

## Special Bore Measurement

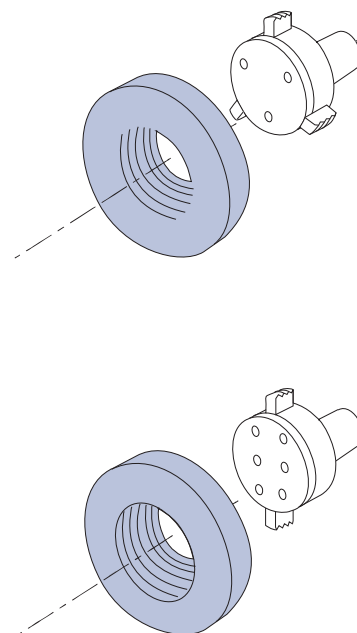
Although Bowers produces the most comprehensive series of bore gauges and internal measuring equipment available, not all applications can be covered by our standard instrument range. In line with our customer care ethos, Bowers has earned a reputation for manufacturing special heads for measuring non-standard applications. The following information illustrates some of the many difficult measuring problems easily solved by these special heads.



### Threads

#### Screw Threads

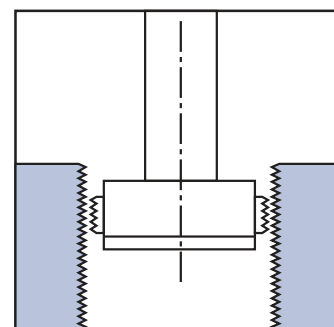
To measure effective (functional) diameter, pitch diameter, major diameter, between M4 - 300mm. / No. 8 UN - 12" diameter.



2 Point



3 Point



#### Ball Screw Threads

From  $\varnothing$  M10.



#### External Threads

External Thread



## Special Bore Measurement - Grooves

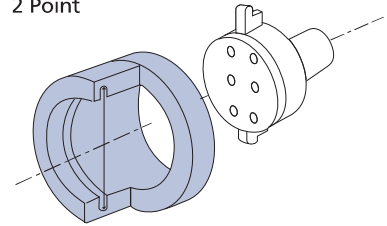
- Interchangeable with standard heads
- Suits Bowers XTD, XTH and Ultima
- Special forms, radius, ball contacts
- Depth stops available for quick location
- Annular grooves possible

### Grooves

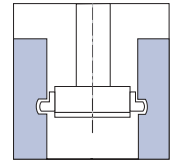
For sizes from 2-300mm diameter.



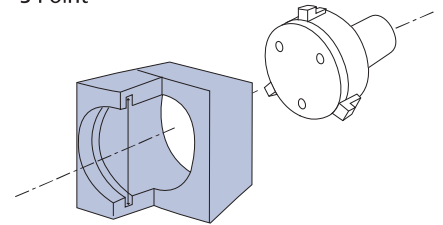
2 Point



Side view



3 Point



Groove Head with Depth Stop

## Brake Caliper Measurement



Caliper Groove Measurement



## Ball Race Measurement

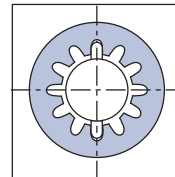
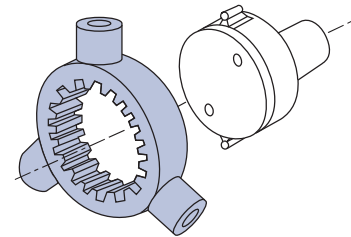


Measuring Component

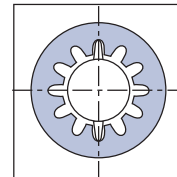


## Special Bore Measurement - Internal Spline

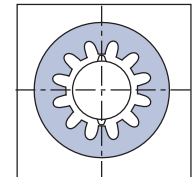
2 and 3 point heads available.  
Anvils manufactured from tool steel.  
Between pin, major and minor diameter heads available.  
Diameters from 8-300mm diameter (5/16"-12").



Pitch Diameter



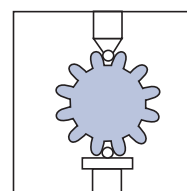
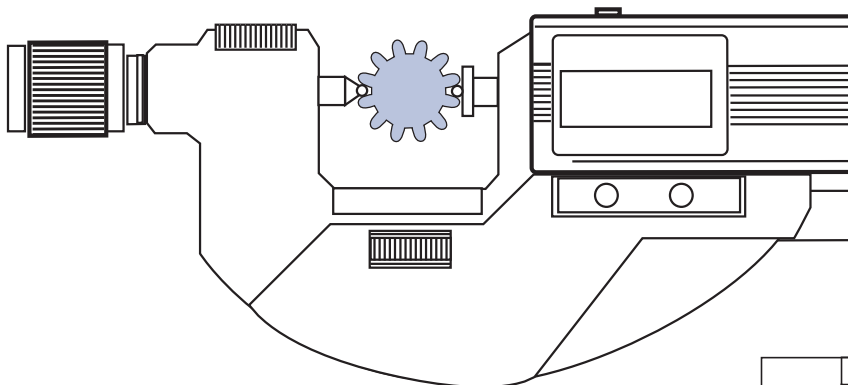
Major Diameter



