

SANGHA

METROLOGY



30 years
ANNIVERSARY

METROLOGY.COM

APPROVED PRODUCTS

Trigabore

3-POINT BORE GAUGING SYSTEM

For the accurate and precise measurement of internal diameters utilizing Sangha Metrology True-bore system gauge heads.

(Measurement Range 6mm-200mm)

(Measurement Range (0.236"-7.870"))

Engineers honour businessman

AN Indian-born Bradford businessman has been given a top honour by his peers.



Mohan Sangha, a chartered engineer who came to Bradford in 1957 and started working at precision toolmaker T Bowers, has been elected a Fellow of the Institution of Mechanical Engineers – it's highest honour. Mr Sangha, who helped develop new patented products for Bowers, joins an elite group of around 130,000 IMechE Fellows around the world. The body was started by steam pioneer George Stephenson and is one of the oldest institutions in the world.



NEWS

Engineering Fellowship for Metrologist:-

SOURCE:-

NEWS PAPER REPORT
BRADFORD T & A

MR.DAVID THOMSON
MD MITUTOYO(UK)

MR.MOHAN SANGHA

MR. MARTIN WEEKS
EXEC.DIRECTOR
MITUTOYO (UK)

PICTURE WAS TAKEN DURING CELEBRATORY LUNCH AT MITUTOYO HEADQUATERS FOR MOHAN SANGHA'S ELECTION TO FELLOWSHIP OF THE INSTITUTION OF MECHANICAL ENGINEERS.

Mr.Mohan Sangha of Sangha Metrology,Pictured here (Center) with David Thomson and Martin Weeks of Mitutoyo UK, has been elected as a Fellow of the Institution Of Mechanical Engineers. This prestigious recognition is only given ,to Engineers who have made a substantial contribution to the Engineering proffession Mr. Sangha, who is a chartered Engineer founded Sangha Metrology which manufactures and supplies 3-Point and 2-Point standard and Special Internal diameter Bore gauges, 25 Years ago.

The Company also has an investment casting facility in INDIA. Before setting up his own company, Mr.Sangha worked for many years for Bowers.He has also been involved in setting up a Factory fo B&Q to supply free standing Bath Tubs from INDIA and started the company Clearwater Collection in 1999. Under his Chairmanship Clearwater achieved a turnover **£7m** and Mr.Sangha's World-wide patent attracted a **£ 72,000** Innovation grant

Mr.Sangha has also had a 20-year, association with Mitutoyo-his company was the first outside japan to supply a major product for worldwide distribution to Mitutoyo.

In recognition of his Achievement he was invited by David Thomson , MD of Mitutoyo UK,for a celebratory lunch.

Mr.Sangha said:" As a supplier and an associate of Mitutoyo I am Very grateful for their recognition of my Fellowship Election which is one of the Highest honours that the IMECHE can bestow on a member.

SOURCE:- QMT NEWS LETTER , DISTRIBUTED AT CONTROL EXHIBITION IN GEMANY



Truebore pistol grip Handle & Truebore lever type Handle	2-3
Table Shown Standard Head, Master Rings & Extensions	4
Digital Dial Gauges & Transducer	5
Standard Trigabore & Truebore Box Sets	6-7
Pneumatic accuated & standard Extension	8
Trigabore, Truebore & Retrofit special application heads	9-17
True Cal Calibration System	18-23
Retro Fit Head Application	24-25
Electronic Plug Gauge & Nylon Sleeve Heads	26-27
Sangha External Measurement System	28-29
Sangha "O" Ring Groove & Width measurment system	30-31
Sangha True Bench Comprator	32-33
Sangha Heavy Duty Dial Gauge Stand	34-35
Sangha Force Gauge	36-37
Sangha Multi Shaft gauging system	38
Sangha Customised Specified Project	39
Sangha Portable Hardness Tester	40-41
Sangha Portable durometer	42
Sangha Chamfer Gauge	43
Flexbar Reprorubber	44-45
Flexbar Surface Measurement system	46-47
Investment Casting	48

**TRIGABORE HANDLE
6-16MM**



**TRIGABORE HANDLE
16-200MM**



**TRUEBORE HANDLE
6-16MM**



**TRUEBORE HANDLE
16-200MM**



Sangha Metrology bore gauging system has 2 types of handle

- 1) Trigabore pistol grip Handle
- 2) Truebore lever type Handle.

Both types can be used with entire range of heads, special and standard. It is not required to have both types to use Sangha heads.

There are 2 handles in each style one for 6-16 range and another for 16-200 range.



Trigabore

is the result of over 30 years of design and manufacture of 3 point bore gauging systems.

Ideal for solving internal diameter measurement problems on the shop floor and inspection areas, the system is available in a large measuring range for specific applications. Mechanical and electronic dial gauges as well as linear probes can be specified.

Ergonomic, self-centering system provides for easy and accurate measurement of internal diameters.

MAIN FEATURES

True-bore heads have a large measuring range and are supplied with fixed anvils eliminating operator error.

24 Heads cover 6-200mm (0.236"-7.870") Range

Unique system design requires only two handles to accommodate the entire range of 24 heads.

Extensions available for increased gauging depths.

Repeatability (0.002mm) (0.0001") 0.0001mm Resdial
Gauges also available.

High degree of accuracy can be achieved without the need for special skills.

Customer can specify type of indicator and add wireless measurement system or cable Connections to PCs for data logging for records & SPC applications. Bluetooth

Ideally suited to simple or integrated measurement applications.

Ergonomically designed handle offers single handed operation.

Accurate calibration and linearity checks can also be made using Sangha Metrology calibrated ring gauges.

True-Cal System for 3-Point Bore Gauge calibration can also be used.

TRUE BORE

Lever
Style Bore Gauge
Handles can
be used with
entire range of
Truebore 3-Point
Bore Gauge Heads.
Ideal for use in
vertical gauging
applications.



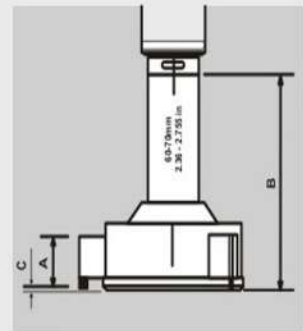
Triga-bore head
& True-bore head
system suitable
for mm/inch
measurements

True-bore 3-point Bore Gauge Heads and Master Setting Rings

CODE	HEAD SIZE	RANGE	LINE "A" CONTACT	HEAD "B" LENGTH	REPEATABILITY	HEAD ACCURACY	CODE	RING SIZE
	MM	MM	MM	MM	MM	MM		MM
670608	6-8	2	2.5	60	.002	.003	690080	8.00
670810	8-10	2	3	60	.002	.003		
671013	10-13	3	3.5	60	.002	.003	690130	13.00
671316	13-16	3	6	60	.002	.003		
671620	16-20	4	7.5	60	.002	.003	690200	20.00
672026	20-26	6	10	60	.002	.003		
672632	26-32	6	10	60	.002	.003	690320	32.00
673240	32-40	8	12.5	70	.002	.004		
674050	40-50	10	15.5	70	.002	.004	690500	50.00
675060	50-60	10	15.5	70	.002	.004		
676070	60-70	10	15.5	70	.002	.004	690700	70.00
677080	70-80	10	15.5	70	.002	.004		
678090	80-90	10	15.5	70	.002	.004	690900	90.00
679010	90-100	10	15.5	70	.002	.004		
671011	100-110	10	19.5	70	.002	.004	691100	110.00
671112	110-120	10	19.5	70	.002	.004		
671213	120-130	10	19.5	70	.002	.004	691300	130.00
671314	130-140	10	19.5	70	.002	.004		
671415	140-150	10	19.5	70	.002	.004	691500	150.00
671516	150-160	10	19.5	70	.002	.004		
671617	160-170	10	23	70	.002	.005	691700	170.00
671718	170-180	10	23	70	.002	.005		
671819	180-190	10	23	70	.002	.005	691900	190.00
671920	190-200	10	23	70	.002	.005		

ALL TRUEBORE HEADS ARE INTERCHANGEABLE WITH TRIGABORE SYSTEM

HEAD RANGE	C
MM	MM
6-10	1.5
10-16	2.0
16-200	0.50



Carbide contact points are standard for all heads above 10 mm

Optional Extensions (For longer measuring depths)

CODE	HEAD RANGE	STANDARD LENGTH
	MM	MM
EXT - 0610	6 - 10	100
EXT - 1016	10 - 16	100
EXT - 1620	16 - 20	100
EXT - 2040	20 - 40	150
EXT - 2620	26 - 200	150

COMPLETE TRIGABORE/TRUE-BORE SETS INCLUDE

CODE	CODE	SET INCLUDES	SET RANGE
TRUE-BORE	TRIGA-BORE		MM
710616	700616	4 HEADS, HANDLE, 2 EXT, 2 RINGS	6-16
711640	701640	4 HEADS, HANDLE, 2 EXT, 2 RINGS	16-40
714060	704060	2 HEADS, HANDLE, 1 EXT, 1 RING	40-60
716080	706080	2 HEADS, HANDLE, 1 EXT, 1 RING	60-80
718010	708010	2 HEADS, HANDLE, 1 EXT, 1 RING	80-100

The above table shows all standard ranges that are available from Sangha Metrology. This includes the sets supplied in carry cases. A large number of non standard range of heads are manufactured as per customer requirements. Various ranges of boxed sets are shown and any special requirements can also be considered.

Extensions are available for larger depths of measurement. More than one extension may be used to give desired range. We can advise what depths are possible for various diameters.



SANGHA



Mitutoyo



SYLVAC



Many makes of dial gauges are available. The most important are Mitutoyo, Sylvac and Sangha Brand. The gauges need to be Presetable to initial ring gauge value. The resolution needs to be 0.001 mm minimum to get best results. The dial gauges on the markit have many features including Blue Tooth for remote data transfer. There are gauges with 0.0001 mm resolution also. These can virtually illiminate digitizing error when compared to 0.001 mm resolution. Typicly the accuracy of digital dial gauge is around 3-5 microns, however bench mounted units such as Heidenhein,Sylvac systems can supply transducers with Accuracy of +/- 0.001 mm. For more critical applications it may be useful to consider these.

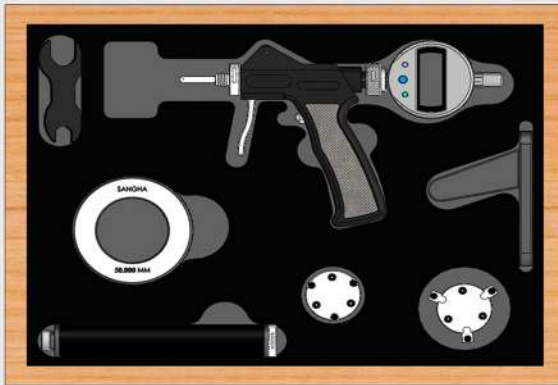
TRIGABORE BOXED SETS



700616 SET 6-16MM



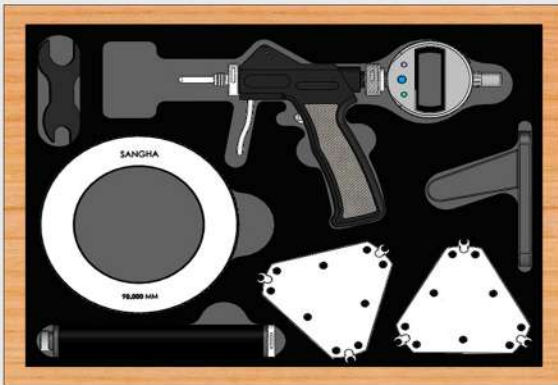
701640 SET 16-40MM



704060 SET 40-60MM



706080 SET 60-80MM



708010 SET 80-100MM



**TYPICAL RING BOXES FOR SIZES
110,130,150,170,190**

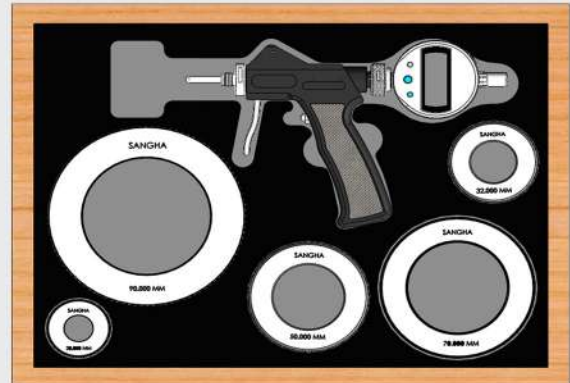
In the standard boxed sets only trigabore handle sets are shown. Truebore handle sets are also available in same configuration as with Trigabore.

Individual heads and Handles are also available according to customer needs. Sets may also be ordered without rings and Dial Indicators.

