FACT NOT FICTION

eumetron

CATALOGUE
CALIBRATION SERVICES
SOFTWARE, SEMINARS AND CONSULTING

Version 10.4

THE REFERENCE IN MEASUREMENT

Contact and Shipping Address

eumetron GmbH
Gartenstraße 133
D-73430 Aalen

Tel.: +49 (0) 73 61 37 03 - 0

info@eumetron.de
www.eumetron.de

Delivery Times: Mo - Fr 8:00 am - 4:00 pm

CALIBRATION SERVICES

SEMINARS AND CONSULTING

SEMINARS

On-Site and Remote Seminars

Various seminars in the field of accreditation and metrology. The lecturer is Dr. Ernst Wiedenmann from Serious Enterprises. The seminars take place at the eumetron premises in Aalen. If required, all seminars can also be attended remotely via MS Teams. You can find the current dates on our website at www.eumetron.de/seminare.

We also offer in-house seminars at your premises. Please contact us for an individual offer.

Description	Content	Item Nr.	€
ISO/IEC 17025:2018 Quality Management for Test and Calibration Laboratories	Day Seminar from 9:00 a.m. - 4:30 p.m.	20060-0160-0020	590,00
Calculation of Measurement Uncertainties for Testing and Calibration Laboratories	Day Seminar from 9:00 a.m. - 4:30 p.m.	20060-0160-0010	590,00
Calculation of Measurement Uncertainties with Coordinate Measuring Machines	Day Seminar from 9:00 a.m. - 4:30 p.m	20060-0160-0000	590,00
On-Site-Seminars	by arrangement	on request	on request

CONSULTING

On-Site and Remote Consulting

We advise you on all questions concerning coordinate measuring technology. The consultation can take place in person at eumetron, at your site or as a remote session via MS Teams.

Description	Content	Item Nr.	€
Metrology Consultation	various topics on demand	on request	on request

SOFTWARE CMM MONITORING TOOL

SOFTWARE CMM MONITORING TOOL

Software for Monitoring and Analysis of your Coordinate Measuring Machine

The CMM Monitoring Tool is characterized by its modular design. The basic configuration always includes a monitoring module for an existing artifact type, for example the CMM-Check 3.0 module. Depending on specific requirements, this base module can be flexibly expanded. Additional monitoring modules for other artifact types can be integrated, or supplementary functions for the existing artifact type can be configured individually.

The selection of the appropriate module is based on the available reference standards and the desired scope of functionality–whether only monitoring is required or a more detailed analysis of geometric deviations is needed. As part of the monitoring process, you receive information on the percentage utilization of the CMM specifications regarding to probing deviations, length measurement deviations, four-axis deviations and other parameters–depending on the artifact in use.

The optional Monitoring Plus extension provides additional functions for more detailed condition monitoring of your CMM, as well as improved management within the evaluation software. These include, among others:

- the comparison of multiple measurements
- a more detailed presentation of length measurement deviations
- visualization of measurement uncertainty
- the option to export monitoring reports as DFQ files for statistical evaluation
- in addition, access control via a password protection system is available

With the optional analysis module, correction factors can be calculated from the determined geometric deviations for the following parameters:

Linear, length-dependent deviations of the CMM axes X, Y, and Z,
Squareness deviations between the CMM planes XY, XZ, and YZ.

CMM MONITORING TOOL SOFTWARE PACKAGES

Modules

Description	Contents	Item Nr.	€
Calibration Certificate Module	Module for automatic generation of calibration certificates	on request	on request
Analysis Module	Analysis of CMS	on request	on request
Monitoring Module PLUS	Additional monitoring function	on request	on request
Monitoring Module	Monitoring of CMS	on request	on request

Module overview

	Step Gauge	Ball Plate	Kugelbalken	Ball Bars / Ball Beams	Pro-Check 1.0	CMM-Check 3.0	Entry-Check 1.0	CMM-Check 2.0	CMM-Check 1.0	DuraMax-Check	Tip-Check	Rotary Table Test	Multi Probe Test
calibration certificate module	✓	✓	✓	✓									
analysis module	✓	✓	✓	✓									
monitoring module ⊕	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Monitoring Module	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Additional services

Description	Contents	Item Nr.	€
Software Maintenance	Includes bug fixing and software updates in the event of standard changes	20070-0010-0100	20% of the software, including all purchased modules
Consulting	On-site or remote	20060-0230-0000	150.00/per hour (excl. travel costs and on-site expenses)

DAKKS CALIBRATION VIRTUAL COORDINATE MEASURING MACHINE (VCMM)

Coordinate Measuring Machine with Software Calypso (Software by Carl Zeiss Industrielle Messtechnik GmbH) 14

DAKKS CALIBRATION VIRTUAL COORDINATE MEASURING MACHINE (VCMM)

Calibration Scope According to VA-30 (On-Site DAkkS Calibration of the CMM for VCMM):

Determination of the influencing variables of a CMM as a prerequisite for the use of the "Virtual Coordinate Measuring Machine" (VCMM) procedure.

Calibration takes place on site at the customer's premises.

Test Value Uncertainties for the Confirmation Test of the following Parameters:

Length Measurement Error	E0 und E150	$U = 0.06\ \mu m + 0{,}3 \bullet 10^{-6} \bullet l$ (l ist die Länge);
Probing Error Ring	$P_{Form.Cir.Scan:PP;Tact}$	$U = 0.05\ \mu m$
Probing Error Sphere	$P_{Form.Sph.Scan:PP;Tact}$	$U = 0.05\ \mu m$
Probing Error Sphere	$P_{Size.Sph.Scan:PP;Tact}$	$U = 0.12\ \mu m$
Multiple-stylus Probing Error Sphere	$P_{Form.Sph.5x25:MS:Tact}$	$U = 0.05\ \mu m$
Multiple-stylus Probing Error Sphere	$P_{Size.Sph.5x25:MS:Tact}$	$U = 0.12\ \mu m$
Multiple-stylus Probing Error Sphere	$P_{Dia.Sph.5x25:MS:Tact}$	$U = 0.05\ \mu m$

The specified test value uncertainties are not the measurement uncertainties achievable for the measurement of individual test characteristics when using the VCMM.

Description	Measurement Range	Item Nr.	€
Coordinate Measuring Machines with Calypso (Software by Carl Zeiss Industrielle Messtechnik GmbH)	up to X = 500 mm, Y = 500 mm, Z = 500 mm	20040-0030-0100	7,700.00*
Coordinate Measuring Machines with Calypso (Software by Carl Zeiss Industrielle Messtechnik GmbH)	up to X = 900 mm, Y = 1300 mm, Z = 650 mm	20040-0030-0200	8,820.00*
Coordinate Measuring Machines with Calypso (Software by Carl Zeiss Industrielle Messtechnik GmbH)	up to X = 1200 mm,Y = 1800 mm, Z = 650 mm	20040-0030-0300	10,027.00*
Coordinate Measuring Machines with Calypso (Software by Carl Zeiss Industrielle Messtechnik GmbH)	up to X = 1200 mm, Y = 2400 mm, Z = 1000 mm	20040-0030-0400	10,920.00*
Coordinate Measuring Machines with Calypso (Software by Carl Zeiss Industrielle Messtechnik GmbH)	ab X = 1200 mm, Y = 2400 mm, Z = 1000 mm	20040-0030-0500	11.970,00*

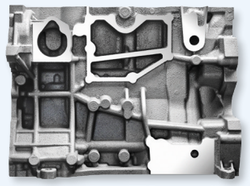
Description	Measurement Range	Item Nr.	€
Temperature detection of the messuring volume	-	20040-0030-1000	1,800.00

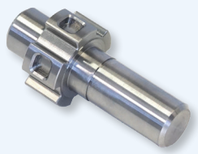
*Prices do not include travel costs, hotel and expanses

Our many years of experience in determining the measurement uncertainty related to test characteristics and the standard-compliant monitoring of coordinate measuring machines is the basis for reliable measurement results.

DAKKS CALIBRATION OF REFERENCE PARTS

CUSTOMER-SPECIFIC REFERENCE STANDARDS/ REFERENCE WORKPIECES



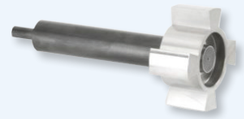
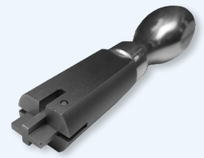

Calibration scope according to VA-40 (VCMM):

Calibration of customer-specific test characteristics

The measurement uncertainty U is determined task-specifically. The measurement uncertainty is determined during calibration and cannot be provided in advance, only estimated

Description	Measurement Range	Item Nr.	€
Customer-specific Reference Standards / Reference Workpieces	X = 1200 mm, Y = 2400 mm, Z = 800 mm	on request	on request

CUSTOMER-SPECIFIC SPECIAL GAUGES

Calibration scope according to VA-40 (VCMM):

Calibration of customer-specific test characteristics

The measurement uncertainty U is determined task-specifically. The measurement uncertainty is determined during calibration and cannot be provided in advance, only estimated.

Description	Measurement Range	Item Nr.	€
Customer-specific Special Gauges	X = 1200 mm, Y = 2400 mm, Z = 800 mm	on request	on request

CUSTOMER-SPECIFIC SETTING MASTERS

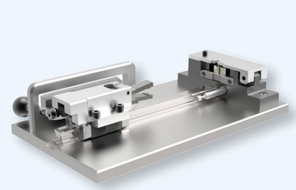
Calibration scope according to VA-40 (VCMM):

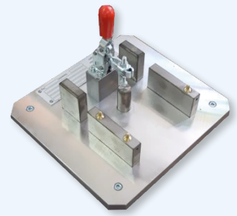
Calibration of customer-specific test characteristics

The measurement uncertainty U is determined task-specifically. The measurement uncertainty is determined during calibration and cannot be provided in advance, only estimated

Description	Measurement Range	Item Nr.	€
Customer-specific Setting Masters	X = 1200 mm, Y = 2400 mm, Z = 800 mm	on request	on request

CUSTOMER-SPECIFIC FIXTURES





Calibration scope according to VA-40 (VCMM):

Calibration of customer-specific test characteristics

The measurement uncertainty U is determined task-specifically. The measurement uncertainty is determined during calibration and cannot be provided in advance, only estimated.

Description	Measurement Range	Item Nr.	€
Customer-specific Fixtures	X = 1200 mm, Y = 2400 mm, Z = 800 mm	on request	on request

DAKKS-CALIBRATION OF 1D ARTIFACTS AND 1D STANDARDS

STEP GAUGES

If required, we can also procure this reference standard for you. Just get in touch with us!

Calibration Level 0 according to VA-66:

Centre to centre distances of measurement surfaces to measurement surface 0

$U = 0.06\ \mu m + 0.27 \bullet 10^{-6} \bullet l$ (l is the length); α is not calibrated

$U = 0.06\ \mu m + 0.23 \bullet 10^{-6} \bullet l$ (l is the length); α is DAkkS calibrated (see page 116 and 117)

$U = 0.06\ \mu m + 0.16 \bullet 10^{-6} \bullet l$ (l is the length); α is ≈ 0 e.g. Glas Ceramic (Zerodur, Robax), Cordierite Ceramic (Nexcera)

Description	Measuring Range	Item Nr.	€
Step Gauges	up to 220 mm	20010-0010-99x1	1,357.00
Step Gauges	up to 320 mm	20010-0010-99x2	1,559.00
Step Gauges	up to 500 mm	20010-0010-99x3	1,845.00
Step Gauges	up to 700 mm	20010-0010-99x4	2,047.00
Step Gauges	up to 1100 mm	20010-0010-99x5	2,332.00

Calibration Level 0 according to VA-51:

Centre to centre distances of measurement surfaces to measurement surface 0

$U = 0.06\ \mu m + 0.35 \bullet 10^{-6} \bullet l$ (l is the length); α is not calibrated

$U = 0.06\ \mu m + 0.30 \bullet 10^{-6} \bullet l$ (l is the length); α is DAkkS calibrated (see page 116 and 117)

$U = 0.06\ \mu m + 0.25 \bullet 10^{-6} \bullet l$ (l is the length); α is ≈ 0 e.g. Glas Ceramic (Zerodur, Robax), Cordierite Ceramic (Nexcera)

Description	Measuring Range	Item Nr.	€
Step Gauges	> 1100 mm up to 1540 mm	20010-0010-99x6	2,820.00

Calibration Level 1 according to VA-66:

Centre to Centre distances of measurement surfaces to measurement surface 0

$U = 0.08\ \mu m + 0.30 \bullet 10^{-6} \bullet l$ (l is the length); α is not calibrated

$U = 0.08\ \mu m + 0.25 \bullet 10^{-6} \bullet l$ (l is the length); α is DAkkS calibrated (see page 116 and 117)

$U = 0.08\ \mu m + 0.20 \bullet 10^{-6} \bullet l$ (l is the length); α is ≈ 0 e.g. Glas Ceramic (Zerodur, Robax), Cordierite Ceramic (Nexcera)

Description	Measuring Range	Item Nr.	€
Step Gauges	up to 220 mm	20010-0010-01x1	1,060.00
Step Gauges	up to 320 mm	20010-0010-01x2	1,213.00
Step Gauges	up to 500 mm	20010-0010-01x3	1,333.00
Step Gauges	up to 700 mm	20010-0010-01x4	1,630.00
Step Gauges	up to 1100 mm	20010-0010-01x5	1,892.00

Calibration Level 2 according to VA-51 (VCMM):

Centre to centre distances of measurement surfaces to measurement surface 0

$U = 0.08\ \mu m + 0.40 \bullet 10^{-6} \bullet l$ (l is the length); α is not calibrated

$U = 0.08\ \mu m + 0.35 \bullet 10^{-6} \bullet l$ (l is the length); α is DAkkS calibrated (see page 116 and 117)

$U = 0.08\ \mu m + 0.30 \bullet 10^{-6} \bullet l$ (l is the length); α ist ≈ 0 e. g. Glas Ceramic (Zerodur, Robax), Cordierite Ceramic (Nexcera)

Description	Measuring Range	Item Nr.	€
Step Gauges	> 1100 mm up to 1540 mm	20010-0010-01x6	2,189.00

STEP GAUGES

Continuation page 25

Calibration Range Level 2 according to VA-40 (VCMM): (>1540-2500)

Centre distances of the measuring surfaces to the measuring surface 0

$U = 0{,}2\ \mu m + 0{,}5 \bullet 10^{-6} \bullet l$ (l is the length)

Description	Measurement Range	Item Nr.	€
Step Gauges	> 1540 mm up to 2020 mm	20010-0010-0201	2,356.00
Step Gauges	> 2020 mm up to 2500 mm	20010-0010-0202	2,653.00

DAkkS Calibration of the Coefficient of Thermal Linear Expansion (CTE) according to VA-54:

Coefficient of thermal linear expansion α of step gauges

$U = 0.04 \bullet 10^{-6}\ K^{-1} + 0.007 \bullet \alpha + (0.03 \bullet 10^{-6}\ K^{-1}\ m) / l$

l is the length and α the nominal value of the coefficient of expansion in $10^{-6}\ K^{-1}$

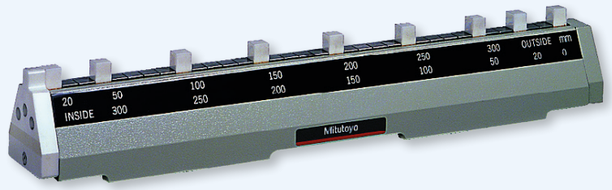
Example for Steel ($\alpha = 11.5 \bullet 10^{-6}\ K^{-1}$):

$U = 0.15 \bullet 10^{-6}\ K^{-1}$ für L = 1000 mm

Description	Measurement Range	Item Nr.	€
1 Step Gauge	up to 1650 mm	20010-0460-0203	1,522.00
1 Step Gauge	up to 2020 mm	20010-0460-0204	1,750.00

CALIBRATION STANDARDS (e.g. for Caliper Gauges and Micrometre Gauge)

If required, we can also procure this reference standard to you. Just get in touch with us!



