

CERTIFICATE OF

# CALIBRATION REPORT FOR COORDINATE MEASURING MACHINE

**Certificate Number 414202031014117**  
Units: Metric mm unless otherwise stated

**Customer Information:**

Name: JandJ Machine, LLC  
Address: 1629 West Haskel Street  
City: Appleton  
State WI 54914  
Contact: Mike Kirkbride  
Title: QA

**Machine Information:**

Machine Serial No: 0310-1411UA  
Machine Type: Global\_Classic  
Machine Size: 7107  
Machine Location: Appleton, WI

**Test Information:**

Certificate Date: 4/14/2020  
Engineer: Jim Lester  
Work Order Number: 143888  
Work Instruction No: HWI-00283 VV14  
Test Method: American National Standard ASME B89.4.1 1997/2001b

Probehead Type: HH-AS8-T2.5  
Probe Type: LSP-X1h  
Probe Serial No: 346  
Measuring Software: 2020r1  
Engineers Temp Gage Cert: 15114

It is hereby certified that the above-described machine has been tested onsite per the American National Standard ASME B89.4.1 1997/2001b test method and conforms to the original manufacturer specifications. All reported uncertainty values are expanded uncertainties with a coverage factor of K=2.

This calibration certificate may not be reproduced other than in full except with the permission of JandJ Machine, LLC and the issuing laboratory.

The standards used by Hexagon Metrology, Inc. are traceable to The National Institute of Standards and Technology (NIST) and/or the National Physical Laboratory (NPL). Records of traceability are on file and available for review upon request.

**Findings:**

Contracted Service, Adjustments were necessary to meet published operating specifications. See attached service report for more detail. ,  
Additional Findings: Found Errors: , X Linear Slope of: 2.02 u/m, Y Linear Slope of: -1.85 u/m, XY Square of: 2.57 Arc/Sec, XZ Square of: -1.05 Arc/Sec, YZ Square of: 0.54 Arc/Sec

**Environmental Conditions:**

Max Standard Ambient Temperature (°C): 22.0 Meets Factory Specification  
Min Standard Ambient Temperature (°C): 18.0 Meets Factory Specification  
Spatial Thermal Gradient (°C/meter): 1 Meets Factory Specification  
Max Recorded Temperature (°C): 22.0  
Min Recorded Temperature (°C): 20.0

Signed by: Jim Lester		Date: 4/14/2020
	 <p><b>HEXAGON</b> MANUFACTURING INTELLIGENCE</p> <p>Hexagon Metrology 250 Circuit Drive North Kingstown, RI 02852 USA</p>	Page 1 of 10 Ver. 03.07.03.07

CERTIFICATE OF  
**CALIBRATION REPORT FOR  
 COORDINATE MEASURING MACHINE**

B89 Repeatability  
 (as derived from B89 4.1-1997/2001b, Section 5.3).

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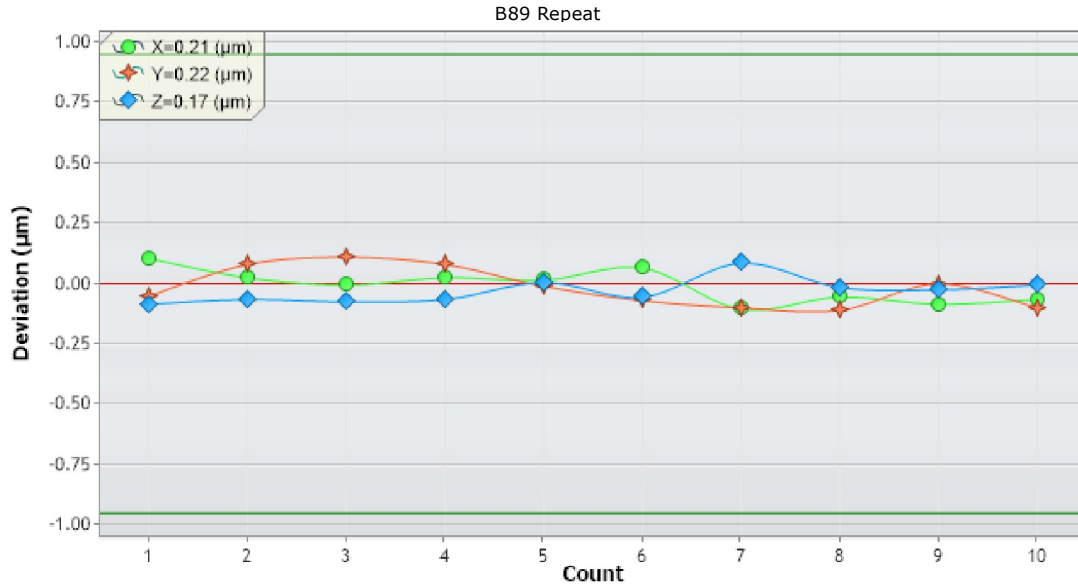
**Calibration Results:**

