

CERTIFICADO DE CALIBRACION

Certificate of Calibration

Número **dfgdfd**

Number

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UNIMETRIK
METROLOGY AND CALIBRATION

OBJETO COORDINATE MEASURING MACHINE

Item

MARCA sfs

Mark

MODELO sfsf

Model

IDENTIFICACION 3

Identification

SOLICITANTE **ddffdfg**

Applicant

sfsf

sf

FECHA/S DE ENSAYO 09 de junio de 2023

Date/s of test

Signatario/s autorizado/s

Authorized signatory/ies

Técnico de laboratorio

Fecha de emisión

Date of issue



Felipe Pereda López de Lacalle
Dtor. Laboratorio



14 de junio de 2023



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CERTIFICATE OF CALIBRATION OF COORDINATE MEASURING MACHINE

Number: dfgdfd

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CHARACTERISTICS

Denomination:	COORDINATE MEASURING MACHINE
Code:	3
Measuring range (mm):	X = 1111 Y = 1111 Z = 1111
Scale division (mm):	5.0000
* MPEe (μ m):	M = 01.00 x L(m) + 01.00
* MPEp (μ m):	5.00
Intervalo (meses):	5
Fecha próxima verificación:	09/11/2023

METHODOLOGY

Calibration has been done according to UNIMETRIK calibration procedure 330-038 for CMM, based on ISO 10360-2 standard.

Calibration procedure compares, basically, distances measured by the machine with those of the musters, in the specified measuring lines.

TRACEABILITY

The traceability of musters and artifacts used in the calibration are guaranteed by laboratories certified by ENAC or another EA entity (European cooperation for Accreditation).

CALIBRATION CONDITIONS

Calibration has been done at customer's establishment.

"X" axis	Temperatura, en °C, 5.00 a 5.00	Gradiente, en °C, 5.00
"Y" axis	Temperatura, en °C, 5.00 a 5.00	Gradiente, en °C, 5.00
"Z" axis	Temperatura, en °C, 5.00 a 5.00	Gradiente, en °C, 5.00
Volumetric	Temperatura, en °C, 5.00 a 5.00	

Relative humidity, in %, < 70

REMARKS

* Maximum permissible errors given by the customer.

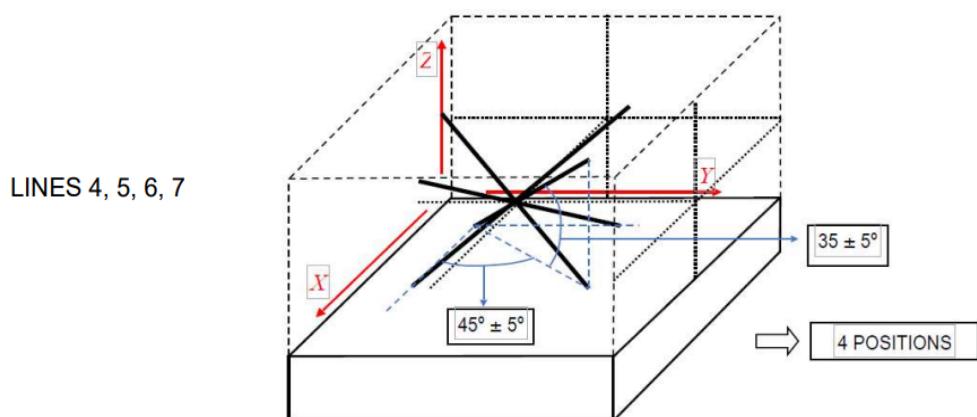
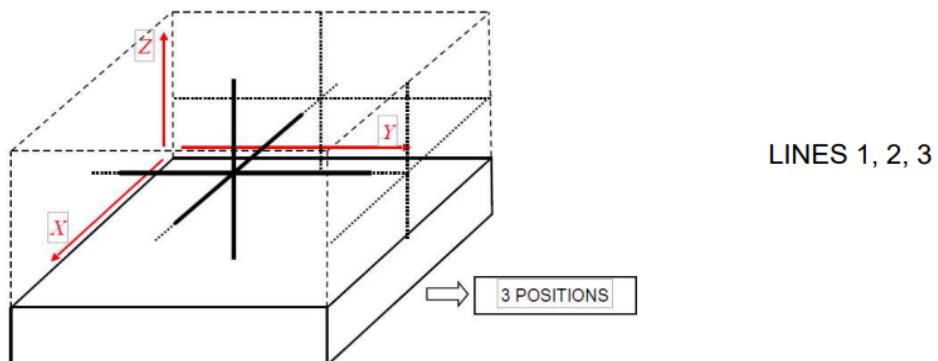
Technician



AXIS VERIFICATION RESULTS

Determination of length measurement error:

5 different lengths will be determined at 7 different positions within the measurement range of the CMM as shown in the figures:



This process will be repeated three times in each of the 7 positions.
Measurements are made using a calibrated ball bar standard of length > 66% of the measuring line.