Extent of Calibration Level 1 according to VA-51:

Centre to centre distances of measurement surfaces to measurement surface 0

$U = 0.1\ \mu m + 0.4 \bullet 10^{-6} \bullet l$ (l is the length)

Description	Measuring Range	Item Nr.	€
Calibration Standards	up to 300 mm (max. 7 steps)	20010-0020-0101	714.00
Calibration Standards	up to 500 mm (max. 9 steps)	20010-0020-0102	833.00
Calibration Standards	up to 1000 mm (max. 12 steps)	20010-0020-0103	1,095.00
Calibration Standards	up to 1000 mm (max. 15 steps)	20010-0020-0104	1,213.00
Calibration Standards	up to 1540 mm (max. 25 steps)	20010-0020-0105	1,393.00

Extent of Calibration Level 2 according to VA-51:

Centre to centre distances of measurement surfaces to measurement surface 0

$U = 0.3\ \mu m + 0.8 \bullet 10^{-6} \bullet l$ (l is the length)

Description	Measuring Range	Item Nr.	€
Calibration Standards	up to 300 mm (max. 7 steps)	20010-0020-0201	465.00
Calibration Standards	up to 500 mm (max. 9 steps)	20010-0020-0202	465.00
Calibration Standards	up to 1000 mm (max. 12 steps)	20010-0020-0203	595.00
Calibration Standards	up to 1000 mm (max. 15 steps)	20010-0020-0204	714.00
Calibration Standards	up to 1540 mm (max. 25 steps)	20010-0020-0205	928.00
Calibration Standards	up to 2020 mm (max. 30 steps)	20010-0020-0206	1,178.00

CALIBRATION STANDARDS (e.g. for Height Measurement Gauges)

Extent of Calibration 1 according to VA-66:

Centre to centre distances of measurement surfaces inside or outside,
mean value, min and max value
$U = 0.1\ \mu m + 0.4 \bullet 10^{-6} \bullet l$ (l is the length)

Description	Measuring Range	Item Nr.	€
Calibration Standards	0 - 100 mm	20010-0550-0101	346.00

Extent of Calibration 2 according to VA-66:

Centre to centre distances of measurement surfaces inside and outside,
each with mean value, min and max value
$U = 0.1\ \mu m + 0.4 \bullet 10^{-6} \bullet l$ (l is the length)

Description	Measuring Range	Item Nr.	€
Calibration Standards	0 - 100 mm	20010-0550-0201	452.00

Extent of Calibration 3 according to VA-66:

Centre to centre distances of 3 measurement surfaces inside, outside and the bore to the base surface
$U = 0.4\ \mu m + 0.5 \bullet 10^{-6} \bullet l$ (l is the length)

Description	Measuring Range	Item Nr.	€
Calibration Standards	0 - 125 mm	20010-0550-0301	506.00

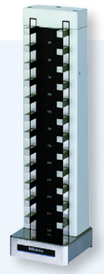
Kalibrierumfang 4 nach VA-66:

Centre to centre distances of measurement surfaces inside or outside,
mean value
$U = 0.1\ \mu m + 0.4 \bullet 10^{-6} \bullet l$ (l ist die Länge)

Description	Measuring Range	Item Nr.	€
Calibration Standards	0 - 100 mm	20010-0550-0401	346.00

CALIBRATION STANDARDS

(e.g. for Micrometre Depth Gauges and Caliper Depth Gauge)



Extent of Calibration according to VA-51:

Centre to centre distances of the left and right surfaces to measurement surface 0
centre to centre distance of the measurement bridge
$U = 0.3\ \mu m + 0.8 \bullet 10^{-6} \bullet l$ (l is the length)

Description	Measuring Range	Item Nr.	€
Calibration Standards	0 - 150 mm	20010-0030-0001	559.00
Calibration Standards	0 - 300 mm	20010-0030-0002	690.00

CALIBRATION STANDARDS FOR HEIGHT DETERMINATIONS (One Measurement Line)

Extent of Calibration according to VA-40 (VCMM):

Centre to centre distances of measurement surfaces to measurement surface 0
$U = 0.6\ \mu m + 0.8 \bullet 10^{-6} \bullet l$ (l is the length)
The calibration is carried out vertically.

Description	Measuring Range	Item Nr.	€
Calibration Standards	up to 350 mm	20010-0700-0001	774.00
Calibration Standards	up to 650 mm	20010-0700-0002	1,011.00

CALIBRATION STANDARDS FOR HEIGHT DETERMINATIONS (Two Measurement Lines)

Extent of Calibration according to VA-40 (VCMM):

Centre to centre distances of measurement surfaces to measurement surface 0
$U = 0.6\ \mu m + 0.8 \bullet 10^{-6} \bullet l$ (l is the length)
The calibration is carried out vertically.

Description	Measuring Range	Item Nr.	€
Calibration Standards	up to 350 mm	20010-0710-0001	1,131.00
Calibration Standards	up to 650 mm	20010-0710-0002	1,368.00

Extent of calibration for Extension Block according to VA-40 (VCMM):

One centre to centre distance of the supports (centroids), measurement surfaces to the respective measurement surface 0
$U = 1.0\ \mu m + 0.8 \bullet 10^{-6} \bullet l$ (l is the length)
One parallelism with $U = 1.0\ \mu m$

Description	Measuring Range	Item Nr.	€
Extension Block	up to 300 mm	20010-0051-0001	203.00

GAUGE BLOCKS

If required, we can also procure this reference standard to you. Just get in touch with us!

Extent of Calibration Level 1 according to VA-53:

Centre to centre distances of the measurement surfaces, parallelism of the measurement surfaces

$U = 0.1\ \mu m + 0.4 \bullet 10^{-6} \bullet l$ (l is the length) for length

$U = 0.1\ \mu m + 0.2 \bullet 10^{-6} \bullet l$ (l is the length) for parallelism

Description	Measuring Range	Item Nr.	€
Gauge Blocks	20 mm up to 100 mm	20010-0060-0101	30.00
Gauge Blocks	> 100 mm up to 500 mm	20010-0060-0102	203.00
Gauge Blocks	> 500 mm up to 1000 mm	20010-0060-0103	250.00

Extent of Calibration Level 2 according to VA-53:

Centre to centre distances of the measurement surfaces, parallelism of the measurement surfaces

$U = 0.2\ \mu m + 0.5 \bullet 10^{-6} \bullet l$ (l is the length) for length

$U = 0.2\ \mu m + 0.4 \bullet 10^{-6} \bullet l$ (l is the length) for parallelism

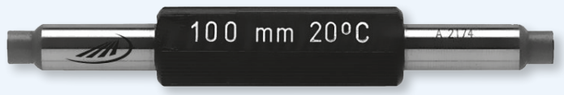
Measuring ranges > 1000 mm: Extent of calibration according to VA-40, higher measurement uncertainties required

Description	Measuring Range	Item Nr.	€
Gauge Blocks	20 mm up to 100 mm	20010-0060-0201	24.00
Gauge Blocks	> 100 mm up to 500 mm	20010-0060-0202	101.00
Gauge Blocks	> 500 mm up to 1000 mm	20010-0060-0203	156.00
Gauge Blocks	> 1000 mm	20010-0060-0299	on request

Remark: Calibration of the coefficient of thermal expansion see page 116 and 117.

SETTING STANDARDS

If required, we can also procure this reference standard to you. Just get in touch with us!



Extent of Calibration Level 1 according to VA-40 (VCMM):

Centre to centre distances of the measurement surfaces, parallelism deviation only with plane-parallel front faces

$U = 0.2\ \mu m + 0.5 \bullet 10^{-6} \bullet l$ (l is the length) for length

$U = 0.2\ \mu m + 0.4 \bullet 10^{-6} \bullet l$ (l is the length) for parallelism

Description	Measuring Range	Item Nr.	€
Setting Standard	≤ including 300 mm	20010-0500-0101	90.00
Setting Standard	> 300 mm up to 1000 mm	20010-0500-0102	113.00
Setting Standard	> 1000 mm up to 1500 mm	20010-0500-0103	137.00
Setting Standard	> 1500 mm up to 2000 mm	20010-0500-0104	172.00

Extent of Calibration Level 2 according to VA-40 (VCMM):

Centre to centre distances of the measurement surfaces, parallelism deviation only with plane-parallel front faces

$U = 0.5\ \mu m + 0.8 \bullet 10^{-6} \bullet l$ (l is the length) for length

$U = 0.5\ \mu m + 0.6 \bullet 10^{-6} \bullet l$ (l is the length) for parallelism

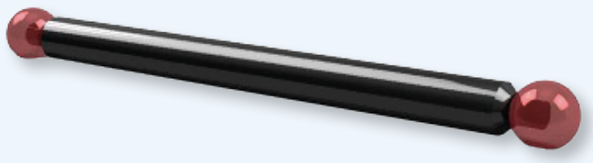
Measuring ranges > 2000 mm: higher measurement uncertainties required

Description	Measuring Range	Item Nr.	€
Setting Standard	≤ including 300 mm	20010-0500-0201	71.00
Setting Standard	> 300 mm up to 1000 mm	20010-0500-0202	98.00
Setting Standard	> 1000 mm up to 1500 mm	20010-0500-0203	119.00
Setting Standard	> 1500 mm up to 2000 mm	20010-0500-0204	156.00
Setting Standard	> 2000 mm	20010-0500-0299	on request

Remark: Calibration of the coefficient of thermal expansion see page 116 and 117.

FIXED BALL BAR

If required, we can also procure this reference standard to you. Just get in touch with us!



Extent of Calibration 1 according to VA-40 (VCMM):

Distance of the ball centres

$U = 0.3\ \mu m + 0.6 \bullet 10^{-6} \bullet l$ (l is the distance between the ball centres)

Description	Measuring Range	Item Nr.	€
Ball Bar	up to 500 mm	20010-0070-0001	238.00
Ball Bar	up to 1000 mm	20010-0070-0002	295.00
Ball Bar	up to 1500 mm*	20010-0070-0003	351.00

*The uncertainty of measurement is only achievable with the corresponding stability of the ball bar

Extent of Calibration 2 according to VA-40 (VCMM):

Diameter and form of both balls, distance of the ball centres

$U = 0.6\ \mu m$ (Diameter and form)

$U = 0.3\ \mu m + 0.6 \bullet 10^{-6} \bullet l$ (l is the distance between the ball centres)

Description	Measuring Range	Item Nr.	€
Ball Bar	up to 500 mm	20010-0090-0001	283.00
Ball Bar	up to 1000 mm	20010-0090-0002	351.00
Ball Bar	up to 1500 mm	20010-0090-0003	431.00

*The uncertainty of measurement is only achievable with the corresponding stability of the ball bar

FIXED OR DISMOUNTABLE BALL BAR (SINGLE BAR)

If required, we can also procure this reference standard to you. Just get in touch with us!

Extent of Calibration 1 according to VA-40 (VCMM):

Distance of the ball centres*

$U = 0.8\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between the ball centres)

Description	Measuring Range	Item Nr.	€
Ball Bar	up to 500 mm	20010-0080-0004	139.00
Ball Bar	up to 1000 mm	20010-0080-0001	147.00
Ball Bar	up to 1400 mm	20010-0080-0002	181.00
Ball Bar	up to 2500 mm	20010-0080-0003	295.00

Extent of Calibration 2 according to VA-40 (VCMM):

Diameter and form of both balls, distance of the ball centres*

$U = 0.8\ \mu m$ (Diameter and form)

$U = 0.8\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between the ball centres)

Description	Measuring Range	Item Nr.	€
Ball Bar	up to 500 mm	20010-0080-0004	197.00
Ball Bar	up to 1000 mm	20010-0100-0001	204.00
Ball Bar	up to 1400 mm	20010-0100-0002	249.00
Ball Bar	up to 2500 mm	20010-0100-0003	385.00

*The measurement uncertainty can only be achieved, if the assembly of the ball bar is reproducible.

DISMOUNTABLE BALL BAR

If required, we can also procure this reference standard to you. Just get in touch with us!

Extent of Calibration 1 according to VA-40 (VCMM):

Distance between two ball centres of one single ball bar

The measurement uncertainty can only be achieved, if the assembly of the ball bar is reproducible

$U = 0.8\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between the ball centres of the single ball bar)

Description	Measuring Range	Item Nr.	€
Ball Bar (Single Bar)	up to 1000 mm (length of a single bar)	20010-0110-0001	113.00

Extent of Calibration 2 according to VA-40 (VCMM):

Diameter and form of the ball, distance between two ball centres of one single ball bar.

The measurement uncertainty can only be achieved, if the assembly of the ball bar is reproducible

$U = 0.8\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between the ball centres of the single ball bar)

$U = 0.8\ \mu m$ (diameter and form)

Description	Measuring Range	Item Nr.	€
Ball Bar (Single Bar)	up to 1000 mm (length of a single bar)	20010-0540-0001	156.00

BALL BEAMS OR HOLE BEAMS

Distances

If required, we can also procure this reference standard to you. Just get in touch with us!

Extent of Calibration according to VA-52:

Centre coordinates of the elements related to the coordinate system

$U = 0.12\ \mu m + 0.4 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary centres)

Description	Measuring Range	Item Nr.	€
Beams up to 3 Elements	up to 550 mm	20010-0120-0001	833.00
Beams up to 11 Elements	up to 1000 mm	20010-0120-0002	1,131.00
Beams up to 25 Elements	up to 1150 mm	20010-0120-0003	1,440.00
Beams up to 31 Elements	up to 1500 mm	20010-0120-0004	1,713.00

Remark: Calibration of the coefficient of thermal expansion see page 116 and 117.

BALL BEAMS OR BALL BARS

Distances

Extent of Calibration Level 1 according to VA-40 (VCMM):

Centre coordinates of the elements related to the coordinate system

$U = 0.3\ \mu m + 0.6 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary centres)

Description	Measuring Range	Item Nr.	€
Ball Beams	up to 500 mm with 2 balls	20010-0130-0105	238.00
Ball Beams	up to 1000 mm with 2 balls	20010-0130-0106	295.00
Ball Beams	up to 1500 mm with 2 balls	20010-0130-0107	351.00
Ball Beams	up to 1000 mm	20010-0130-0101	861.00
Ball Beams	up to 1600 mm	20010-0130-0102	1,371.00
Ball Beams	up to 2500 mm	20010-0130-0103	1,869.00
Ball Beams	up to 3000 mm	20010-0130-0104	2,436.00

Extent of Calibration Level 2 according to VA-40 (VCMM):

Centre coordinates of the elements related to the coordinate system

$U = 0.8\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary centres)

Description	Measuring Range	Item Nr.	€
Ball Beams	up to 1000 mm with 2 balls	20010-0130-0205	147.00
Ball Beams	up to 1400 mm with 2 balls	20010-0130-0206	181.00
Ball Beams	up to 2500 mm with 2 balls	20010-0130-0207	295.00
Ball Beams	up to 1000 mm	20010-0130-0201	578.00
Ball Beams	up to 1600 mm	20010-0130-0202	918.00
Ball Beams	up to 2500 mm	20010-0130-0203	1,235.00
Ball Beams	up to 3000 mm	20010-0130-0204	1,484.00

BALL BEAMS OR BALL BARS

Distances, Diameter, Form

Extent of Calibration Level 1 according to VA-40 (VCMM):

Diameter and form of the balls, centre coordinates of the balls related to the coordinate system

$U = 0.3\ \mu m + 0.6 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary centres)

$U = 0.6\ \mu m$ (Diameter and form)

Description	Measuring Range	Item Nr.	€
Ball Beams	up to 500 mm with 2 balls	20010-0690-0105	283.00
Ball Beams	up to 1000 mm with 2 balls	20010-0690-0106	351.00
Ball Beams	up to 1500 mm with 2 balls	20010-0690-0107	431.00
Ball Beams	up to 1000 mm	20010-0690-0101	1,326.00
Ball Beams	up to 1600 mm	20010-0690-0102	1,366.00
Ball Beams	up to 2500 mm	20010-0690-0103	2,096.00
Ball Beams	up to 3000 mm	20010-0690-0104	2,719.00

Extent of Calibration Level 2 according to VA-40 (VCMM):

