



ASME B89.4.10360:2008 Calibration Report



Select Calibration Incorporated

213 Fourth St. PO Box 96
Rodney, Ontario
N0L 2C0
(519) 902 7215
www.selectcalibration.ca

Customer: **Some Company**
Address: **1024 Binary Way**
Somewhere, Ontario
N0L 2C0

Machine Model: **Omega**
Machine Model Id: **24.06**
Serial Number: **90210**
Customer Gauge:
Temperature Min: **20.4 °C**
Temperature Max: **21.5 °C**

Calibration Date: **26 Aug 2015**
Certificate Number: **Sample**
NRC CLAS Certification Number: **2015-02**
SCC Accreditation Laboratory: **811**

Remarks

Select Calibration certifies the measurement performance of this equipment to the resolution of the measurement uncertainties as indicated in the appropriate sections of this report. Select Calibration's quality system conforms to the requirements of ISO 9001:2008 and ISO/IEC 17025:2005. The calibration procedure used by Select Calibration Incorporated, SCI-011, follows the ASME B89.4.10360 and ISO 10360 standards.

The Calibration Laboratory Assessment Service (CLAS) of the National Research Council of Canada (NRC) has assessed and certified specific calibration capabilities of this laboratory and traceability to the International System of Units (SI) or to standards acceptable to the CLAS program. This certificate of calibration is issued in accordance with the conditions of certification granted by CLAS and the conditions of accreditation granted by the Standards Council of Canada (SCC). Neither CLAS nor SCC guarantee the accuracy of individual calibrations by accredited laboratories.

The uncertainties are expanded using a coverage factor $k = 2$ for a level of confidence of approximately 95%, assuming a normal distribution.

Copyright of this certificate is owned by Select Calibration Incorporated and may not be reproduced, other than in full, with the prior written approval of Select Calibration Incorporated.

Conditions

Environmental Conditions:

Manufacturer recommended requirements as described in the system User's Manual.
 Custom requirements. *

* Machines in poor thermal environments are likely to have errors which may not be completely revealed by testing in the same environment. It is always best to improve the environment. Temperature measurements are from a subset of the entire machine volume.

Machine Adjustments:

No adjustment was necessary to meet published operating specifications. Adjustments were done to improve performance.
 Statement of Compliance Required
 Measurement Uncertainty Reported

Reference Standards and Unit Under Test

Description	Standard ID	CTE	Length	Cal. Date	Due Date
Laser	L-4975	11.5		Apr 2 2015	Apr 2 2017
Gauge Block	GB-131417	10.8	12.7	May 13 2016	May 13 2018
Laser Environment	WS-1869			Mar 6 2015	Mar 6 2017
Thermometer	T-75014120711-141732			May 11 2016	May 11 2017
Step Gauge	SG-1520007	10.8	1010.0	May 24 2016	May 24 2017

Effective CTE of machine scales: **10.0**
Scale Resolution: **0.000780**
Probe Type: **SP25M**
Probe Stylus: **5 mm diameter, 30 mm length**

Signed By:

Tech: Ron

Date:



ASME B89.4.10360:2008 Calibration Report



Select Calibration Incorporated

213 Fourth St. PO Box 96
Rodney, Ontario
N0L 2C0
(519) 902 7215
www.selectcalibration.ca

Customer: **Some Company**
Address: **1024 Binary Way**
Somewhere, Ontario
N0L 2C0

Machine Model: **Omega**
Machine Model Id: **24.06**
Serial Number: **90210**
Customer Gauge:
Temperature Min: **20.4 °C**
Temperature Max: **21.5 °C**

Calibration Date: **26 Aug 2015**
Certificate Number: **Sample**
NRC CLAS Certification Number: **2015-02**
SCC Accreditation Laboratory: **811**

Point Repeatability (Rpt)

Repeated measurements of a centrally located precision sphere repeated ten times as rapidly as practical. For each axis the range of the sphere center coordinate is calculated as the difference between the maximum and minimum value. The point coordinate repeatability (Rpt) is the largest range of coordinate values measured.