TRIGA BORE BOXED SETS



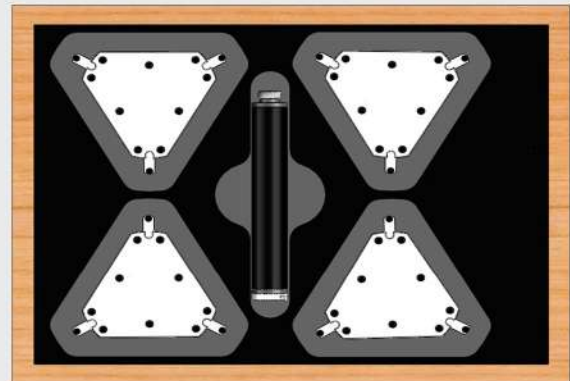
701610 SET 16-100MM HEADS



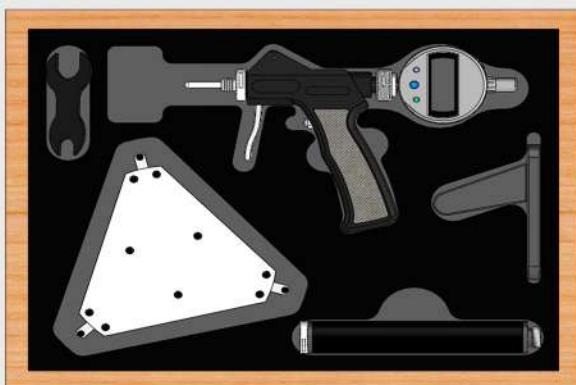
701610 SET-RING AND TRIGABORE HANDLE



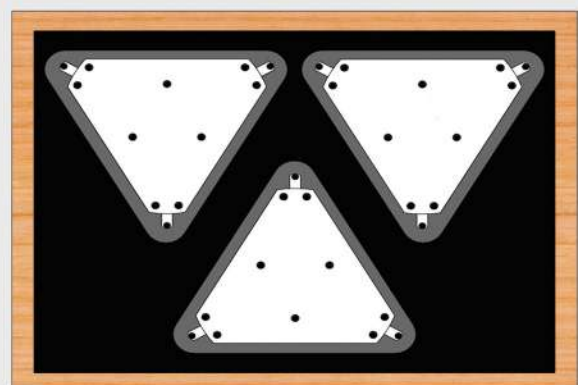
700020 SET 100-120MM



702010 SET 120-160MM HEADS



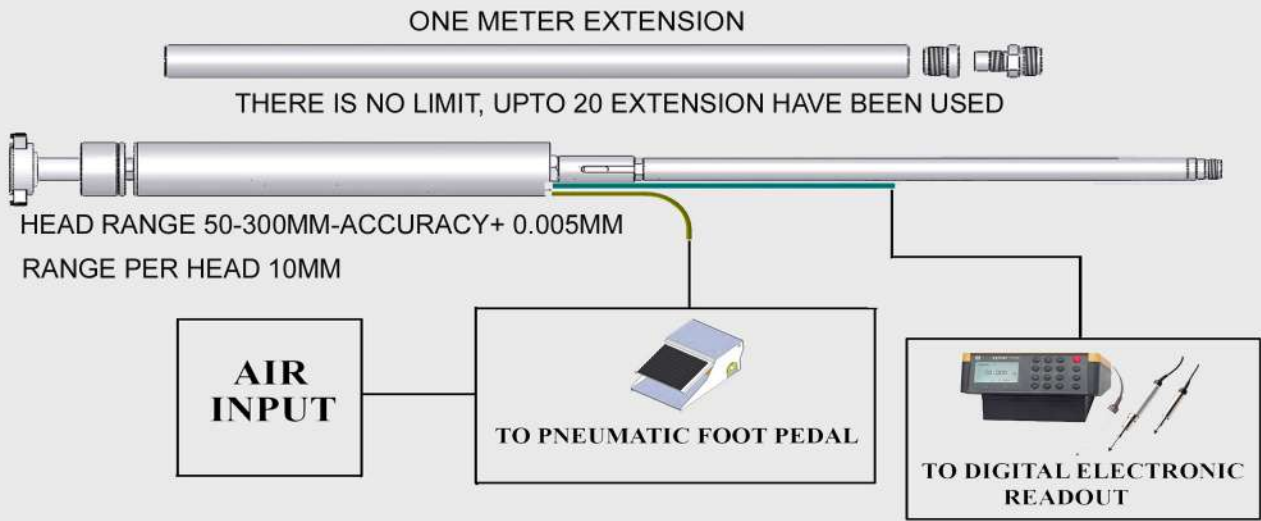
706070 SET 160-170MM



707020 SET 170-200MM HEADS

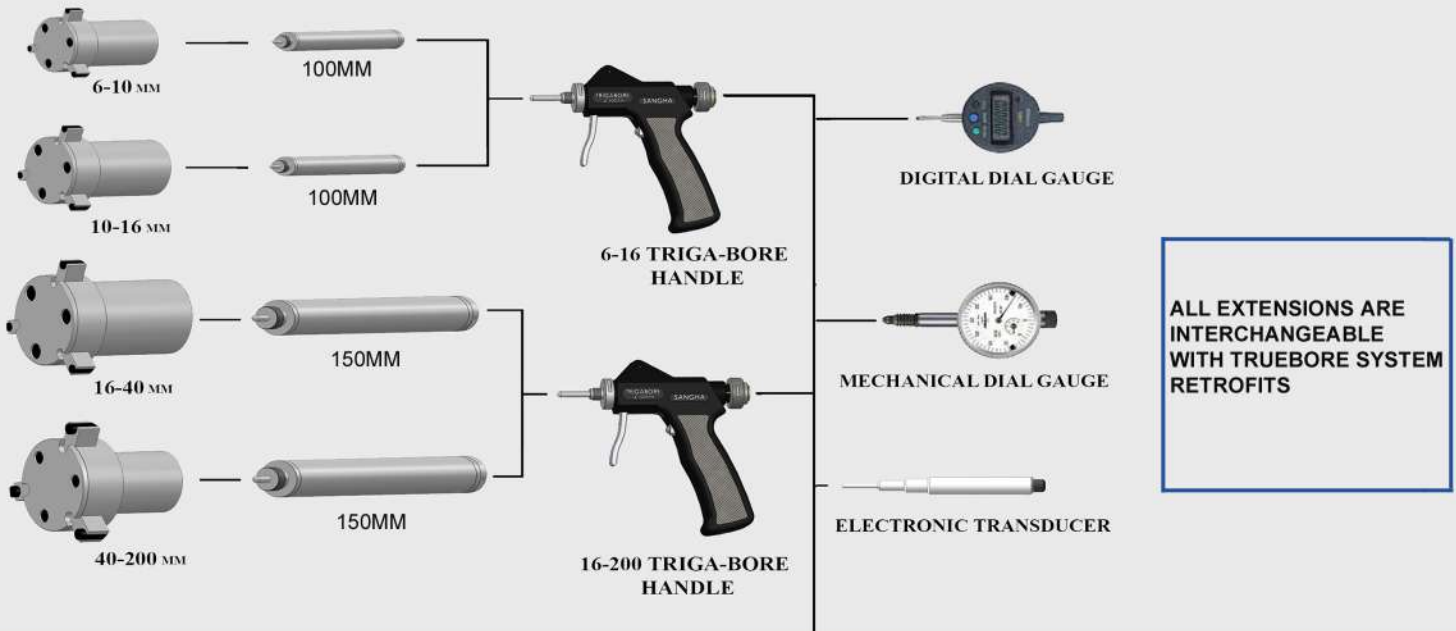
When ordering sets, rings, Dial gauges are included in the box. However for sizes above 100 mm, the rings are supplied in individual boxes. The ring sizes are too large to be included with the boxed sets as for the sets below 100 mm. Rings and Dial Gauges can be sourced by the Customer. Only one Handle 6-16mm & 16 200mm are needed to cover full range

ULTIMATE DEEP HOLE MEASURING SYSTEM



A pneumatic actuator and anvil heads with suitable spherical contact points, long range electronic transducer plus reading unit makes this the ultimate deep hole measuring system available. Extensions are 1 meter long and there is no limit as to how deep you can go. On an application up to 20 extensions have been used. This device is suitable for long precision honed cylinders and gun barrels of any size from 50 mm to 300 mm. The transducer being near to the measuring point helps with the temperature fluctuations in factory or in field.

Air pipe has to go into the hole along with the transducer cable. New generation of measuring devices can offer Bluetooth type of remote sensing which makes this system even more operator friendly.



Four standard extensions are available with lengths as shown Extensions can be joined together for greater lengths. Special long length Extensions up to one meter length can be provided as specials. For deep holes spherical contact points are recommended.

Extensions are fully interchangeable with Trubore system and Retrofit applications.

SANGHA METROLOGY

SANGHA BUILDING, BLANCHE STREET, BRADFORD,
BD4 8DA, ENGLAND
TEL : 44 (01274) 667785 FAX : 44 (01274) 662523
e-mail : sales@sanghametrology.com
website : www.sanghametrology.com

Special Application Gauge Heads



Special Application Gauge Heads

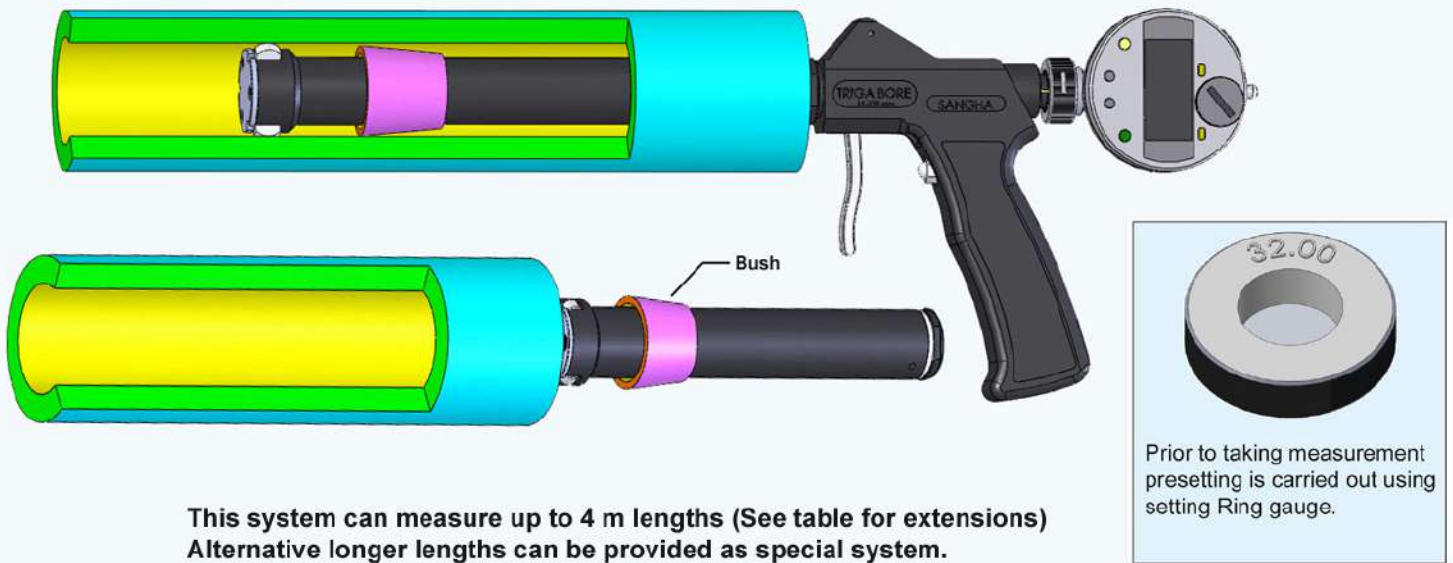
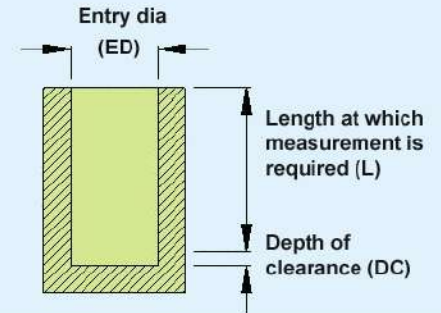
Quickly & Accurately measure most internal Threads, Grooves, Splines, Slot and Tapper Bores.
Available in measuring ranges : Diameter from 8 mm to 200 mm.

DESIGN NOTES DEEP HOLE MEASUREMENT

To design the Anvil head for Deep Hole measurement, the following information is required:

How to understand

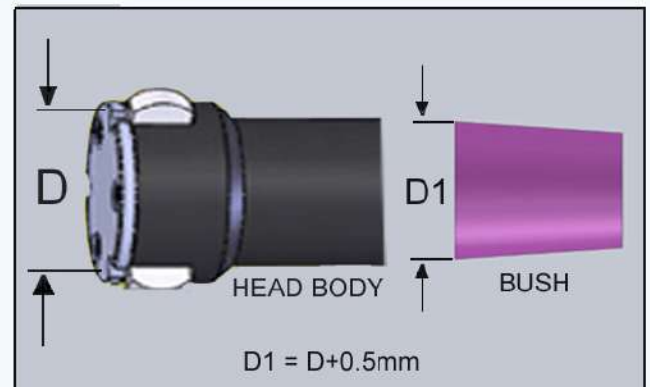
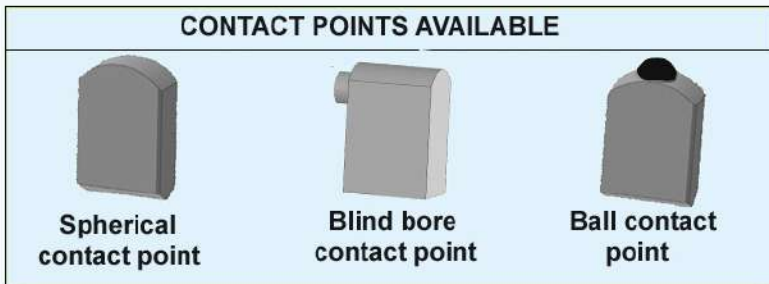
- ED** : Smallest dia through which the given head has to pass
- L** : Length at which measurement is req. (Add extension if required)
- DC** : Depth of clearance for Cover plate (If there is no Bottom or Head clearance, extra special Anvil Design can be provided)



The purpose of the Bush is to protect the Anvils when sliding through deep holes. For normal applications this bush is not required. When measuring deep holes user should ensure the alignment of Gauge axis and

Bore axis. For measuring deep holes Spherical contact points are preferred because they allow certain amount of deviation in Gauge axis without affecting accuracy.

For measuring less deep holes, standard contact points can be used.



