

# PH10 Motorised indexing heads

What is it?

Where is it used?

Why do **you** need it?



## What is a PH10?

- A PH10 is an **indexing probe holder** which allows the probe to be **orientated** and **locked** in any of 720 positions during the inspection cycle
- Renishaw offers a family of PH10's that can be matched to your specific application

### PH10T



### PH10M



### PH10MQ



# Differences

	Head mount	Probe mount
PH10T	Shank	M8
PH10M	Shank	Autojoint
PH10MQ	In-quill	Autojoint



## Where is it used?

- The PH10 family gives **DCC** machines the added capability of **probe reorientation**, allowing the probe to inspect features at the **optimum angle**, considering **access requirements** and probing **best practise**
- PH10's can be mounted to a variety of different sized **bridge** or **horizontal arm** machines for **touch trigger**, **optical** or **scanning** probing



## Where is it used?

- The PH10 range is a **universal** family of products used in many industries including **aerospace** and **automotive**
- Compatible with a full range of sensors and extensions the **position, size and form** of critical highly toleranced features can be determined
- The PH10 is an **established reliable** product that provides a **cost effective** probing solution



## Why do you need it?



The PH10 family brings many benefits that will improve the way you inspect components and assemblies

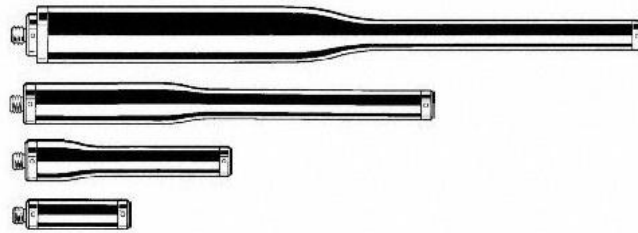
These benefits include:

- **Flexibility**
- Increased throughput
- Maximum accessibility
- Improved accuracy
- Minimal risk to head and CMM
- Low cost of ownership

# Why do you need it?

## Flexibility:

- The **PH10T** can be used with Renishaw's range of **M8 thread** probes and extension bars (maximum recommended length of 300mm). TP20 and TP200 permit module and stylus changing



PEL extension bar range  
(M8 to M8)



TP6



TP20



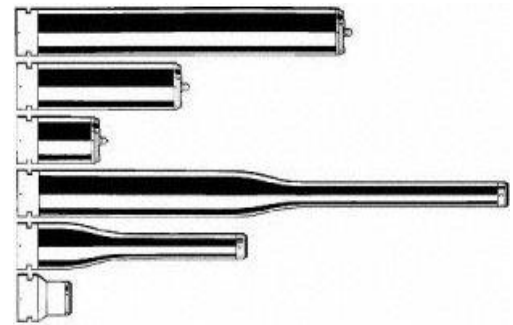
TP200



# Why do you need it?

## Flexibility:

- The PH10M / MQ can be used with Renishaw's range of **autojoint** probes and extension bars (maximum recommended length of 300mm) allowing automatic probe changing using ACR3





## Why do you need it?



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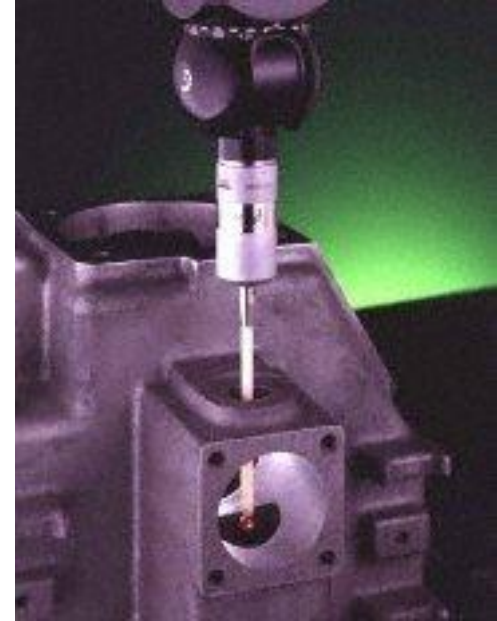
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- **Increased throughput**
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## Why do you need it?

### Increased throughput:

- The ability of the PH10 to **index** reduces the number of stylus changes required **increasing the throughput** of your machine. Indexing is faster than stylus changing
- The PH10 family of products can move through **90 degrees in 3.5 seconds** keeping the time that you are not inspecting to a minimum
- The highly repeatable **kinematic autojoint** on the PH10M/MQ allows for DCC probe or extension bar changing using ACR3 **without** the need for re-qualification of the stylus tip thereby **reducing inspection time** and allowing un-manned inspection cycles



## Why do you need it?

**High speed indexing minimises cycle times**



**Rapid indexing during CMM positioning moves  
give flexible access with no impact on cycle times**

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## Why do you need it?

