

RX10  
7N2260  
05-May-2015



## Calibration Certificate RX10 Rotary Indexer

**Serial No:** 7N2260

**Date of Calibration:** 5th May 2015

### Calibration Method:

The RX10 Rotary Indexer identified above was calibrated on the specified date as follows:

- The positional error for each 5° step was measured for two bi-directional runs from -5° to +365°. Rotational positional error readings were taken using a laser angular interferometer system at each position - both before and after each step. Alignment of the laser interferometer system was maintained by the RX10 indexer being mounted on another rotary axis that is contra-rotated between successive pairs of laser measurement readings.

The laser calibration analysis software then processed the test data as follows:

- The accumulative measured error for each 5° step was calculated and stored.
- For each (unidirectional) half of each bi-directional run the 0° and 360° measurements were end-point fitted to "close the circle".
- Consecutive unidirectional data was then joined at the common end points (365° & -5°).
- The stitched data was then zero-shifted to balance the magnitudes of the overall maximum positive and negative errors calculated through both bi-directional runs.

The above test is carried out with the RX10 in 5 different orientations (see figures on page 2).

### Calibration Result:

The maximum error calculated in 72 positions in 5 orientations was less than ±1 arc second.

**Recommended Period of Recalibration (normal use - see Notes):** 3 years

### Notes:

- More frequent calibration is advised for units used in extreme environmental conditions, or where damage is suspected. The requirements of your quality assurance programme or national / local regulations may also dictate more frequent recalibration.

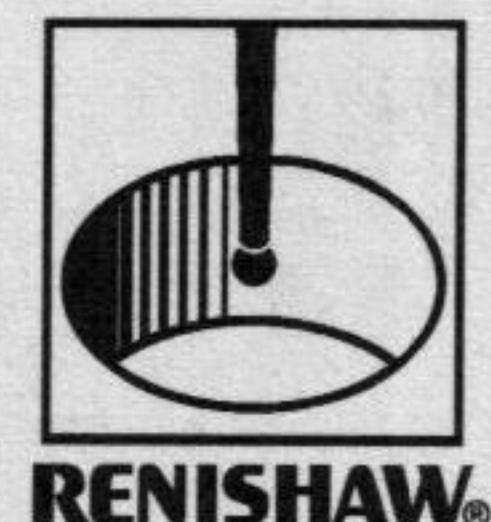
Authorised Signature	Signatory	Position	Issue Date
 <small>APPROVAL CERTIFICATE APPROVAL CERTIFICATE APPROVAL CERTIFICATE APPROVAL CERTIFICATE</small>	W. Lee	Divisional Director	12th May 2015

