User's guide - Equator Gauge Checker
H-5925-8600-01-B

RENISHAW
apply innovation™

Equator™ Gauge Checker

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Renishaw part no: H-5925-8600-01-B

Issued: 04.2015

Equator™ Gauge Checker

Installation and user's guide

Changes to equipment

Renishaw reserves the right to change specifications without notice.

Warranty

Equipment requiring attention under warranty must be returned to our supplier. No claims will be considered where equipment has been incorrectly installed or misused, or where repairs or adjustments have been attempted by unauthorised persons. Prior consent must be obtained in instances where Renishaw equipment is to be substituted or omitted. Failure to comply with this requirement will invalidate the warranty.

WEEE directive

The use of this symbol on Renishaw products and/or accompanying documentation indicates that the product should not be mixed with general household waste upon disposal. It is the responsibility of the end user to dispose of this product at a designated collection point for waste electrical and electronic equipment (WEEE) to enable reuse or recycling. Correct disposal of this product will help to save valuable resources and prevent potential negative effects on the environment. For more information, please contact your local waste disposal service or Renishaw distributor.

Safety

The Gauge Checker kit weighs 0.44 kg.

Care should be taken when handling the Gauge Checker artefact. It should be lifted from its storage box using the base. If the artefact is dropped or receives an impact, it must be assumed that it is not suitable for use and Renishaw should be contacted with reference to a replacement.

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1. Introduction

Gauge Checker has been specifically designed as an aid to your Equator gauging system.

Unlike a CMM, the Equator does not need to be re-calibrated at periodic intervals, to ensure accuracy across the working volume. Equator is regularly ‘re-calibrated’ by nature of the mastering process which continually re-establishes an error map based on measurement of a known master part. However, it is useful to be able to validate that the Equator is working as well today as the day it was manufactured. Gauge Checker is a quick health-check enabling this to be performed quickly and easily.

Designed to exercise all of the measurement methods used on Equator, Gauge Checker performs a Golden Part Compare where the Equator runs a master cycle followed by an immediate measure cycle. A report is produced showing deviations from nominal for each feature during the measure cycle and these deviations are tested against the comparison uncertainty limits for each feature.

It is easy to integrate Gauge Checker into your maintenance schedule. Each Gauge Checker kit can be used across multiple Equator machines.

Set up is quick, intuitive and easy, using the software wizard as a step by step guide.

2. Product description

2.1 Hardware

Item	Description
1	55 mm artefact adapter
2	Thread adapter (M6, M8, 1/4-UNC)
3	Gauge Checker artefact
4	Scanning stylus (A-5003-5061) & (A-2237-0180)
5	Wrench Hex Key 3 mm A/F Ni Pl
6	Touch Trigger stylus (A-5003-0040)

2.2 Software

Included as part of the Gauge Checker kit, is the Gauge Checker wizard. This wizard guides the user through the Gauge Checker process.

To start the Gauge Checker wizard:

- Navigate to Diagnostics within Equator Manager.

- Click on the Gauge Checker icon and the wizard will appear. Follow the instructions given within the wizard to run the Gauge Checker application.

3. Product operation

3.1 Assembling the Gauge Checker artefact

To assemble the Gauge Checker artefact, please see the steps below.

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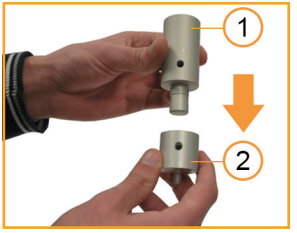

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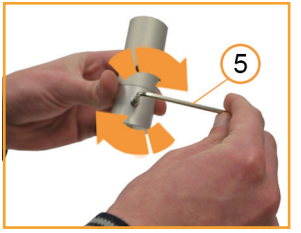

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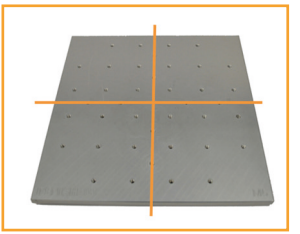

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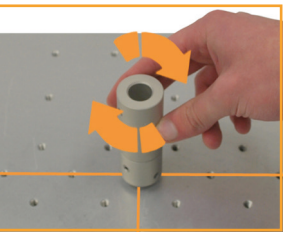

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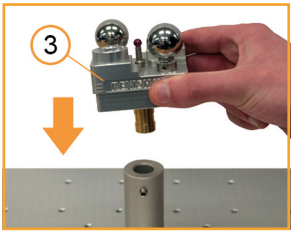