Errors must be < MPEE (μm).

VERIFICATION RESULTS AXIS Measuring line 1

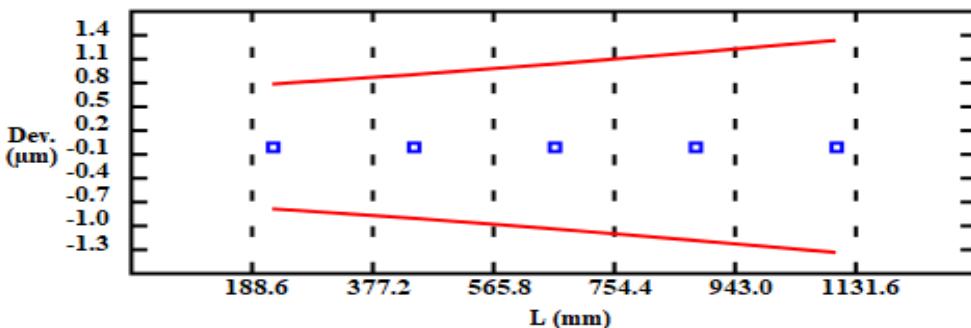
The represented errors are referred to each lenght of the measuring line.
 For uncertainty calculation, only the uncertainty of the masters has been considered.

Nominal Xj (mm)	Error Ej (μm)	Expanded uncertainty (k=2) U (μm)	MPEE - U μm	MPEE - U μm			(μm)
220	0.00	0.43	0.79	-0.79	1	Mean	0.00
220	0.00	0.43	0.79	-0.79		Minimum	0.00
220	0.00	0.43	0.79	-0.79		Maximun	0.00
440	0.00	0.54	0.90	-0.90	2	Mean	0.00
440	0.00	0.54	0.90	-0.90		Minimum	0.00
440	0.00	0.54	0.90	-0.90		Maximun	0.00
660	0.00	0.62	1.04	-1.04	3	Mean	0.00
660	0.00	0.62	1.04	-1.04		Minimum	0.00
660	0.00	0.62	1.04	-1.04		Maximun	0.00
880	0.00	0.70	1.18	-1.18	4	Mean	0.00
880	0.00	0.70	1.18	-1.18		Minimum	0.00
880	0.00	0.70	1.18	-1.18		Maximun	0.00
1100	0.00	0.76	1.34	-1.34	5	Mean	0.00
1100	0.00	0.76	1.34	-1.34		Minimum	0.00
1100	0.00	0.76	1.34	-1.34		Maximun	0.00

Measuring line

Defined by its initial and final points, represented by their coordinates (mm).

Xinicial	0.00	Xfinal	1100.00
Yinicial	0.00	Yfinal	0.00
Zinicial	0.00	Zfinal	0.00



Remark: This graphic depicts the values of the CMM indication errors and their uncertainty U.
 Also, indication maximum permitted errors MPEe are represented.

VERIFICATION RESULTS AXIS Measuring line 2

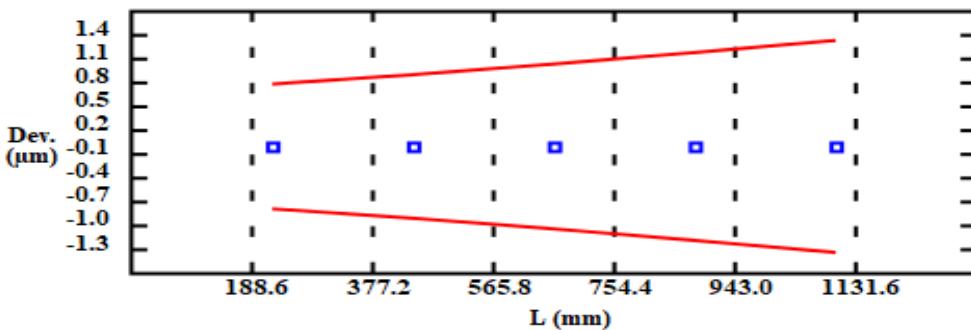
The represented errors are referred to each lenght of the measuring line.
For uncertainty calculation, only the uncertainty of the masters has been considered.