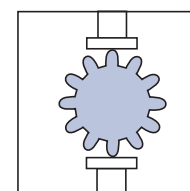
Minor Diameter

## Special Measurement - External Spline

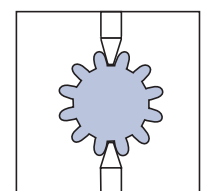
Frames fitted with 1 x ball and 1 x pin.



Pitch Diameter



Major Diameter



Minor Diameter

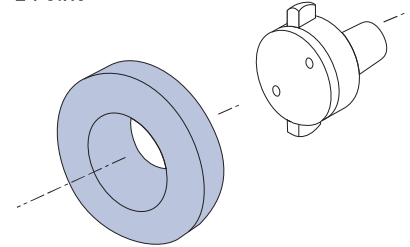
## Special Bore Measurement - Spherical

### 2 Point Spherical

Measurement of ovality in bore.  
Measurement of bores with irregularities.



2 Point

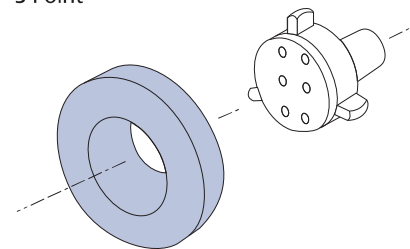


### 3 Point Spherical

Gives good repeatability even when out of line with bore centre.  
Available from 6-300mm diameter on digital systems.

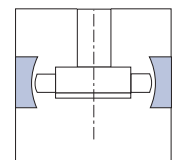
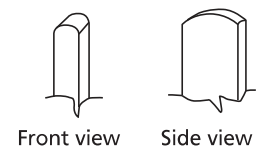
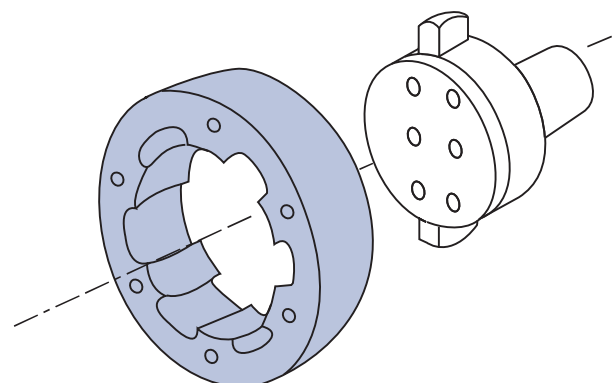


3 Point



### Spherical Radius

Can be supplied as a 2 point  
(for ovality) or 3 point contact.  
Available from 6-300mm.



## Special Bore Measurement - Deep Hole Pneumatic

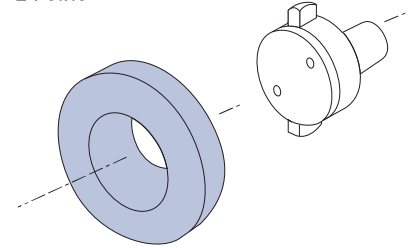
Operated by a pneumatic actuator powered by a 3 bar compressed air supply - either from a compressor or a workshop air-line. The measurement data is collected by a capacitive probe fitted just behind, and in constant contact with the measuring head. This direct contact ensures high-quality transducer-type accuracy, even at great depths. Measurements are taken by pressing a footswitch connected to the airline and the data is then passed automatically via cable back down the bore to the digital readout at the operator end.

### Features

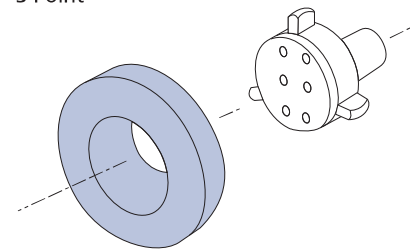
- Measures diameters from 50-310mm, up to 15m deep
- Spherical, Tungsten Carbide anvils
- 2 point and 3 point heads available
- Accuracy  $\pm 0.005\text{mm}$  (subject to bore condition)
- Quick set-up time
- Easy to use
- Not adversely effected by temperature fluctuation
- Robust design
- Various readouts available



2 Point



3 Point

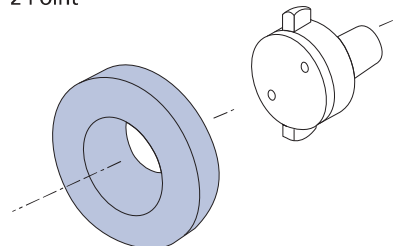


## Deep Hole XT - Under 2 Metres

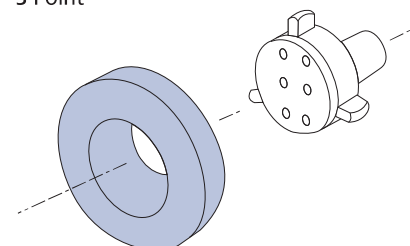
Up to 2.0 metres deep with standard extensions.