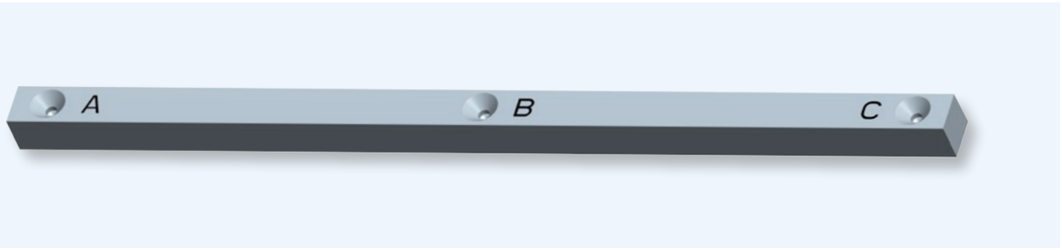
Diameter and form of the balls, centre coordinates of the balls related to the coordinate system

$U = 0.8\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary centres)

$U = 0.8\ \mu m$ (Diameter and form)

Description	Measuring Range	Item Nr.	€
Ball Beams	up to 1000 mm with 2 balls	20010-0690-0205	204.00
Ball Beams	up to 1400 mm with 2 balls	20010-0690-0206	249.00
Ball Beams	up to 2500 mm with 2 balls	20010-0690-0207	385.00
Ball Beams	up to 1000 mm	20010-0690-0201	884.00
Ball Beams	up to 1600 mm	20010-0690-0202	1,086.00
Ball Beams	up to 2500 mm	20010-0690-0203	1,462.00
Ball Beams	up to 3000 mm	20010-0690-0204	1,801.00

BEAMS OR STRIPS with Cone Elements or Triple Ball Elements



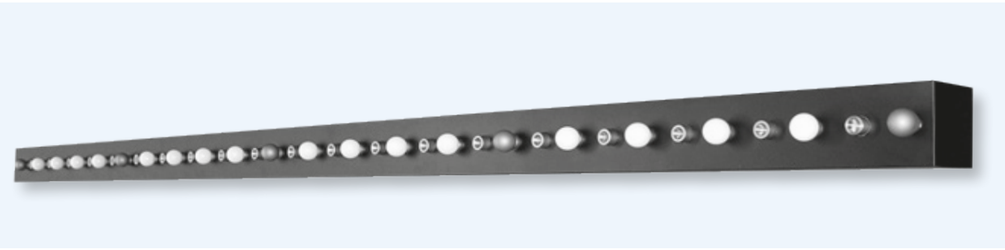
Extent of Calibration according to VA-40 (VCMM):

Distance of elements

$U = 2.0\ \mu m + 2.0 \bullet 10^{-6} \bullet l$ up to l = 2000 mm (l is the distance between two arbitrary cone or triple ball elements)
$U = 2.5\ \mu m + 2.5 \bullet 10^{-6} \bullet l$ up to l = 2500 mm (l is the distance between two arbitrary cone or triple ball elements)
$U = 2.5\ \mu m + 3.5 \bullet 10^{-6} \bullet l$ up to l = 3000 mm (l is the distance between two arbitrary cone or triple ball elements)

Description	Measuring Range	Item Nr.	€
Cone Beams	up to 1100 mm	20010-0150-0001	465.00
Cone Beams	up to 2000 mm	20010-0150-0002	690.00
Cone Beams	up to 2500 mm	20010-0150-0003	917.00
Cone Beams	up to 3000 mm	20010-0150-0004	1,155.00

COMBINED BEAMS with Ball and Cone Elements or Triple Ball Elements



Extent of Calibration 1 according to VA-40 (VCMM): Distance of elements

$U = 0.8\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary ball centres)
$U = 1.5\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary cone or triple ball elements)
$U = 2.5\ \mu m + 2.0 \bullet 10^{-6} \bullet l$ (l > 2000 mm is the distance between two arbitrary cone or triple ball elements)
$U = 2.5\ \mu m + 3.5 \bullet 10^{-6} \bullet l$ (l > 2500 mm is the distance between two arbitrary cone or triple ball elements)

Description	Measuring Range	Item Nr.	€
Combined Beams	up to 1100 mm	20010-0160-0101	1,060.00
Combined Beams	up to 2000 mm	20010-0160-0102	1,654.00
Combined Beams	up to 2500 mm	20010-0160-0103	2,212.00
Combined Beams	up to 3000 mm	20010-0160-0104	2,712.00

Extent of Calibration 2 according to VA-40 (VCMM):

Distance of elements, diameter and form of the balls

$U = 0.8\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary ball centres)
$U = 1.5\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary cone or triple ball elements)
$U = 2.5\ \mu m + 2.0 \bullet 10^{-6} \bullet l$ (l > 2000 mm is the distance between two arbitrary cone or triple ball elements)
$U = 2.5\ \mu m + 3.5 \bullet 10^{-6} \bullet l$ (l > 2500 mm is the distance between two arbitrary cone or triple ball elements)
$U = 0.8\ \mu m$ (Diameter and form)

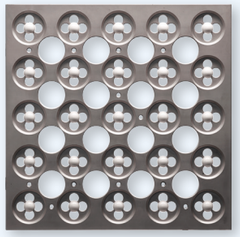
Description	Measuring Range	Item Nr.	€
Combined Beams	up to 1100 mm	20010-0160-0201	1,213.00
Combined Beams	up to 2000 mm	20010-0160-0202	1,892.00
Combined Beams	up to 2500 mm	20010-0160-0203	2,546.00
Combined Beams	up to 3000 mm	20010-0160-0204	3,082.00

DAKKS CALIBRATION OF 2D ARTIFACTS

Ball plates with inside or outside balls and hole plates

BALL PLATES with Inside or Outside Balls and Hole Plates

If required, we can also procure this reference standard to you. Just get in touch with us!



Extent of Calibration according to VA-55:

Centre coordinates of elements related to coordinate system
(up to a diagonal distance of the elements of 1150 mm)
$U = 0.12\ \mu m + 0.4 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary elements)

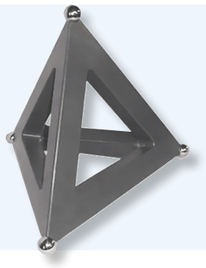
Description	Measuring Range	Item Nr.	€
Symmetrical Plates with 9 Elements	500 x 500 mm	20010-0170-0001	2,321.00
Symmetrical Plates with 25 Elements	230 x 230 mm	20010-0170-0002	2,594.00
Symmetrical Plates with 25 Elements	320 x 320 mm	20010-0170-0003	2,712.00
Symmetrical Plates with 25 Elements	420 x 420 mm	20010-0170-0004	2,844.00
Symmetrical Plates with 25 Elements	620 x 620 mm	20010-0170-0005	2,975.00
Symmetrical Plates with 28 Elements	820 x 820 mm	20010-0170-0009	3,188.00
Symmetrical Plates with 36 Elements	620 x 620 mm	20010-0170-0010	3,654.00
Symmetrical Plates with 36 Elements	820 x 820 mm	20010-0170-0006	3,867.00
Symmetrical Plates with 44 Elements	820 x 820 mm	20010-0170-0007	4,462.00
Symmetrical Plates with 62 Elements	820 x 820 mm	20010-0170-0008	5,853.00

Remark: Calibration of the thermal length extension coefficient see page 116 and 117.
Remark: Measurement equipment probe system check see page 72.

OUR SMALLEST MEASUREMENT UNCERTAINTY FOR BALL PLATES: U = 0.52 µm PER METRE

DAKKS CALIBRATION OF 3D ARTIFACTS

TETRAHEDRONS in Solid Design



Extent of Calibration 1 according to VA-40 (VCMM):

6 single distances between two respective ball centres

$U = 0.3\ \mu m + 0.6 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary ball centres)

Description	Measuring Range	Item Nr.	€
6 Ball Distances	up to 400 mm length of a ball distance	20010-0180-0101	999.00
6 Ball Distances	up to 850 mm length of a ball distance	20010-0180-0102	1,166.00
6 Ball Distances	up to 1150 mm length of a ball distance	20010-0180-0103	1,333.00

Extent of Calibration 2 according to VA-40 (VCMM):

4 ball centre coordinates and 6 single distances between two respective ball centres

$U = 1.0\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary ball centres)

Description	Measuring Range	Item Nr.	€
4 Centre Coordinates; 6 Ball Distances	up to 400 mm length of a ball distance	20010-0180-0201	999.00
4 Centre Coordinates; 6 Ball Distances	up to 850 mm length of a ball distance	20010-0180-0202	1,166.00
4 Centre Coordinates; 6 Ball Distances	up to 1150 mm length of a ball distance	20010-0180-0203	1,333.00

Extent of Calibration 3 according to VA-40 (VCMM):

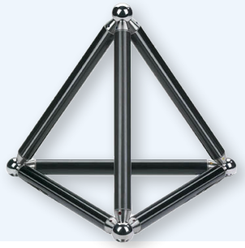
4 ball centre coordinates and 6 single distances between two respective ball centres, diameter and form deviation of 4 balls

$U = 1.0\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary ball centres)

$U = 0.8\ \mu m$ (diameter and form)

Description	Measuring Range	Item Nr.	€
4 Centre Coordinates; 6 Ball Distances	up to 400 mm length of a ball distance	20010-0180-0301	1,166.00
4 Centre Coordinates; 6 Ball Distances	up to 850 mm length of a ball distance	20010-0180-0302	1,369.00
4 Centre Coordinates; 6 Ball Distances	up to 1150 mm length of a ball distance	20010-0180-0303	1,571.00

TETRAHEDRONS in Dismountable Design



Extent of Calibration 1 according to VA-40 (VCMM):

6 single distances of two respective ball centres, diameter and form deviation of 4 balls
The measurement uncertainty can only be achieved, if the assembly of the ball bar is reproducible
$U = 0.8\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between the ball centres of the single ball bar)
$U = 1.5\ \mu m + 1.5 \bullet 10^{-6} \bullet l$ (l > 1700 mm is the distance between the ball centres of the single ball bar)
$U = 1.5\ \mu m + 2.5 \bullet 10^{-6} \bullet l$ (l > 2000 mm is the distance between the ball centres of a single bar)
$U = 0.8\ \mu m$ (Diameter and form)

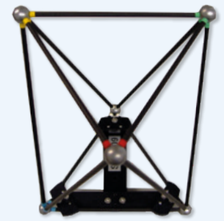
Description	Measuring Range	Item Nr.	€
6 Ball Bars	up to 1000 mm length of a single bar	20010-0190-0101	917.00
6 Ball Bars	up to 1700 mm length of a single bar	20010-0190-0102	1,202.00
6 Ball Bars	up to 2000 mm length of a single bar	20010-0190-0103	1,916.00
6 Ball Bars	up to 2400 mm length of a single bar	20010-0190-0104	2,677.00

Extent of Calibration 2 according to VA-40 (VCMM):

6 single distances of two respective ball centres
The measurement uncertainty can only be achieved, if the assembly of the ball bar is reproducible
$U = 0.8\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between the ball centres of the single ball bar)
$U = 1.5\ \mu m + 1.5 \bullet 10^{-6} \bullet l$ (l > 1700 mm is the distance between the ball centres of a single bar)
$U = 1.5\ \mu m + 2.5 \bullet 10^{-6} \bullet l$ (l > 2000 mm is the distance between the ball centres of a single bar)

Description	Measuring Range	Item Nr.	€
6 Ball Bars	up to 1000 mm length of a single bar	20010-0190-0201	655.00
6 Ball Bars	up to 1700 mm length of a single bar	20010-0190-0202	857.00
6 Ball Bars	up to 2000 mm length of a single bar	20010-0190-0203	1,369.00
6 Ball Bars	up to 2400 mm length of a single bar	20010-0190-0204	1,669.00

OCTAHEDRONS in Solid Design

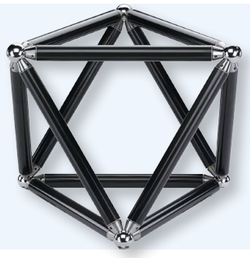


Extent of Calibration according to VA-40 (VCMM):

6 ball centre coordinates and 12 single distances between two respective ball centres
$U = 1.5\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary ball centres)

Description	Measuring Range	Item Nr.	€
6 Centre Coordinates; 12 Ball Distances	up to 400 mm length of a ball distance	20010-0200-0001	1,499.00
6 Centre Coordinates; 12 Ball Distances	up to 850 mm length of a ball distance	20010-0200-0002	1,749.00

OCTAHEDRONS in Dismountable Design



Extent of Calibration 1 according to VA-40 (VCMM):

12 single distances between two respective ball centres, diameter and form deviation of 6 balls
The measurement uncertainty can only be achieved, if the assembly of the ball bar is reproducible
$U = 0.8\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between the ball centres of the single ball bar)
$U = 1.5\ \mu m + 1.5 \bullet 10^{-6} \bullet l$ (l > 1700 mm is the distance between the ball centres of a single bar)
$U = 0.8\ \mu m$ (diameter and form)

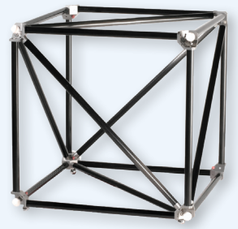
Description	Measuring Range	Item Nr.	€
12 Ball Bars	up to 1000 mm length of a single bar	20010-0210-0101	1,845.00
12 Ball Bars	up to 1400 mm length of a single bar	20010-0210-0102	2,403.00
12 Ball Bars	up to 2000 mm length of a single bar	20010-0210-0103	3,831.00

Extent of Calibration 2 according to VA-40 (VCMM):

12 single distances between two respective ball centres
The measurement uncertainty can only be achieved, if the assembly of the ball bar is reproducible
$U = 0.8\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between the ball centres of the single ball bar)

Description	Measuring Range	Item Nr.	€
12 Ball Bars	up to 1000 mm length of a single bar	20010-0210-0201	1,321.00
12 Ball Bars	up to 1700 mm length of a single bar	20010-0210-0202	1,713.00
12 Ball Bars	up to 2000 mm length of a single bar	20010-0210-0203	2,737.00

BALL CUBES in Solid Design



Extent of Calibration 1 according to VA-40 (VCMM):

24 single distances and additional the center coordinates of the balls related to the reference coordinate system
$U = 0.50\ \mu m + 0.80 \bullet 10^{-6} \bullet l$ (l is the distance between to arbitrary ball centers)
$U = 0.80\ \mu m + 1.00 \bullet 10^{-6} \bullet l$ (l > 800 mm is the distance between two arbitrary ball centres)
$U = 0.80\ \mu m$ (Diameter and form)

Description	Measuring Range	Item Nr.	€
Ball Cubes	up to 300 x 300 x 300 mm	20010-0220-0101	2,197.00
Ball Cubes	up to 400 x 400 x 400 mm	20010-0220-0102	2,697.00
Ball Cubes	up to 600 x 600 x 600 mm	20010-0220-0103	2,946.00
Ball Cubes	up to 800 x 800 x 800 mm	20010-0220-0104	4,196.00
Ball Cubes	up to 1000 x 1000 x 1000 mm	20010-0220-0105	5,195.00

Extent of Calibration 2 according to VA-40 (VCMM):

24 single distances and additional the centre coordinates of the balls related to the reference coordinate system
$U = 0.5\ \mu m + 0.8 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary centres)
$U = 0.8\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l > 800 mm is the distance between two arbitrary centres)

Description	Measuring Range	Item Nr.	€
Ball Cubes	up to 300 x 300 x 300 mm	20010-0220-0001	1,939.00
Ball Cubes	up to 400 x 400 x 400 mm	20010-0220-0002	2,439.00
Ball Cubes	up to 600 x 600 x 600 mm	20010-0220-0003	2,688.00
Ball Cubes	up to 800 x 800 x 800 mm	20010-0220-0004	3,939.00
Ball Cubes	up to 1000 x 1000 x 1000 mm	20010-0220-0005	4,938.00

ARTIFACT for Computer Tomographs

Extent of Calibration Level 1 according to VA-40 (VCMM):

Diameter of the balls
Centre coordinates of the balls related to the reference coordinate system and single distances between two respective ball centres
U = 1.2 µm (Centre coordinates)
U = 0.8 µm (Diameter)
U = 0.6 µm (Distances)