Nominal Xj (mm)	Error Ej (μm)	Expanded uncertainty (k=2) U (μm)	MPEE - U μm	MPEE - U μm			(μm)
220	0.00	0.43	0.79	-0.79	1	Mean	0.00
220	0.00	0.43	0.79	-0.79		Minimum	0.00
220	0.00	0.43	0.79	-0.79		Maximun	0.00
440	0.00	0.54	0.90	-0.90	2	Mean	0.00
440	0.00	0.54	0.90	-0.90		Minimum	0.00
440	0.00	0.54	0.90	-0.90		Maximun	0.00
660	0.00	0.62	1.04	-1.04	3	Mean	0.00
660	0.00	0.62	1.04	-1.04		Minimum	0.00
660	0.00	0.62	1.04	-1.04		Maximun	0.00
880	0.00	0.70	1.18	-1.18	4	Mean	0.00
880	0.00	0.70	1.18	-1.18		Minimum	0.00
880	0.00	0.70	1.18	-1.18		Maximun	0.00
1100	0.00	0.76	1.34	-1.34	5	Mean	0.00
1100	0.00	0.76	1.34	-1.34		Minimum	0.00
1100	0.00	0.76	1.34	-1.34		Maximun	0.00

Measuring line

Defined by its initial and final points, represented by their coordinates (mm).

Xinicial	0.00	Xfinal	0.00
Yinicial	0.00	Yfinal	1100.00
Zinicial	0.00	Zfinal	0.00



Remark: This graphic depicts the values of the CMM indication errors and their uncertainty U. Also, indication maximum permitted errors MPEe are represented.

VERIFICATION RESULTS AXIS Measuring line 3

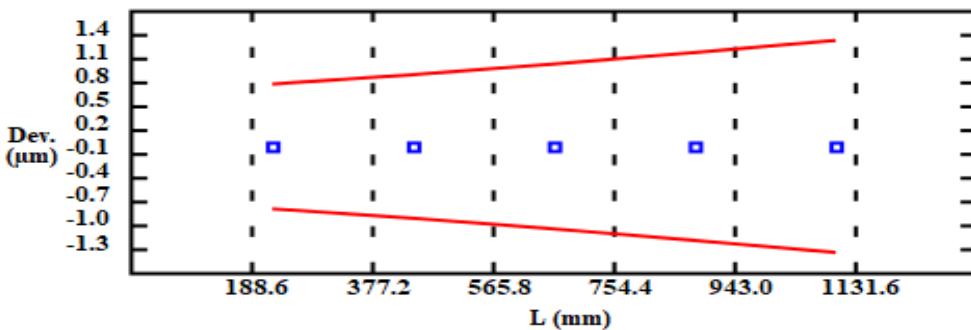
The represented errors are referred to each lenght of the measuring line.
For uncertainty calculation, only the uncertainty of the masters has been considered.

Nominal Xj (mm)	Error Ej (μm)	Expanded uncertainty (k=2) U (μm)	MPEE - U μm	MPEE - U μm			(μm)
220	0.00	0.43	0.79	-0.79	1	Mean	0.00
220	0.00	0.43	0.79	-0.79		Minimum	0.00
220	0.00	0.43	0.79	-0.79		Maximun	0.00
440	0.00	0.54	0.90	-0.90	2	Mean	0.00
440	0.00	0.54	0.90	-0.90		Minimum	0.00
440	0.00	0.54	0.90	-0.90		Maximun	0.00
660	0.00	0.62	1.04	-1.04	3	Mean	0.00
660	0.00	0.62	1.04	-1.04		Minimum	0.00
660	0.00	0.62	1.04	-1.04		Maximun	0.00
880	0.00	0.70	1.18	-1.18	4	Mean	0.00
880	0.00	0.70	1.18	-1.18		Minimum	0.00
880	0.00	0.70	1.18	-1.18		Maximun	0.00
1100	0.00	0.76	1.34	-1.34	5	Mean	0.00
1100	0.00	0.76	1.34	-1.34		Minimum	0.00
1100	0.00	0.76	1.34	-1.34		Maximun	0.00

Measuring line

Defined by its initial and final points, represented by their coordinates (mm).