### Accessibility:

- PH10's can articulate in **7.5 degree** increments in both the A (105 degrees) and B (+/- 180 degrees) axes giving **720 repeatable positions**
- Long **extension bars** and a comprehensive range of **styli** increase the access range of the PH10 family
- The PH10MQ **increases** the available **working volume** with its B axis housed within the quill of the CMM. An 80mm quill is required



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## Why do you need it?

### Accuracy:

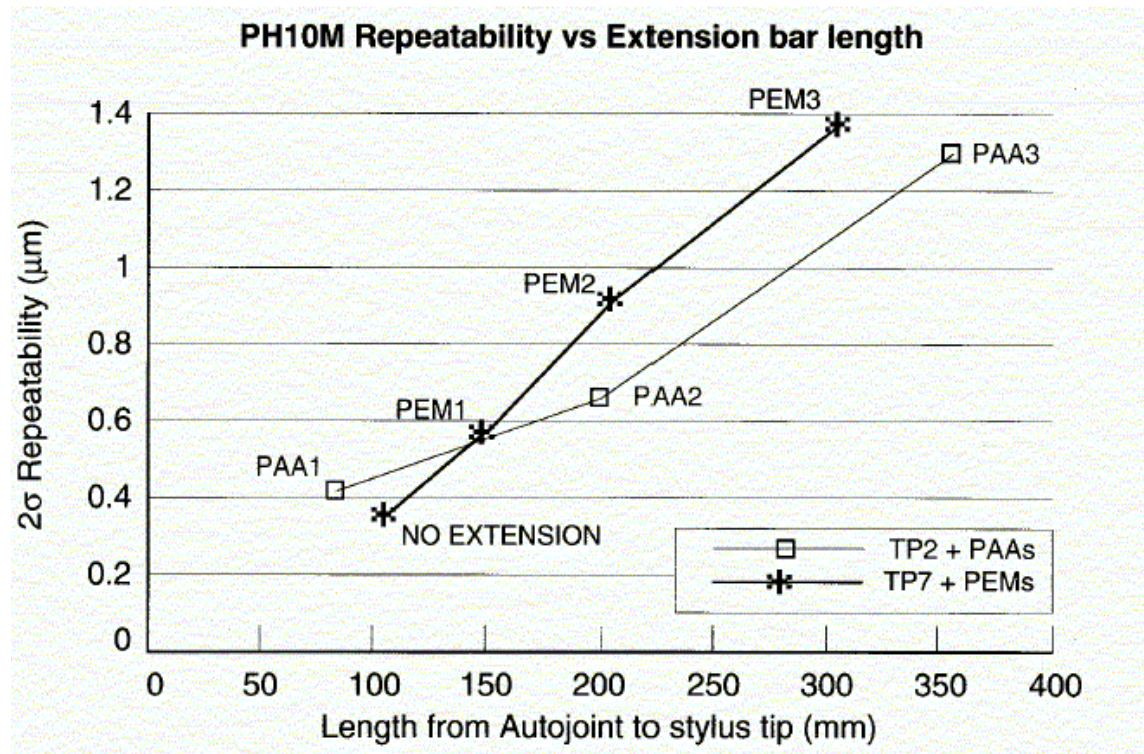
- The PH10 family can achieve **0.5µm repeatability** at 62mm radius providing accurate positioning even when using long extensions
- The accuracy that the PH10 enables you to achieve **improves inspection** routines and can help to **reduce** the level of **scrap** experienced
- Articulating heads with **simplified styli configurations** improve the accuracy and dynamics achieved
- Repeatable extension bar and probe / module changing also enhances the accuracy and flexibility of the system



## Why do you need it?

### Accuracy:

The graph below shows typical PH10M indexing repeatability test results ( $2\sigma$  at the stylus tip) for various probe/extension bar configurations. Testing was carried out on a high accuracy CMM under controlled conditions.





## Why do you need it?

### Head repeatability test results:

- **Method:**

- 50 measurements of calibration sphere at {A45,B45}, then 50 with an index of the PH10M head to {A0,B0} between each reading
  - TP200 trigger probe with 10mm stylus

- **Results:**

Result	Span fixed	Span index	$\Delta$ [Span]	$\Delta$ [Repeatability]
X	0.00063	0.00119	0.00056	$\pm$ <b>0.00034</b>
Y	0.00039	0.00161	0.00122	$\pm$ <b>0.00036</b>
Z	0.00045	0.00081	0.00036	$\pm$ <b>0.00014</b>

- **Comment:**

- Indexing head repeatability has a similar effect on measurement accuracy to stylus changing repeatability

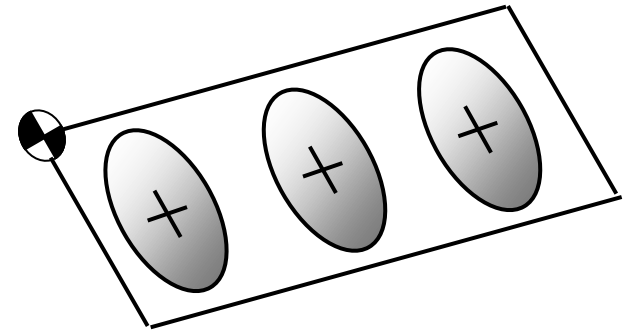
## Why do you need it?