Please fill in the following information for Quotations:

Contact Name :
 Company :
 Country :
 E-mail :
 URL :
 Tel No. :
 Fax No. :

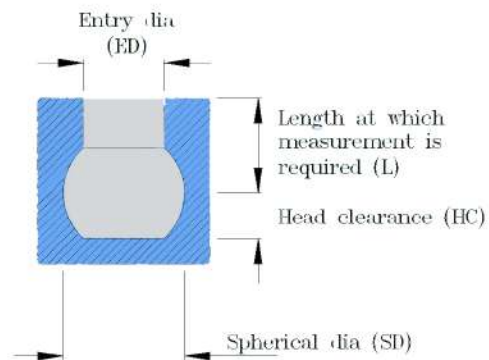
Parameter	Size	
	mm	inch
ED		
L		
DC		

DESIGN NOTES SPHERICAL DIAMETER MEASUREMENT

To design the Anvil head for Spherical Diameter measurement, the following information is required:

How to understand

- SD** : Spherical diameter to be measured
- ED** : Smallest dia through which the given head has to pass
- L** : Length at which measurement is req. (Add extension if required)
- HC** : Dia of bottom clearance (If there is no Bottom or Head clearance, extra special Anvil Design can be provided)



APPLICATION LIMITATION:

SD - ED ≤ HEAD RANGE : SEE TABLE



RECOMMENDATION : Three point system is recommended. Two point system also available as an option.
For standard measuring lengths : See Table
More than one extension can be used. For extension lengths available : See Table

CONTACT POINT AVAILABLE	
	
Spherical Contact point	Ball contact point

Please fill in the following information for Quotations:

Contact Name :
 Company :
 Country :
 E-mail :
 URL :
 Tel. No. :
 Fax No. :

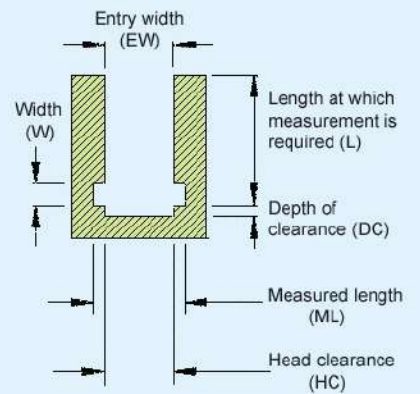
Parameter	Size	
	mm	inch
SD		
ED		
L		
HC		

DESIGN NOTE SLOT MEASUREMENT

To design the Anvil head for Slot measurement, the following information is required:

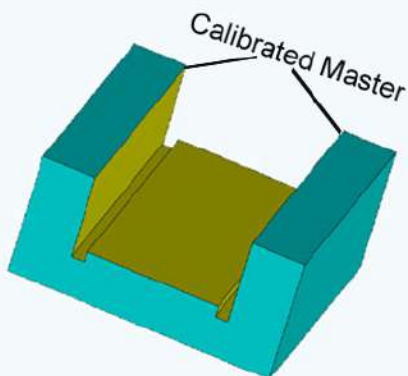
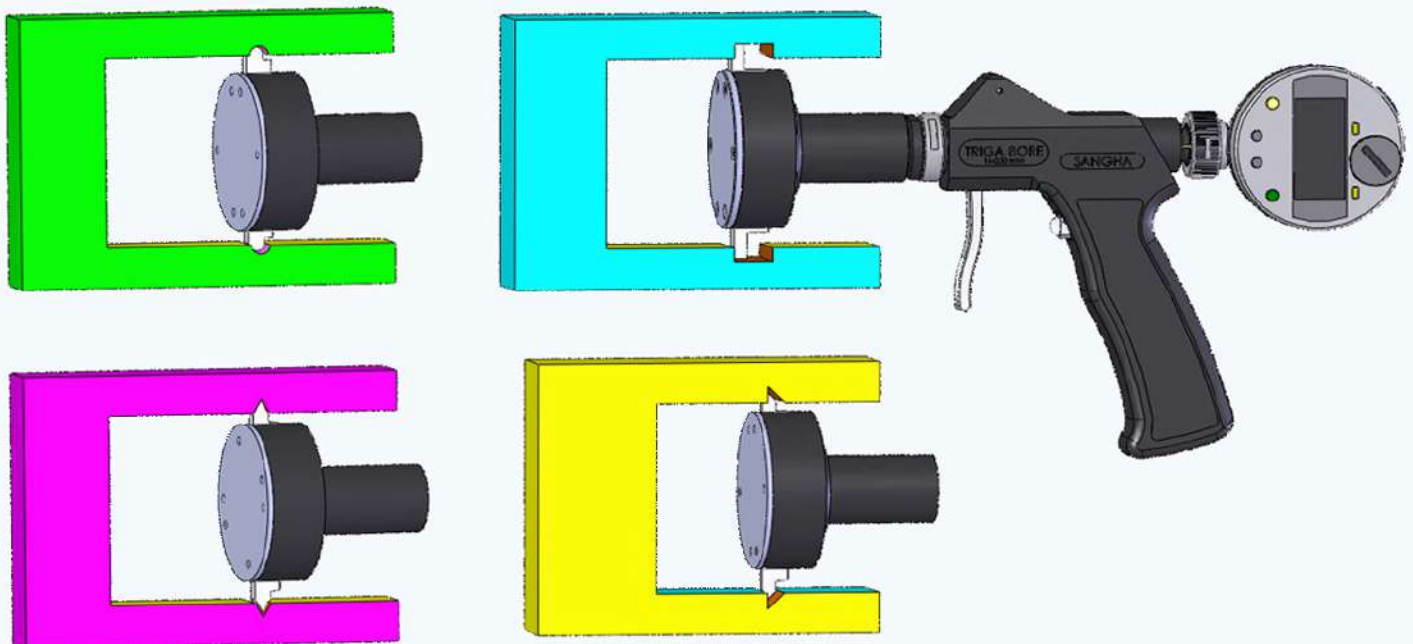
How to understand

- ML** : Length of slot to be measured
- EW** : Smallest width through which the given head has to pass
- W** : Width of slot
- L** : Length at which measurement is req. (Add extension if required)
- DC** : Depth of clearance for cover plate
- HC** : Head clearance (If there is no bottom or Head clearance, extra special Anvil design can be provided)



APPLICATION LIMITATION:

$EW - ML \leq \text{HEAD RANGE}$: SEE TABLE



Preset to know master prior to taking measurement

Type of Slot		
A	B	C
Plain Slot	Recess Slot	Special shape Slot (Profile dwg. required)

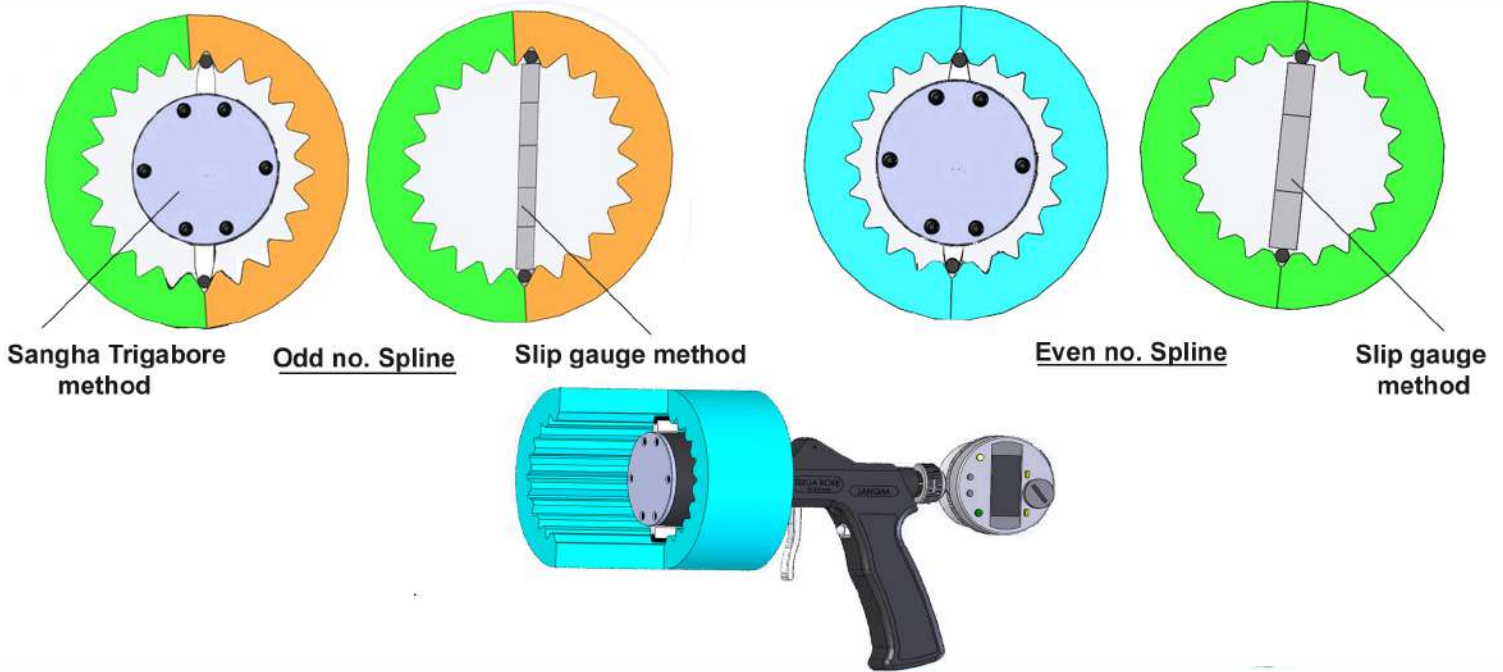
Please fill in the following information for Quotations:

Contact Name	:	.....
Company	:	.....
Country	:	.....
E-mail	:	.....
URL	:	.....
Tel. No.	:	.....
Fax No.	:	.....

Parameter	Size		Type of Slot (A/B/C)
	mm	inch	
ML			
EW			
W			
L			
DC			
HC			

DESIGN NOTES SPLINE MEASUREMENT

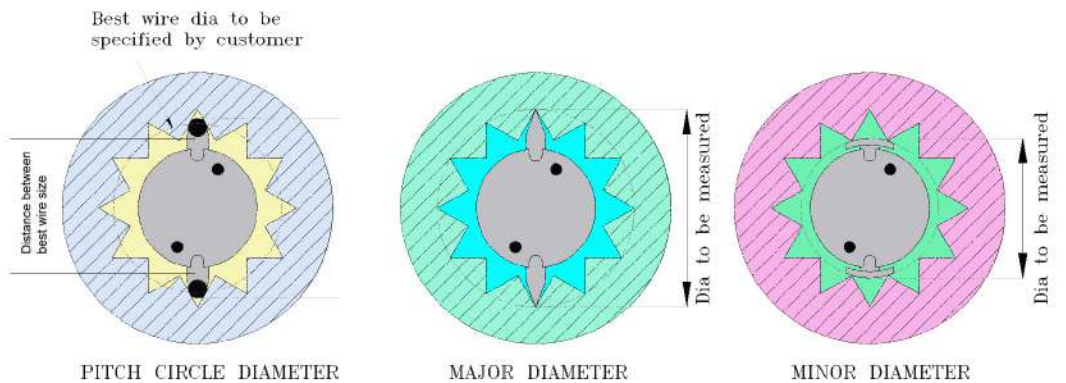
To design the Anvil head for Spline measurement, the following information is required:



CONTACT POINTS REQUIRED FOR SPLINE MEASUREMENT



INFORMATION REQUIRED: Profile drawing of the Spline to be measured with full design details including no. of teeth in the spline.



Please fill in the following information for Quotations:

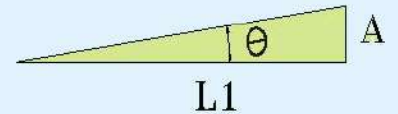
Contact Name :
 Company :
 Country :
 E-mail :
 URL :
 Tel No. :
 Fax No. :

Parameter	Size	
	mm	inch
Best wire size		
Distance between pin		
Minor dia		
Pitch dia		
Measure dia		

To design the Anvil head for Taper measurement, the following information is required:

How to Understand

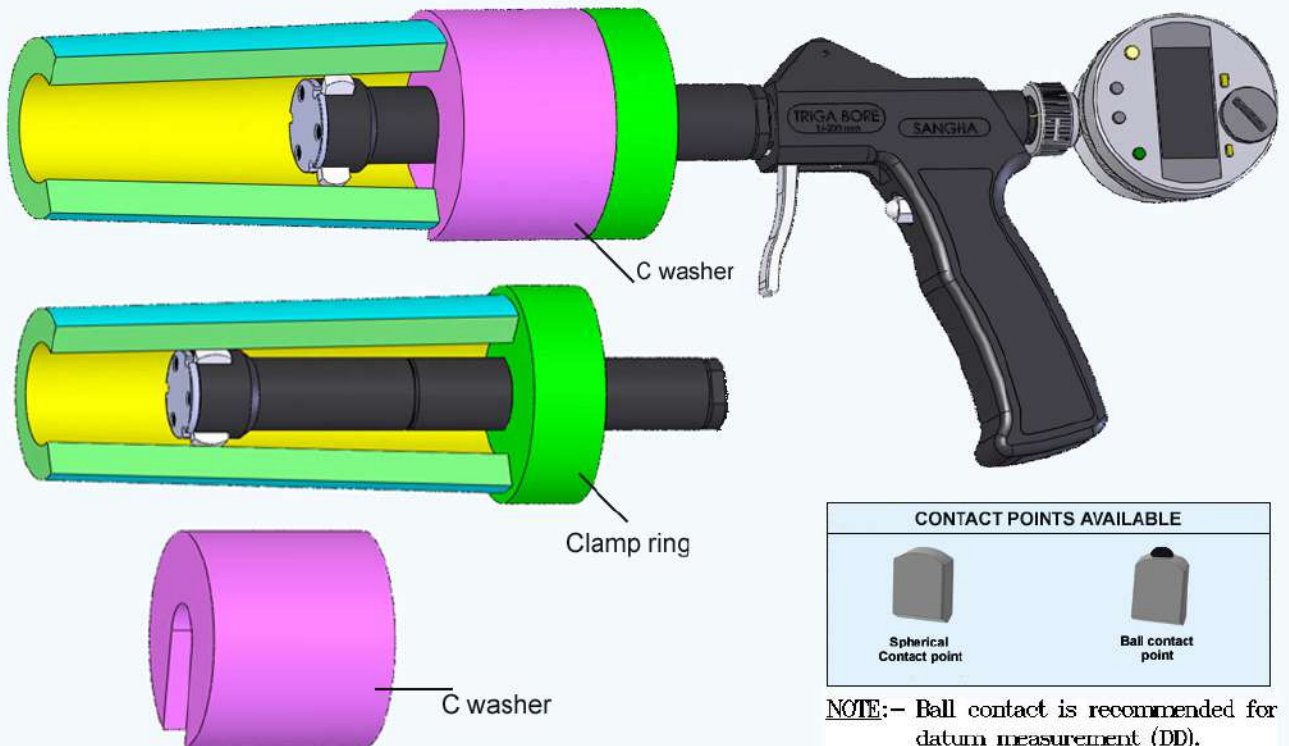
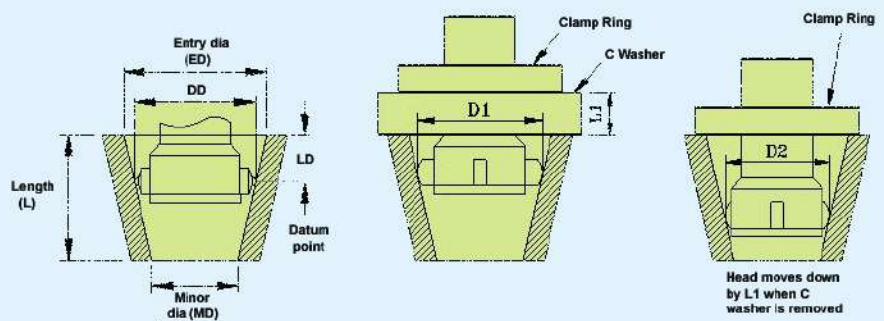
- ED** : Entry diameter of the component.
- MD** : Minor diameter of the component
- L** : Length of the component
- LD** : Length of datum point
- DD** : Datum point diameter



here

$$A = (D1 - D2) / 2$$

Taper angle can be calculated as: $\tan(\theta) = (A/L1)$



NOTE:- Ball contact is recommended for datum measurement (DD).

Please fill in the following information for Quotations:

Contact Name	.....
Company	.....
Country	.....
E-mail	.....
URL	.....
Tel. No.	.....
Fax No.	.....

Parameter	Size	
	mm	inch
ED		
MD		
L		
LD		
DD		

DESIGN NOTES 'O' RING GROOVE MEASUREMENT

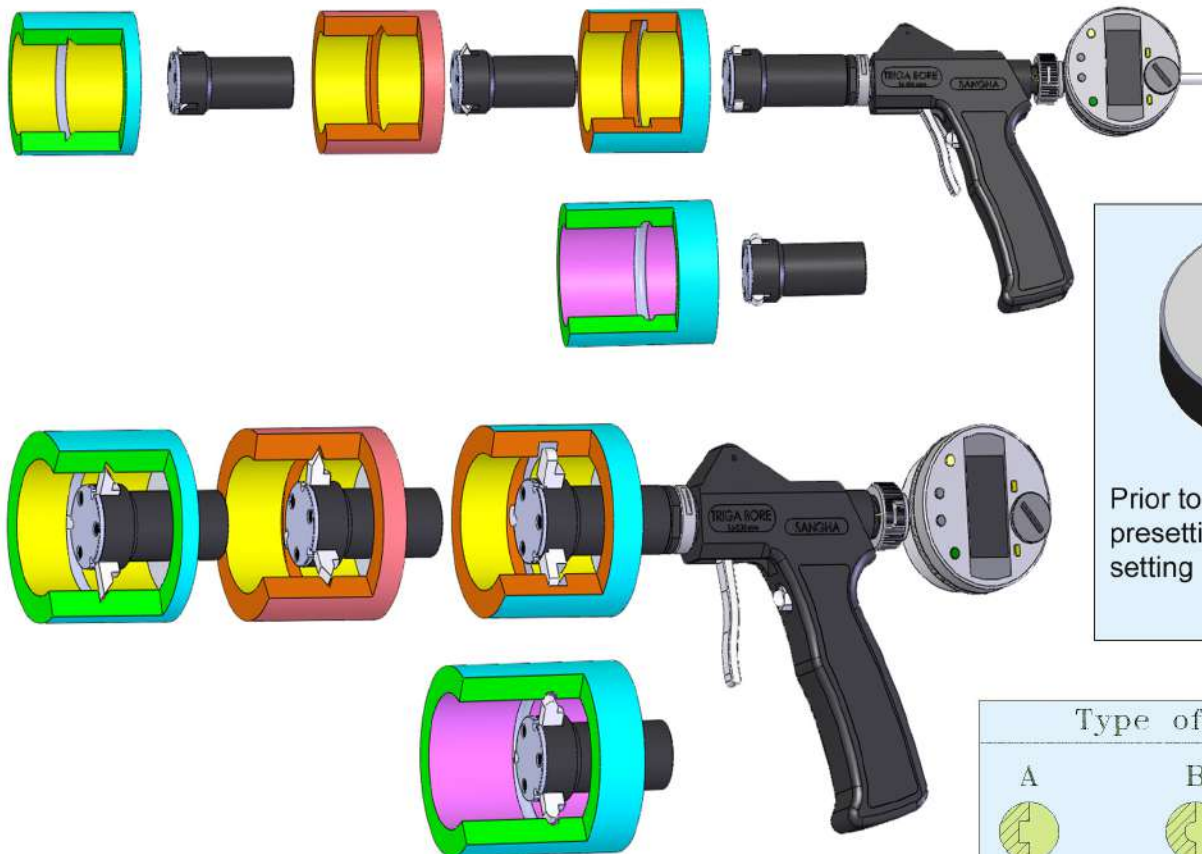
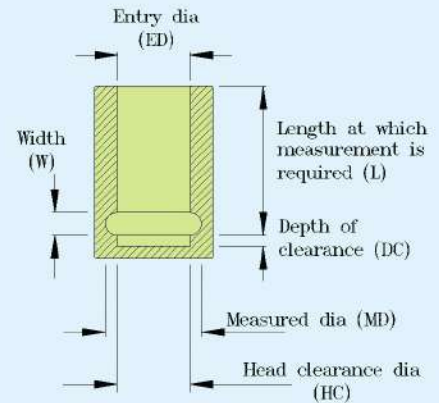
To design the Anvil head for 'O' Ring Groove measurement, the following information is required:

How to understand




- MD** : Dia to be measured
- ED** : Smallest dia through which the given head has to pass
- W** : Width of 'O' ring groove
- L** : Length at which measurement is req. (Add extension if required)
- DC** : Depth of clearance for Cover plate
- HC** : Dia of bottom clearance (If there is no Bottom or Head clearance, extra special Anvil Design can be provided)

APPLICATION LIMITATION:

MD - ED ≤ HEAD RANGE : SEE TABLE



Prior to taking measurement presetting is carried out using setting Ring gauge.

Type of Groove		
A 	B 	C 
Square Groove	Radius Groove	Special shape Groove (Profile dwg. required)

Please fill in the following information for Quotations:

Contact Name :
 Company :
 Country :
 E-mail :
 URL :
 Tel. No. :
 Fax No. :

Parameter	Size		Type of Groove (A/B/C)
	mm	inch	
MD			
ED			
W			
L			
DC			
HC			

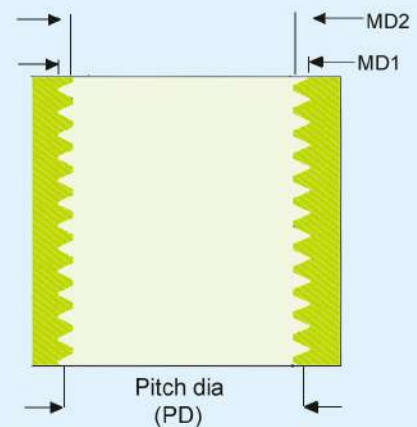
To design the Anvil head for Thread measurement, the following information is required:

How to understand

- MD1: Major diameter of the thread
- MD2: Minor diameter of the thread
- PD : Pitch diameter of the thread
- T : Type of thread
- P : Pitch of thread
- DT : Depth of thread
- LH : Left hand
- RH : Right hand

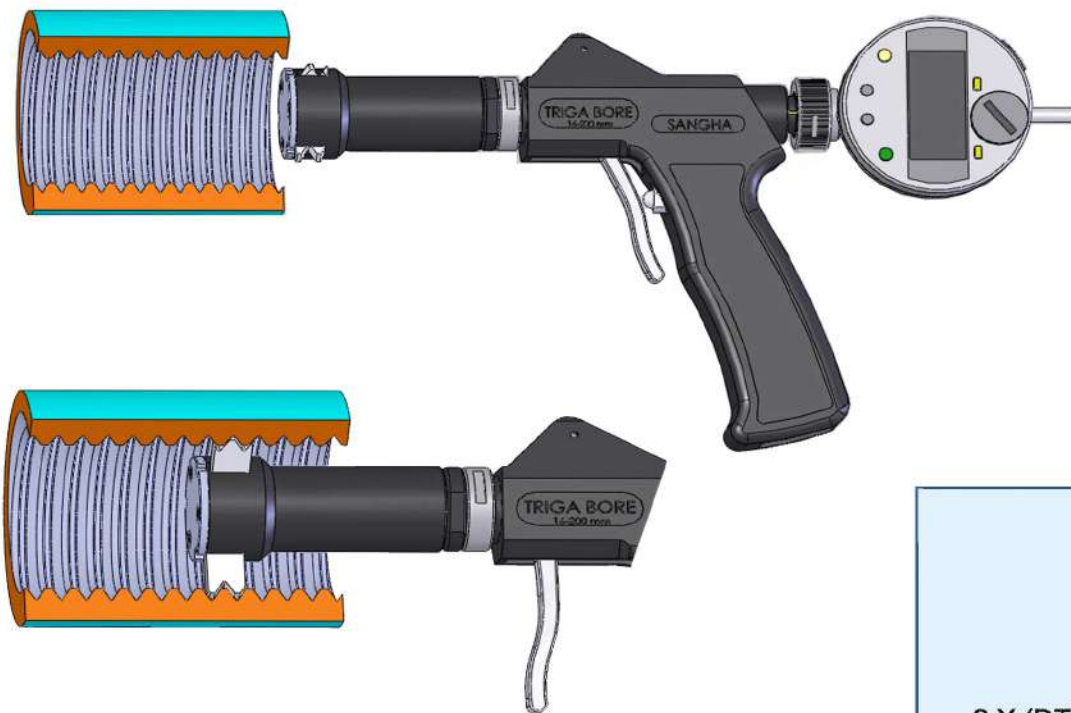
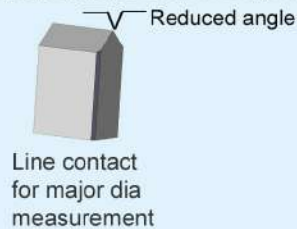
APPLICATION LIMITATION:

MD1 - MD2 ≤ HEAD RANGE : SEE TABLE

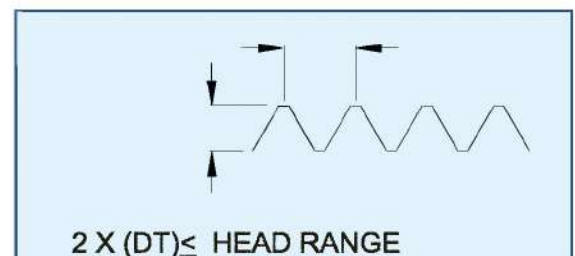


Instrument is preset to pitch circle diameter from a, **MASTER CALIBRATED THREAD RING GAUGE**

CONTACT POINTS REQUIRED FOR THREAD MEASUREMENT



THREAD FORM	
A	Metric
B	UN
C	Whit worth
LH	Left hand
RH	Right hand



Please fill in the following information for Quotations:

Contact Name :
 Company :
 Country :
 E-mail :
 URL :
 Tel. No. :
 Fax No. :

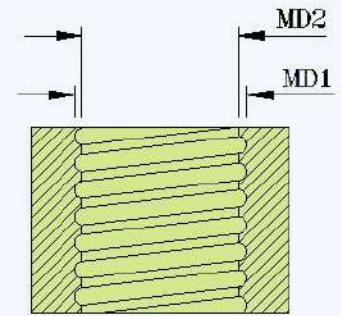
Parameter	Size		Type of Thread (A/B/C)
	mm	inch	
MD1			
MD2			
PD			
P			
DT			

DESIGN NOTES BALL SCREW THREAD MEASUREMENT

To design the Anvil head for Ball screw thread measurement, the following information is required:

How to understand

- MD1** : Major diameter of the thread
- MD2** : Minor diameter of the thread (can be gauged by using standard three point heads)
- P** : Pitch of thread
- DT** : Depth of thread
- BD** : Ball diameter
- LH** : Left hand
- RH** : Right hand



APPLICATION LIMITATION:

MD1-MD2 ≤ HEAD RANGE : SEE TABLE

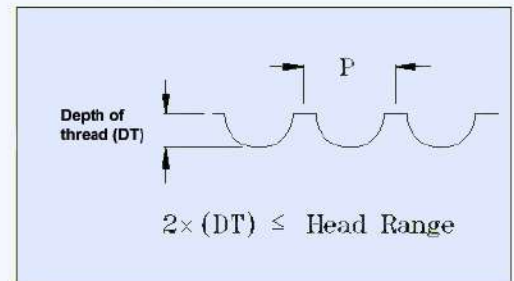
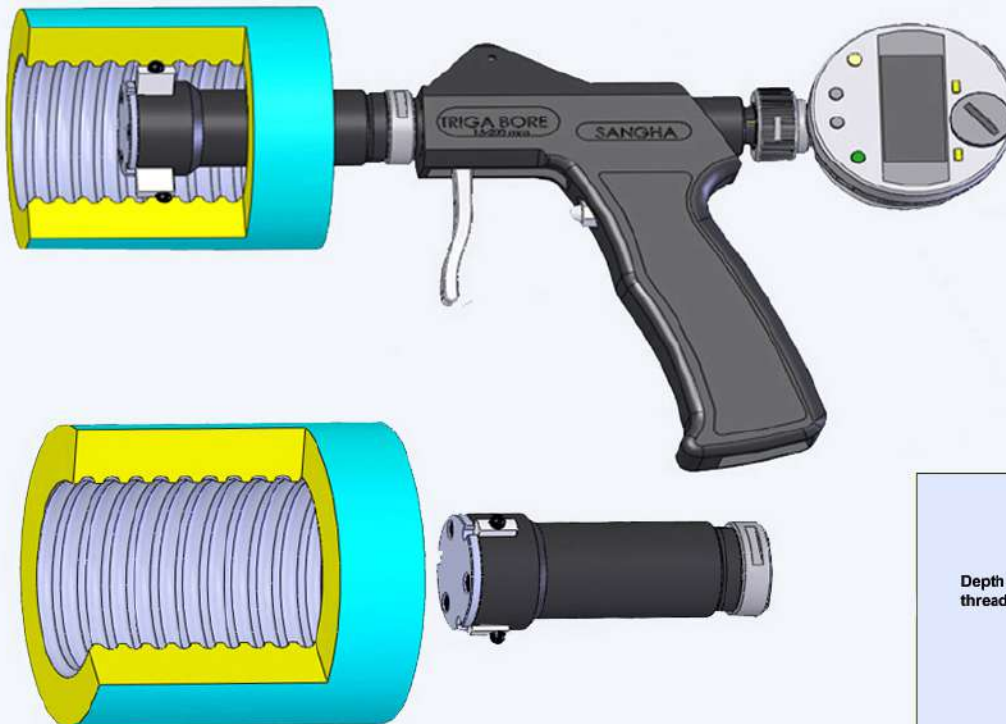
CONTACT POINTS REQUIRED FOR BALL SCREW THREAD MEASUREMENT



Two Ball contact



Three Ball contact



Please fill in the following information for Quotations:

Contact Name :
Company :
Country :
E-mail :
URL :
Tel. No. :
Fax No. :

Parameter	Size		Pitch P	Thread profile details
	mm	inch		
MD1				
MD2				
P				
BD				
LH/RH				



**TRUECAL CALIBRATION CAN BE USED
TO CALIBRATE ANY 3 POINT MICROMETER
WITH CONTACT POINTS AT 120° FROM 16-200MM**



Truecal from Sangha Metrology is a unique calibration system for Three Point Bore gauge and Micrometers. This system provides more comprehensive results than by using ring gauge method. The cost reduction from ring method is additional advantage.

This system was first brought into the market some 30 years ago many Laboratories and organisation have now used this to solve the problem of Calibrating Three point bore gauges.

**SANGHA METROLOGY
TRUE CAL SYSTEM**

**GENERAL DESCRIPTION OF THE
TRUE CAL UNIT**



TRUE CAL UNIT



60° SETTING MASTER



RING GAUGE

THE TRUE-CAL SYSTEM

True-Cal is an innovative solution to the problems presented by the accurate calibration of 3 point bore gauge micrometers. Any micrometer (from 16-200mm) can be calibrated on a single unit, and the True-Cal method dispenses with the need for large numbers of settings rings and provides more comprehensive results.

OPERATIONS

The True-Cal system relies on the use of slip gauges with an optional electronic transducer output. Operation is quick and simple, and requires no specialist skills.

LINEARITY CHECK

Conventional ring gauge methods do not give comprehensive indications of linearity. True-Cal allows the gauge to be checked at any point on the range of the gauge being inspected.

TRACEABILITY

True-Cal measurement are traceable through the slip gauges used and the certification of the angular setting block.

COST SAVINGS

True-Cal simplifies gauge management by dispensing with the need for costly ring gauges and their periodic calibration. This reduces costs in both the long and short term.

GEOMETRICAL PRINCIPLE

True-Cal based on the 60° included angle principle (See fig. 1).

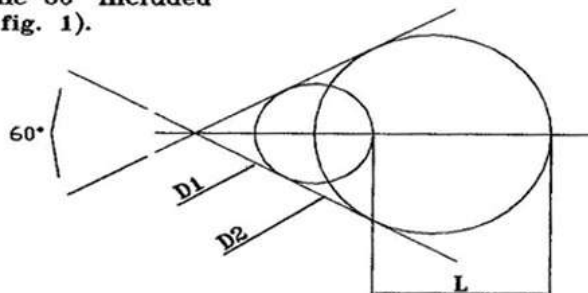


Fig. 1

$$D2 - D1 = L / 1.5$$

**SANGHA METROLOGY
TRUE CAL SYSTEM**

**METHOD OF OPERATION FOR THE
TRUE CAL UNIT**

GENERAL NOTES

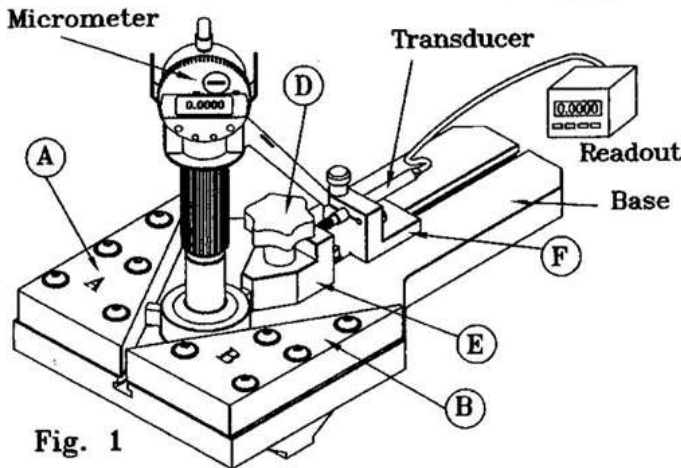


Fig. 1

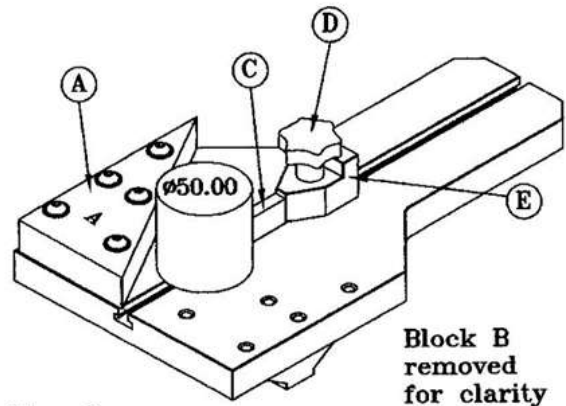


Fig. 2

Method of Operation

- (1) Set the micrometer in the setting ring gauge and set to nominal zero as shown in Fig. 3.
- (2) Locate the three point gauge on the calibrator between sides A & B and slip block C with sliding anvil E clamped in position by knob D (the size of slip block C is selected according to the range of instrument being calibrated).

i.e. 20mm for all ranges within 0-10mm
40mm for all ranges up to 25mm

- (3) Move the sliding anvil with slip block in position to generate the circle diameter equal to nominal bottom point on the range of the micrometer being calibrated. (Refer Fig. 1)

This can also be set by use of cylindrical block with nominal dia equal to the bottom end range of the head. See Fig. 2 and Fig. 4

- (4) When taking readings search for smallest value (up to 15 minutes practice is needed to achieve this with confidence).

Adjust the position of slider anvil E as necessary.

- (5) When nominal value of the lowest point is achieved clamp slider E firmly in position and set micrometer to nominal zero. (Refer Fig. 1)

- (6) Repeat measurement to ensure that the instrument reads zero within the repeatability of the system (overall .002mm with .001mm resolution). Reset micrometer to zero if necessary.

- (7) To take subsequent measurements on the range of the instrument, simply reduce the size of slip block C. For example if slip block is reduced by 15mm the increase in new ring generated size is equal to 15mm divided by 1.5 which equals 10mm.

- (8) To obtain 1mm step on the range of micrometer being calibrated the slip block size is reduced by 1.5mm, by using factor 1.5 any point on the range of the instrument can be checked.

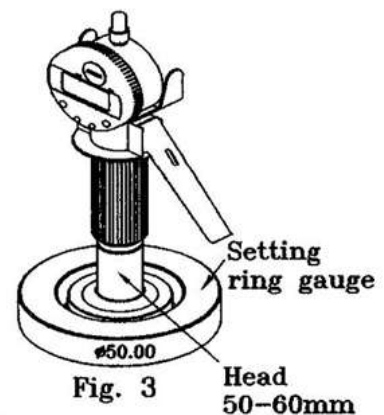


Fig. 3

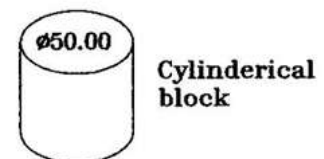


Fig. 4

**SANGHA METROLOGY
TRUE CAL SYSTEM**

**TRANSDUCER METHOD OF CALIBRATION FOR
THE THREE POINT BORE GAUGE**

CALIBRATION PROCEDURE

CONSIDER THE CALIBRATION OF 50-60mm HEAD.

USE THESE INSTRUCTIONS IN CONJUNCTION WITH INSTRUCTION SHEET REF25003 & GENERAL NOTES.

- (1) Transducer and digital readout system can be used as length standard for calibration of three point micrometer.

The range of transducer must be 1.5 times the range of the head.

i.e. 10mm head range will require $10 \times 1.5 = 15\text{mm}$ range of transducer.

& 25mm head range will require, $25 \times 1.5 = 38\text{mm}$ range of transducer.

- (2) When using the transducer method, the slip gauges used are of nominal value only and need not be calibrated.

Slip gauges are primarily used for conveniently locating positions on which calibration is to be carried out.

- (3) To obtain calibration point, the R_o (readout reading) is divided by 1.5 ($R_o/1.5$) each time to calculate R_2 . R_2 is reading at calibration point.

- (4) Deviation is calculated from $R_2 - R_1$.

- (5) After setting up zero point, the subsequent readings are taken by reducing the size of Slip block by suitable amount and Slider anvil is clamped in this position. Take micrometer readings (R_1) and repeat process. Refer table 2.

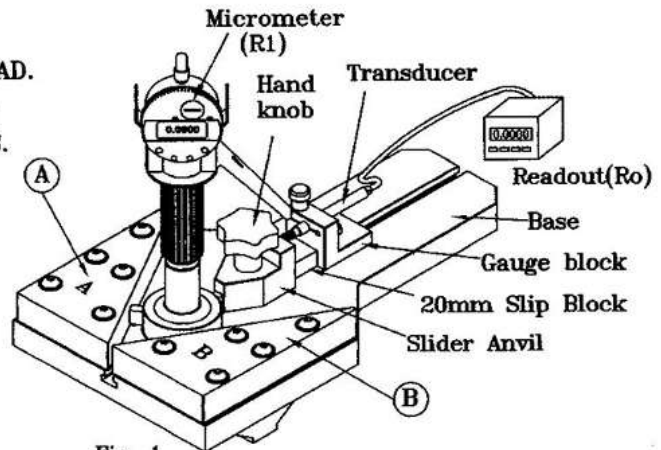


Fig. 1

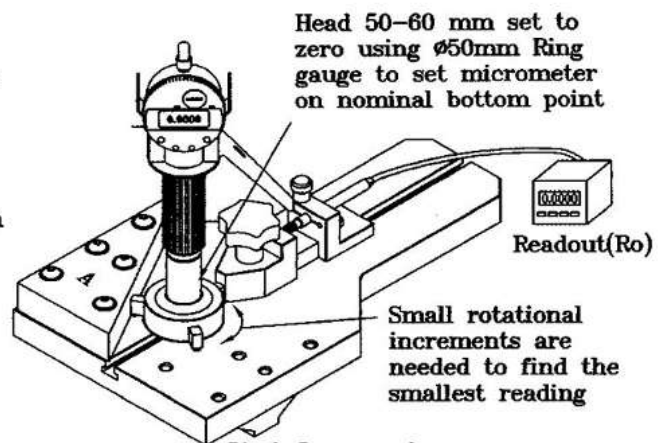


Fig. 2 Block B removed for clarity

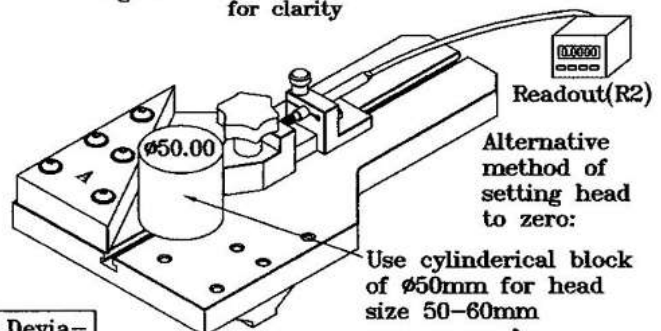


Fig. 3 Block B removed for clarity

TABLE 2 (All readings in mm)

Reading No.	Slip block size (Nominal)	Readout reading R_o	$\left(\frac{R_o}{1.5} = R_2\right)$	Micrometer reading R_1	Deviation $R_2 - R_1$
1	20	0.000	0.000	0.000	± 0.000
2	17				\pm
3	14				\pm
4	11				\pm
5	8				\pm
6	5				\pm

ISSUE NUMBER	ISSUE DATE	MODIFICATIONS	APP. BY
1	22/04/07	INFORMATION ISSUE	M.S.S
INSTRUCTION SHEET REF25004			1 OFF 1

**SANGHA METROLOGY
TRUE CAL SYSTEM**

**SLIP GAUGE METHOD OF CALIBRATION FOR
THE THREE POINT BORE GAUGE**

CALIBRATION PROCEDURE (Use this sheet in conjunction with GENERAL NOTES)

CONSIDER THE CALIBRATION OF 50-60mm HEAD.