Description	Measuring Range	Item Nr.	€
Artifact for Computer Tomographs	up to 5 balls	20010-0230-0303	999.00
Artifact for Computer Tomographs	up to 15 balls	20010-0230-0301	1,402.00
Artifact for Computer Tomographs	up to 30 balls	20010-0230-0302	1,963.00

Extent of Calibration Level 2 according to VA-40 (VCMM):

Diameter of the balls
Centre coordinates of the balls related to the reference coordinate system and single distances between two respective ball centres
U = 1.5 µm (Centre coordinates)
U = 0.8 µm (Diameter)
U = 0.8 µm (Distances)

Description	Measuring Range	Item Nr.	€
Artifact for Computer Tomographs	up to 5 balls	20010-0230-0203	761.00
Artifact for Computer Tomographs	up to 15 balls	20010-0230-0201	1,166.00
Artifact for Computer Tomographs	up to 30 balls	20010-0230-0202	1,642.00

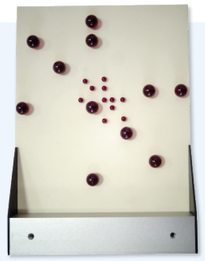
Extent of Calibration Level 3 according to VA-40 (VCMM):

Diameter of the balls
Centre coordinates of the balls related to the reference coordinate system
U = 1.5 µm (Centre coordinates)
U = 0.8 µm (Diameter)
U = 1.0 µm (Distances)

Description	Measuring Range	Item Nr.	€
Artifact for Computer Tomographs	up to 5 balls	20010-0230-0103	608.00
Artifact for Computer Tomographs	up to 15 balls	20010-0230-0101	1,011.00
Artifact for Computer Tomographs	up to 30 balls	20010-0230-0102	1,428.00

BALL PLATE FOR CT

Ball Centre Coordinates



Extent of Calibration 1 Level 1 according to VA-40 (VCMM):

Centre coordinates of elements related to the coordinate system

$U = 0.4\ \mu m + 0.5 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary elements)

Description	Measuring Range	Item Nr.	€
Ball plate	22 balls	20010-0670-0101	1,333.00
Ball plate	16 balls	20010-0670-0301	969.00

Extent of Calibration 1 Level 2 according to VA-40 (VCMM):

Centre coordinates of elements related to the coordinate system

$U = 0.8\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary elements)

Description	Measuring Range	Item Nr.	€
Ball plate	22 balls	20010-0670-0201	1,035.00
Ball plate	16 balls	20010-0670-0401	752.00

BALL PLATE FOR CT

Ball Centre Coordinates, Diameter, Form

Extent of Calibration 2 Level 1 according to VA-40 (VCMM):

Diameter and form of the balls, center coordinates of elements relates to the coordinate system

$U = 0.4\ \mu m$ (diameter and form)

$U = 0.4\ \mu m + 0.5 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary elements)

Description	Measuring Range	Item Nr.	€
Ball plate	22 balls	20010-0680-0101	1,755.00
Ball plate	16 balls	20010-0680-0301	1,276.00

Extent of Calibration 2 Level 2 according to VA-40 (VCMM):

Diameter and form of the balls, center coordinates of elements relates to the coordinate system

$U = 0.8\ \mu m$ (diameter and form)

$U = 0.8\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance between two arbitrary elements)

Description	Measuring Range	Item Nr.	€
Ball plate	22 balls	20010-0680-0201	1,494.00
Ball plate	16 balls	20010-0680-0401	1,086.00

BALL BEAM ARTIFACT

Extent of Calibration according to VA-40 (VCMM):

Diameter, form of the sphere, center-to-center distances of the spheres, centre coordinates of the spheres

U = 0.8 µm (diameter and form)

U = 0.8 µm + 1.0 • 10^{-6} • l

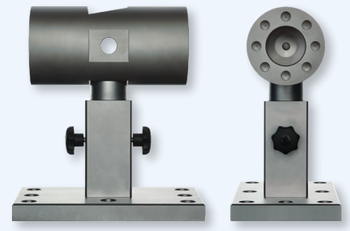
(l is the distance between two arbitary centres)

Probing pattern: 25 points according to DIN EN ISO 10360-5:2011-01

Description	Measuring Range	Item Nr.	€
Ball Beam Artifact	up to 8 spheres	20010-0640-0001	797.00
Ball Beam Artifact	up to 18 spheres	20010-0640-0002	1,630.00
Ball Beam Artifact	up to 20 spheres	20010-0640-0003	1,797.00

MULTI-FEATURE-CHECK

(Universal reference workpiece for determinating of the measurement uncertainty and testing procedure of the CMM)



Extent of Calibration according to VA-40 (VCMM):

up to 51 selected form, size and position features

The measurement U is defined depending on task

Description	Measuring Range	Item Nr.	€
Multi-Feature-Check (made of Aluminium)	D = 100 mm, L = 200 mm	20010-0430-0001	1,850.00
Multi-Feature-Check (made of Aluminium)	D = 50 mm, L = 100 mm	20010-0430-0002	1,850.00
Multi-Feature-Check mini (made of Synthetic PPS)	D = 50 mm, L = 100 mm	20010-0430-0004	1,850.00
Multi-Feature-Check mini (made of Synthetic PEEK)	D = 50 mm, L = 100 mm	20010-0430-0006	1,850.00
Multi-Feature-Check mikro (made of Stainless Steel)	D = 15 mm, L = 50 mm	20010-0430-0005	1,850.00

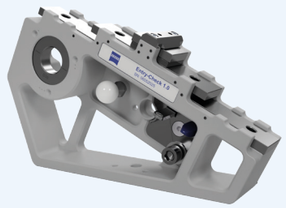
Note: The aluminum multi-feature check is typically used on coordinate measuring machines for various applications. The MultiFeature-Checks made of PPS, PEEK and stainless steel are specially designed for monitoring computer tomographs.

DAKKS CALIBRATION OF COMBINED ARTIFACTS

ARTIFACT ENTRY-CHECK 1.0

(Artifact for Acceptance Test and Inspection of CMM According to DIN EN ISO 10360)

If required, we can also procure this reference standard for you. Just get in touch with us!



Extent of Calibration:

Calibration of: 3x Gauge Block L = 50 mm, L = 150 mm and L =300 mm
1x Ring D = 30 mm,
1x Sphere D = 25 mm

The specification of the VA's and the uncertainty of the levels of the calibration can be found in the individual standards of this price list.

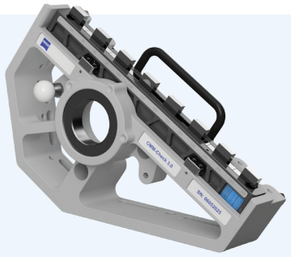
Description	Level	Item Nr.	€
Artifact Entry-Check 1.0	Level 1	20010-0730-0101	1,235.00

MORE INFORMATION:
WWW.EUMETRON.DE

ARTIFACT CMM-CHECK 3.0

(Artifact for Acceptance Test and Inspection of CMM According to DIN EN ISO 10360)

If required, we can also procure this reference standard for you. Just get in touch with us!



Extent of Calibration:

Calibration of: 1x Step Gauge L = 300 mm
1x Ring D = 50 mm,
1x Sphere D = 25 mm

The specification of the VA's and the uncertainty of the levels of the calibration can be found in the individual standards of this price list.

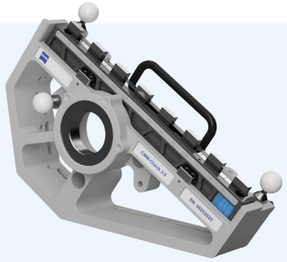
Step gauge level 0 and coefficient of linear thermal expansion α of the step gauge available on request.

Description	Level	Item Nr.	€
Artifact CMM-Check 3.0	Level 1	20010-0750-0101	2,074.00

ARTIFACT CMM-CHECK 3.0 WITH OPTION RT

(Artifact for Acceptance Test and Inspection of CMM According to DIN EN ISO 10360)

If required, we can also procure this reference standard for you. Just get in touch with us!



Extent of Calibration:

Calibration of: 1x Step Gauge L = 300 mm
1x Ring D = 50 mm,
3x Sphere D = 25 mm

The specification of the VA's and the uncertainty of the levels of the calibration can be found in the individual standards of this price list.

Step gauge level 0 and coefficient of linear thermal expansion α of the step gauge available on request.

Description	Level	Item Nr.	€
Artifact CMM-Check 3.0 with option RT	Level 1	20010-0760-0101	2,480.00

ARTIFACT PRO-CHECK 1.0

(Artifact for Acceptance Test and Inspection of CMM According to DIN EN ISO 10360)

If required, we can also procure this reference standard for you. Just get in touch with us!

Extent of Calibration:

Calibration of: 1x Ring D = 50 mm,
1x Sphere D = 25 mm

The specification of the VA's and the uncertainty of the levels of the calibration can be found in the individual standards of this price list.

The calibration of the Step Gauge is not included in this item.

Description	Level	Item Nr.	€
Artifact Pro-Check 1.0	Level 1	20010-0770-0101	799.00

ARTIFACT PRO-CHECK 1.0 WITH OPTION RT

(Artifact for Acceptance Test and Inspection of CMM According to DIN EN ISO 10360)

If required, we can also procure this reference standard for you. Just get in touch with us!

Extent of Calibration:

Calibration of: 1x Ring D = 50 mm,
3x Sphere D = 25 mm

The specification of the VA's and the uncertainty of the levels of the calibration can be found in the individual standards of this price list.

The calibration of the Step Gauge is not included in this item.

Description	Level	Item Nr.	€
Artifact Pro-Check 1.0 with Option RT	Level 1	20010-0780-0101	1,205.00

ARTIFACT CMM-CHECK 1.0

Artifact for Inspection of CMM

Extent of Calibration:

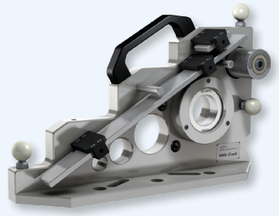
Calibration of: 2 x Gauge Blocks L = 50 mm and L = 400 mm
1 x Ring D = 50 mm,
1 x Sphere D = 30 mm
1 x Amplification Standard D = 50 mm with two cuts

The specification of the VA's and the uncertainty of the levels of the calibration can be found in the individual standards of this price list.

Description	Measuring Range	Item Nr.	€
CMM-Check	Level 1	20010-0250-0101	1,306.00
CMM-Check	Level 2	20010-0250-0201	1,008.00

ARTIFACT CMM-RT-CHECK 1.0

(Artifact for Inspection of CMM and Rotary Table)



Extent of Calibration:

Calibration of: 2 x Gauge Blocks L = 50 mm and L = 400 mm
1 x Ring D = 50 mm,
3 x Sphere D = 30 mm
1 x Amplification Standard D = 50 mm with two cuts

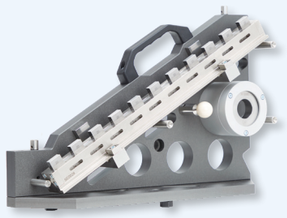
The specification of the VA's and the uncertainty of the levels of the calibration can be found in the individual standards of this price list.

Description	Measuring Range	Item Nr.	€
CMM-RT-Check 1.0	Level 1	20010-0260-0101	1,712.00
CMM-RT-Check 1.0	Level 2	20010-0260-0201	1,414.00

ARTIFACT CMM-CHECK 2.0

(Artifact for Acceptance Test and Inspection of CMM According to DIN EN ISO 10360)

If required, we can also procure this reference standard to you. Just get in touch with us!



Extent of Calibration:

Calibration of: 1 x Step Gauge L = 420 mm
1 x Ring D = 30 mm
1 x Sphere D = 25 mm

The specification of the VA's and the uncertainty of the levels of the calibration can be found in the individual standards of this price list.

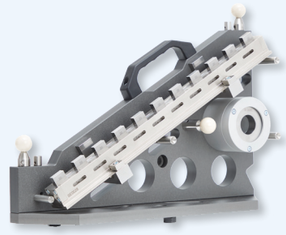
Step gauge Level 0 and coefficient of thermal expansion α for the step gauge on request.

Description	Measuring Range	Item Nr.	
CMM-Check 2.0	Level 1	20010-0560-0101	2,194.00

ARTIFACT CMM-RT-CHECK 2.0

(Artifact for Acceptance Test and Inspection of CMM According to DIN EN ISO 10360)

If required, we can also procure this reference standard to you. Just get in touch with us!



Extent of Calibration:

Calibration of: 1 x Step Gauge L = 420 mm
1 x Ring D = 30 mm
3 x Sphere D = 25 mm

The specification of the VA's and the uncertainty of the levels of the calibration can be found in the individual standards of this price list.

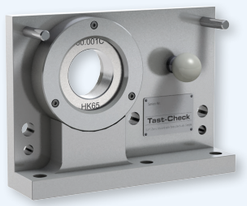
Step gauge Level 0 and coefficient of thermal expansion α for the step gauge on request.

Description	Measuring Range	Item Nr.	€
CMM-Check 2.0 + Option RT	Level 1	20010-0570-0101	2,600.00

PROBING SYSTEM CHECK UNIT

consisting of Sphere and Ring or Plug

If required, we can also procure this reference standard to you. Just get in touch with us!



Extent of Calibration:

Calibration of Sphere and Ring or Plug

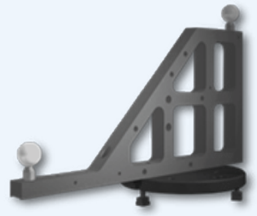
The specification of the VA's and the uncertainty of the levels of the calibration can be found in the individual standards of this price list.

Description	Measuring Range	Item Nr.	€
Probing System Check Unit	Level 1	20010-0240-0101	737.00
Probing System Check Unit	Level 2	20010-0240-0201	547.00

ARTIFACT ROTARY-CHECK

(Test Piece for Inspection of the Rotary Table)

If required, we can also procure this reference standard to you. Just get in touch with us!



Extent of Calibration:

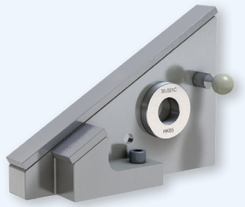
Calibration of 2 spheres D = 30 mm

The specification of the VA's and the uncertainty of the levels of the calibration can be found in the individual standards of this price list.

Description	Measuring Range	Item Nr.	€
Rotary-Check	Level 1	20010-0490-0101	666.00
Rotary-Check	Level 2	20010-0490-0201	547.00

ARTIFACT DURAMAX-CHECK

(Test Piece for Inspection of CMM)



Extent of Calibration:

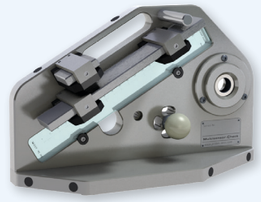
Calibration of: 2 x Gauge Block L = 50 mm and L = 300 mm
1 x Ring D = 30 mm
1 x Sphere D = 25 mm

The specification of the VA's and the uncertainty of the levels of the calibration can be found in the individual standards of this price list.

Description	Measuring Range	Item Nr.	€
Duramax-Check	Level 1	20010-0470-0101	1,011.00
Duramax-Check	Level 2	20010-0470-0201	714.00

ARTIFACT MULTISENSOR-CHECK

(Test Piece for Inspection of CMM)



Extent of Calibration:

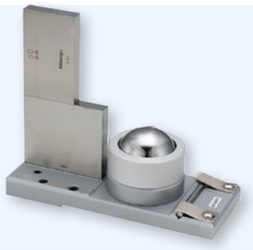
Calibration of: 2 x Gauge Block L = 50 mm and L = 200 mm
1 x Ring D = 16 mm
1 x Sphere D = 25 mm
1 x Glass Scale L = 200 mm

The specification of the VA's and the uncertainty of the levels of the calibration can be found in the individual standards of this price list.