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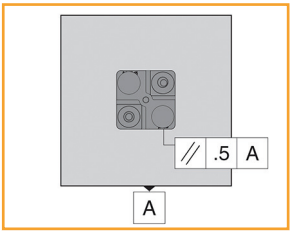

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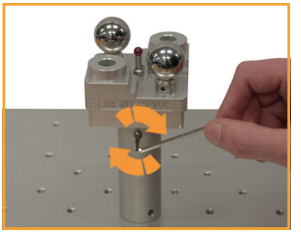
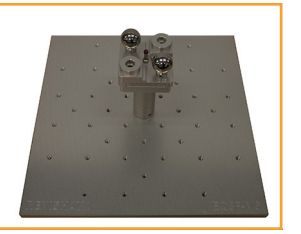
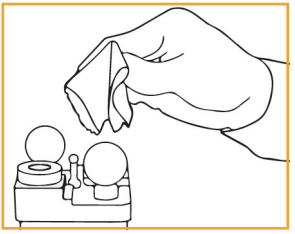
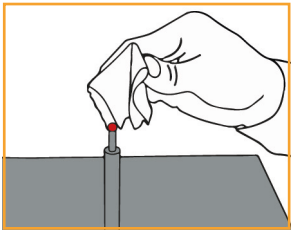
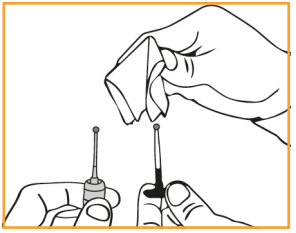
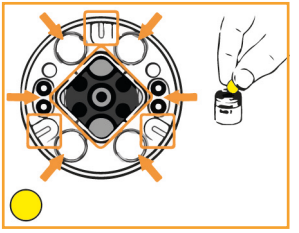




3.2 How to use

- Store the Gauge Checker artefact in the provided case when not in use.
- Use gloves when handling the Gauge Checker artefact.
- Remove the Gauge Checker artefact from the storage case for two hours prior to use. This ensures that the Gauge Checker artefact is at ambient temperature.
- Using the provided yellow tac and a lint-free cleaning cloth, clean the Gauge Checker artefact, calibration artefact, stylus and module before every use.

- Open the Gauge Checker wizard.
- Follow the steps within the Gauge Checker wizard. When the Gauge Checker process has finished, a pass/fail report will be produced.

3.3 Interpreting the results

The pass/fail report shows deviations from nominal for each feature during the measure cycle and these deviations are tested against the comparison uncertainty limits for each feature.

Pass - If the deviation is within the comparison uncertainty limits the result is a pass.

Fail - When the results are outside the comparison uncertainty the result is a fail. If an Equator fails, it is most likely to be down to dirt on the equipment. Clean the Gauge Checker artefact and stylus and run the test again. If the test fails a second time, contact your local Renishaw distributor.

Multiple measure cycles - When performing multiple measure cycles, it is possible that thermal effects could give rise to larger deviations.

Pass/fail will therefore only be tested against the first measure cycle, but the use of multiple measure cycles can be a good way to assess the stability of your inspection process in a changing thermal environment.

4. Technical data

4.1 Gauge Checker test limits

The test limits set for the Gauge Checker have been derived from the performance specifications quoted for the Equator and the measurement uncertainty† evaluated for the inspection of the Gauge Checker (to a 95% confidence interval).

- Size[1]: ± 2 µm
- Position[1]: ± 2 µm
- Distance:
  - 1D[2]: ± 2.8 µm
  - 2D[3]: ± 4.0 µm
  - 3D[4]: ± 4.9 µm
- Form error[5]: 5 µm
- Freeform curve deviation[6]: ± 5 µm

Note: These limits have been set for the Golden Part Comparison method, with no calibration file (.cal file), and with an assumption of no more than 2 °C temperature difference between master and measure.

[1] Size and position: the Equator performance specification quoted is ±2 µm (evaluated using empirical measurements)

[2] 1D Distance: $\sqrt{2^2 + 2^2} = 2\sqrt{2} = \pm 2.828$ µm

[3] 2D Distance: $\sqrt{2(2^2) + 2(2^2)} = \pm 4.000$ µm

[4] 3D Distance: $\sqrt{3(2^2) + 3(2^2)} = \pm 4.899$ µm

[5] Form error (non-freeform curves): test limits evaluated using empirical measurements (for further information, please contact Renishaw).