- (1) Set Bore Gauge to nominal bottom point on range using ring gauge with nominal value at 50mm (bottom end of the range).

- (1A) Set the micrometer to nominal zero using 20mm Slip block as shown in fig. 1.

The nominal bottom point diameter of 50mm for 50-60mm Head can be achieved by using Ring gauge of $\phi 50\text{mm}$. This can also be achieved by using a cylindrical block whose nominal diameter is $\phi 50\text{mm}$. Cylinder of nominal value for each micrometer bottom point is required for this method. (See fig. 2 & fig. 3)

- (2) Decrease the size of Slip Block in steps of 3mm i.e. take the Slip blocks of sizes 20mm, 17mm, 14mm, 11mm, 8mm and 5mm. With 20mm Slip block, micrometer has been set to nominal zero. When 17mm Slip block is used, the micrometer should read 2mm. Record deviation from micrometer readings.

The increase in micrometer reading from nominal value is a function of the size of slip block:

$$\left[\begin{array}{l} \text{Increase in} \\ \text{micrometer} \\ \text{reading} \end{array} \right] = \left[\frac{\text{Decrease in slip block size}}{1.5} \right]$$

- (3) The readings of the micrometer for decreasing size of the Slip block is shown in Table 1.

The slip block size is selected according to the range of instrument being calibrated.

i.e. 20mm for all Head ranges within 0-10mm.

40mm for all Head ranges up to 25mm.

TABLE 1 (All readings in mm)

Reading No.	Slip block size (Calibrated)	Calibrated settings R2	Micrometer reading R1	Deviation (R2-R1)
1	20	0.000	0.000	± 0.000
2	17	2.000		\pm
3	14	4.000		\pm
4	11	6.000		\pm
5	8	8.000		\pm
6	5	10.000		\pm

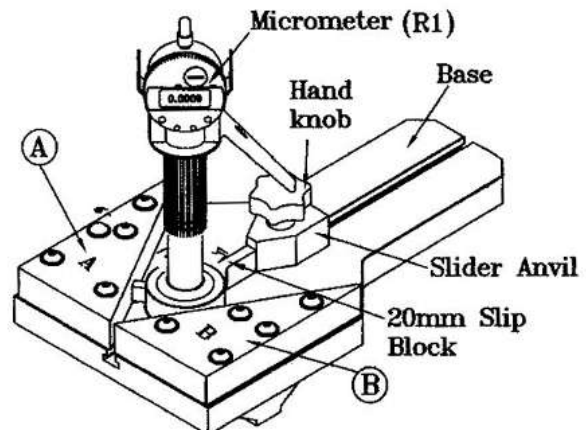


Fig. 1

Head 50-60 mm set to zero using $\phi 50\text{mm}$ Ring gauge to set micrometer on nominal bottom point

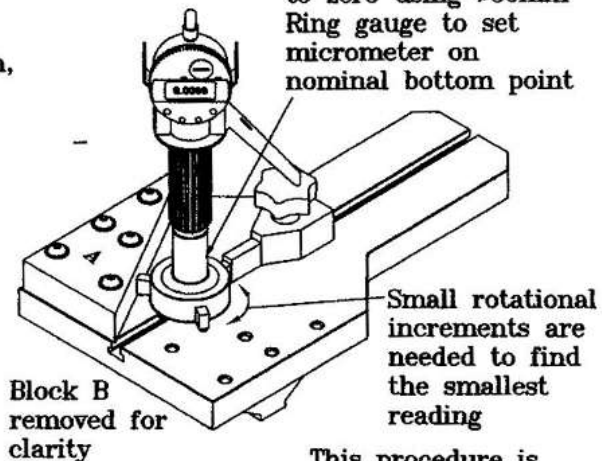


Fig. 2

This procedure is followed at each step of measurement

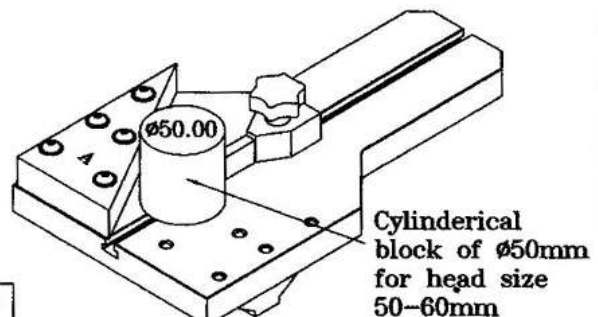


Fig. 3

1	22/04/07	INFORMATION ISSUE	M.S.S
ISSUE NUMBER	ISSUE DATE	MODIFICATIONS	APP. BY
INSTRUCTION SHEET REF25003			1 OFF 1

**SANGHA METROLOGY
TRUE CAL SYSTEM**

**CALIBRATION PROCEDURE FOR THE
TRUE CAL UNIT**

(1) CALIBRATE 60° SETTING MASTER

The certified Setting Master must be to the tolerance specified and 60° angle to be central to the pins. (See fig. 1)

Angle Setting Master Ref. No.	
Actual Measured Angle	

(2) SET THE TRUE CAL USING 60° SETTING MASTER

To align Angle blocks A & B, clamp the Setting master using clamp screw with matched set of slip gauges. Release the blocks A & B and press against slip gauges to align with the calibrated master & clamp setting master in this position. See fig. 2

The setting master will ensure that the Angle Blocks will align to the central axis of the True Cal.

All 4 matched Slip blocks must be tested for contact.

When set correctly, Angle blocks A & B will align to the setting master within $\pm 00^{\circ} 00' 05''$.

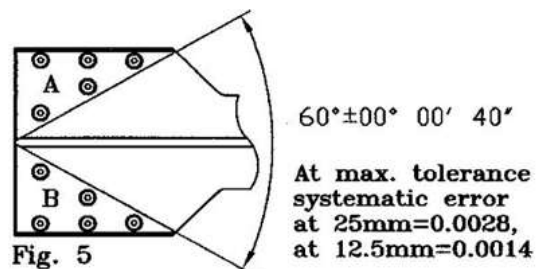
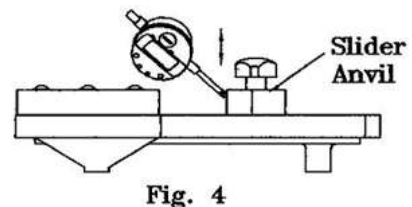
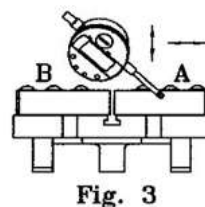
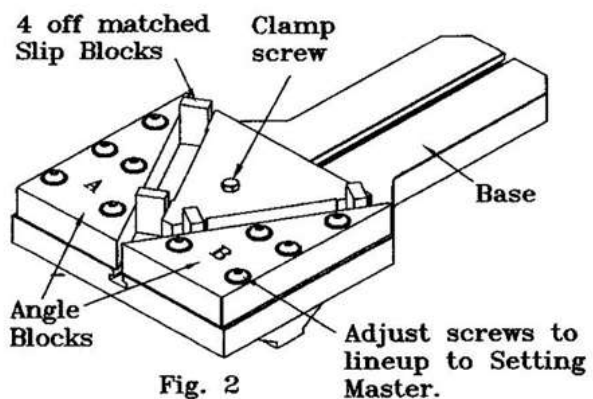
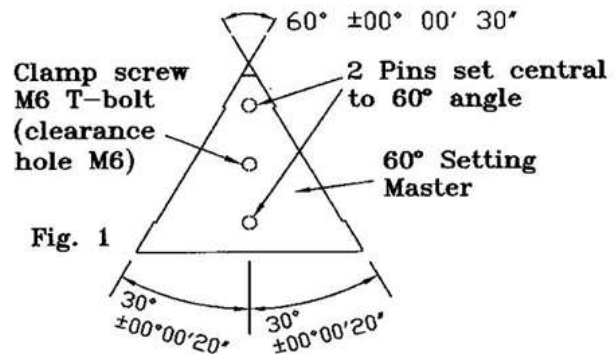
Squareness of Base to A, B & slider is calibrated to 0.004mm. (See fig. 3 & fig. 4)

Straightness of the Angle Blocks to be within 0.002mm/25mm length at any position on the faces.

TRUE CAL Ref. No.			
PARAMETER	SIDE A	SIDE B	SLIDER ANVIL
Straightness			N/A
Squareness			
A & B angle			

Angle of sides A and B calibrated to $60^{\circ} \pm 00^{\circ} 00' 40''$ (See fig. 5)

Systematic error of $\pm 0.0028\text{mm}$ can be calculated over 25mm range. Over 12.5mm range the systematic error will be $\pm 0.0014\text{mm}$.



Systematic error for actual calibrated value can be calculated and applied if required

010	22/04/07	INFORMATION ISSUE	M.S.S
ISSUE NUMBER	ISSUE DATE	MODIFICATIONS	APP. BY
INSTRUCTION SHEET REF25002			1 OFF 1



SET 16-60MM



SET 60-100MM



SANGHA 3 POINT STANDARD AND SPECIAL APPLICATIONS CAN BE USED WITH MITUTOYO 468 MID RANGE READOUT.

ANY SANGHA SPECIAL OR STANDARD 2 & 3 POINT HEAD CAN BE ACCOMODATED WITH MITUTOYO SANGHA ADAPTOR.



RETROFIT HEAD APPLICATION FOR MITUTOYO READ OUT SYSTEMS

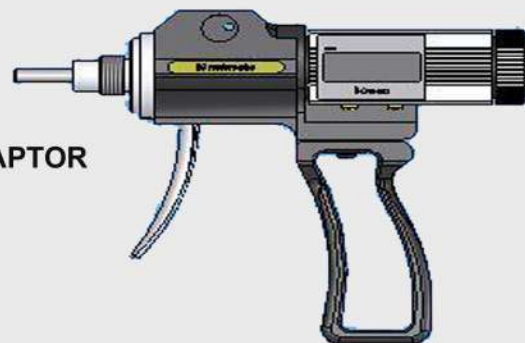
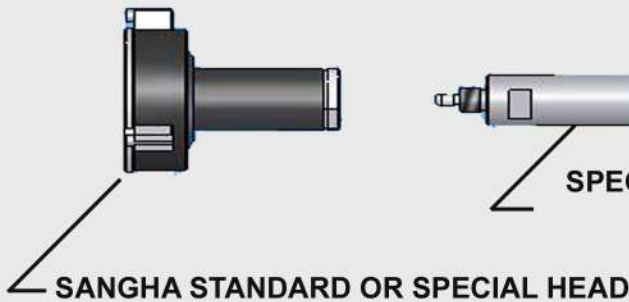
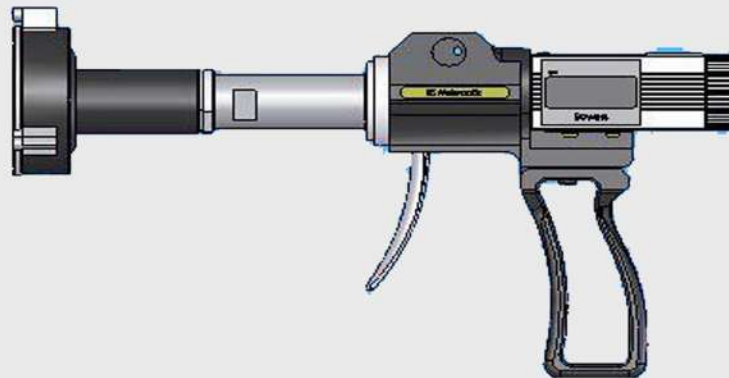
There are many compatible products to Sangha system such as Mitutoyo readout system for Three point bore micrometers and bore gauges. Since Sangha specialises in the manufacture of standard and special application , for many years we have offered Sangha heads to fit to existing customer Read out system from other makes.

We can supply Three and Two point heads special and standard at a very competitive price and fast delivery for replacement heads. We have developed interface adaptors to use Sangha standard heads for these applications.

SANGHA RETROFIT HEADS FOR MITUTOYO BOREMATIC



SANGHA HEADS CAN BE SUPPLIED TO WORK WITH ANY OTHER MAKE OF READ OUT SYSTEM



SANGHA SPECIAL AND STANDARD HEADS FOR CUSTOMER READOUT SYSTEMS OF OTHER MAKES

Sangha standard heads are directly compatible with Mitutoyo Bormatic Handle. Standard Sangha Heads have a 10 mm max range. There for the customer may have to have additional ring gauges. Suitable Standard rings for Sangha heads are available from Sangha if required. Adaptors for other make of handles are also available. We can supply Sangha Standard and extensive range of special applications with any other Read out system in the market place.