Axis	Factory Specification	Measured Range
X	1.9 (µm)	0.21 (µm) Meets Factory Specification
Y	1.9 (µm)	0.22 (µm) Meets Factory Specification
Z	1.9 (µm)	0.17 (µm) Meets Factory Specification

**Sphere Gage Control No:**15063  
**Sphere Serial No:**163370  
**Sphere Gage Due Date:**12/6/2020

**Calibration Data:**

Position	X Deviation (µm)	Y Deviation (µm)	Z Deviation (µm)	Diameter
1	0.11	-0.05	-0.09	25.0076
2	0.03	0.08	-0.07	25.0075
3	-0.01	0.11	-0.08	25.0076
4	0.03	0.08	-0.07	25.0076
5	0.02	-0.01	0.01	25.0075
6	0.07	-0.07	-0.06	25.0076
7	-0.11	-0.1	0.09	25.0074
8	-0.06	-0.11	-0.02	25.0075
9	-0.09	0.0	-0.03	25.0076
10	-0.07	-0.1	-0.01	25.0075



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B89 Volumetric Performance, Measurement Uncertainty  
 (as derived from B89 4.1-1997/2001b, Section 5.5.2)

**Certificate Number 414202031014117**  
 Units: Metric mm unless otherwise stated

**Calibration Results:** Meets Factory Specification  
 Factory Specification: 10.0 (µm)  
 Results: 5.77 (µm)  
 No of Bar Positions: 23  
 Uncertainty: 0.51 (µm)

**Ballbar Gage Control No:**11739  
**Ballbar Gage Serial No:**11739A/11739B  
**Ballbar Gage Due Date:**9/15/2020  
 Nominal Bar Length: 552.1700

**Calibration Data:**

Bar Position	Measured Length	Range (µm)	Dev'n to Mean (µm)
1	552.1701	0.27	-0.6
2	552.1706	0.59	-0.1
3	552.1688	0.34	-1.9
4	552.1699	0.05	-0.8
5	552.1713	0.34	+0.6
6	552.1706	0.16	-0.1
7	552.1695	0.06	-1.2
8	552.1701	0.02	-0.6
9	552.1679	0.57	-2.8
10	552.1678	0.1	-2.9
11	552.1716	0.0	+0.9
12	552.1705	0.25	-0.2
13	552.1711	0.63	+0.4
14	552.1681	0.03	-2.6
15	552.1736	0.06	+2.9
16	552.1692	0.14	-1.5
17	552.1698	0.27	-0.9
18	552.1686	0.06	-2.0
19	552.1715	0.02	+0.8
20	552.1685	0.1	-2.2
21	552.1723	0.35	+1.6
22	552.1711	0.11	+0.4