X Axis

Measurement:	1	2	3	4	5	6	7	8	9	10
Result:	0.0	0.5	-0.6	-0.3	-1.6	0.0	-0.4	0.2	0.3	0.1

Min	Max	Range
-0.0016	0.0005	0.0020

Rpt MPL: **0.0030**
Rpt: **0.0029**

Y Axis

Measurement:	1	2	3	4	5	6	7	8	9	10
Result:	0.0	0.5	0.5	0.9	1.1	1.9	1.9	1.4	1.3	0.6

Min	Max	Range
0.0000	0.0019	0.0019

Uc (k=2): **0.0007**

Z Axis

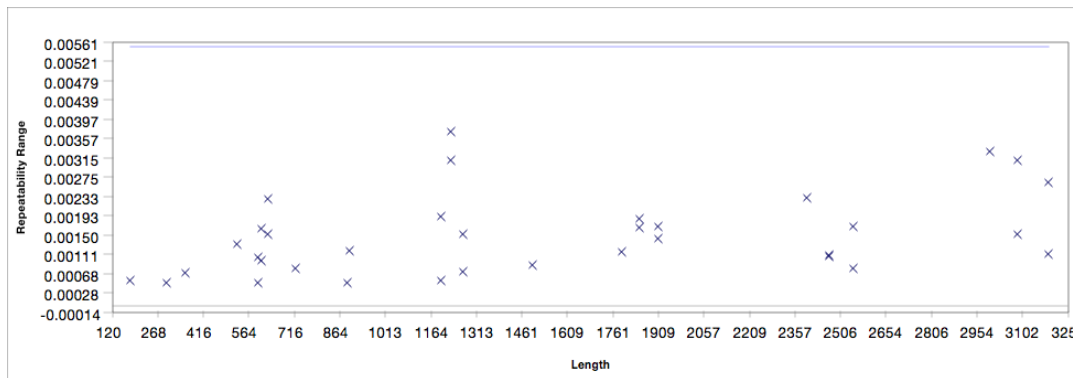
Measurement:	1	2	3	4	5	6	7	8	9	10
Result:	0.0	-0.6	-0.6	-2.5	-1.6	0.5	-0.9	-0.3	-0.4	-0.2

Min	Max	Range
-0.0025	0.0005	0.0029

Compliance is unknown (B89.4.10360 Section 5.4.1)

Length Repeatability (R0)

For each E0 length measurement the range is calculated as the difference between the maximum and minimum length. The repeatability range (R0) is the largest range of the measurement lengths.



R0 MPL: **0.0055**
As Found R0: **0.0037**
As Left R0: **0.0037**

As Found Average R0:
As Left Average R0: **0.0015**

Uc (k=2): **0.0004**

Meets or exceeds specification (B89.4.10360 Section 6.4)



ASME B89.4.10360:2008 Calibration Report



Select Calibration Incorporated

213 Fourth St. PO Box 96
Rodney, Ontario
N0L 2C0
(519) 902 7215
www.selectcalibration.ca

Customer: **Some Company**
Address: **1024 Binary Way**
Somewhere, Ontario
N0L 2C0

Machine Model: **Omega**
Machine Model Id: **24.06**
Serial Number: **90210**
Customer Gauge:
Temperature Min: **20.4 °C**
Temperature Max: **21.5 °C**

Calibration Date: **26 Aug 2015**
Certificate Number: **Sample**
NRC CLAS Certification Number: **2015-02**
SCC Accreditation Laboratory: **811**

Length Measurement Error (E0)

Five calibrated test lengths are measured three times with a zero (or minimal) tip offset. The length measurement error (E0) is the maximum length deviation from the fifteen length measurements. The compliance statement opinion is based on the maximum length deviation from the fifteen measurements, the expanded measurement uncertainty, and the machine specifications. Correction of the reference artifacts and machine scales for thermal expansion are done within the inspection software of the machine. No correction for thermal effects are performed external of the inspection software.

Position 1

As Left	X	1235.733
	Y	39.093
Translation:	Z	-892.256
	I	-0.390489160
	J	0.888644880
Meas. Axis:	K	0.240475560

Nominal	Length 1	Dev 1	Length 2	Dev 2	Length 3	Dev 3	Uc (k=2)
630.0007	629.9969	-3.7	629.9992	-1.5	629.9989	-1.7	0.0029
1270.0000	1269.9984	-1.6	1269.9996	-0.4	1269.9999	-0.1	0.0032
1910.0001	1909.9984	-1.7	1909.9984	-1.7	1910.0001	-0.1	0.0045
2549.9982	2549.9990	0.7	2549.9993	1.0	2549.9985	0.3	0.0054
3190.0018	3189.9990	-2.8	3190.0007	-1.1	3189.9981	-3.7	0.0072

