



CERTIFICATE OF CALIBRATION

Report

Number 20196-6877-FA
Issue date 25 June 2019

Customer

Company ALBRECHT PRAZISION KG
Address GERMANY

Phone -

Instrument

Type Articulated Arm Coordinate Measuring Machine (AACMM)
Serial number 8520-6-6877-FA
Model 8520-6
Measuring range 2000 mm
Calibration date 25 June 2019

Tests

Standard ISO 10360-12 : 2016

The instrument listed above was calibrated and tested under monitored and compensated environmental conditions, using gauges that are traceable to national laboratories. Environmental conditions during the tests and identification numbers for the instrument and gauges are reported below in this certificate. The calibration and test procedures conformed to ISO 10360-12.

Results

Probing performance of the AACMM	Pass
Articulation performance of the AACMM	Pass
Length measuring performance of the AACMM	Pass

See the last page of this certificate for detailed measurement results.


Acceptance

We hereby certify that the AACMM listed above passed all acceptance tests.

25 June 2019



Operator BRIMBOEUF.D



Inspector Laurent Janvier



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Terms and definitions

AACMM	Articulated Arm Coordinate Measuring Machine.
Measuring range	Diameter of the spherical volume within which an AACMM is capable of measuring. Specified by the manufacturer.
Cone	Mechanical, kinematic seat (nest) that repeatably holds the center of a spherical surface in a fixed position in space.
Artefact	Calibrated, traceable reference object (e.g. a bar with known length).
P_{Size}	Probing size error, tactile. Unabbreviated symbol is P _{Size.Sph.1x25:Tact.AArm}
P_{Form}	Probing form error, tactile. Unabbreviated symbol is P _{Form.Sph.1x25:Tact.AArm}
L_{Dia}	Articulated location error, tactile. Unabbreviated symbol is L _{Dia.5x5:Art:Tact.AArm}
E_{Uni}	Length measurement error, unidirectional. Unabbreviated symbol is E _{Uni:0:Tact.AArm}
MPE	Maximum Permissible Error.
Specification	MPE for the relevant AACMM acceptance test, as specified by the manufacturer.
Deviation	Difference between the calibrated value and the measured value of the test artefact.
Acceptance	The performance of the AACMM is verified for each acceptance criteria (probing size error, probing form error, articulated location error, and length measurement error). The error is not greater than the MPE specified by the manufacturer.

Instrument calibrated

Type	AACMM
Brand	Hexagon
Serial number	8520-6-6877-FA
Model	8520-6
Measuring range	2000 mm
Probe	50mm length, 15mm ball

Environmental conditions

Temperature (°C)	19.9
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Gauge(s) used

Nomenclature	Serial number	Report number	Calibration date	Calibration due
Length bar artefact	H00011383-FA-003	24925	19 Fervrier 2019	19 Fevrier 2020
Sphere artefact	M173	FR184916368	19 December 2018	19 December 2019
Temp monitor	-	-	-	-

Traceability

This certification is traceable to national standards and laboratories via the gauges listed above.