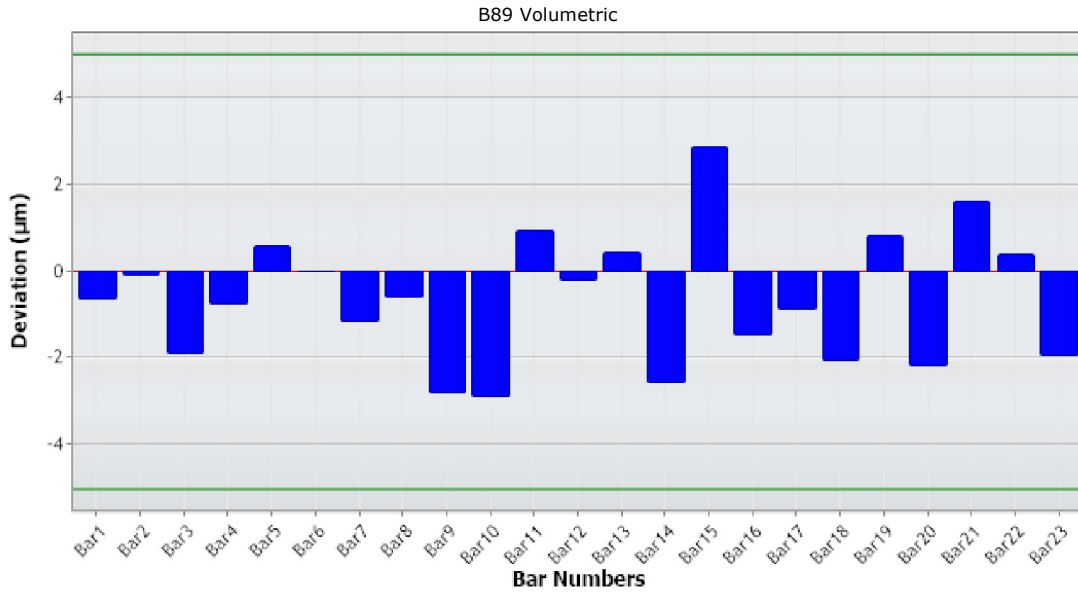
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B89 Volumetric Performance, Measurement Uncertainty  
 (as derived from B89 4.1-1997/2001b, Section 5.5.2).

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**Calibration Data (Continued):**

Bar Position	Measured Length	Range	Dev'n to Mean
23	552.1687	0.29	-1.9



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B89 Linear Displacement Accuracy, Measurement Uncertainty  
(as derived from B89 4.1-1997/2001b, Section 5.4).

**Certificate Number 414202031014117**

Units: Metric mm unless otherwise stated

**Calibration Results:** Linear Displacement Accuracy = Maximum spread of mean differences over 3 runs

Axis	Factory Specification	Max Uncertainty (µm)	Measured Range (µm)
X	4.0	0.34	1.0

**Gage Serial No:**14665

**Gage Cert No:**201511-001

**Gage Due Date:**8/8/2020

Meets Factory Specification

**Calibration Data:**

Axis	Position	Calibrated Length	Mean Measured Length	Deviation (µm)	Uncertainty (µm)
X	40.0	39.9910	39.9906	-0.4	0.12
X	80.0	79.9904	79.9899	-0.5	0.14
X	120.0	119.9899	119.9899	+0.0	0.15
X	160.0	159.9893	159.9893	+0.0	0.17
X	200.0	199.9919	199.9915	-0.4	0.18
X	240.0	239.9909	239.9904	-0.5	0.20
X	280.0	279.9934	279.9930	-0.4	0.21
X	320.0	319.9898	319.9896	-0.2	0.23
X	360.0	359.9930	359.9929	-0.1	0.24
X	400.0	399.9975	399.9974	-0.1	0.26
X	440.0	439.9890	439.9892	+0.2	0.27
X	480.0	479.9919	479.9922	+0.3	0.29
X	520.0	519.9919	519.9918	+0.0	0.30
X	560.0	559.9882	559.9876	-0.7	0.32
X	600.0	599.9920	599.9913	-0.7	0.34



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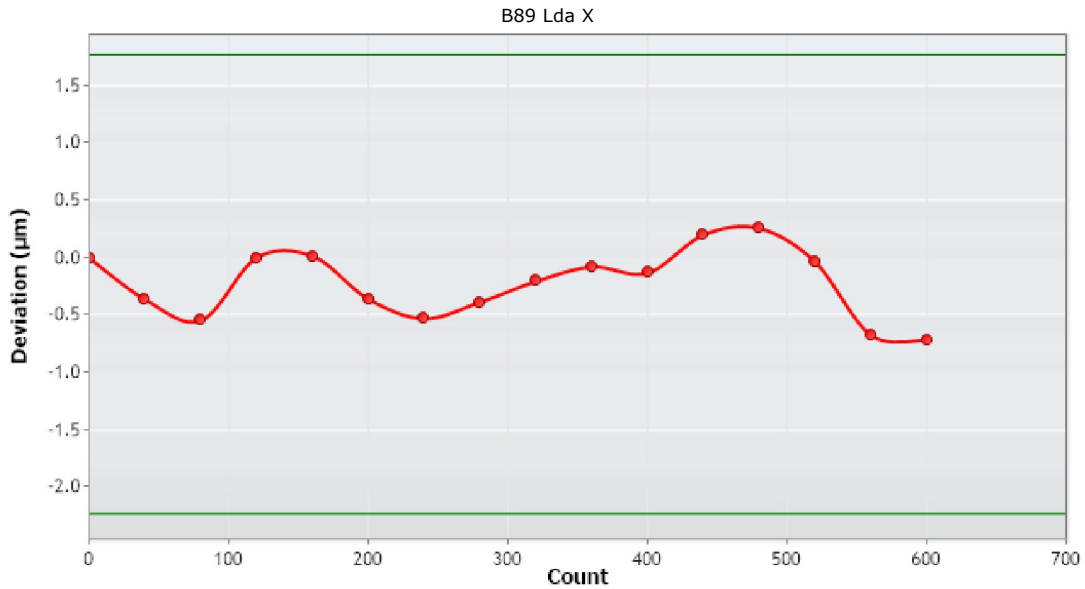
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Units: Metric mm unless otherwise stated