TRIGABORE ELECTRONIC PLUG GAUGE



FEATURES :



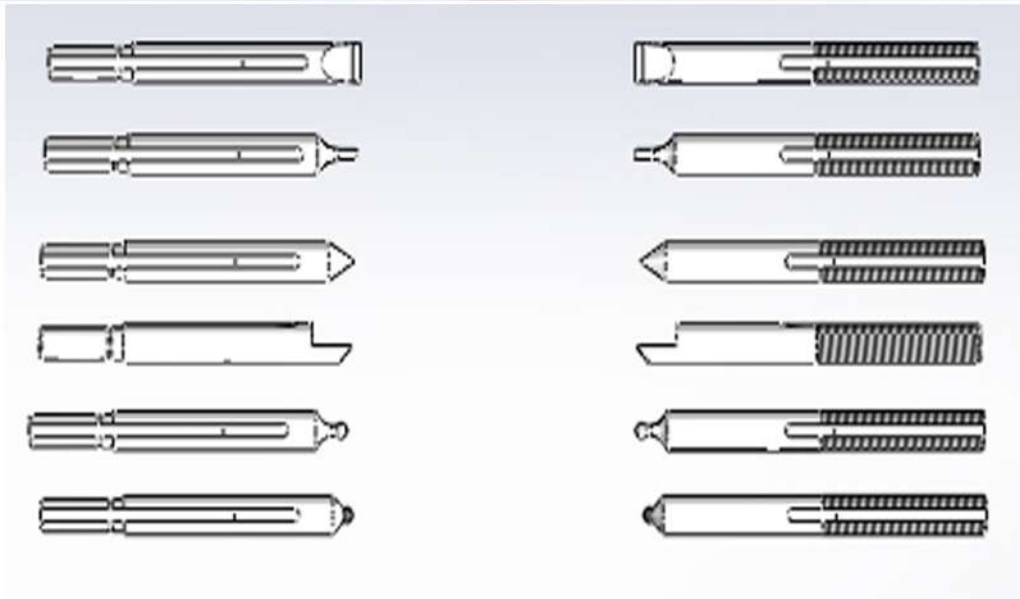
1. Guide bush ensures self centering of plug in bore.
2. The head can be rotated in the bore to check for roundness errors.
3. The head can be slid axially to check for taper, barreling or bell mouching.
4. 2 point ball contact is ideal to gauge errors in elliptical bores.
5. 3 point measuring head is required for tri-lobing.
6. Measuring range is from 0.1mm - 1.0mm subject to application.
7. Repeatability 0.001mm is possible.
8. Handle is insulated to the effects of the operator body heat.
9. One ring gauge is required to set the bore plug gauge.
10. 3 types of standard handles to cover range from 10mm - 150mm.
11. Carbide contact points are standard. Other types for contact can be specified.
12. Extensions for deep hole measurement are available.
13. Other feature such as depth stops and handle stands can be provided.
14. Any Transducer with 8mm shank can be used including electronic capacitive & inductive system to give resolution of 0.0001mm.
15. Computer Connectivity can be provided via Cable or Radio remote contacts with suitable digital transducers.





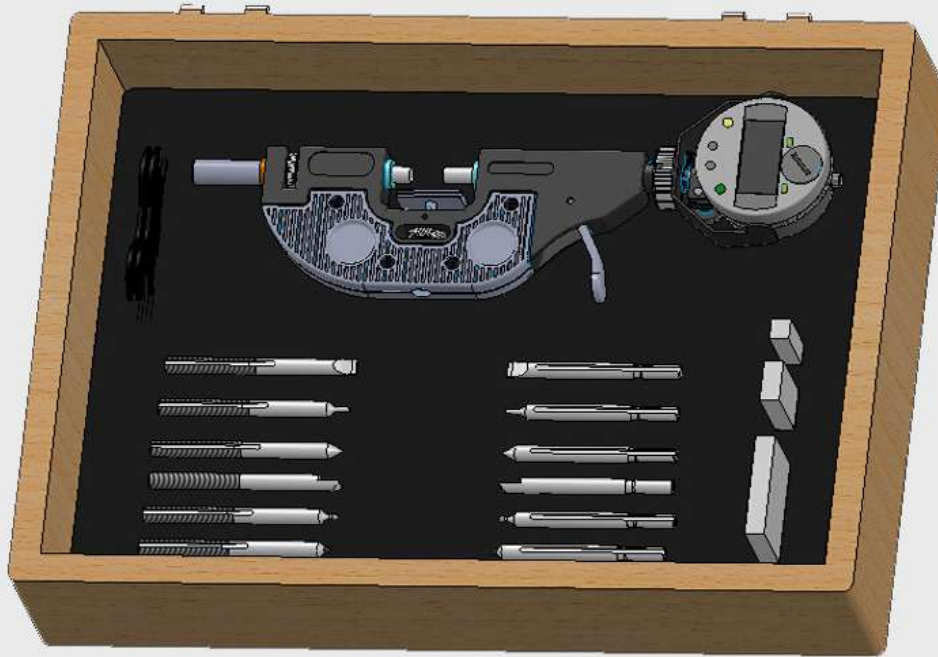
Nylon sleeve guide type is a new innovative idea for two and three point heads for bore gauges. This offers number of advantages over the traditional Air gauges and for Electronic measuring heads. Air and Electric sleeves are very closed toleranced to the holes being measured. These can only be used as final inspection gauges. Often there are problems when sizes are on size or under tolerance. This is particularly acute problem when these gauges are used on large sizes. These are not useful when trying to use them for production aids.

The nylon type of bushing over comes most of the problems for Air and Electronic heads. The nylon sleeves design allows larger clearances between the bore being measured, typically up to 0.3- 0.4 mm. This is made possible with the innovative spherical contact points which allows for larger clearances. This Design also allows the Anvils to Float

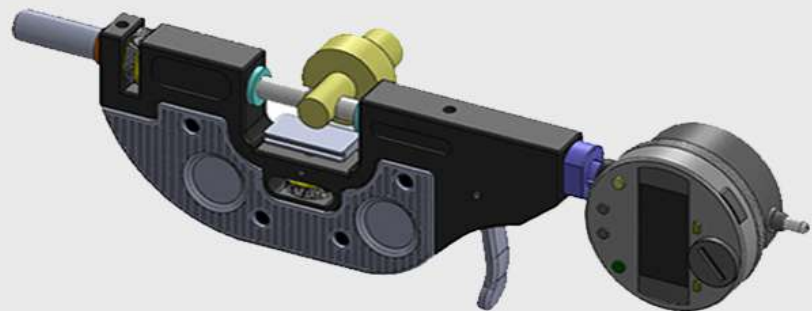


SANGHA EXTERNAL MEASURING SYSTEM

Sangha External measuring system has many unique features not available from other makes. Using a 12.7 mm range Digital dial gauge a range of 10 mm can be measured with standard or special contact points. The Frame has 30 mm range and can be set in 10 mm steps using cylindrical master or slip gauges at only one point of the 10 mm range. You can then measure at any point to an accuracy of 0.004 mm. Need for special setting masters is eliminated. Four frames can cover a range of 0-120 mm both on bench work and measurement on the machine. Standard probes are interchangeable with all frames.



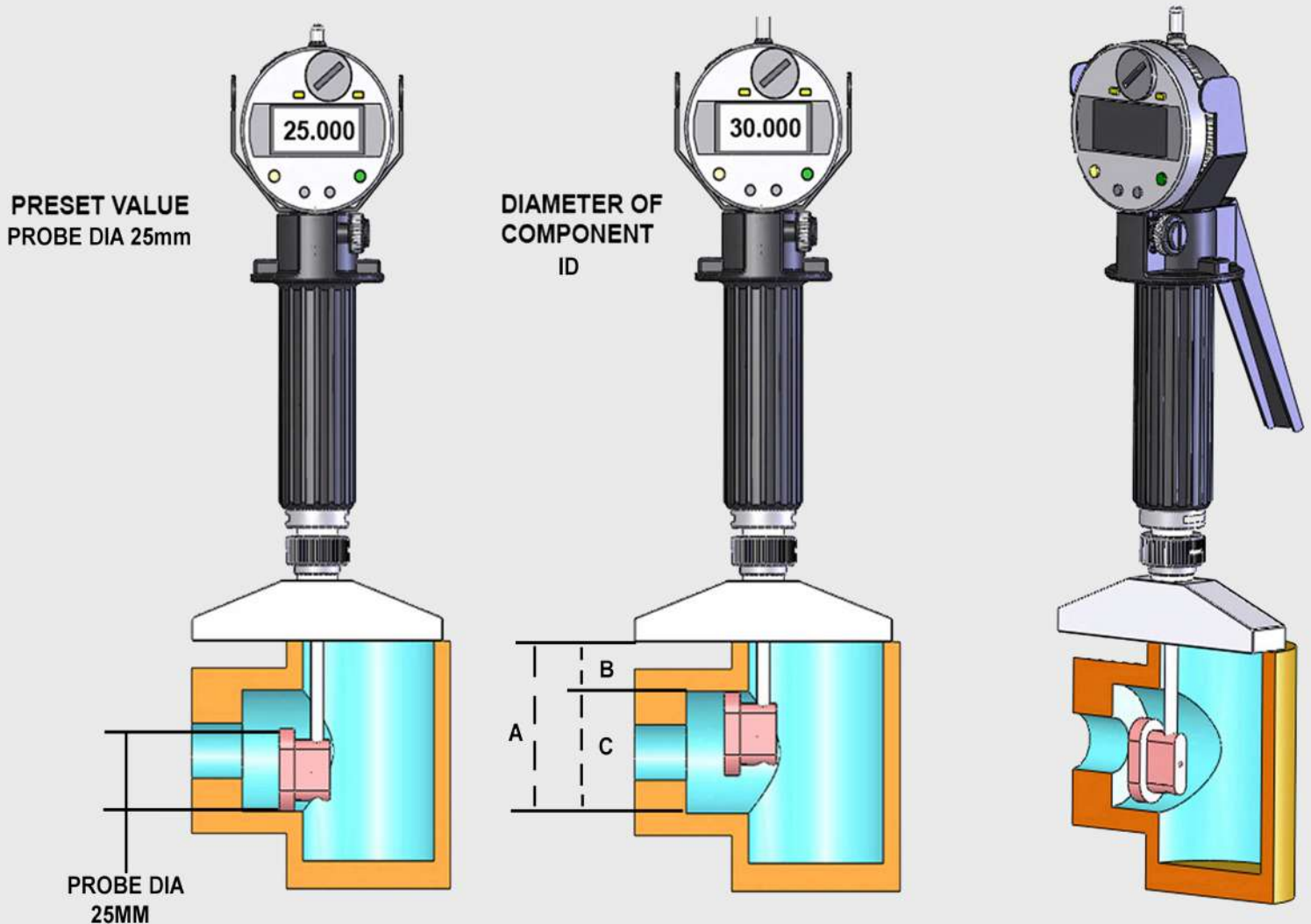
FRAME	SIZE
1.	0-30
2.	30-60
3.	60-90
4.	90-120



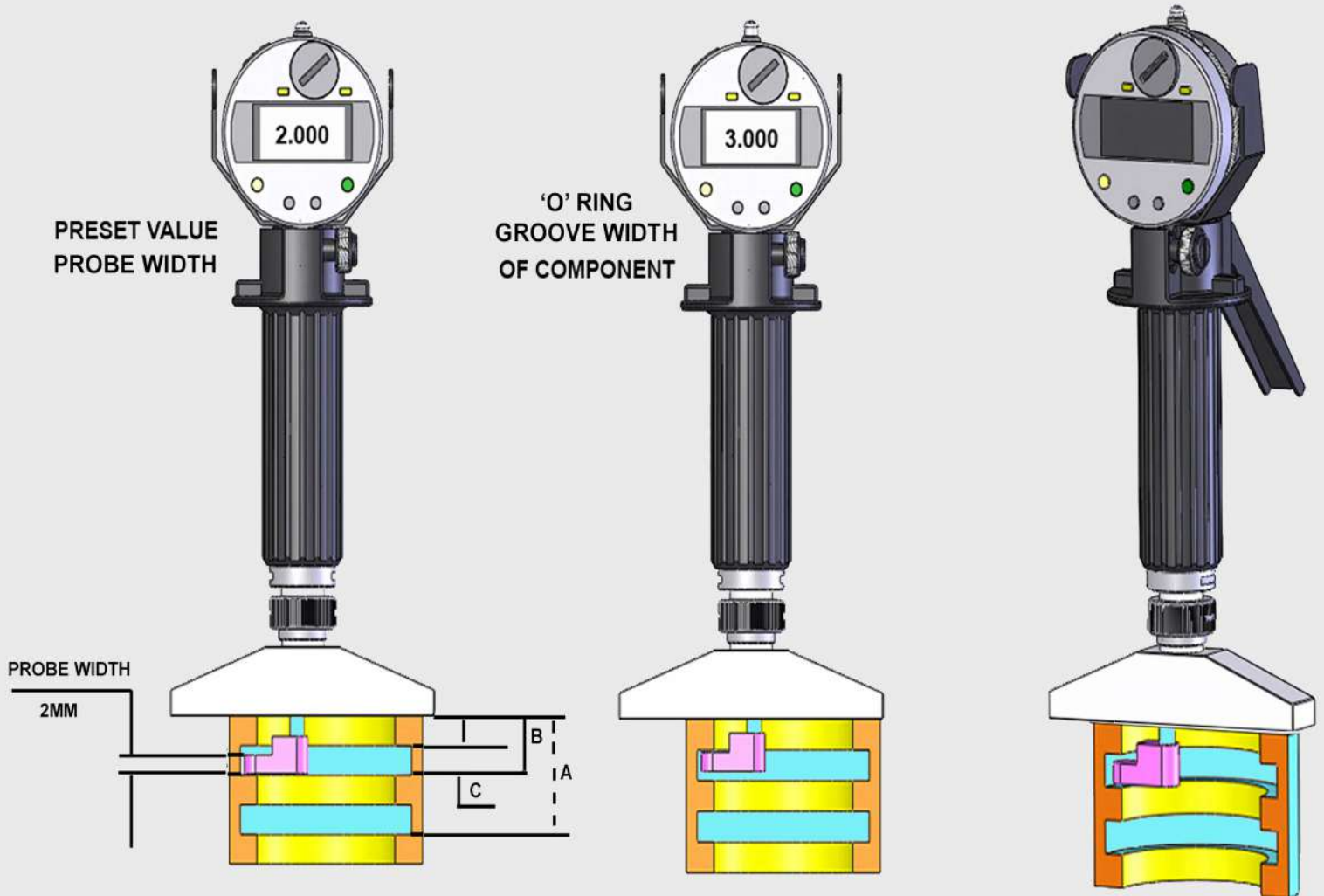
SANGHA EXTERNAL MEASUREMENT SYSTEM:-

Four Frames can Measure any Size from 0-120mm. Standard tips are carbide. Special application contact spindles are available and Inter-Changeable with all Frames.....