Description	Measuring Range	Item Nr.	€
Multisensor-Check	Level 1	20010-0480-0101	1,744.00
Multisensor-Check	Level 2	20010-0480-0201	1,337.00

SETTING STANDARD CONTRACER

(Test Piece for Inspection of CV 3100/CV 4100)



Extent of Calibration:

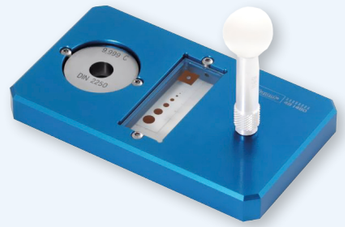
Calibration of a Gauge Block, Sphere and Plug

The specification of the VA's and the uncertainty of the levels of the calibration can be found in the individual standards of this price list.

Description	Measuring Range	Item Nr.	€
Setting Standard Contracer		20010-0590-0001	471.00

ARTIFACT GARANT

If required, we can also procure this reference standard to you. Just get in touch with us!



Extent of Calibration:

Calibration of Ring, Sphere and Glas Scale

The specification of the VA's and the uncertainty of the levels of the calibration can be found in the individual standards of this price list.

Description	Measuring Range	Item Nr.	€
Artifact Garant	Level 1	20010-0630-0101	1,248.00
Artifact Garant	Level 2	20010-0630-0201	984.00

DAKKS CALIBRATION OF SETTING STANDARDS

SETTING RINGS / INTERNAL CYLINDERS

If required, we can also procure this reference standard to you. Just get in touch with us!

Extent of Calibration Level 1 according to VA-56:

1 two-point diameter, 3 roundness (top, middle, bottom), 4 straightness, 2 parallelism
U = 0.1 µm + 0.4 • 10^{-6} • d (d is the diameter)
U = 0.1 µm (Roundness)
U = 0.2 µm (Straightness)
U = 0.25 µm (Parallelism)
Filter: Roundness ≤ Ø 25 mm Gauss 50 (UPR), > Ø 25 mm Gauss 150 (UPR), > Ø 80 mm Gauss 500 (UPR)
Straightness and parallelism Gauss Lc 0.8 mm

Description	Measuring Range	Item Nr.	€
Setting Ring Gauges / Internal Cylinders	D of 10 mm up to 100 mm	20010-0270-0101	405.00

Extent of Calibration Level 2 according to VA-56:

3 two-point diameter, (Measuring plane 1-3), 3 roundness (Measuring plane 1-3)
U = 0.2 µm + 0.5 • 10^{-6} • d (d is the diameter)
U = 0.1 µm (Roundness)
Filter: Roundness ≤ Ø 25 mm Gauss 50 (UPR), > Ø 25 mm Gauss 150 (UPR), >Ø 80 mm Gauss 500 (UPR)

Description	Measuring Range	Item Nr.	€
Setting Ring Gauges / Internal Cylinders	D of 10 mm up to 100 mm	20010-0270-0204	452.00

Extent of Calibration Level 2 according to VA-56: :

1 two-point diameter, 3 roundness (middle height ± 1 mm)
U = 0.2 µm + 0.5 • 10^{-6} • d (d is the diameter)
U = 0.1 µm (Roundness)
Filter: Roundness ≤ Ø 25 mm Gauss 50 (UPR), > Ø 25 mm Gauss 150 (UPR), > Ø 80 mm Gauss 500 (UPR)

Description	Measuring Range	Item Nr.	€
Setting Ring Gauges / Internal Cylinders	D of 10 mm up to 100 mm	20010-0270-0201	274.00

Extent of Calibration Level 2 according to VA-40 (VCMM) and VA-59:

1 two-point diameter, 3 roundness (middle height ± 1 mm)
U = 0.2 µm + 0.5 • 10^{-6} • d (d is the diameter)
U = 0.1 µm (Roundness)
Filter: Roundness up to Ø 25 mm Gauss 50 (UPR), > Ø 80 mm Gauss 500 (UPR)

Description	Measuring Range	Item Nr.	€
Setting Ring / Internal Cylinders	D from 3 mm < 10 mm or > 100 mm up to 370 mm	20010-0270-0202	333.00

Extent of Calibration Level 2 according to VA-40 (VCMM):

1 two-point diameter, 3 roundness (middle height ± 1 mm)
U = 0.2 µm + 0.5 • 10^{-6} • d (d is the diameter)
U = 0.6 µm (Roundness) Filter: Roundness Gauss 500 (UPR)

Description	Measuring Range	Item Nr.	€
Setting Ring / Internal Cylinders	D > 370 mm up to 500 mm	20010-0270-0203	363.00
Setting Ring / Internal Cylinders	D > 500 up to 600 mm	20010-0270-0206	424.00

Extent of Calibration Level 3 according to VA-40 (VCMM):

1 two-point diameter, 3 roundness (top, middle, bottom), 4 straightness, 2 parallelism
U = 0.2 µm + 0.5 • 10^{-6} • d (d is the diameter)
U = 0.6 µm (Roundness)
U = 0.4 µm (Straightness)
U = 0.5 µm (Parallelism)
Filter: Roundness ≤ Ø 25 mm Gauss 50 (UPR), > Ø 25 mm Gauss 150 (UPR), > Ø 80 mm Gauss 500 (UPR)
Straightness and parallelism: Gauss Lc 0,8 mm

Description	Measuring Range	Item Nr.	€
Setting Ring / Internal Cylinders	D > 3 mm up to 500 mm	20010-0270-0301	405.00

SETTING PLUG / EXTERNAL CYLINDERS

If required, we can also procure this reference standard to you. Just get in touch with us!

Extent of Calibration Level 1 according to VA-57:

1 two-point diameter, 3 roundness (top, middle, bottom), 4 straightness, 2 parallelism
U = 0.1 µm + 0.4 • 10^{-6} • d (d is the diameter)
U = 0.1 µm (Roundness)
U = 0.2 µm (Straightness)
U = 0.25 µm (Parallelism)
Filter: Roundness ≤ Ø 25 mm Gauss 50 (UPR), > Ø 25 mm Gauss 150 (UPR)
Straightness and Parallelism Gauss Lc 0.8 mm

Description	Measuring Range	Item Nr.	€
Setting Plug / External Cylinder	D of 10 mm up to 100 mm	20010-0280-0101	405.00

Extent of Calibration Level 2 according to VA-57:

3 two-point diameter (Measuring plane 1-3), 3 roundness (Measuring plane 1-3)
U = 0.2 µm + 0.5 • 10^{-6} • d (d is the diameter)
U = 0.1 µm (Roundness)
Filter: Roundness ≤ Ø 25 mm Gauss 50 (UPR), > Ø 25 mm Gauss 150 (UPR)

Description	Measuring Range	Item Nr.	€
Setting Plug / External Cylinder	D of 10 mm up to 100 mm	20010-0280-0204	452.00

Extent of Calibration Level 2 according to VA-57:

1 two-point diameter, 3 roundness (middle height ± 1 mm)
U = 0.2 µm + 0.5 • 10^{-6} • d (d is the diameter)
U = 0.1 µm (Roundness)
Filter: Roundness ≤ Ø 25 mm Gauss 50 (UPR), > Ø 25 mm Gauss 150 (UPR)

Description	Measuring Range	Item Nr.	€
Setting Plug / External Cylinder	D of 10 mm up to 100 mm	20010-0280-0201	274.00

Extent of Calibration Level 2 according to VA-40 (VCMM) and VA-60:

1 two-point diameter, 3 roundness (Middle height ± 1 mm)
U = 0.2 µm + 0.5 • 10^{-6} • d (d is the diameter)
U = 0.1 µm (Roundness)
Filter: Roundness ≤ Ø 25 mm Gauss 50 (UPR), > Ø 25 mm Gauss 150 (UPR), > Ø 80 mm Gauss 500 (UPR)

Description	Measuring Range	Item Nr.	€
Setting Plug / External Cylinder	D from 3 mm up to 10 mm or over 100 mm up to 290 mm	20010-0280-0202	333.00

Extent of Calibration Level 2 according to VA-40 (VCMM):

1 two-point diameter, 3 roundness (Middle height ± 1 mm)
U = 0.2 µm + 0.5 • 10^{-6} • d (d is the diameter)
U = 0.6 µm (Roundness)
Filter: Roundness Gauss 500 (UPR)

Description	Measuring Range	Item Nr.	€
Setting Plug / External Cylinder	D over 290 mm up to 500 mm	20010-0280-0203	363.00

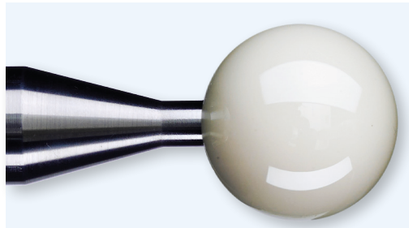
Extent of Calibration Level 3 according to VA-40 (VCMM):

1 two-point diameter, 3 roundness (top, middle, bottom), 4 straightness, 2 parallelism
U = 0.2 µm + 0.5 • 10^{-6} • d (d is the diameter)
U = 0.6 µm (Roundness)
U = 0.4 µm (Straightness)
U = 0.5 µm (Parallelism)
Filter: Roundness ≤ Ø 25 mm Gauss 50 (UPR), > Ø 25 mm Gauss 150 (UPR), > Ø 80 mm Gauss 500 (UPR)
Straightness and Parallelism Gauss Lc 0.8 mm

Description	Measuring Range	Item Nr.	€
Setting Plug / External Cylinder	D of 3 mm up to 500 mm	20010-0280-0301	405.00

SPHERES (Two-Point-Diameter)

If required, we can also procure this reference standard to you. Just get in touch with us!



Extent of Calibration Level 0 according to VA-58 and VA-61:

1 two-point-diameter, 3 roundness (0°, -45°, +45°)
$U = 0.1\ \mu m + 0.4 \bullet 10^{-6} \bullet d$ (d is the diameter)
$U = 0.05\ \mu m$ (Roundness)
Filter: Roundness Gauss 150 (UPR)

Description	Measuring Range	Item Nr.	€
Sphere	D from 10 mm up to 100 mm	20010-0290-9901	405.00

Extent of Calibration Level 1 according to VA-58:

1 two-point-diameter, 3 roundness (0°, -45°, +45°)
$U = 0.1\ \mu m + 0.4 \bullet 10^{-6} \bullet d$ (d is the diameter)
$U = 0.1\ \mu m$ (Roundness)
Filter: Roundness Gauss 150 (UPR)

Description	Measuring Range	Item Nr.	€
Sphere	D from 10 mm up to 100 mm	20010-0290-0101	333.00

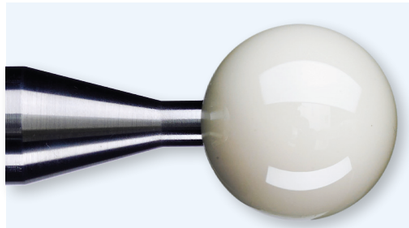
Extent of Calibration Level 2 according to VA-58 oder VA-40 (VCMM) und VA-61:

1 two-point-diameter, 3 roundness (0°, -45°, +45°)
$U = 0.2\ \mu m + 0.45 \bullet 10^{-6} \bullet d$ (d is the diameter)
$U = 0.1\ \mu m$ (Roundness)
Filter: Roundness Gauss 150 (UPR)
If D is smaller than 10 mm or larger than 100 mm, the DAkkS calibration of the diameters is carried out using the VA-40 (VCMM method) and the roundness roundness measurement is carried out using the VA-61.

Description	Measuring Range	Item Nr.	€
Sphere	D from 10 mm up to 100 mm	20010-0290-0201	274.00
Sphere	D from 3 mm up to < 10 mm or D > 100 mm up to 200 mm	20010-290-0203	274.00

SPHERES (25-Point-Pattern, roundness on the equator)

If required, we can also procure this reference standard to you. Just get in touch with us!



Extent of Calibration 2, Level 1 according to VA-40 (VCMM), VA-61:

1 sphere diameter (25 points according to DIN EN ISO 10360-5:2011-01)
1 roundness on the equator incl. formplot
$U = 0.3\ \mu m$ (Diameter)
$U = 0.1\ \mu m$ (Roundness)

Description	Measuring Range	Item Nr.	€
Sphere	D from 3 mm up to 30 mm	20010-0720-0101	321.00

Extent of Calibration 2, Level 2 according to VA-40 (VCMM):

1 sphere diameter (25 points according to DIN EN ISO 10360-5:2011-01)
1 roundness on the equator incl. formplot
$U = 0.6\ \mu m$ (Diameter)
$U = 0.6\ \mu m$ (Roundness)

Description	Measuring Range	Item Nr.	€
Sphere	D from 3 mm up to 30 mm	20010-0720-0201	262.00

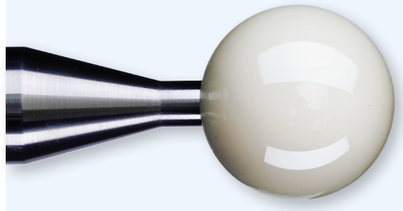
Extent of Calibration 2, Level 3 according to VA-40 (VCMM):

1 sphere diameter (25 points according to DIN EN ISO 10360-5:2011-01)
1 roundness on the equator incl. formplot
$U = 0.8\ \mu m$ (Diameter)
$U = 1.0\ \mu m$ (Roundness)

Description	Measuring Range	Item Nr.	€
Sphere	D from 3 mm up to 50 mm	20010-0720-0301	227.00

SPHERES (with 25-Points-Pattern according to DIN EN ISO 10360-5:2011-01)

If required, we can also procure this reference standard to you. Just get in touch with us!



Extent of Calibration Level 0 according to VA-40 (VCMM):

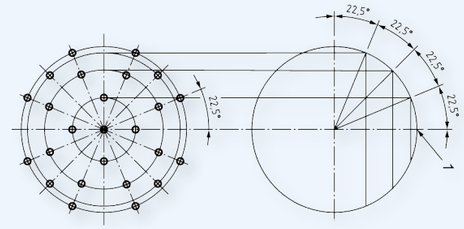
1 sphere diameter (25 points according to DIN EN ISO 10360-5:2011-01)
1 sphere form
U = 0.15 µm (Diameter)
U = 0.15 µm (Sphere form)

Description	Measuring Range	Item Nr.	€
Sphere	D from 3 mm up to 30 mm	20010-0650-9901	346.00

Extent of Calibration Level 1 according to VA-40 (VCMM):

1 sphere diameter (25 points according to DIN EN ISO 10360-5:2011-01)
1 sphere form
U = 0.3 µm (Diameter)
U = 0.3 µm (Sphere form)

Description	Measuring Range	Item Nr.	€
Sphere	D from 3 mm up to 30 mm	20010-0650-0101	274.00

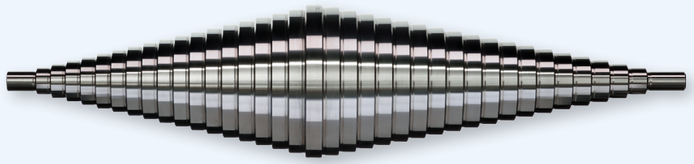


Extent of Calibration Level 2 according to VA-40 (VCMM):

1 sphere diameter (25 points according to DIN EN ISO 10360-5:2011-01)
1 sphere form
U = 0.6 µm + 1.0 • 10^{-6} • d (d is the diameter)
U = 0.6 µm (Sphere form)

Description	Measuring Range	Item Nr.	€
Sphere	D from 3 mm up to 250 mm	20010-0650-0201	167.00

STEP SHAFTS / COLLAR SHAFTS



Extent of Calibration according to VA-40 (VCMM):

Diameters and lengths

$U = 0.3\ \mu m + 0.6 \bullet 10^{-6} \bullet d$ (d is the diameter)
$U = 0.4\ \mu m + 0.6 \bullet 10^{-6} \bullet l$ (l is the length)

Description	Measuring Range	Item Nr.	€
Step Shafts / Collar Shafts	up to D = 400 mm and L = 1060 mm	on request	on request

TAPER SLEEVES

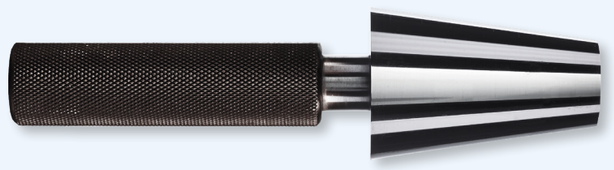
Extent of Calibration Level 3 according to VA-40 (VCMM):

1 two-point diameter, 1 taper angle, 1 taper form

$U = 0.4\ \mu m + 0.5 \bullet 10^{-6} \bullet d$ (d is the diameter)
$U = (200\ mm / l)$ (Taper angle; l is the measuring height)
$U = 0.6\ \mu m$ (Taper form)

Description	Measuring Range	Item Nr.	€
Taper Sleeve	D from 10 mm up to 150 mm	20010-0320-0301	214.00
Taper Sleeve	D > 150 mm up to 370 mm	20010-0320-0302	238.00
Taper Sleeve	D > 370 mm up to 500 mm	20010-0320-0303	298.00
Taper Sleeve	D from 3 mm < 10 mm or D > 500 mm	20010-0320-0304	298.00

TAPER MANDRELS



Extent of Calibration Level 3 according to VA-40 (VCMM):

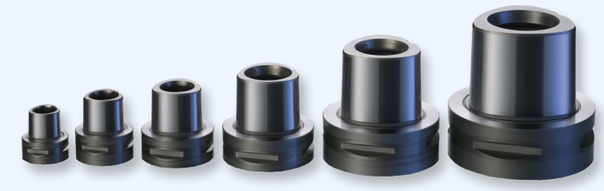
1 two-point diameter, 1 taper angle, 1 taper form

U = 0.6 µm (Taper form)

The measurement uncertainties for diameter and cone angle depends on the length and diameter of the cone.