[6] Freeform curve deviation: test limits evaluated using empirical measurements (for further information, please contact Renishaw).

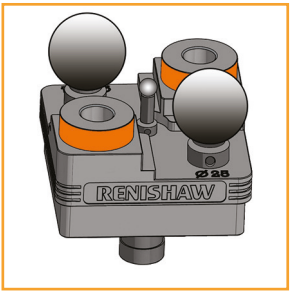
[†] Measurement uncertainty is defined in the GUM (Guide to the expression of Uncertainty in Measurement) as: “a parameter, associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurand”.

4.2 Compare procedure

Gauge Checker will give a pass/fail for each type of measurement. Namely: position, diameter, 1D, 2D, 3D distances, free-form profile* and sphericity.

*Not Touch Trigger.

Some of the features that are inspected are shown below.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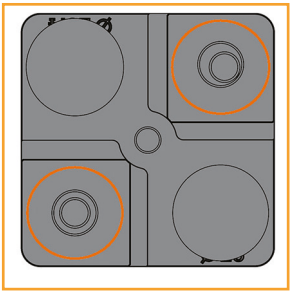

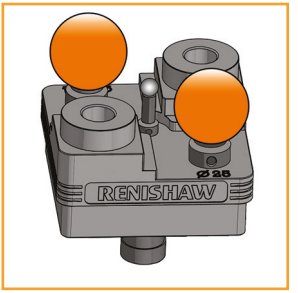
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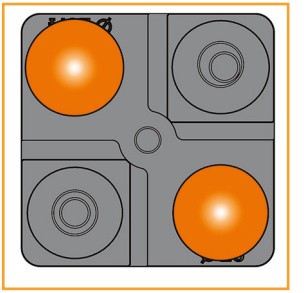

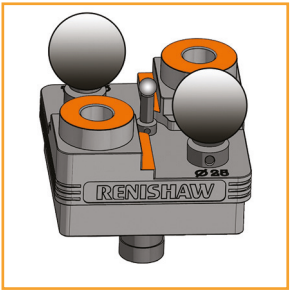
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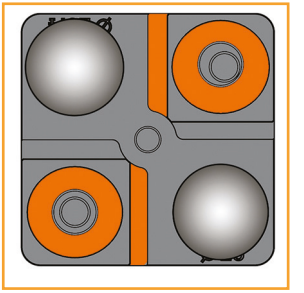

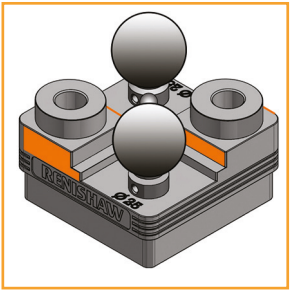
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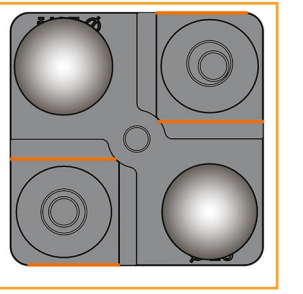

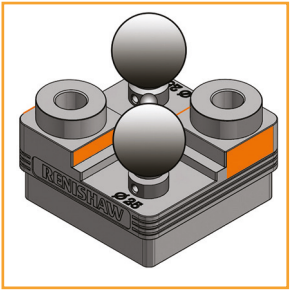
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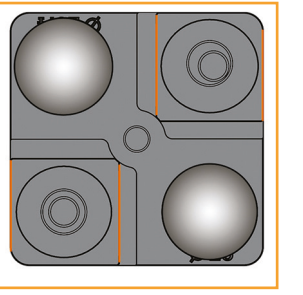

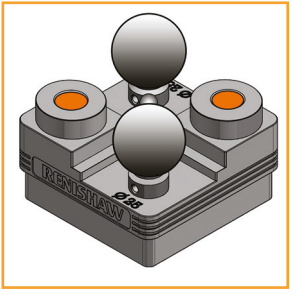
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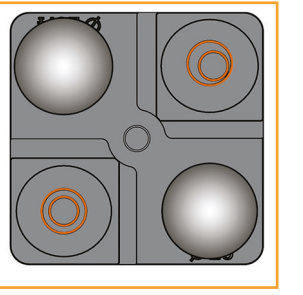

5. Help

Please contact Renishaw for help.

For worldwide contact details, please visit our main website at www.renishaw.com/contact

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