Meets or exceeds specification (B89.4.10360 Section 6.3) E0: **0.0037**

Position 2

As Left	X	1139.732
	Y	2860.753
Translation:	Z	-801.304
	I	-0.369976650
	J	-0.903117970
Meas. Axis:	K	0.217933970

Nominal	Length 1	Dev 1	Length 2	Dev 2	Length 3	Dev 3	Uc (k=2)
609.9999	610.0022	2.3	610.0006	0.7	610.0012	1.3	0.0022
1230.0001	1230.0027	2.5	1230.0009	0.8	1230.0001	-0.5	0.0041
1850.0001	1850.0030	2.8	1850.0011	1.0	1850.0022	2.0	0.0044
2470.0034	2470.0011	-2.3	2470.0021	-1.3	2470.0020	-1.4	0.0053
3090.0012	3090.0001	-1.1	3090.0016	0.4	3090.0016	0.4	0.0067

Meets or exceeds specification (B89.4.10360 Section 6.3) E0: **0.0028**

Position 3

As Left	X	312.404
	Y	2869.281
Translation:	Z	-797.516
	I	0.356626390
	J	-0.908587890
Meas. Axis:	K	0.217452680

Nominal	Length 1	Dev 1	Length 2	Dev 2	Length 3	Dev 3	Uc (k=2)
609.9986	610.0006	2.0	610.0001	1.5	609.9997	1.1	0.0018
1229.9987	1230.0012	2.6	1230.0001	1.5	1229.9975	-1.1	0.0046
1849.9977	1850.0006	2.9	1849.9989	1.2	1849.9992	1.5	0.0043
2470.0002	2470.0003	0.1	2469.9992	-1.0	2469.9997	-0.5	0.0053
3090.0040	3090.0028	-1.2	3089.9998	-4.3	3089.9998	-4.3	0.0074

Meets or exceeds specification (B89.4.10360 Section 6.3) E0: **0.0043**

Position 4

As Left	X	106.725
	Y	64.291
Translation:	Z	-891.532
	I	0.409293790
	J	0.880263400
Meas. Axis:	K	0.240031130

Nominal	Length 1	Dev 1	Length 2	Dev 2	Length 3	Dev 3	Uc (k=2)
629.9976	629.9999	2.3	629.9991	1.5	629.9984	0.8	0.0021
1269.9979	1269.9989	1.0	1269.9982	0.3	1269.9984	0.6	0.0028
1909.9966	1909.9986	2.0	1909.9989	2.3	1909.9975	0.9	0.0043
2550.0003	2549.9989	-1.4	2550.0000	-0.3	2550.0006	0.3	0.0056
3190.0037	3189.9999	-3.8	3189.9988	-4.9	3189.9989	-4.8	0.0068

Meets or exceeds specification (B89.4.10360 Section 6.3) E0: **0.0049**

E0 MPE: **0.0040+0.0050L/1000**

Deration:

As Found Max E0:

As Left Max E0: **0.0049**



ASME B89.4.10360:2008 Calibration Report



Select Calibration Incorporated

213 Fourth St. PO Box 96
Rodney, Ontario
N0L 2C0
(519) 902 7215
www.selectcalibration.ca

Customer: **Some Company**
Address: **1024 Binary Way**
Somewhere, Ontario
N0L 2C0

Machine Model: **Omega**
Machine Model Id: **24.06**
Serial Number: **90210**
Customer Gauge:
Temperature Min: **20.4 °C**
Temperature Max: **21.5 °C**

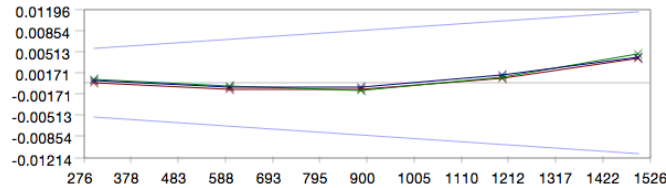
Calibration Date: **26 Aug 2015**
Certificate Number: **Sample**
NRC CLAS Certification Number: **2015-02**
SCC Accreditation Laboratory: **811**

Length Measurement Error (E0)

Five calibrated test lengths are measured three times with a zero (or minimal) tip offset. The length measurement error (E0) is the maximum length deviation from the fifteen length measurements. The compliance statement opinion is based on the maximum length deviation from the fifteen measurements, the expanded measurement uncertainty, and the machine specifications. Correction of the reference artifacts and machine scales for thermal expansion are done within the inspection software of the machine. No correction for thermal effects are performed external of the inspection software.