**Calibration Data (Continued):**

Axis	Position	Nominal Length	Measured Length	Deviation ( $\mu\text{m}$ )	Uncertainty ( $\mu\text{m}$ )
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**Calibration Results:** Linear Displacement Accuracy = Maximum spread of mean differences over 3 runs

Axis	Factory Specification	Max Uncertainty (µm)	Measured Range (µm)
Y	4.0	0.48	0.8

**Gage Serial No:** 14665

**Gage Cert No:** 201511-001

**Gage Due Date:** 8/8/2020

Meets Factory Specification

**Calibration Data:**

Axis	Position	Calibrated Length	Mean Measured Length	Deviation (µm)	Uncertainty (µm)
Y	40.0	40.0000	39.9997	-0.3	0.12
Y	80.0	80.0000	79.9996	-0.4	0.14
Y	120.0	120.0000	119.9996	-0.4	0.15
Y	160.0	160.0000	159.9997	-0.3	0.17
Y	200.0	200.0000	199.9994	-0.6	0.18
Y	240.0	240.0000	239.9996	-0.4	0.20
Y	280.0	280.0000	279.9995	-0.5	0.21
Y	320.0	320.0000	319.9996	-0.4	0.23
Y	360.0	360.0000	359.9996	-0.4	0.24
Y	400.0	400.0000	399.9996	-0.4	0.26
Y	440.0	440.0000	439.9996	-0.4	0.27
Y	480.0	480.0000	479.9996	-0.4	0.29
Y	520.0	520.0000	519.9995	-0.5	0.30
Y	560.0	560.0000	559.9996	-0.4	0.32
Y	600.0	600.0000	599.9996	-0.4	0.34
Y	640.0	640.0000	639.9993	-0.7	0.35
Y	680.0	680.0000	679.9995	-0.5	0.37
Y	720.0	720.0000	719.9994	-0.6	0.38
Y	760.0	760.0000	759.9996	-0.4	0.40
Y	800.0	800.0000	799.9995	-0.5	0.41
Y	840.0	840.0000	839.9994	-0.6	0.43
Y	880.0	880.0000	879.9994	-0.6	0.45
Y	920.0	920.0000	919.9994	-0.6	0.46



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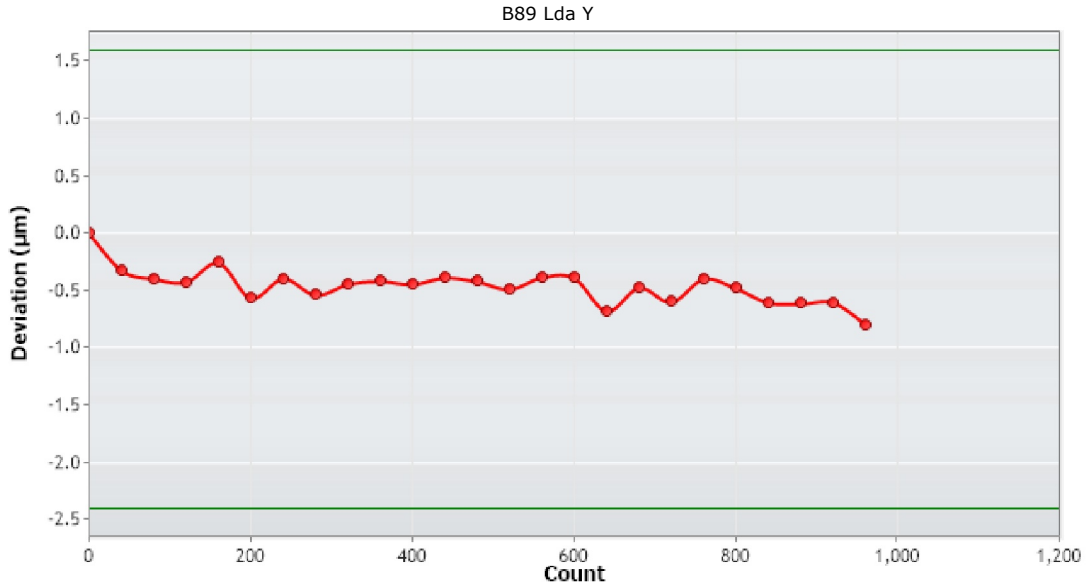
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**Calibration Data (Continued):**