Xinicial	0.00	Xfinal	0.00
Yinicial	0.00	Yfinal	0.00
Zinicial	0.00	Zfinal	1100.00



Remark: This graphic depicts the values of the CMM indication errors and their uncertainty U.
Also, indication maximum permitted errors MPEe are represented.

VERIFICATION RESULTS AXIS Measuring line 4

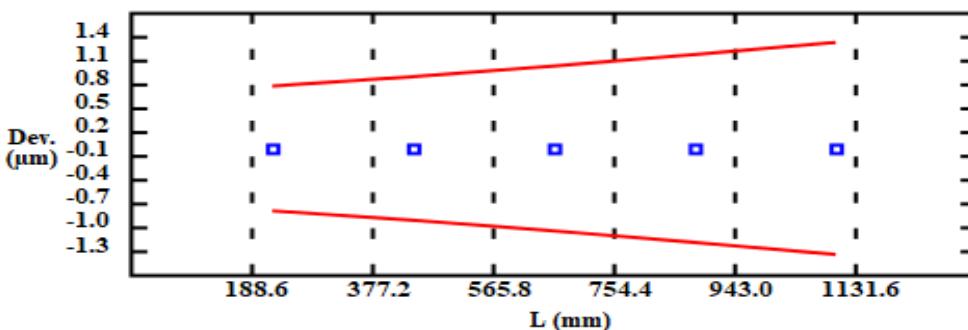
The represented errors are referred to each lenght of the measuring line.
 For uncertainty calculation, only the uncertainty of the masters has been considered.

Nominal Xj (mm)	Error Ej (μm)	Expanded uncertainty (k=2) U (μm)	MPEE - U μm	MPEE - U μm			(μm)
220	0.00	0.43	0.79	-0.79	1	Mean	0.00
220	0.00	0.43	0.79	-0.79		Minimum	0.00
220	0.00	0.43	0.79	-0.79		Maximun	0.00
440	0.00	0.54	0.90	-0.90	2	Mean	0.00
440	0.00	0.54	0.90	-0.90		Minimum	0.00
440	0.00	0.54	0.90	-0.90		Maximun	0.00
660	0.00	0.62	1.04	-1.04	3	Mean	0.00
660	0.00	0.62	1.04	-1.04		Minimum	0.00
660	0.00	0.62	1.04	-1.04		Maximun	0.00
880	0.00	0.70	1.18	-1.18	4	Mean	0.00
880	0.00	0.70	1.18	-1.18		Minimum	0.00
880	0.00	0.70	1.18	-1.18		Maximun	0.00
1100	0.00	0.76	1.34	-1.34	5	Mean	0.00
1100	0.00	0.76	1.34	-1.34		Minimum	0.00
1100	0.00	0.76	1.34	-1.34		Maximun	0.00

Measuring line

Defined by its initial and final points, represented by their coordinates (mm).

Xinicial	0.00	Xfinal	635.09
Yinicial	0.00	Yfinal	635.09
Zinicial	0.00	Zfinal	635.09



Remark: This graphic depicts the values of the CMM indication errors and their uncertainty U.
 Also, indication maximum permitted errors MPEe are represented.

VERIFICATION RESULTS AXIS Measuring line 5

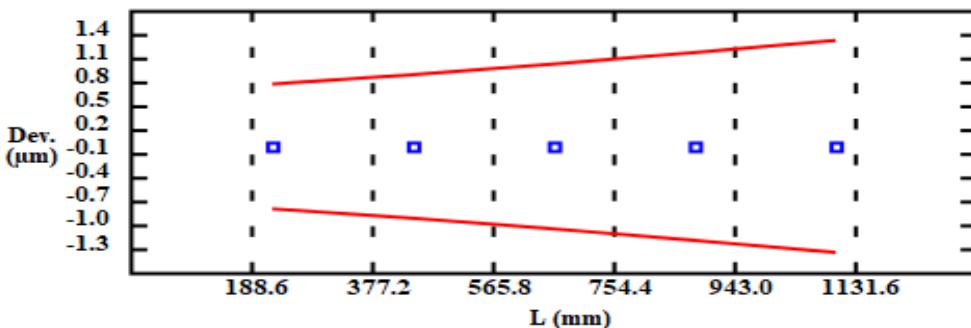
The represented errors are referred to each lenght of the measuring line.
 For uncertainty calculation, only the uncertainty of the masters has been considered.