Description	Measuring Range	Item Nr.	€
Taper Mandrel	D from 10 mm up to 150 mm	20010-0330-0301	214.00
Taper Mandrel	D > 150 mm up to 290 mm	20010-0330-0302	238.00
Taper Mandrel	D > 290 mm up to 500 mm	20010-0330-0303	298.00

CONICAL POLYGONAL TOOL HOLDING FIXTURE ("CAPTO")



Extent of Calibration according to VA-40 (VCMM):

Deviation of the polygon to the nominal contour in direction of the normal at 180 measuring positions

Angle of the cone

$U = 0.4\ \mu m + 0.5 \bullet 10^{-6} \bullet d$ (Deviation in direction of the normal; d is the diameter)

U = 2.0" (Angle of the cone)

Description	Item Nr.	€
Conical Polygonal Tool Holding Fixture	on request	on request

TEST CYLINDER with Cone Fixture

Extent of Calibration according to VA-40 (VCMM):

Reference for the calibration is the cone fixture
Cone fixture: angle of cone, form of the cone
Test cylinder: 3 cuts in each case with diameter, roundness and oncentricity,
4 straightness and 2 parallelism of generators

U = 0.8" (Angle of cone)
U = 0.5 µm (Form of the cone, diameter, roundness, straightness, parallelism)
U = 1.2 µm up to length of cylinder = 300 mm (Concentricity)
U = 2.4 µm up to length of cylinder = 600 mm (Concentricity)

Description	Measuring Range	Item Nr.	€
Test Cylinder with Cone Fixture	up to length of cylinder 300 mm	20010-0350-0001	785.00
Test Cylinder with Cone Fixture	up to length of cylinder 600 mm	20010-0350-0002	881.00

TEST CYLINDER with Fixture of Cylinder and Plane

Extent of Calibration according to VA-40 (VCMM):

Reference for the calibration is the fixture with cylinder and plane
Fixture Cylinder/Plane: 2 cuts in each case with diameter, roundness,
flatness and rectangularity cylinder to plane
Test Cylinder: 3 cuts in each case with diameter, roundness and concentricity,
4 straightness and 2 parallelism of generators

U = 0.5 µm (Flatness, rectangularity, diameter, roundness, straightness, parallelism)
U = 1.2 µm up to length of cylinder = 300 mm (Concentricity)
U = 2.4 µm up to length of cylinder = 600 mm (Concentricity)

Description	Measuring Range	Item Nr.	€
Test Cylinder with Fixture of Cylinder and Plane	up to length of cylinder 300 mm	20010-0360-0001	785.00
Test Cylinder with Fixture of Cylinder and Plane	up to length of cylinder 600 mm	20010-0360-0002	881.00

TEST CYLINDER with HSK Fixture

Extent of Calibration according to VA-40 (VCMM):

Reference for the calibration is the plane surface and the HSK-fixture
Fixture Plane/HSK: flatness plane surface, angle of cone, form of the cone, rectangularity
Test cylinder: 3 cuts in each case with diameter, roundness and concentricity

U = 0.8" (Angle of cone)
U = 0.5 µm (Flatness, rectangularity, diameter, roundness)
U = 1.2 µm up to length of cylinder = 300 mm (Concentricity)
U = 2.4 µm up to length of cylinder = 600 mm (Concentricity)

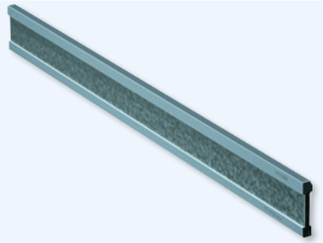
Description	Measuring Range	Item Nr.	€
Test Cylinder with HSK-Fixture	up to length of cylinder 300 mm	20010-0600-0001	785.00
Test Cylinder with HSK-Fixture	up to length of cylinder 600 mm	20010-0600-0002	881.00

Accuracy, reliability and innovation are basic requirements for a company that moves within the limits of the achievable measurement uncertainty.
Over the years assembled expert-knowledge, implemented in DAkkS accreditations for a wide variety of parametres with the smallest uncertainties, forms the essential foundation.

DAKKS CALIBRATION OF FORM STANDARDS

STRAIGHTNESS STANDARDS

If required, we can also procure this reference standard to you. Just get in touch with us!



Extent of Calibration 1 according to VA-40 (VCMM):

1 straightness error

U = 0.5 µm up to length 500 mm
U = 1.0 µm up to length 1000 mm
U = 1.5 µm up to length 1500 mm
U = 2.0 µm up to length 2000 mm

Description	Measuring Range	Item Nr.	€
Straightness Standard	up to 100 mm	20010-0370-0101	191.00
Straightness Standard	up to 300 mm	20010-0370-0102	227.00
Straightness Standard	up to 500 mm	20010-0370-0103	262.00
Straightness Standard	up to 1000 mm	20010-0370-0104	346.00
Straightness Standard	up to 1500 mm	20010-0370-0105	405.00
Straightness Standard	up to 2000 mm	20010-0370-0106	488.00

Extent of Calibration 2 according to VA-40 (VCMM):

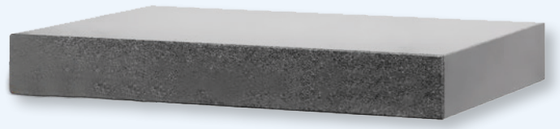
1 flatness error

U = 1.0 µm up to length 300 mm
U = 1.5 µm up to length 500 mm
U = 2.5 µm up to length 1500 mm
U = 3.5 µm up to length 2000 mm

Description	Measuring Range	Item Nr.	€
Straightness Standard	up to 100 mm	20010-0370-0201	229.00
Straightness Standard	up to 300 mm	20010-0370-0202	274.00
Straightness Standard	up to 500 mm	20010-0370-0203	309.00
Straightness Standard	up to 1000 mm	20010-0370-0204	417.00
Straightness Standard	up to 1500 mm	20010-0370-0205	487.00
Straightness Standard	up to 2000 mm	20010-0370-0206	571.00

FLATNESS STANDARDS

If required, we can also procure this reference standard to you. Just get in touch with us!



Extent of Calibration 1 according to VA-40 (VCMM):

8 straightness errors "Union Jack pattern" or 12 straightness errors "Cake pattern",
1 flatness error

U = 1.0 µm long side or diameter up to 300 mm
U = 1.5 µm long side or diameter up to 500 mm
U = 2.0 µm long side or diameter up to 1000 mm
U = 2.5 µm long side or diameter up to 1500 mm

Description	Measuring Range	Item Nr.	€
Flatness Standard	long side or diameter up to 100 mm	20010-0380-0101	250.00
Flatness Standard	long side or diameter up to 200 mm	20010-0380-0102	285.00
Flatness Standard	long side or diameter up to 300 mm	20010-0380-0103	321.00
Flatness Standard	long side or diameter up to 400 mm	20010-0380-0104	405.00
Flatness Standard	long side or diameter up to 500 mm	20010-0380-0105	488.00
Flatness Standard	long side or diameter up to 1000 mm	20010-0380-0106	747.00
Flatness Standard	long side or diameter up to 1500 mm	20010-0380-0107	1,001.00

Extent of Calibration 2 according to VA-40 (VCMM):

12 straightness errors "Grid 6 x 6 pattern", 1 flatness error

U = 1.0 µm long side or diameter up to 300 mm
U = 1.5 µm long side or diameter up to 800 mm

Description	Measuring Range	Item Nr.	€
Flatness Standard	long side or diameter up to 100 mm	20010-0380-0201	375.00
Flatness Standard	long side or diameter up to 200 mm	20010-0380-0202	428.00
Flatness Standard	long side or diameter up to 300 mm	20010-0380-0203	482.00
Flatness Standard	long side or diameter up to 400 mm	20010-0380-0204	608.00
Flatness Standard	long side or diameter up to 500 mm	20010-0380-0205	732.00
Flatness Standard	long side or diameter up to 800 mm	20010-0380-0206	857.00

ROUNDNESS STANDARDS

If required, we can also procure this reference standard to you. Just get in touch with us!

Extent of Calibration Level 0 according to VA-59, VA-60, VA-61 or VA-64:

1 roundness with centering method MZC

U = 0.01 µm + 0.05 • RONt (RONt is the roundness error of the calibration object)

Description	Measuring Range	Item Nr.	€
Sphere / Plug / Ring / Hemisphere / Amplification Standard (Flick depth max. 100 µm) Wave length: 15 UPR*	D from 3 mm up to 290 mm**	20010-0520-201x	298.00
Sphere / Plug / Ring / Hemisphere / Amplification Standard (Flick depth max. 100 µm) Wave length: 50 UPR*	D from 3 mm up to 290 mm**	20010-0520-202x	298.00
Sphere / Plug / Ring / Hemisphere / Amplification Standard (Flick depth max. 100 µm) Wave length: 150 UPR*	D from 3 mm up to 290 mm**	20010-0520-203x	298.00
Sphere / Plug / Ring / Hemisphere / Amplification Standard (Flick depth max. 100 µm) Wave length: 500 UPR*	D from 3 mm up to 290 mm**	20010-0520-204x	298.00
Sphere / Plug / Ring / Hemisphere / Amplification Standard (Flick depth max. 100 µm) Wave length: 15 UPR, 50 UPR, 150 UPR, 500 UPR*	D from 3 mm up to 290 mm**	20010-0520-205x	339.00

*Filter: Gaussian

** Measuring Range Ring: D from 3 mm up to 370 mm

Extent of Calibration Level 1 according to VA-59, VA-60 or VA-61:

1 roundness with compensation procedure MZCI, evaluation with wave length: 150 UPR

U = 0.05 µm

Description	Measuring Range	Item Nr.	€
Sphere	D from 3 mm up to 290 mm	20010-0520-2103	179.00
Plug	D from 3 mm up to 290 mm	20010-0520-2101	179.00
Rings	D from 3 mm up to 370 mm	20010-0520-2102	179.00

Extent of Calibration Level 2 according to VA-59, VA-60 or VA-61:

1 roundness with compensation procedure MZCI, evaluation with wave length: 150 UPR

U = 0.10 µm

Description	Measuring Range	Item Nr.	€
Sphere	D from 3 mm up to 290 mm	20010-0520-2203	95.00
Plug	D from 3 mm up to 290 mm	20010-0520-2201	95.00
Rings	D from 3 mm up to 370 mm	20010-0520-2202	95.00

Extent of Calibration Level 3 according to VA-40 (VCMM):

1 roundness with compensation procedure MZCI measured on the CMM,, evaluation with wave length 50 UPR

U = 0.8 µm

Description	Measuring Range	Item Nr.	€
Sphere / Ring / Plug	D from 3 mm up to 500 mm	20010-0520-2301	60.00

AMPLIFICATION STANDARDS

(Setting plug with cuts)

Extent of Calibration 1 according to VA-40 (VCMM):

8 roundness (Filter 15 UPR, 50 UPR, 150 UPR, 500 UPR on 2 cuts)

U = 0.8 µm

Description	Measuring Range	Item Nr.	€
Setting plug with 2 cuts	D from 10 up to 100 mm	20010-0300-0001	274.00

Extent of Calibration 2 according to VA-40 (VCMM):

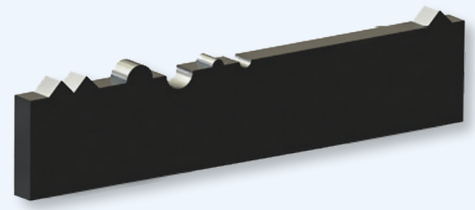
4 roundness (Filter 15 UPR, 50 UPR, 150 UPR, 500 UPR on 1 cuts)

U = 0,8 µm

Description	Measuring Range	Item Nr.	€
Setting plug with 1 cut	D from 10 mm up to 100 mm	20010-0300-0002	233.00

CONTOUR STANDARDS

If required, we can also procure this reference standard to you. Just get in touch with us!



Extent of Calibration according to VA-40 (VCMM):

Distances, radii, angles and form error

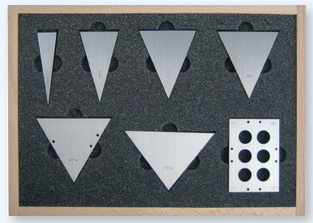
U = 0.8 µm (Distances)
U = 0.8 µm (Radii)
U = 0.006° (Angles)
U = 0.5 µm (Form error)

Roughness Ra, Rz, Rmax
U = ~ 5% (Roughness)
Uncertainty depends on types and could deviate from the upper uncertainties.
Calibration of the roughness is carried out by an external laboratory!