Position 5[X]

As Left X -46.800
Y 879.101
Translation: Z -676.338
I 1.000000000
J 0.000000000
Meas. Axis: K 0.000000000



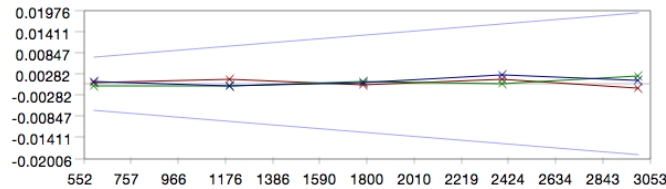
Nominal	Length 1	Dev 1	Length 2	Dev 2	Length 3	Dev 3	Uc (k=2)
299.9999	299.9999	0.1	300.0004	0.5	300.0003	0.4	0.0011
600.0009	599.9999	-1.0	600.0004	-0.5	600.0002	-0.7	0.0015
890.0007	889.9996	-1.1	889.9995	-1.3	889.9999	-0.8	0.0021
1199.9990	1199.9998	0.8	1200.0000	1.0	1200.0003	1.3	0.0027
1499.9966	1500.0005	3.9	1500.0014	4.7	1500.0008	4.2	0.0033

Meets or exceeds specification (B89.4.10360 Section 6.3)

E0: **0.0047**

Position 6[Y]

As Left X 754.375
Y 2961.050
Translation: Z -675.027
I 0.000000000
J -1.000000000
Meas. Axis: K 0.000000000



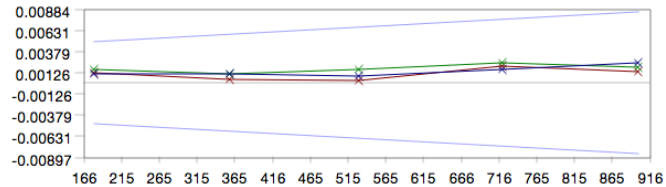
Nominal	Length 1	Dev 1	Length 2	Dev 2	Length 3	Dev 3	Uc (k=2)
600.0004	600.0006	0.2	599.9999	-0.5	600.0009	0.5	0.0018
1199.9972	1199.9983	1.2	1199.9966	-0.6	1199.9965	-0.7	0.0033
1789.9999	1789.9995	-0.4	1790.0006	0.7	1790.0002	0.3	0.0040
2399.9983	2399.9994	1.1	2399.9985	0.1	2400.0007	2.4	0.0056
2999.9998	2999.9986	-1.2	3000.0019	2.1	3000.0007	0.9	0.0071

Meets or exceeds specification (B89.4.10360 Section 6.3)

E0: **0.0024**

Position 7[Z]

As Left X 614.212
Y 1092.599
Translation: Z -952.695
I 0.000000000
J 0.000000000
Meas. Axis: K 1.000000000



Nominal	Length 1	Dev 1	Length 2	Dev 2	Length 3	Dev 3	Uc (k=2)
179.9999	180.0010	1.2	180.0014	1.6	180.0009	1.0	0.0010
360.0003	360.0007	0.4	360.0014	1.0	360.0014	1.1	0.0013
530.0001	530.0003	0.3	530.0016	1.6	530.0009	0.8	0.0019
719.9999	720.0020	2.0	720.0023	2.4	720.0015	1.6	0.0019
899.9990	900.0003	1.3	900.0009	1.9	900.0015	2.4	0.0023

Meets or exceeds specification (B89.4.10360 Section 6.3)

E0: **0.0024**

E0 MPE: **0.0040+0.0050L/1000**

Deration:

As Found Max E0:

As Left Max E0: **0.0049**



ASME B89.4.10360:2008 Calibration Report



Select Calibration Incorporated

213 Fourth St. PO Box 96
 Rodney, Ontario
 N0L 2C0
 (519) 902 7215
 www.selectcalibration.ca

Customer: **Some Company**
 Address: **1024 Binary Way**
Somewhere, Ontario
N0L 2C0