2 Point



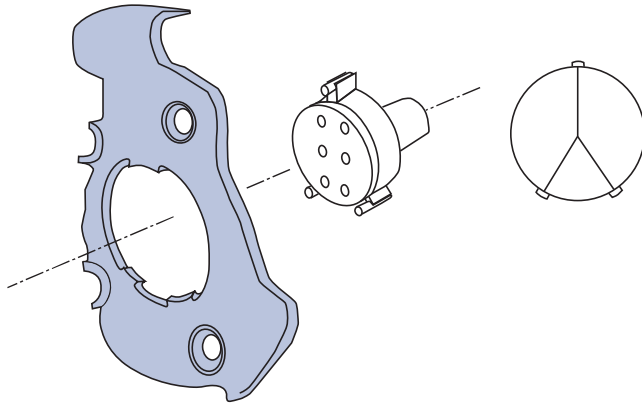
3 Point



## Special Bore Measurement - Miscellaneous

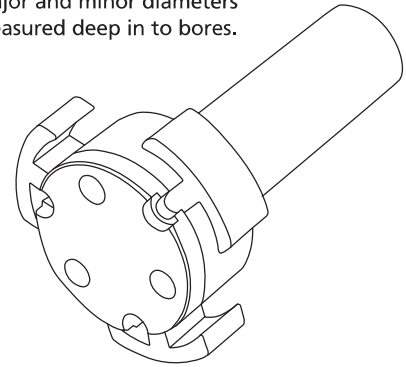
### Irregular Spacing

Available between 16-300mm diameter to measure between odd spaced lobes.



### Gun Barrel Head

Measurement of smooth bore and rifled bore gun barrels. Major and minor diameters measured deep in to bores.

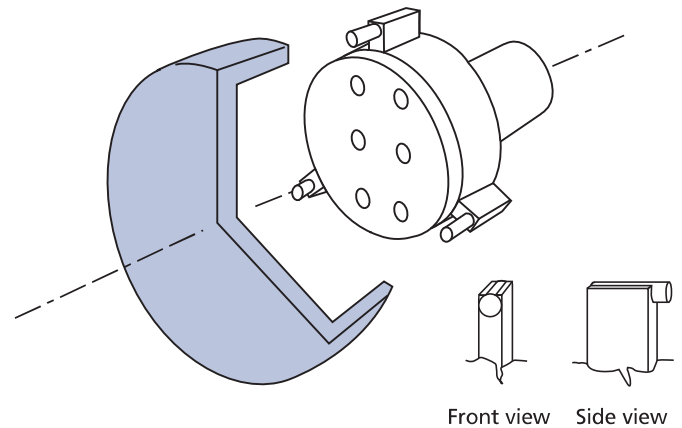


### Right Angled Adaptor



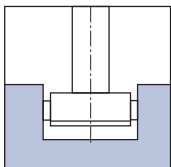
### Blind Bore

Standard between 2-6mm and 12.5-300mm. Between 6-12.5mm on request.



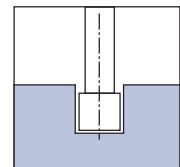
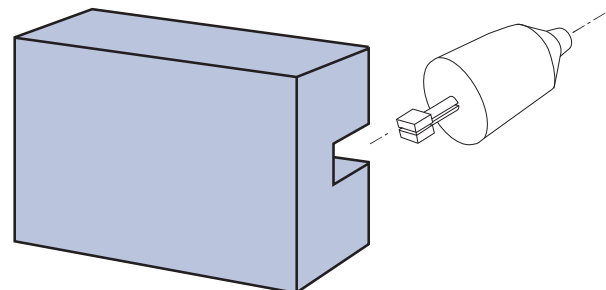
### Slot Width (Large)

Slot widths from 6-100mm.



### Slot Width (Small)

Slot widths from 2-6mm.



## Special Bore Measurement - Measurement of Dovetail Slots & Turbine Blade Grooves

### The Challenge:

Bowers was approached by a well-known industrial turbine manufacturer to develop a method of measuring dovetail slot width and position in a circular component. The datum for the measurements was taken from the shoulder of the slot replicating the final 'In Service' blade datums.