Nominal Xj (mm)	Error Ej (μm)	Expanded uncertainty (k=2) U (μm)	MPEE - U μm	MPEE - U μm			(μm)
220	0.00	0.43	0.79	-0.79	1	Mean	0.00
220	0.00	0.43	0.79	-0.79		Minimum	0.00
220	0.00	0.43	0.79	-0.79		Maximun	0.00
440	0.00	0.54	0.90	-0.90	2	Mean	0.00
440	0.00	0.54	0.90	-0.90		Minimum	0.00
440	0.00	0.54	0.90	-0.90		Maximun	0.00
660	0.00	0.62	1.04	-1.04	3	Mean	0.00
660	0.00	0.62	1.04	-1.04		Minimum	0.00
660	0.00	0.62	1.04	-1.04		Maximun	0.00
880	0.00	0.70	1.18	-1.18	4	Mean	0.00
880	0.00	0.70	1.18	-1.18		Minimum	0.00
880	0.00	0.70	1.18	-1.18		Maximun	0.00
1100	0.00	0.76	1.34	-1.34	5	Mean	0.00
1100	0.00	0.76	1.34	-1.34		Minimum	0.00
1100	0.00	0.76	1.34	-1.34		Maximun	0.00

Measuring line

Defined by its initial and final points, represented by their coordinates (mm).

Xinicial	0.00	Xfinal	-635.09
Yinicial	0.00	Yfinal	635.09
Zinicial	0.00	Zfinal	635.09



Remark: This graphic depicts the values of the CMM indication errors and their uncertainty U.
 Also, indication maximum permitted errors MPEe are represented.

VERIFICATION RESULTS AXIS Measuring line 6

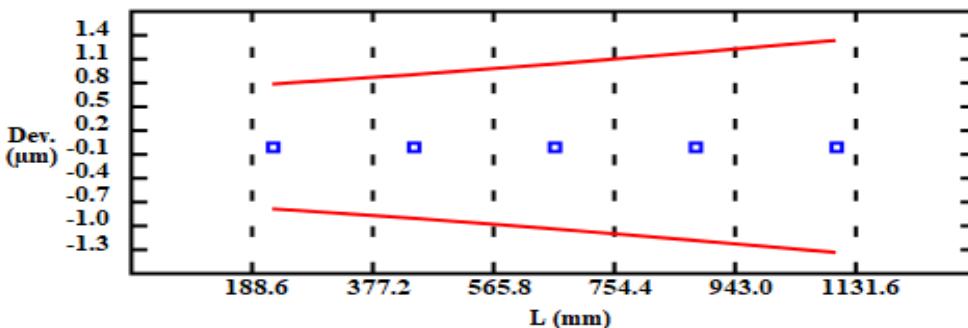
The represented errors are referred to each lenght of the measuring line.
 For uncertainty calculation, only the uncertainty of the masters has been considered.

Nominal Xj (mm)	Error Ej (μm)	Expanded uncertainty (k=2) U (μm)	MPEE - U μm	MPEE - U μm			(μm)
220	0.00	0.43	0.79	-0.79	1	Mean	0.00
220	0.00	0.43	0.79	-0.79		Minimum	0.00
220	0.00	0.43	0.79	-0.79		Maximun	0.00
440	0.00	0.54	0.90	-0.90	2	Mean	0.00
440	0.00	0.54	0.90	-0.90		Minimum	0.00
440	0.00	0.54	0.90	-0.90		Maximun	0.00
660	0.00	0.62	1.04	-1.04	3	Mean	0.00
660	0.00	0.62	1.04	-1.04		Minimum	0.00
660	0.00	0.62	1.04	-1.04		Maximun	0.00
880	0.00	0.70	1.18	-1.18	4	Mean	0.00
880	0.00	0.70	1.18	-1.18		Minimum	0.00
880	0.00	0.70	1.18	-1.18		Maximun	0.00
1100	0.00	0.76	1.34	-1.34	5	Mean	0.00
1100	0.00	0.76	1.34	-1.34		Minimum	0.00
1100	0.00	0.76	1.34	-1.34		Maximun	0.00

Measuring line

Defined by its initial and final points, represented by their coordinates (mm).