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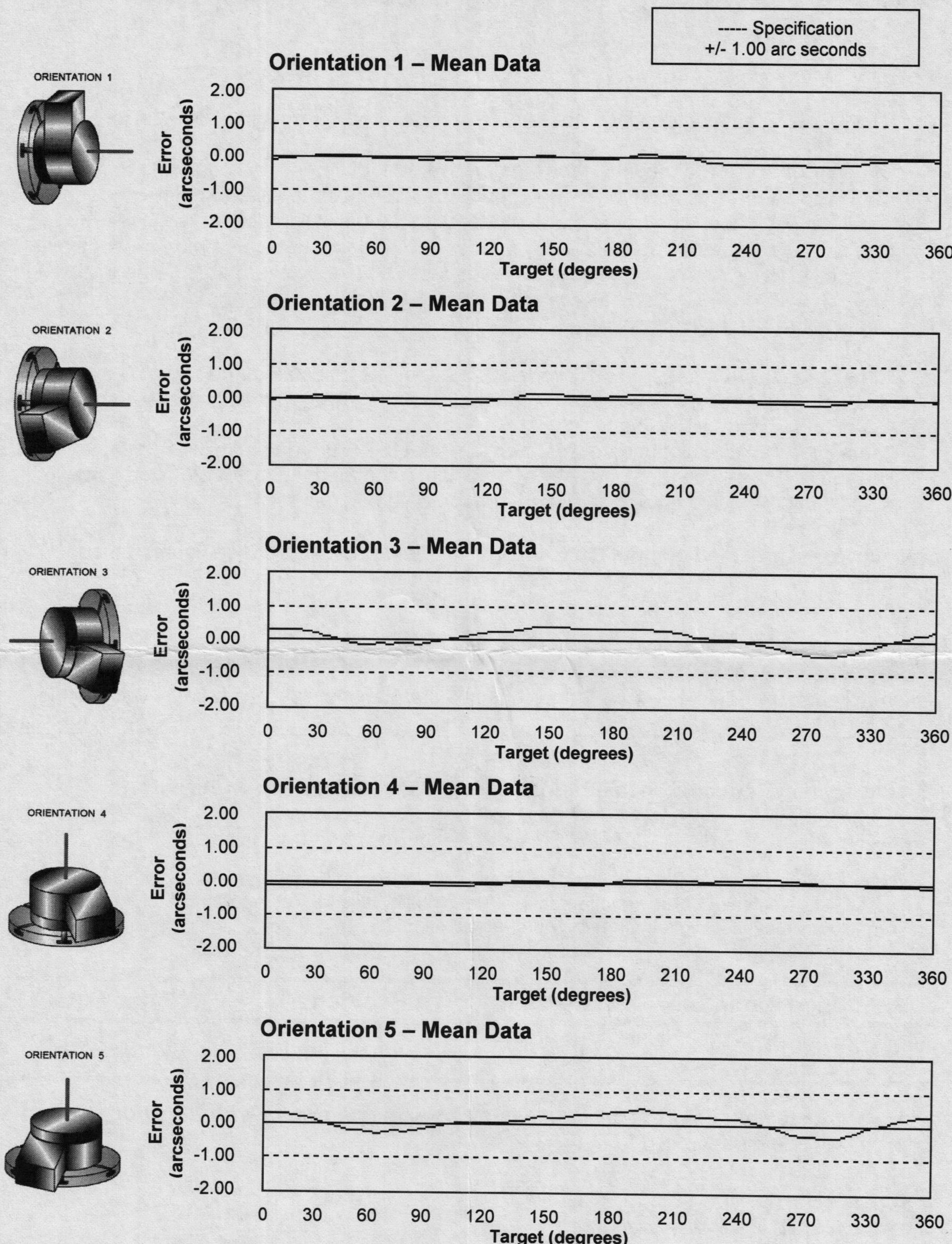
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The graphs below are plots of the mean calculated data for each of the five orientations.



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**Mean Data (arc seconds)**

Target (degrees)	Orientation				
	1	2	3	4	5
0	-0.10	-0.03	0.28	-0.11	0.31
5	-0.06	0.02	0.30	-0.09	0.32
10	-0.03	0.04	0.30	-0.09	0.30
15	-0.01	0.07	0.28	-0.08	0.27
20	0.01	0.07	0.23	-0.08	0.20
25	0.04	0.08	0.18	-0.10	0.13
30	0.03	0.07	0.11	-0.11	0.03
35	0.05	0.06	0.03	-0.11	-0.06
40	0.05	0.06	-0.04	-0.10	-0.10
45	0.03	0.03	-0.09	-0.10	-0.18
50	0.01	-0.02	-0.13	-0.10	-0.21
55	-0.03	-0.06	-0.13	-0.10	-0.25
60	-0.05	-0.11	-0.12	-0.08	-0.29
65	-0.06	-0.13	-0.13	-0.07	-0.26
70	-0.06	-0.13	-0.11	-0.07	-0.19
75	-0.07	-0.14	-0.12	-0.06	-0.24
80	-0.08	-0.14	-0.13	-0.06	-0.19
85	-0.08	-0.16	-0.10	-0.07	-0.14
90	-0.06	-0.16	-0.06	-0.09	-0.10
95	-0.08	-0.18	-0.01	-0.10	-0.07
100	-0.06	-0.15	0.05	-0.09	-0.02
105	-0.08	-0.14	0.12	-0.08	0.03
110	-0.08	-0.12	0.15	-0.08	0.05
115	-0.09	-0.09	0.22	-0.07	0.06
120	-0.08	-0.06	0.23	-0.07	0.06
125	-0.06	-0.02	0.24	-0.05	0.06
130	-0.03	0.02	0.26	-0.01	0.06
135	-0.01	0.09	0.30	0.03	0.10
140	0.02	0.13	0.34	0.03	0.11
145	0.04	0.17	0.40	0.07	0.21
150	0.03	0.14	0.41	0.04	0.23
155	0.02	0.15	0.41	0.02	0.20
160	0.01	0.12	0.40	-0.01	0.22
165	-0.01	0.10	0.37	-0.04	0.24
170	-0.03	0.08	0.37	-0.06	0.30
175	-0.06	0.05	0.36	-0.07	0.29