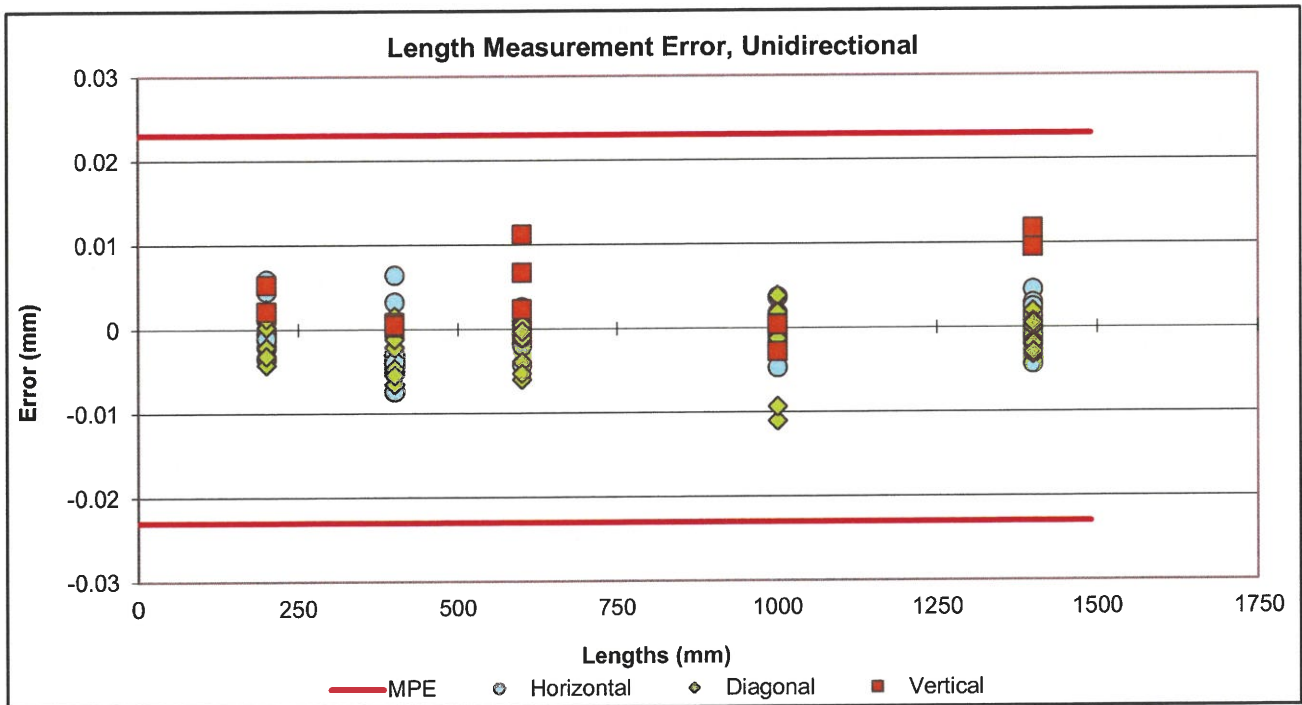


CERTIFICATE OF CALIBRATION

Measurement results

The measurement results for each AACMM acceptance test are listed below.

Symbol (abbreviated)	Specification (mm)		Measure (mm)	Result (Pass / Fail)
P_{Size}	0.008	Probing size error, tactile	0.002	Pass
P_{Form}	0.017	Probing form error, tactile	0.014	Pass
L_{Dia}	0.030	Articulated location error	0.008	Pass
E_{Uni}	0.023	Length measurement error, unidirectional	0.012	Pass



This is the acceptance test to determine length measuring performance per ISO 10360-12. The chart shows the calculated error for the 105 length measurements defined in ISO 10360-12. The length measurement error is the difference between the measured value and the calibrated value of the test length.



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Calibration method

The AACMM is calibrated according to the manufacturer's procedures using specialized calibration tools, calibrated artefacts, and calibration software (RDS).

Certification method

The AACMM is certified according to the ISO 10360-12 standard. The AACMM performance is verified by following the measuring equipment, positions, and procedures defined in the ISO 10360-12 standard.

To test probing performance, a sphere is measured in 2 locations, 25 points per location, without rotating or changing the direction of the probe stylus.

To test articulation performance, a sphere is measured in 2 locations, 25 points per location, changing the direction of the probe stylus every 5 points per hemisphere of the sphere (top, left, right, front, and back).

To test length measuring performance, a bar at least 66% of the AACMM measuring range with multiple lengths on the bar is measured in 7 bar locations (3 horizontal, 3 diagonal, 1 vertical), with 5 well-distributed lengths per location, measured 3 times per length, changing the elbow articulation for each length, for a total of 105 length measurements.

Additional information

Hexagon Metrology quality management system is ISO 9001:2015 certified.

The results in this document refer to the time and conditions under which calibration was performed.

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CERTIFICATE OF CALIBRATION

ISSUED BY TN UNITED KINGDOM, LTD
DATE OF ISSUE 13 March, 2019
CERTIFICATE NUMBER 171550

Page 1 of 1 pages

Approved Signature

B. De Padova

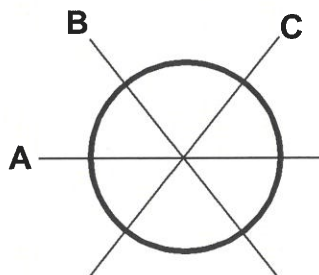
TN UNITED KINGDOM, LTD

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Customer: HMI-Division Romer
2 Rue Francois Aragoza,
Des Blois Blanche, Montoire,
41800 France.

Calibrated in: U.K.

Order No: 444130
Date of Calibration: 13-Mar-19
Description: CMM Reference Ball
Part No: NCA7-7-52013
Size: 25.400mm \pm 0.5 μ m GD10
Material: Stainless 440C
Serial No: 5064-58
Ident No: ---
Report: The ball has been calibrated against the Laboratory Standards for diameter on one plane(s) with the measured diameter(s), corrected for elastic compression and expressed to the nearest 0.000 05mm given below, and for roundness on one plane(s) with the results as given below.