Xinicial	0.00	Xfinal	-635.09
Yinicial	0.00	Yfinal	-635.09
Zinicial	0.00	Zfinal	635.09



Remark: This graphic depicts the values of the CMM indication errors and their uncertainty U.
 Also, indication maximum permitted errors MPEE are represented.

VERIFICATION RESULTS AXIS Measuring line 7

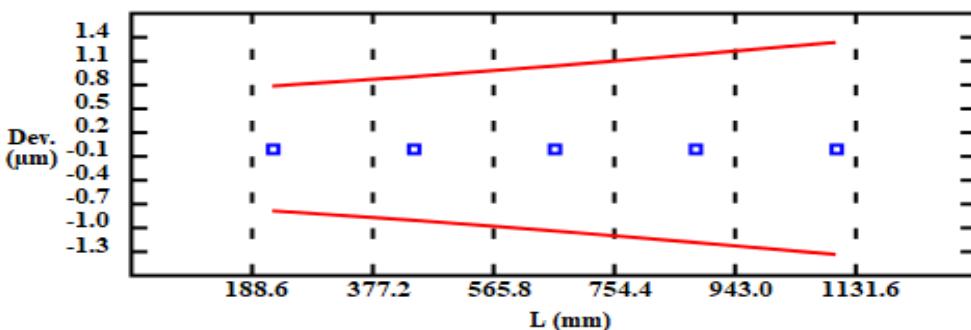
The represented errors are referred to each lenght of the measuring line.
 For uncertainty calculation, only the uncertainty of the masters has been considered.

Nominal Xj (mm)	Error Ej (μm)	Expanded uncertainty (k=2) U (μm)	MPEE - U μm	MPEE - U μm			(μm)
220	0.00	0.43	0.79	-0.79	1	Mean	0.00
220	0.00	0.43	0.79	-0.79		Minimum	0.00
220	0.00	0.43	0.79	-0.79		Maximun	0.00
440	0.00	0.54	0.90	-0.90	2	Mean	0.00
440	0.00	0.54	0.90	-0.90		Minimum	0.00
440	0.00	0.54	0.90	-0.90		Maximun	0.00
660	0.00	0.62	1.04	-1.04	3	Mean	0.00
660	0.00	0.62	1.04	-1.04		Minimum	0.00
660	0.00	0.62	1.04	-1.04		Maximun	0.00
880	0.00	0.70	1.18	-1.18	4	Mean	0.00
880	0.00	0.70	1.18	-1.18		Minimum	0.00
880	0.00	0.70	1.18	-1.18		Maximun	0.00
1100	0.00	0.76	1.34	-1.34	5	Mean	0.00
1100	0.00	0.76	1.34	-1.34		Minimum	0.00
1100	0.00	0.76	1.34	-1.34		Maximun	0.00

Measuring line

Defined by its initial and final points, represented by their coordinates (mm).

Xinicial	0.00	Xfinal	635.09
Yinicial	0.00	Yfinal	-635.09
Zinicial	0.00	Zfinal	635.09



Remark: This graphic depicts the values of the CMM indication errors and their uncertainty U.
 Also, indication maximum permitted errors MPEe are represented.

EPEATABILITY OF CMM LENGTH (Ro) MEASUREMENT ERRORS

The repeatability of the error for each length of the measurement line is represented.

For the calculation of repeatability, it is carried out as the statistical range of the three repeated length measurements.

	Nominal Xj (mm)	Repet. (μm)
Ro (X)	220	0.00
	440	0.00
	660	0.00
	880	0.00
	1100	0.00
Ro (Y)	220	0.00
	440	0.00
	660	0.00
	880	0.00
	1100	0.00
Ro (Z)	220	0.00
	440	0.00
	660	0.00
	880	0.00
	1100	0.00
Ro (D1)	220	0.00
	440	0.00
	660	0.00
	880	0.00
	1100	0.00

	Nominal Xj (mm)	Repet. (μm)
Ro (D2)	220	0.00
	440	0.00
	660	0.00
	880	0.00
	1100	0.00
Ro (D3)	220	0.00
	440	0.00
	660	0.00
	880	0.00
	1100	0.00
Ro (D4)	220	0.00
	440	0.00
	660	0.00
	880	0.00
	1100	0.00