Axis	Position	Nominal Length	Measured Length	Deviation (µm)	Uncertainty (µm)
Y	960.0	960.0000	959.9992	-0.8	0.48





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**Calibration Results:** Linear Displacement Accuracy = Maximum spread of mean differences over 3 runs

Axis	Factory Specification	Max Uncertainty (µm)	Measured Range (µm)
Z	3.0	0.33	0.8

**Gage Serial No:**14665

**Gage Cert No:**201511-001

**Gage Due Date:**8/8/2020

Meets Factory Specification

**Calibration Data:**

Axis	Position	Calibrated Length	Mean Measured Length	Deviation (µm)	Uncertainty (µm)
Z	40.0	39.9910	39.9909	-0.1	0.12
Z	80.0	79.9904	79.9903	-0.1	0.14
Z	120.0	119.9899	119.9903	+0.3	0.15
Z	160.0	159.9893	159.9897	+0.4	0.17
Z	200.0	199.9919	199.9921	+0.2	0.18
Z	240.0	239.9909	239.9910	+0.1	0.19
Z	280.0	279.9934	279.9936	+0.2	0.21
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Z	560.0	559.9882	559.9880	-0.2	0.31
Z	600.0	599.9920	599.9916	-0.4	0.33



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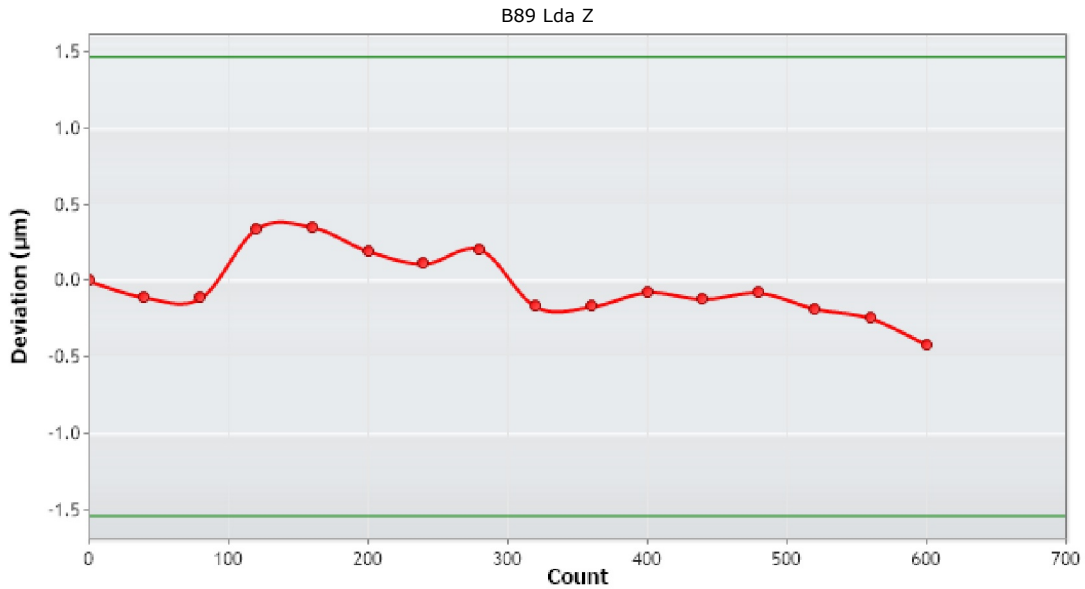
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**Calibration Data (Continued):**

Axis	Position	Nominal Length	Measured Length	Deviation ( $\mu\text{m}$ )	Uncertainty ( $\mu\text{m}$ )
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