Plane	Corrected diameter (mm)	Roundness (μ m) (LSC: $\Delta r =$)
A	25.400 25	0.06
B	---	---
C	---	---

Roundness Uncertainty \pm 0.025 μ m (1 μ in)
Uncertainty of Measurement \pm 0.000 65mm
Equipment: DIAMETER: Heidenhain ND281B + CT6001 Transducer @ 1N
ROUNDNESS: Talyrond 73PC Roundness Analyser
Temperature: 20° C \pm 1° C
Traceability: To National Standards via Gauge Blocks serial no: 10054
For USA: To NIST on Certificate No. 683/289259-17

This Laboratory is accredited in accordance with the recognised International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system. (refer joint ISO-ILAC-IAF communiqué dated Jan 2009).

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with prior written approval of the issuing laboratory



ACCREDITATION
N° 2-5510
Dimensionnel
Scope available on www.cofrac.fr



Hexagon Metrology Division Romer,
2 rue François Arago,
41800 Montoire - France
www.hexagonmi.com

Certificate of Traceable Calibration

Page 1 of 1

Certificate Number: RCC32378-FA-633-A

Customer:

Model Number: 32378

Serial Number: 32378-FA-633

Description: Certified Length Bar

Procedure: I-23

Reference Temperature: 20.0 C

Technician: Deniau Guillaume

Date of Calibration: 04/06/2019

This Certificate of Traceable Calibration guarantee the measurement is aligned to International Standard unit (SI). Measurement uncertainty as noticed below are express with k=2, providing a confidence level of 95%


*Hexagon Metrology quality management system is ISO9001:2015 registered
Hexagon Metrology laboratory is ISO 17025 Accredited.*

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Standards Used:

Nomenclature	Serial Number	Traceability	Calibration Date	Calibration Due Date
Length Standard	32378-2-9839	RCC32378-2-9839A	06/04/2018	28/06/2019
CMM	HP15.9.7/B4S - 357	intl - 2018-7-25 -HP15.9.7/B4S -357	25/07/2018	25/07/2019

Result:

Description	Measured Length (mm)	Expanded Uncertainty (µm)	Name & signature
Cone A - Cone B	361.953	3.8	Lab Manager  M. POITEVIN
Cone A - Cone C	711.206	4.5	

akkreditiert durch die / accredited by the

Deutsche Akkreditierungsstelle GmbH

als Kalibrierlaboratorium im / as calibration laboratory in the

Deutschen Kalibrierdienst



Deutsche
 Akkreditierungsstelle
 D-K-15151-01-00

Kalibrierschein
 Calibration certificate

Kalibrierzeichen
 Calibration mark

24925
D-K- 15151-01-00
2019-02

Gegenstand Object	Kegelbalken aus Siliziumcarbid mit 21 Kegelelementen <i>Cone bar made of silicon carbide with 21 cone elements</i>
Hersteller Manufacturer	Unbekannt <i>unknown</i>
Typ Type	3000 mm
Fabrikat/Serien-Nr. Serial number	H00011383-FA-003
Auftraggeber Customer	HEXAGON METROLOGY – Division ROMER ZA des Bois Blanche 2, Rue François Arago F-41800 Montoire sur le Loir

Auftragsnummer
Order No. 442864

Anzahl der Seiten des Kalibrierscheines
Number of pages of the certificate 6

Datum der Kalibrierung
Date of calibration 19.02.2019

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung sowohl der Deutschen Akkreditierungsstelle als auch des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine ohne Unterschrift haben keine Gültigkeit.

This calibration certificate may not be reproduced other than in full except with the permission of both the German Accreditation Body and the issuing laboratory. Calibration certificates without signature are not valid.

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).

Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.

Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).

The DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates.

The user is obliged to have the object recalibrated at appropriate intervals.

Datum
Date

Stellv. Leiter des Kalibrierlaboratoriums
Deputy head of the calibration laboratory

Bearbeiter
Person in charge

19.02.2019

Andreas Pierro

Florian Paul

Notre référence (*Our reference*) : CEOP2018120702

DOSSIER DE SOUS TRAITANCE OUTSOURCING REPORT N° FR184916368

Date d'intervention (*Calibration Date*) : 03/12/2018

Désignation (*Designation*) : Sphère

Marque (*Manufacturer*) : /

N° de série (*Serial number*) : /

Modèle (*Model*) : /

Identification client (*Customer ID*) : **M173**

Détail de l'intervention (*Detail of intervention*)

Observations (*remarks*) : /

Sous-traitant : Trescal Italie
(*Subcontractor*)

Type d'intervention : Etalonnage accrédité
(*Type of calibration*)

Numéro de document : LAT051C1181F1E10
(*Document number*)

Ce document comprend (*this document includes*) : 8 page(s) dont 7 annexes

**Sans jugement
(Without judgement)
(*)**

Date d'émission (*Issue date*) : 19/12/2018

Responsable de production

Jacquin Bertrand

(*) *Les résultats pris en compte sont ceux établis par le sous-traitant*

(*) *The results taken account are those established by the subcontractor*



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