Description	Measuring Range	Item Nr.	€
Contour standard	up to 5 features	20010-0390-0014	294.00
Contour standard	up to 10 features	20010-0390-0001	476.00
Contour standard	up to 15 features	20010-0390-0012	530.00
Contour standard	up to 30 features	20010-0390-0002	726.00
Contour standard	up to 50 features	20010-0390-0005	940.00
Contour standard	up to 70 features	20010-0390-0006	1,119.00
Contour standard	up to 90 features	20010-0390-0007	1,284.00
Contour standard	Typ CN303 / KN3 with 18 features	20010-0390-0008	575.00
Contour standard	Typ CN303 / KN3 with 30 features	20010-0390-0009	726.00
Contour standard	up to 30 features incl. roughness	20010-0390-0003	1,051.00
Contour standard	up to 5 features only roughness	20010-0390-0004	324.00
Contour standard	Typ 6.302 with 4 features	20010-0390-0011	397.00

DAKKS CALIBRATIONS OF ANGLE STANDARDS & THREAD STYLI

ANGULAR GAUGE BLOCKS



Extent of Calibration according to VA-40 (VCMM):

One angle for each angular gauge block

U = 2.0"

Description	Measuring Range	Item Nr.	€
Angular Gauge Block	1" up to 90 °	20010-0400-0001	56.00

ANGLE STANDARDS 90° TRIANGULAR FORM

Extent of Calibration according to VA-40 (VCMM):

90° angle, 2 straightness
(DAkkS calibration of the 90° angles with supplementary form measurement)

U = 0.5"
U = 0.5 µm + 1.0 • 10^{-6} • l (l is the length) (Straightness)

Description	Measuring Range	Item Nr.	€
Angle Standard 90°	long side from 150 mm up to 300 mm	20010-0410-0001	346.00
Angle Standard 90°	long side up to 500 mm	20010-0410-0002	428.00
Angle Standard 90°	long side up to 1000 mm	20010-0410-0003	726.00

Extent of Calibration according to VA-40 (VCMM):

90° angle, 2 straightness
(DAkkS calibration of the 90° angles with supplementary form measurement)

U = 0.5"
U = 0.8 µm + 1.0 • 10^{-6} • l (l is the length) (Flatness)

Description	Measuring Range	Item Nr.	€
Angle Standard 90°	long side from 150 mm up to 300 mm	20010-0410-0011	398.00
Angle Standard 90°	long side up to 500 mm	20010-0410-0012	480.00
Angle Standard 90°	long side up to 1000 mm	20010-0410-0013	778.00

ANGLE STANDARDS 90° RECTANGULAR FORM

Extent of Calibration according to VA-40 (VCMM):

4 x 90° angles, 4 straightness
(DAkkS calibration of the 90° angles with supplementary form measuring)

U = 0.5"
U = 0.5 µm + 1.0 • 10^{-6} • l (l is the length) (Straightness)

Description	Measuring Range	Item Nr.	€
Angle Standard 90°	long side from 150 mm up to 300 mm	20010-0420-0001	655.00
Angle Standard 90°	long side up to 500 mm	20010-0420-0002	846.00
Angle Standard 90°	long side up to 1000 mm	20010-0420-0003	1,226.00

DAkkS Calibration of Angle Standards

THREAD STYLI

Extent of Calibration according to VA-40 (VCMM):

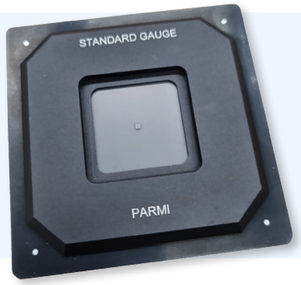
Diameter and form of both Spheres, centre to centre distance of both spheres

U = 0.8 µm + 1.0 • 10^{-6} • l (l is the distance between the ball centres of the single ball bar)
U = 0.8 µm (Diameter and form)

Description	Measuring Range	Item Nr.	€
1 Piece	Ø 0.45 mm up to Ø 4.0 mm	20010-0610-0001	333.00
Set from 4 to 6 Pieces	Ø 0.45 mm up to Ø 4.0 mm	20010-0610-0002	1,160.00
Set from 7 to 9 Pieces	Ø 0.45 mm up to Ø 4.0 mm	20010-0610-0003	1,692.00
Set from 10 to 12 Pieces	Ø 0.45 mm up to Ø 4.0 mm	20010-0610-0004	2,225.00
Set from 13 to 15 Pieces	Ø 0.45 mm up to Ø 4.0 mm	20010-0610-0005	2,806.00

DAkkS calibrations of Gewindetastern

SPI HEIGHT MEASUREMENT STANDARD



Extent of Calibration according to VA-40:

1x Step Height (150 µm)

U = 0.1 µm

Description	Level	Item Nr.	€
SPI Height Measurement Standard		20010-0790-0101	167.00

AOI HEIGHT MEASUREMENT STANDARD

Extent of Calibration according to VA-40:

3x Step Height (200 µm; 500 µm; 10000 µm)

U = 0.1 µm

Description	Level	Item Nr.	€
AOI Height Measurement Standard		20010-0800-0101	219.00

DAKKS-CALIBRATION COEFFICIENT OF THERMAL EXPANSION

Coefficient of thermal expansion CTE

COEFFICIENT OF THERMAL EXPANSION CTE

Extent of Calibration 1 (on request):

Determination of the coefficient of thermal expansion CTE (Coefficient Thermal Expansion) between 20°C and 32°C by defining the temperature relevant linear part α (Alpha) and the temperature relevant quadratical part β (Beta) of the length deviation.

It is recommended to conside the β (Beta) value in addition the the α (Alpha) value especially when using standards or artifacts for high end CMM with significant deviation of temperatures other than 20°C (VDI/VDE 2617 page 2.1).

Extent of Calibration 2 according to VA-54:

Determination of the coefficient of thermal expansion (CTE) between 20°C and 32°C by defining the temperature relevant linear part α (Alpha) of the length deviation for the reference temperature of 20° C is recommended to consider when using standards or artifacts for high-end CMM. (VDI/VDE 2617 page 2.1)

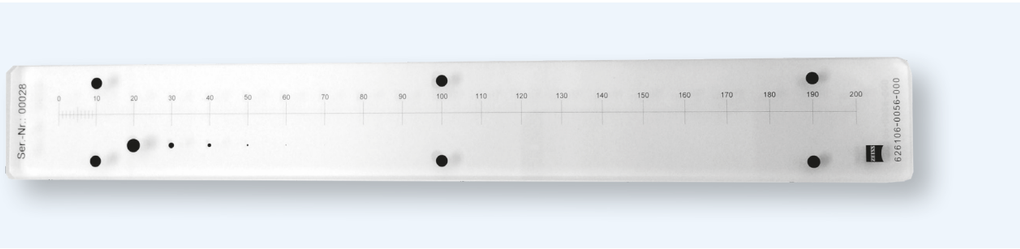
$U = 0.04 \bullet 10^{-6}\ K^{-1} + 0.007 \bullet \alpha + (0.03 \bullet 10^{-6}\ K^{-1}\ m) / l$
l is the length and α the denomination of the coefficient in $10^{-6}\ K^{-1}$

Example for steel ($\alpha = 11.5 \bullet 10^{-6}\ K^{-1}$):
$U = 0.42 \bullet 10^{-6}\ K^{-1}$ for L = 100 mm
$U = 0.18 \bullet 10^{-6}\ K^{-1}$ for L = 500 mm
$U = 0.15 \bullet 10^{-6}\ K^{-1}$ for L = 1000 mm

Description	Measuring Range	Item Nr.	€
Gauge Block, 1 Piece	up to 1650 mm	20010-0460-0201	690.00
Gauge Blocks, 2 Piece	up to 1650 mm	20010-0460-0209	1,237.00
Gauge Blocks, 3 Piece	up to 1650 mm	20010-0460-0210	1,760.00
Gauge Blocks, 4 Piece	up to 1650 mm	20010-0460-0211	2,212.00
Gauge Blocks, 5 Piece	up to 1650 mm	20010-0460-0212	2,594.00
Gauge Blocks, 6 Piece	up to 1650 mm	20010-0460-0213	2,903.00
Gauge Blocks, 7 Piece	up to 1650 mm	20010-0460-0214	3,140.00
Gauge Blocks, 8 Piece	up to 1650 mm	20010-0460-0218	3,253.00
Gauge Blocks, 9 Piece	up to 1650 mm	20010-0460-0215	3,367.00
Gauge Blocks, 10 Piece	up to 1650 mm	20010-0460-0217	3,558.00
Step Gauge	up to 1650 mm	20010-0460-0203	1,522.00
Step Gauge	up to 2020 mm	20010-0460-0204	1,760.00
Ball Bar / Cone Bar	up to 1500 mm	20010-0460-0216	1,522.00
Ball Beam / Hole Beam	up to 1650 mm	20010-0460-0205	1,522.00
Ball Beam / Hole Beam	> than 1650 mm	20010-0460-0206	2,900.00
Ball Plate / Hole Plate	up to 650 x 650 mm	20010-0460-0207	1,760.00
Scale	up to 1650 mm	20010-0460-0208	1,522.00
Reference Workpiece (Cylindrical/Cuboid)	up to 1650 mm	20010-0460-0219	1,522.00

DAKKS CALIBRATION OF OPTICAL STANDARDS & ARTIFACTS

GLASS SCALE FOR MULTISENSOR-CHECK



Extent of Calibration Level 1 according to VA-70 and VA-74:

Determination of the line spacing, in regards to the line centre (DAkkS calibration)
0 mm - 9 mm within a 1 mm interval
10 mm - 200 mm within a 10 mm interval
Diameter and roundness of 8 circles with diameters of 50 µm up to 3500 µm

U = 0.12 µm + 0.3 • 10^{-6} • l (l is the distance)
U = 0.25 µm (Diameter)
U = 0.5 µm (Roundness)

Description	Measuring Range	Item Nr.	€
Glass Scale for Multisensor-Check	Distances, diameters and roundness	20011-2010-0101	732.00

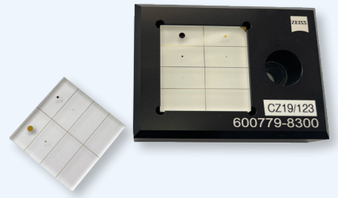
Extent of Calibration Level 2 according to VA-70 and VA-74:

Determination of the line spacing, in regards to the line centre (DAkkS calibration)
0 mm - 9 mm within a 1 mm interval
10 mm - 200 mm within a 10 mm interval
Diameter and roundness of 8 circles with diameters of 50 µm up to 3500 µm

U = 0.2 µm + 0.5 • 10^{-6} • l (l is the distance)
U = 0.5 µm (Diameter)
U = 1.0 µm (Roundness)

Description	Measuring Range	Item Nr.	€
Glass Scale for Multisensor-Check	Distances, diameters and roundness	20011-2010-0201	623.00

CALIBRATION TEMPLATE VISCAN



Extent of Calibration Level 1 according to VA-70 und VA-74:

Distance of the horizontal lines of the left side
Diameter and Roundness X- and Y-Coordinate of 8 circles with diameters of 50 µm to 3,500 µm or 10 circles with diameters of 25 µm up to 3500 µm

U = 0.12 µm + 0.3 • 10^{-6} • l (l is the distance)
U = 0.25 µm (Diameter)
U = 0.5 µm (Roundness)

Description	Measurement Range	Item Nr.	€
Calibration Template ViScan	Distances, Diameter and Roundness (8 circles)	20011-2020-0101	530.00
Calibration Template ViScan	Distances, Diameter and Roundness (10 circles)	20011-2020-0102	597.00

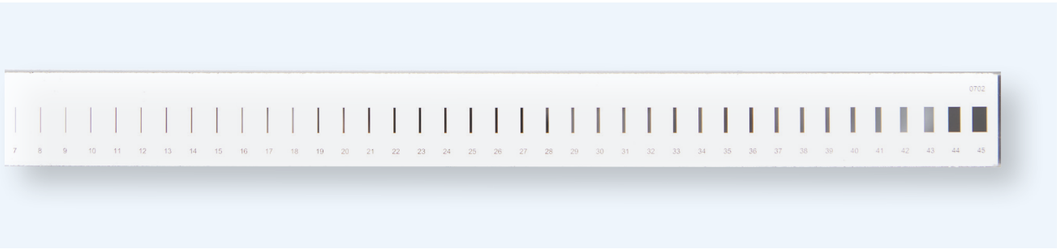
Extent of Calibration Level 2 according to VA-70 und VA-74:

Distance of the horizontal lines of the left side
Diameter and Roundness X- and Y-Coordinate of 8 circles with diameters of 50 µm to 3,500 µm

U = 0.2 µm + 0,5 • 10^{-6} • l (l is the distance)
U = 0.5 µm (Diameter)
U = 1.0 µm (Roundness)

Description	Measurement Range	Item Nr.	€
Calibration Template ViScan	Distances, Diameter and Roundness	20011-2020-0201	410.00

LINE SCALE (UP TO 600 MM LENGTH)



Extent of Calibration Level 1 according to VA-70:

Determination of the line spacing by either the line centre, the left or right line edge as an unidirectional spacing (Line Spacing)

$U = 0.12\ \mu m + 0.3 \bullet 10^{-6} \bullet l$ (l is the distance)

Description	Measuring Range	Item Nr.	€
Line Scale	up to 20 distances unidirectional	20011-2030-0101	599.00
Line Scale	up to 50 distances unidirectional	20011-2030-0102	927.00
Line Scale	up to 100 distances unidirectional	20011-2030-0103	1,396.00
Line Scale	> 100 distances unidirectional	on request	on request

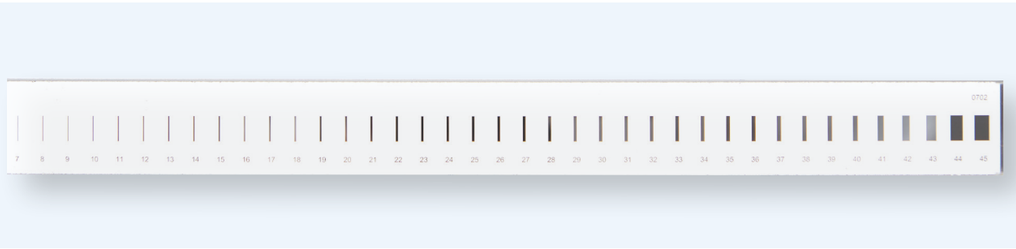
Extent of Calibration Level 2 according to VA-70:

Determination of the line spacing by either the line centre, the left or right line edge as an unidirectional spacing (Line Spacing)

$U = 0.2\ \mu m + 0.5 \bullet 10^{-6} \bullet l$ (l is the distancce)

Description	Measuring Range	Item Nr.	€
Line Scale	up to 20 distances unidirectional	20011-2030-0201	509.00
Line Scale	up to 50 distances unidirectional	20011-2030-0202	789.00
Line Scale	up to 100 distances unidirectional	20011-2030-0203	1,187.00
Line Scale	> 100 distances unidirectional	on request	on request

LINE SCALE (UP TO 1180 MM LENGTH)



Extent of Calibration Level 1 according to VA-71:

Determination of the line spacing by either the line centre, the left or right line edge as an unidirectional spacing (Line Spacing)

$U = 0.35\ \mu m + 0.8 \bullet 10^{-6} \bullet l$ (l is the distance)

Description	Measurement Range	Item Nr.	€
Line Scale	up to 20 distances unidirectional	20011-2030-0301	578.00
Line Scale	up to 50 distances unidirectional	20011-2030-0302	816.00
Line Scale	up to 100 distances unidirectional	20011-2030-0303	1,173.00
Line Scale	> 100 distances unidirectional	on request	on request

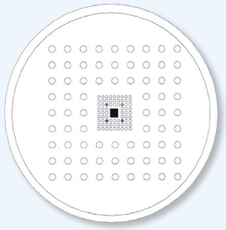
Extent of Calibration Level 2 according to VA-71:

Determination of the line spacing by either the line centre, the left or right line edge as an unidirectional spacing (Line Spacing)

$U = 0.8\ \mu m + 1.5 \bullet 10^{-6} \bullet l$ (l is the distance)

Description	Measurement Range	Item Nr.	€
Line Scale	up to 20 distances unidirectional	20011-2030-0401	471.00
Line Scale	up to 50 distances unidirectional	20011-2030-0402	688.00
Line Scale	up to 100 distances unidirectional	20011-2030-0403	992.00
Line Scale	> 100 distances unidirectional	on request	on request

OPTICAL CALIBRATION PLATE



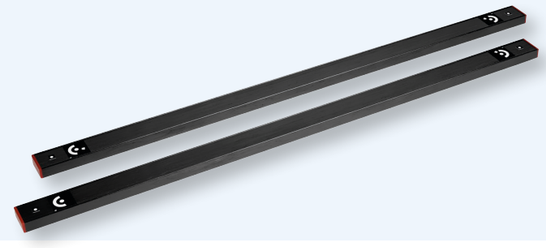
Extent of calibration according to VA-72 and VA-74:

Circle center positions
Diameters
Form errors

U = 0.15 µm + 0.3 • 10^{-6} • l (l is the distance)
U = 0.5 µm (Diameter)
U = 1.0 µm (Roundness)

Description	Measuring Range	Item Nr.	€
Optical Calibration Plate	4 circles of an array, Minimum Diameter of Ø 0.05 mm	20011-2040-0101	754.00
Optical Calibration Plate	all circles of an array Minimum Diameter of Ø 0.05 mm	20011-2040-0102	2,820.00

PHOTOGRAMMETRY SCALE



Extent of Calibration according to VA-70 or VA-71:

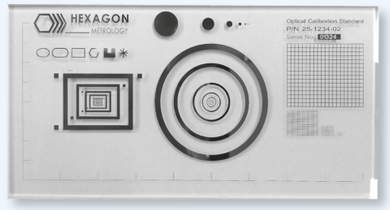
Determination of the distances with the middle point of the circles

Standard:
U = 0.5 µm + 1.0 • 10^{-6} • l (l is the distance)
U = 3.0 µm + 1.0 • 10^{-6} • l (l is the distance, for l > 2000 mm)

Retro:
U = 3.5 µm + 1.0 • 10^{-6} • l (l is the distance)