### Indexing repeatability affects the **measured position** of features

- Size and form are unaffected

### Most features relationships are measured **‘in a plane’**

- Feature positions are defined relative to datum features in the same plane (i.e. the same index position)
  - Datum feature used to establish a part co-ordinate system
- Therefore indexing typically has **no negative impact** on measurement results, but many benefits



## Why do you need it?



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- Low cost of ownership

## Why do you need it?

### Minimal risk to head and CMM:

- The PH10 has a recommended **maximum torque of 0.45Nm**. This safety feature ensures that in the event of an accidental collision the head will **overtravel** protecting itself and the CMM from damage
- The ACR3 autochange rack uniformly controls the changing of probes and extensions **removing** the element of **human error** and the possibility of damage when manually changing probes



**Quick and repeatable sensor changing for maximum flexibility**

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## Why do you need it?

### Low cost of ownership:

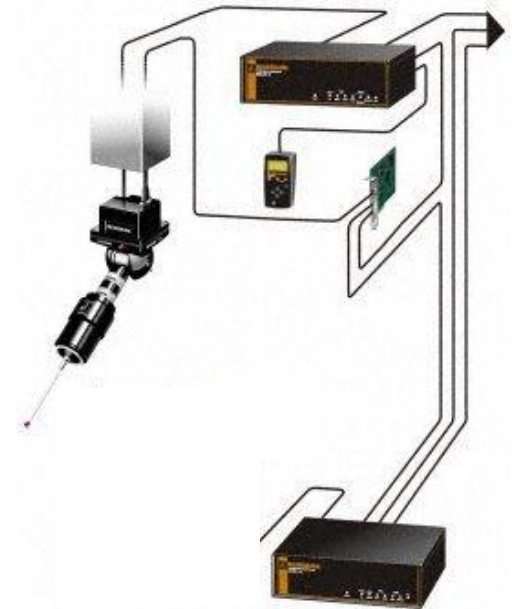
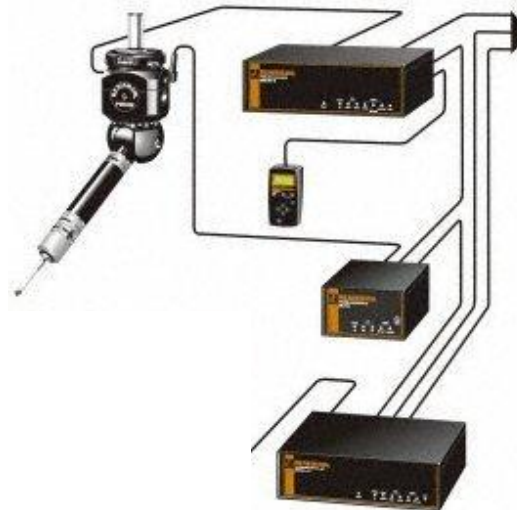
- The items within a PH10 system are individually priced giving you the added **flexibility** of choosing and growing the **best system** for your **application** when required
- Renishaw offers a wide range of service options for all their products in order to **minimise the customers downtime**
- The cost of the repair is determined from the extent and nature of the damage and consultation takes place before any work is undertaken
- In the case of PH10's the customer also has the option of purchasing a replacement from the **Repair By Exchange (RBE)** scheme in the interests of fast turn around and minimal downtime



# PH10 system

## The PH10 system comprises:

- PH10 head (T, M or MQ), extension bars, probes, styli, rack, controller (the PH10 can be integrated with the Renishaw Universal CMM Controller UCC1), hand control unit



## Summary

### With PH10 you can:

- measure using touch trigger, optical or scanning probes depending on your application
- index your stylus tip for increased accessibility
- increase throughput by stylus changing without having to re-qualify
- automatically change extension bars up to 300mm long for increased accessibility
- achieve accuracy of 0.5 $\mu$ m at 62mm radius
- protect your investment through integral overtravel protection
- be assured that any machine downtime will be kept to a minimum through Renishaw's expert service and support



## Responsive service and expert support

- **Application and product support wherever you are**
  - Renishaw has offices in **over 30 countries**
  - responsive service to keep you running
  - optional **advance RBE** (repair by exchange) service on many products
    - we ship a replacement on the day you call
  - trouble-shooting and FAQs on **[www.renishaw.com/support](http://www.renishaw.com/support)**



**Service facility  
at Renishaw  
Inc, USA**

# Questions?