### The Solution:

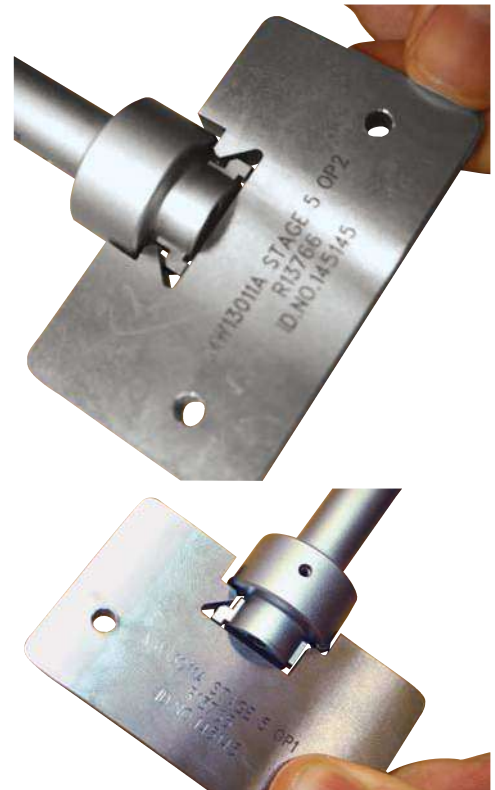
Bowers' Special Applications Team developed a special 2 Point head solution based on the popular Bowers XT system. The system incorporates tungsten carbide ball contacts for high accuracy. The Bowers XT digital readout offers the capability to send data for SPC and part traceability.

### Advantages over Competitor Solutions:

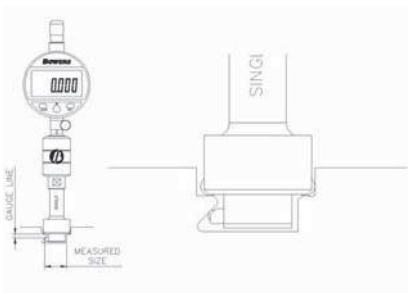
The Bowers dovetail variable gauge is able to output the actual size and position as opposed to competitors' attribute (Go / No Go) gauging. The gauge has a long working life and doesn't wear like attribute gauging.

### Potential Industries:

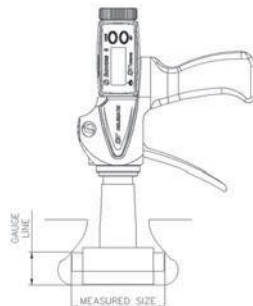
- Aerospace
- Nuclear
- Turbines
- Power Generation



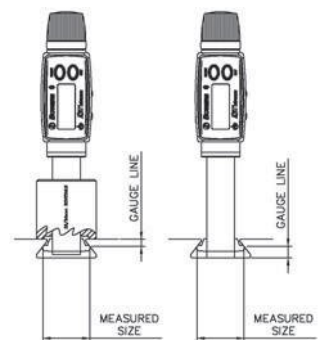
Single side measurement for set-up / symmetry



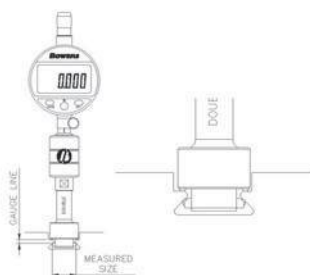
Measurement of dovetail seat face width



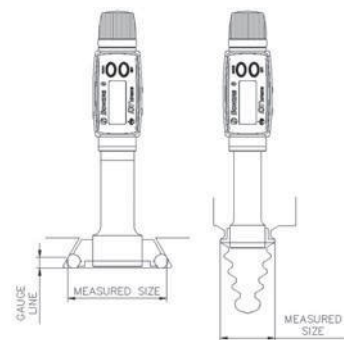
Other Dovetail & Fir Tree Slots



Double side measurement for overall width



Measurement of bottom lobe width



## Special Bore Measurement - Internal Measurement of Surface/Subsea Valve Cavity-Seat Pockets



### The Challenge:

Bowers was approached by a well-known solutions provider to the global oil & gas industry to develop a method of measuring the internal cavity in valve bodies.

Features to measure include:

- Internal diameters inside seat pocket
- Internal spot face distance between flats
- Internal spot face to diameter measurement

### The Solution:

Bowers' Special Applications Team developed a solution utilising a one-piece right angle adapter to allow entry down a perpendicular bore. This allows measurement to take place at 90 degrees to entry of the bore. An optimised anvil form and guide pieces aid entry and position the measuring head correctly for higher accuracy measurements and ease of use for operator.

### Features:

- Higher accuracy
- Improved ease of use
- Faster inspection

### Potential Industries:

- Oil & Gas
- Hydraulics
- Industrial Pipework



Typical part