Machine Model: **Omega**
 Machine Model Id: **24.06**
 Serial Number: **90210**
 Customer Gauge:
 Temperature Min: **20.4 °C**
 Temperature Max: **21.5 °C**

Calibration Date: **26 Aug 2015**
 Certificate Number: **Sample**
 NRC CLAS Certification Number: **2015-02**
 SCC Accreditation Laboratory: **811**

Length Measurement Error (E150)

Five calibrated test lengths are measured three times with a tip offset of 150mm (5.9"). The length measurement error (E150) is the maximum length deviation from the fifteen length measurements. The compliance statement opinion is based on the maximum length deviation from the fifteen measurements, the expanded measurement uncertainty, and the machine specifications. Correction of the reference artifacts and machine scales for thermal expansion are done within the inspection software of the machine. No correction for thermal effects are performed external of the inspection software.

Position D1		Graph	Nominal	Length 1	Dev 1	Length 2	Dev 2	Length 3	Dev 3	Uc (k=2)	
As Left	X 280.229			209.9934	209.9929	-0.5	209.9938	0.4	209.9943	0.9	0.0024
	Y 1721.098	409.9964		409.9984	2.0	409.9980	1.6	409.9977	1.3	0.0022	
Translation:	Z -923.526	610.0008		610.0012	0.4	610.0016	0.8	610.0016	0.8	0.0024	
	I 0.723527020	810.0027		810.0023	-0.5	810.0019	-0.8	810.0021	-0.6	0.0027	
	J -0.007191760	1010.0028		1010.0016	-1.2	1010.0015	-1.3	1010.0016	-1.2	0.0030	
Meas. Axis:	K 0.690258590										
Meets or exceeds specification (B89.4.10360 Section 6.5) E150: 0.0020											

Position D2		Graph	Nominal	Length 1	Dev 1	Length 2	Dev 2	Length 3	Dev 3	Uc (k=2)	
As Left	X 1063.075			209.9934	209.9937	0.3	209.9931	-0.3	209.9937	0.3	0.0021
	Y 1774.113	409.9964		409.9973	0.9	409.9965	0.1	409.9960	-0.4	0.0025	
Translation:	Z -923.823	610.0008		610.0019	1.1	610.0015	0.7	610.0009	0.1	0.0026	
	I -0.722747980	810.0027		810.0034	0.7	810.0029	0.2	810.0035	0.8	0.0027	
	J 0.019025140	1010.0028		1010.0027	-0.1	1010.0023	-0.5	1010.0027	-0.1	0.0030	
Meas. Axis:	K 0.690849770										
Meets or exceeds specification (B89.4.10360 Section 6.5) E150: 0.0011											

E150 MPE: **0.0040+0.0050L/1000**

Deration:

As Found Max E150:

As Left Max E150: **0.0020**



ASME B89.4.10360:2008 Calibration Report



CLAS 2015-02

Select Calibration Incorporated

213 Fourth St. PO Box 96
Rodney, Ontario
N0L 2C0
(519) 902 7215
www.selectcalibration.ca

Customer: **Some Company**
Address: **1024 Binary Way**
Somewhere, Ontario
N0L 2C0

Machine Model: **Omega**
Machine Model Id: **24.06**
Serial Number: **90210**
Customer Gauge:

Calibration Date: **26 Aug 2015**
Certificate Number: **Sample**
NRC CLAS Certification Number: **2015-02**
SCC Accreditation Laboratory: **811**

Temperature Min: **20.4 °C**
Temperature Max: **21.5 °C**

Measurement Summary

This page contains a summary of all measurement results. Complete information for all reported values is shown on the previous sections of this report. Compliance statement can be one of three conditions: inside specification, unknown, or outside specification and indicated as I,U, or O on this page of the report.

Point Repeatability (Rpt)

Repeated measurements of a centrally located precision sphere repeated ten times as rapidly as practical. For each axis the range of the sphere center coordinate is calculated as the difference between the maximum and minimum value. The point coordinate repeatability (Rpt) is the largest range of coordinate values measured.

Rpt MPL: **0.0030**
Rpt: **0.0029** U
Uc (k=2): **0.0007**

Length Repeatability (R0)

For each E0 length measurement the range is calculated as the difference between the maximum and minimum length. The repeatability range (R0) is the largest range of the measurement lengths.