**Mean Data (arc seconds)**

Target (degrees)	Orientation				
	1	2	3	4	5
185	-0.03	0.08	0.37	0.02	0.36
190	0.01	0.10	0.34	0.06	0.38
195	0.05	0.13	0.36	0.08	0.42
200	0.08	0.15	0.35	0.10	0.45
205	0.09	0.15	0.35	0.10	0.48
210	0.07	0.15	0.32	0.10	0.42
215	0.06	0.15	0.30	0.11	0.40
220	0.03	0.13	0.25	0.09	0.36
225	-0.02	0.08	0.20	0.09	0.32
230	-0.07	0.03	0.12	0.10	0.29
235	-0.13	-0.01	0.09	0.07	0.26
240	-0.17	-0.06	0.06	0.07	0.24
245	-0.18	-0.06	0.04	0.11	0.22
250	-0.19	-0.07	0.03	0.11	0.21
255	-0.18	-0.07	0.01	0.12	0.18
260	-0.18	-0.07	-0.03	0.14	0.15
265	-0.18	-0.09	-0.11	0.13	0.08
270	-0.19	-0.10	-0.17	0.13	0.02
275	-0.19	-0.08	-0.22	0.13	-0.05
280	-0.20	-0.09	-0.28	0.11	-0.14
285	-0.21	-0.12	-0.35	0.08	-0.23
290	-0.23	-0.14	-0.39	0.06	-0.28
295	-0.24	-0.17	-0.43	0.05	-0.32
300	-0.26	-0.14	-0.44	0.02	-0.36
305	-0.26	-0.12	-0.43	0.02	-0.35
310	-0.20	-0.10	-0.41	-0.01	-0.34
315	-0.18	-0.02	-0.35	0.02	-0.26
320	-0.15	0.01	-0.26	-0.00	-0.19
325	-0.11	0.04	-0.18	-0.03	-0.05
330	-0.08	0.06	-0.08	-0.05	-0.02
335	-0.06	0.07	0.01	-0.05	0.06
340	-0.04	0.05	0.06	-0.04	0.14
345	-0.06	0.04	0.12	-0.06	0.22
350	-0.07	0.02	0.19	-0.07	0.26
355	-0.06	-0.01	0.22	-0.09	0.31
360	-0.10	-0.03	0.28	-0.11	0.31

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### Traceability of RX10 Rotary Indexer Calibration

Each step of the RX10 indexer has been measured using a Renishaw ML10 laser interferometer. The readings are scaled so that their sum is 360° (closing the circle). The important characteristic required from the laser is therefore that its wavelength stability is maintained to within ±0.25ppm for the duration of the test. The calibration is carried out in a temperature stabilised environment (< ±0.5°C). The ML10 laser stability is specified to be within ±0.1ppm for 3 years and has been calibrated at Renishaw. These measurements are traceable to UK national standards via NPL's calibration of Renishaw's iodine stabilised reference laser.



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### EC DECLARATION OF CONFORMITY

We RENISHAW plc of New Mills, Wotton-under-Edge, Gloucestershire, GL12 8JR, England declare that:

1. We are the manufacturers of the equipment identified by the following particulars -

Equipment type: ROTARY INDEXER  
Model: RX10

2. The equipment conforms to the following EC Directives -

98/37/EC (Machinery)  
93/68/EEC (CE Marking)

3. and complies with the relevant essential health and safety protection requirements of these directives.

The equipment conforms to the following European standards -

BS EN 50081-1 : 1992	(Electromagnetic Compatibility)
BS EN 50082-1 : 1992	(Electromagnetic Susceptibility)
BS EN 292 : 1991	(Machinery Safety)

Signed by:

M. Chapman  
Mark Chapman

Date: 15/01/2003

Position:

Director & General Manager  
Laser & Calibration Products Division

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