Description	Measuring Range	Item Nr.	€
Photogrammetry Scale	with 2 Circle Marks	20011-2050-0xx1	250.00
Photogrammetry Scale	up to 5 Circle Marks	20011-2050-0xx2	419.00
Photogrammetry Scale	up to 10 Circle Marks	20011-2050-0xx3	480.00
Photogrammetry Scale	up to 15 Circle Marks	20011-2050-0xx4	542.00
Photogrammetry Scale	up to 25 Circle Marks	20011-2050-0xx5	709.00
Photogrammetry Scale	up to 30 Circle Marks	20011-2050-0xx6	767.00
Photogrammetry Scale	up to 35 Circle Marks	20011-2050-0xx7	822.00

2D POSITION STANDARD



Extent of Calibration Level 1 according to VA-70:

Box-in-box frame structure:
Calibration of pitches in rectangle structures, 12 tracks in X-direction (left edges) and Y-direction (lower edges)

Circle Ring Structure:
Calibration of center position of 9 circle ring structures

$U = 0.12\ \mu m + 0.3 \bullet 10^{-6} \bullet l$ (l is the distance)

Description	Measuring Range	Item Nr.	€
2D Position Standard	Rectangle Structur and Circel Ring Structure	20011-2060-0001	737.00

Extent of Calibration Level 2 according to VA-70:

Box-in-box frame structure:
Calibration of pitches in rectangle structures, 12 tracks in X-direction (left edges) and Y-direction (lower edges)

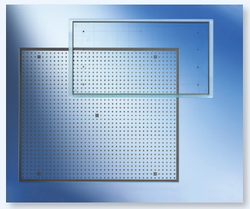
Circle Ring Structure:
Calibration of center position of 9 circle ring structures

$U = 0.2\ \mu m + 0.5 \bullet 10^{-6} \bullet l$ (l is the distance)

Description	Measuring Range	Item Nr.	€
2D Position Standard	Rectangle Structur and Circel Ring Structure	20011-2060-0002	589.00

SYMMETRICAL PLATES

(up to a diagonal spacing of 600 mm)



Extent of Calibration Level 1 according to VA-72:

Optical 2D distance measurement between the symmetrical 2D structures (circle centres or reticule)
using a calibrated coordinate measuring machine by single-point probing with a video sensor in comparison to an optical scale, in the case of reticules, the distance is measured via the intersection point of the centre lines of the reticules

$U = 0.15\ \mu m + 0.3 \bullet 10^{-6} \bullet l$ (l is the distance)

Description	Measuring Range	Item Nr.	€
Symmetrical Plates	up to 200 Circles / Reticules	20011-2070-0101	2,083.00
Symmetrical Plates	up to 500 Circles / Reticules	20011-2070-0102	2,873.00
Symmetrical Plates	up to 1500 Circles / Reticules	20011-2070-0103	3,161.00
Symmetrical Plates	> 1500 Circles / Reticules	on request	on request

Extent of Calibration Level 2 according to VA-72:

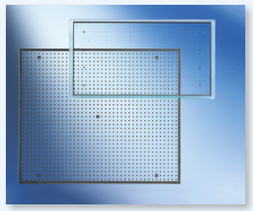
Optical 2D distance measurement between the symmetrical 2D structures (circle centres or reticule)
using a calibrated coordinate measuring machine by single-point probing with a video sensor in comparison to an optical scale, in the case of reticules, the distance is measured via the intersection point of the centre lines of the reticules

$U = 0.2\ \mu m + 0.5 \bullet 10^{-6} \bullet l$ (l is the distance)

Description	Measuring Range	Item Nr.	€
Symmetrical Plates	up to 200 Circles / Reticules	20011-2070-0201	1,458.00
Symmetrical Plates	up to 500 Circles / Reticules	20011-2070-0202	2,010.00
Symmetrical Plates	up to 1500 Circles / Reticules	20011-2070-0203	2,211.00
Symmetrical Plates	> 1500 Circles / Reticules	on request	on request

SYMMETRICAL PLATES

(up to a diagonal spacing of 1200 mm)



Extent of Calibration Level 1 according to VA-73:

Optical 2D distance measurement between the symmetrical 2D structures (Middle of circles or reticule)
using a calibrated coordinate measuring machine by single-point probing with a video sensor in comparison to an optical scale, in the case of reticules, the distance is measured via the intersection point of the centre lines of the reticules

$U = 0.4\ \mu m + 0.8 \bullet 10^{-6} \bullet l$ (l is the distance)

Description	Measuring Range	Item Nr.	€
Symmetrical Plates	up to 200 Circles / Reticules	20011-2070-0301	1,771.00
Symmetrical Plates	up to 500 Circles / Reticules	20011-2070-0302	2,442.00
Symmetrical Plates	up to 1500 Circles / Reticules	20011-2070-0303	2,687.00
Symmetrical Plates	> 1500 Circles / Reticules	on request	on request

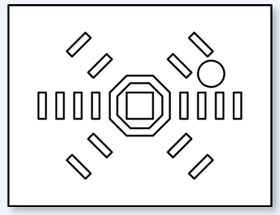
Extent of Calibration level 2 according to VA-73:

Optical 2D distance measurement between the symmetrical 2D structures (Middle of circles or reticule)
using a calibrated coordinate measuring machine by single-point probing with a video sensor in comparison to an optical scale, in the case of reticules, the distance is measured via the intersection point of the centre lines of the reticules

$U = 0.8\ \mu m + 1.5 \bullet 10^{-6} \bullet l$ (l is the distance)

Description	Measuring Range	Item Nr.	€
Symmetrical Plates	up to 200 Circles / Reticules	20011-2070-0401	1,239.00
Symmetrical Plates	up to 500 Circles / Reticules	20011-2070-0402	1,709.00
Symmetrical Plates	up to 1500 Circles / Reticules	20011-2070-0403	1,882.00
Symmetrical Plates	> 1500 Circles / Reticules	on request	on request

OCTAGON CHROMIUM PLATE



Extent of Calibration according to VA-70 and VA-74:

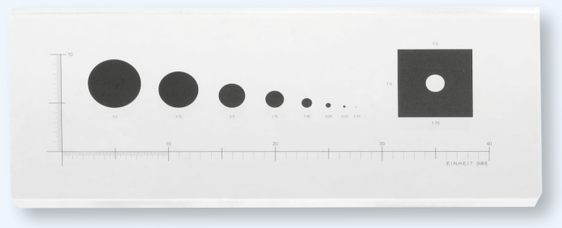
DAkkS calibration:
34 distances in relation to the left line edge
1 diameter
1 roundness

Standard calibration:
34 line widths

$U = 0.12\ \mu m + 0.3 \bullet 10^{-6} \bullet l$ (l is the distance)
$U = 0.5\ \mu m$ (Line width)
$U = 0.25\ \mu m$ (Diameter)
$U = 0.5\ \mu m$ (Roundness)

Description	Measuring Range	Item Nr.	€
Octagon	Distances, Line Width, Diameter and Roundness	20011-2080-0001	945.00

GLAS STANDARD GARANT



Extent of Calibration Level 1 according to VA-70 and VA-74:

8 unidirectional distances,
9 circles (diameter and roundness)

$U = 0.12\ \mu m + 0.3 \bullet 10^{-6} \bullet l$ (l is the distance)
$U = 0.25\ \mu m$ (Diameter)
$U = 0.5\ \mu m$ (Roundness)

Description	Measuring Range	Item Nr.	€
Glas Standard Garant	Distances, Diameter and Roundness	20011-2090-0101	511.00

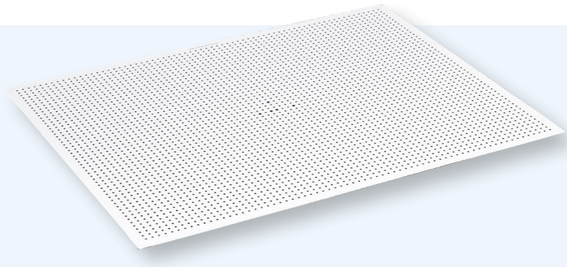
Extent of Calibration Level 2 according to VA-70 and VE-74:

8 unidirectional distances,
9 circles (diameter and roundness)

$U = 0.2\ \mu m + 0.5 \bullet 10^{-6} \bullet l$ (l is the distance)
$U = 0.5\ \mu m$ (Diameter)
$U = 1.0\ \mu m$ (Roundness)

Description	Measuring Range	Item Nr.	€
Glas Standard Garant	Distances, Diameter and Roundness	20011-2090-0201	435.00

OPTICAL CALIBRATION PLATE



Extent of Calibration according to VA-72, VA-73 or VA-40 and VA-73:

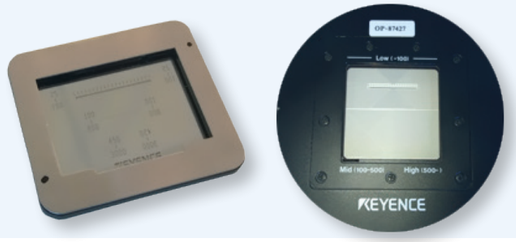
X- and Y-coordinates of all circles
Z-coordinates of the three circles 501497, 501503 und 504500 to the point of origin 501500

$U = 0.4\ \mu m + 0.8 \bullet 10^{-6} \bullet X$ (X is the distance to the point of origin)
$U = 0.4\ \mu m + 0.8 \bullet 10^{-6} \bullet Y$ (Y is the distance to the point of origin)
$U = 5.0\ \mu m$ (Z-Coordinate) (Standard Calibration)

Description	Measuring Range	Item Nr.	€
Optical Calibration Plate CP40-38	with 3657 circles	20011-2100-0001	3,016.00
Optical Calibration Plate CP40-60	with 3657 circles	20011-2100-0002	3,016.00
Optical Calibration Plate CP40-100	with 3657 circles	20011-2100-0003	3,016.00
Optical Calibration Plate CP40-170	with 3657 circles	20011-2100-0004	3,016.00
Optical Calibration Plate CP40-270	with 2623 circles	20011-2100-0010	2,450.00
Optical Calibration Plate CP40-200	with 1911 circles	20011-2100-0005	2,343.00
Optical Calibration Plate CP40-320	with 3657 circles	20011-2100-0006	3,016.00
Optical Calibration Plate CP40-560	with 3657 circles	20011-2100-0007	3,016.00
Optical Calibration Plate CP40-700	with 2961 circles	20011-2100-0008	2,627.00
Optical Calibration Plate CP40-1000	with 2655 circles	20011-2100-0009	2,488.00

KEYENCE GLASS SCALE WITH 3 SCALES

(OP-87426, OP-87427, OP-87657, OP-51483, OP-51491, OP-87656)



Extent of Calibration Level 1 according to VA-70:

Determination of the line spacing over the line centre as unidirectional distance (line spacing)

$U = 0.2\ \mu m + 0.5 \bullet 10^{-6} \bullet l$ (l is the distance)

Description	Measurement Range	Item Nr.	€
Keyence Glas Scale with 3 scales	Line Spacing scale A, B und C	20011-2110-0101	869.00

Extent of Calibration Level 2 according to VA-70:

Determination of the line spacing over the line centre as unidirectional distance (line spacing)

$U = 1.0\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance)

Description	Measurement Range	Item Nr.	€
Keyence Glas Scale with 3 scales	Line Spacing scale A, B und C	20011-2110-0201	608.00

CALIBRATION STANDARD KEYENCE VR-3000 / VR-3200

Extent of Calibration Level 1 according to VA-40 and VA-70:

CMM tactile (ceramic block):
Determination of two distances of 3 measurement planes
CMM optical (glass scale):
Determination of two distances over the left line edge as unidirectional distance

$U = 0.2\ \mu m + 0.5 \bullet 10^{-6} \bullet l$ (l is the distance)

Description	Measurement Range	Item Nr.	€
Keyence VR-3000 / VR-3200	Distances	20011-2120-0101	494.00

Extent of Calibration Level 2 according to VA-40 and VA-70:

CMM tactile (ceramic block):
Determination of two distances of 3 measurement planes
CMM optical (glass scale):
Determination of two distances over the left line edge as unidirectional distance

$U = 1.0\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance)

Description	Measurement	Item Nr.	€
Keyence VR-3000 / VR-3200	Distances	20011-2120-0201	346.00

CALIBRATION STANDARD KEYENCE VR-5000

(OP-88275)

Extent of Calibration Level 1 according to VA-40 and VA-70:

CMM (ceramic block):
Determination of 4 distances of 6 measurement planes
CMM (glas scale):
Determination of 2 distances over the left line edge as unidirectional distance

$U = 0.2\ \mu m + 0.5 \bullet 10^{-6} \bullet l$ (l is the distance)

Description	Measurement Range	Item Nr.	€
Keyence VR-5000 with Ceramic Block	Distances	20011-2130-0101	600.00

Extent of Calibration Level 2 according to VA-40 and VA-70:

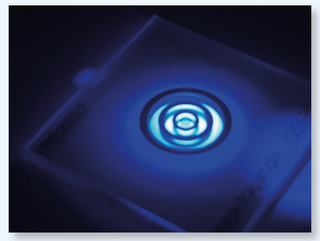
CMM (ceramic block):
Determination of 4 distances of 6 measurement planes
CMM (glas scale):
Determination of 2 distances over the left line edge as unidirectional distance

$U = 1.0\ \mu m + 1.0 \bullet 10^{-6} \bullet l$ (l is the distance)

Description	Measurement Range	Item Nr.	€
Keyence VR-5000	Distances	20011-2130-0201	422.00

OPTICAL DIAMETER AND ROUNDNESS

(25-POINTS)



Extent of Calibration Level 1 according to VA-74:

Determination of the diameter (25 points) and the roundness

$U = 0.25\ \mu m$ (Diameter)
$U = 0.5\ \mu m$ (Roundness)

Description	Measurement Range	Item Nr.	€
Optical Diameter and Roundness (25 points)	Diameter and Roundness	20011-2170-0101	382.00

Extent of Calibration Level 2 according to VA-74:

Determination of the diameter (25 points) and the roundness

$U = 0.5\ \mu m$ (Diameter)
$U = 1.0\ \mu m$ (Roundness)

Description	Measurement Range	Item Nr.	€
Optical Diameter and Roundness (25 points)	Diameter and Roundness	20011-2170-0201	286.00

INFORMATION

Accredited Calibration Laboratory according to DIN EN ISO/IEC 17025: 2018

The calibration laboratory of eumetron GmbH is accredited by the Deutsche Akkreditierungsstelle (DAkkS) (German Accreditation Body) with the Number D-K-15151-01-00 according to DIN EN ISO/IEC 17025:2018.

Measurement Uncertainty

The stated measurement uncertainties *U* are the smalles possible measurement uncertainties (CMC) that are achievable by the calibration laboratory for the calibrated item. Depending on the characteristic or the reproducibility of the object to be calibrated the specified measurement uncertainties may increase. The declaration of the measurement uncertainty is a statement about the quality of the calibration procedure and a prerequisite for the traceability of measurement results to national standards. The expanded measurement uncertainty *U* is always given, it is derived from the standard measurement uncertainty *U* by multiplication with the coverage factor k=2. It was determinded in accordance with EA-4102 M:2013. The value of the measured variable lies within the assigned value range with a probability of 95%.

Specification of Process Instructions (VA)

The process instructions (VA) given in this price list are in-house processes of the calibration laboratory. Within the framework of the assessment and accreditation by the German Accreditation Body (DAkks), these in-house processes are technically assessed and tested for suitability and correct application. After testing, approval is given for calibration operations within the laboratory. In the annex of the accreditation certificate (available on the website www.eumetron.de), the process instructions are assigned to the respective calibration process. In-house processes are subject to secrecy and are not disclosed to second parties.

Subcontractors

Subcontractors are only awarded to calibration laboratories which are accredited with the standard of DIN EN ISO/IEC 17025: 2018.

General Terms and Conditions

You can find our general terms and conditions on our website www.eumetron.de.

Version status of calibration services: 10.4E
This price list will invalidate all previous price lists.
Changes and mistakes are reserved.

Contact and Shipping Address

eumetron GmbH
Gartenstraße 133
D-73430 Aalen

Tel.: +49 (0) 73 61 37 03 - 0

info@eumetron.de
www.eumetron.de

Delivery Times: Mo - Fr 8:00 am - 4:00 pm

OUR SERVICES FOR YOUR SUCCESS