, corresponding with a resolution of approx. 0.025 °C at a Pt100 thermometer
Calibration:	in Ohm absolute at 23 °C
Resistance material:	ZERANIN®, MANGANIN® or ISAOHM®
Temperature coefficient:	< 5 ppm/K in the step 10 x 100 kΩ ≤ 2 ppm/K in the steps 10 x 1 Ω to 10 x 10 kΩ < 10 ppm/K in the steps 10 x 10 mΩ to 10 x 100 mΩ
Construction of winding:	according Chaperon
Zero point (model 1405, 1406):	400 ppm/K
Long-term stability:	model 1405 < 0.02 % over years model 1406, 1407 < 0.01 % 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 1405	Model 1406	Model 1407	Value	Tolerance	Nominal current
x	x	-	10 x 0.01 Ω	± 2 %	2000 mA
x	x	x	10 x 0.1 Ω	± 0.5 %	2000 mA
x	x	x	10 x 1 Ω	± 0.05 %	600 mA
x	x	x	10 x 10 Ω	± 0.02 %	200 mA
x	x	x	10 x 100 Ω	± 0.01 %	60 mA
-	x	x	10 x 1 kΩ	± 0.01 %	20 mA
-	x	x	10 x 10 kΩ	± 0.01 %	6 mA
-	-	x	10 x 100 kΩ	± 0.02 %	2 mA
x	-	-	2 x 1 kΩ	± 0.02 %	15 mA
x	-	-	4 x 10 Ω	± 0.1 %	150 mA

5. Manufacturer Calibration Certificate

DKD/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).

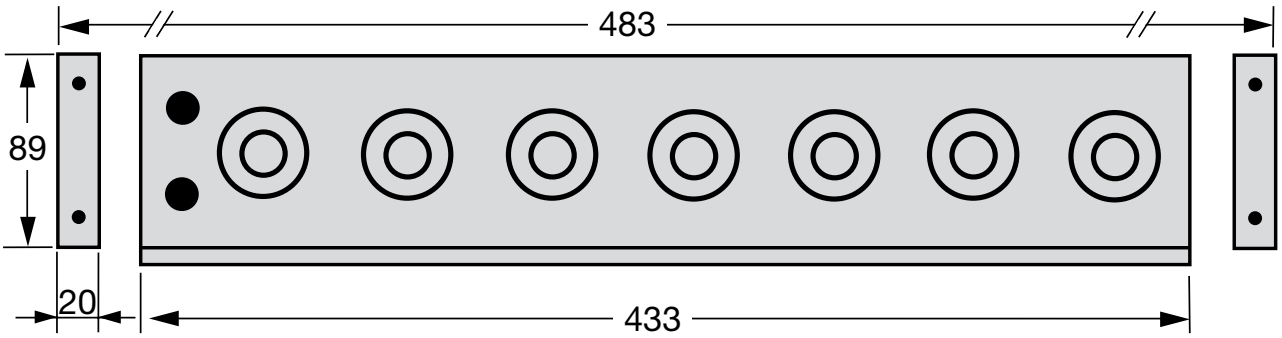
The Calibration Certificate shows the values for the resistance a total of 56/70 values in 10 switch positions of each decade and the inherent relative uncertainty. As experience has show, the relative uncertainty in the upper decades amounts to only 1/5 resp. 1/10 to 1/20 of the respective error tolerance.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

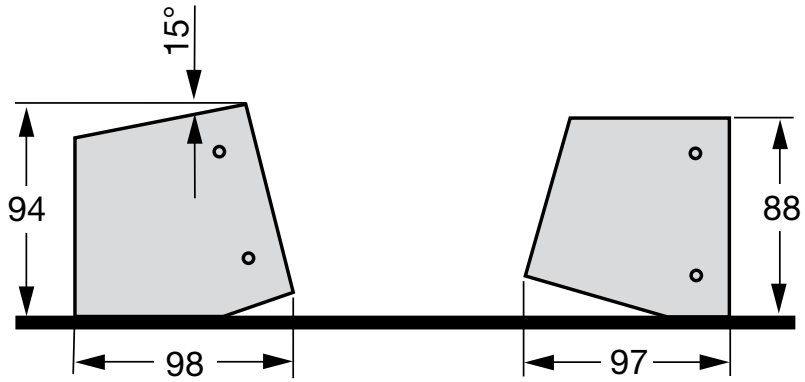
Order code	**14 DKD-1405**
Order code	**14 DKD-1406**
Order code	**14 DKD-1407**

Manufacturer Calibration Certifiacte
Please refer to DKD Calibration, but with a higher uncertainly.

Order code	**14WKS-1405**
Order code	**14WKS-1406**
Order code	**14WKS-1407**

6. Housing





top desk application built-in application

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.