R0 MPL: **0.0055**
R0: **0.0037** I
Uc (k=2): **0.0004**

Length Measurement Error (EL)

Five calibrated test lengths are measured three times with a zero (or minimal) tip offset for E0 and a 150 mm (5.9") tip offset for E150. The length measurement error is the maximum length deviation from the fifteen length measurements.

Length Measurement Error (E0)

E0 MPE: **0.0040+0.0050L/1000**

Deration:

Percentage of maximum error relative to out of tolerance: **37.4%**

Max E0: **0.0049**

Position 1					Position 2					Position 3				
Nominal	Dev 1	Dev 2	Dev 3	Uc (k=2)	Nominal	Dev 1	Dev 2	Dev 3	Uc (k=2)	Nominal	Dev 1	Dev 2	Dev 3	Uc (k=2)
630.0007	-3.7	-1.5	-1.7	0.0029	609.9999	2.3	0.7	1.3	0.0022	609.9986	2.0	1.5	1.1	0.0018
1270.0000	-1.6	-0.4	-0.1	0.0032	1230.0001	2.5	0.8	-0.5	0.0041	1229.9987	2.6	1.5	-1.1	0.0046
1910.0001	-1.7	-1.7	-0.1	0.0045	1850.0001	2.8	1.0	2.0	0.0044	1849.9977	2.9	1.2	1.5	0.0043
2549.9982	0.7	1.0	0.3	0.0054	2470.0034	-2.3	-1.3	-1.4	0.0053	2470.0002	0.1	-1.0	-0.5	0.0053
3190.0018	-2.8	-1.1	-3.7	0.0072	3090.0012	-1.1	0.4	0.4	0.0067	3090.0040	-1.2	-4.3	-4.3	0.0074

Position 4					Position 5[X]					Position 6[Y]				
Nominal	Dev 1	Dev 2	Dev 3	Uc (k=2)	Nominal	Dev 1	Dev 2	Dev 3	Uc (k=2)	Nominal	Dev 1	Dev 2	Dev 3	Uc (k=2)
629.9976	2.3	1.5	0.8	0.0021	299.9999	0.1	0.5	0.4	0.0011	600.0004	0.2	-0.5	0.5	0.0018
1269.9979	1.0	0.3	0.6	0.0028	600.0009	-1.0	-0.5	-0.7	0.0015	1199.9972	1.2	-0.6	-0.7	0.0033
1909.9966	2.0	2.3	0.9	0.0043	890.0007	-1.1	-1.3	-0.8	0.0021	1789.9999	-0.4	0.7	0.3	0.0040
2550.0003	-1.4	-0.3	0.3	0.0056	1199.9990	0.8	1.0	1.3	0.0027	2399.9983	1.1	0.1	2.4	0.0056
3190.0037	-3.8	-4.9	-4.8	0.0068	1499.9966	3.9	4.7	4.2	0.0033	2999.9998	-1.2	2.1	0.9	0.0071

Position 7[Z]				
Nominal	Dev 1	Dev 2	Dev 3	Uc (k=2)
179.9999	1.2	1.6	1.0	0.0010
360.0003	0.4	1.0	1.1	0.0013
530.0001	0.3	1.6	0.8	0.0019
719.9999	2.0	2.4	1.6	0.0019
899.9990	1.3	1.9	2.4	0.0023

Length Measurement Error (E150)

E150 MPE: **0.0040+0.0050L/1000**

Deration:

Percentage of maximum error relative to out of tolerance: **23.8%**

Max E150: **0.0020**

Position D1					Position D2				
Nominal	Dev 1	Dev 2	Dev 3	Uc (k=2)	Nominal	Dev 1	Dev 2	Dev 3	Uc (k=2)
209.9934	-0.5	0.4	0.9	0.0024	209.9934	0.3	-0.3	0.3	0.0021
409.9964	2.0	1.6	1.3	0.0022	409.9964	0.9	0.1	-0.4	0.0025
610.0008	0.4	0.8	0.8	0.0024	610.0008	1.1	0.7	0.1	0.0026
810.0027	-0.5	-0.8	-0.6	0.0027	810.0027	0.7	0.2	0.8	0.0027
1010.0028	-1.2	-1.3	-1.2	0.0030	1010.0028	-0.1	-0.5	-0.1	0.0030