One system can measure standard and plain diamteres using interchangeable spindles.



We have many times been asked to measure difficult to reach diameters with conventional instruments. One such application that can be catered for with this special width measuring instrument is as shown in the picture. The size of the diameter or width being measured can easily be accommodated by using a probe width to suit the component. The application can be for a diameter or a slot in plate.



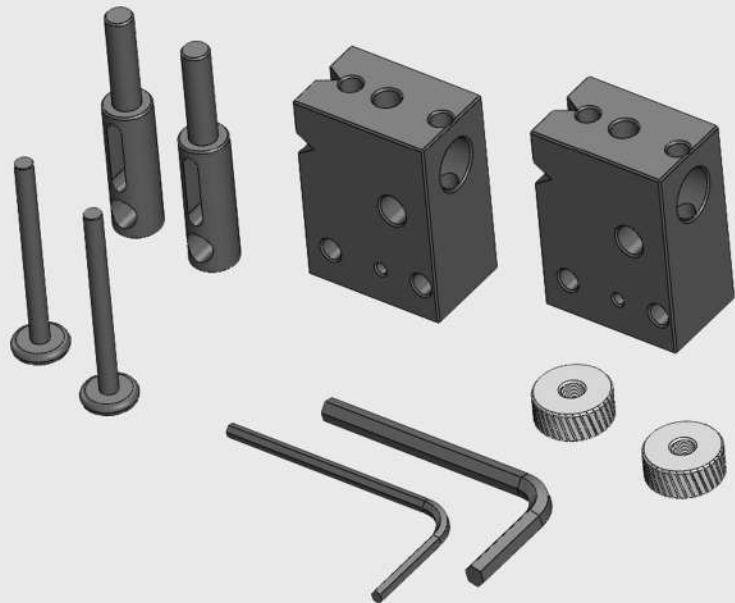
“O” RING GROOVE WIDTH MEASUREMENT SYSTEM

Sangha Metrology is a world leader in the measurement of O ring groove diameters. The other feature that needs to be measured is the width of the groove. After receiving many requirements to measure width of O ring grooves, this product is developed to measure many difficult to inspect features of critical components. This includes (1, Width, 2, Position from face, 3, Relative positions from each other) Difficult to measure details can also be measured using suitable adaptors and probes. No calculations are required and the results are displayed on the presettable dial gauge.

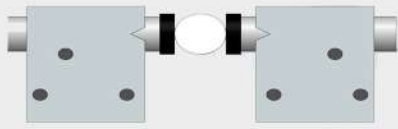


TRUE BENCH COMPARATOR GAUGE IS A VERY VERSATILE BENCH MOUNTED MEASURING INSTRUMENTS. IT HAS MANY APPLICATION PARTICULARLY SUITED TO MEDIUM OR LARGE BATCH PRODUCTION PARTS IDEAL FOR INWARD INSPECTION.

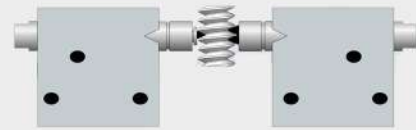
STANDARD RANGE OF FIXTURING AND PROBES ARE AVAILABLE SPECIAL APPLICATIONS CAN BE ADAPTED BY THE USER OR SANGHA METROLOGY CAN PROVIDE THE COMPLETE SOLUTION FROM DRAWING CONCEPT TO FINAL APPLICATION.



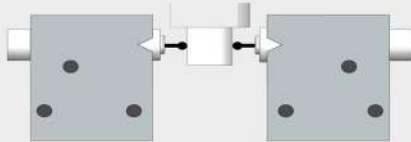
TRUE BENCH COMPARATOR FROM SANGHA METROLOGY EXTENSIVE RANGE OF APPLICATION CAN BE CATERED FOR WITH TRUE BENCH COMPARATOR. STANDARD MACHINE CAN BE ADAPTED FOR DIFFERENT APPLICATIONS.



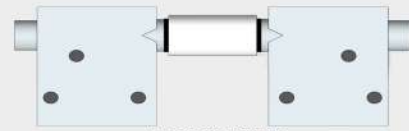
OUTSIDE DIAMETER



THREAD FEATURES



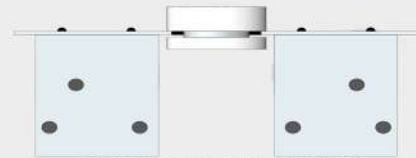
UNDERCUT DEPTH



LENGTH



EXTERNAL SPLINE/GEAR PCD



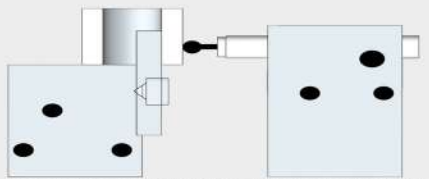
EXTERNAL DIAMETER



ROLLING GEAR TEST



INTERNAL TAPER



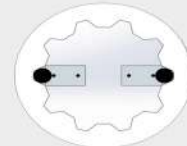
COCENTRICITY/WALL THICKNESS



INTERNAL SPLINE (SMALL DIAMETER)



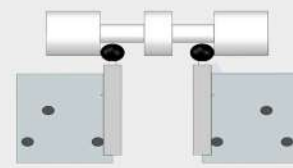
HOLE CENTRES



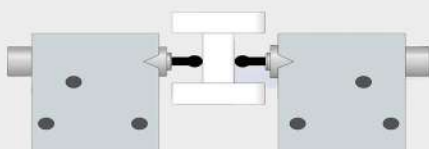
INTERNAL SPLINE (BIG DIAMETER)



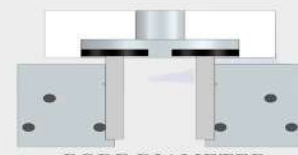
EXTERNAL TAPER



WEB THICKNESS



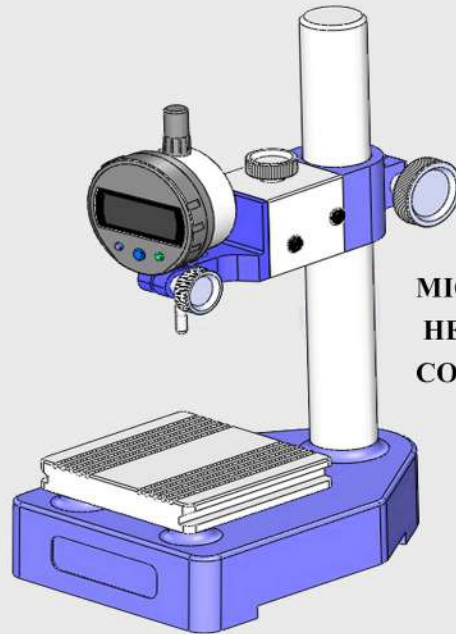
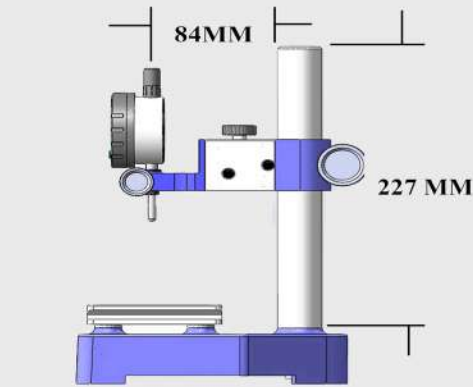
RECESS DIAMETER



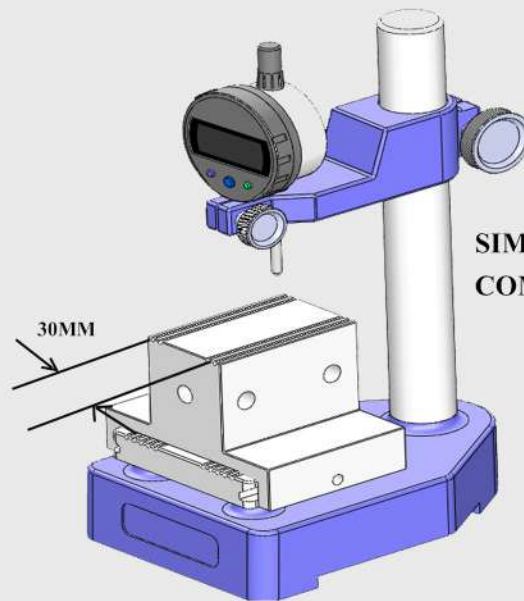
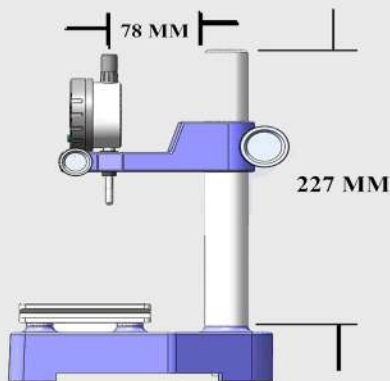
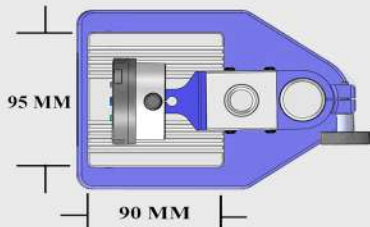
BORE DIAMETER

Many combinations of measuring set ups can be achieved with the True Bench applications. The above are just some examples of how these can be applied. Sangha can provide design for the application that is required. Please send us the part or part drawing and we can propose suitable attachments for the application.

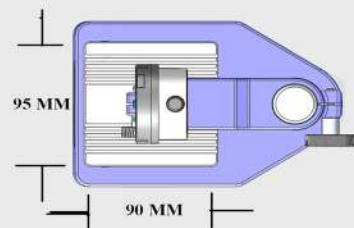
Please note that one anvil is movable and one is fixed. Single measuring gauge is required for any application.



**MICRO-ADJUST
HEAVY DUTY
COMPARATOR STAND**

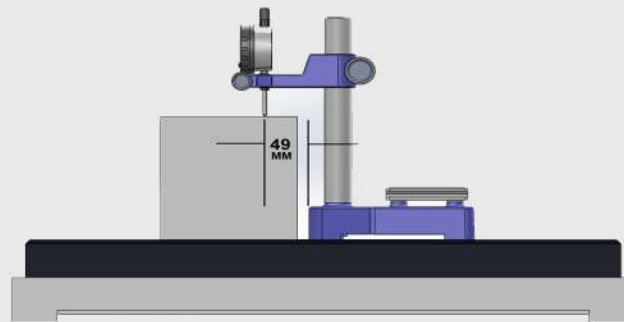


**SIMPLE HEAVY DUTY
COMPARATOR STAND**

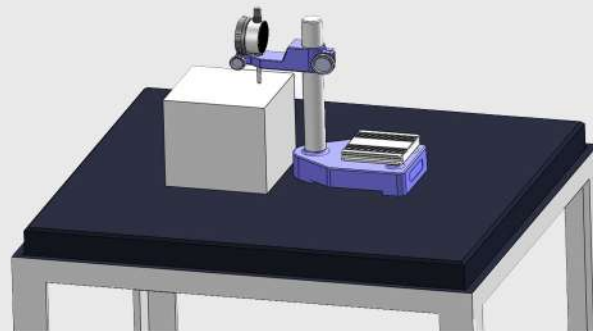


This is a very useful instrument for measurement applications both in Standards room and shop floor. Using comparative method, this can be used to make measurements on length and diameters to a very high accuracy order.

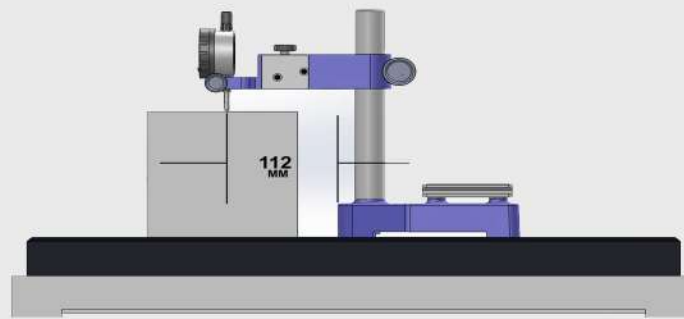
The standard column height is 200 mm actual useful length. On request 500 mm height columns can be provided. The column is chrome finished steel bar.



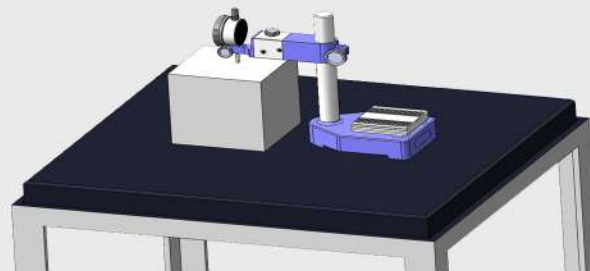
**SIMPLE DIAL GAUGE
HOLDER MOUNTED ON
COMPARATOR STAND**



**NOTE THE THROAT
DISTANCE WHEN USED
ON SURFACE PLATE
APPLICATION**



**MICRO ADJUSTED
STEM MOUNT BEING
USED WITH
COMPARATOR STAND**

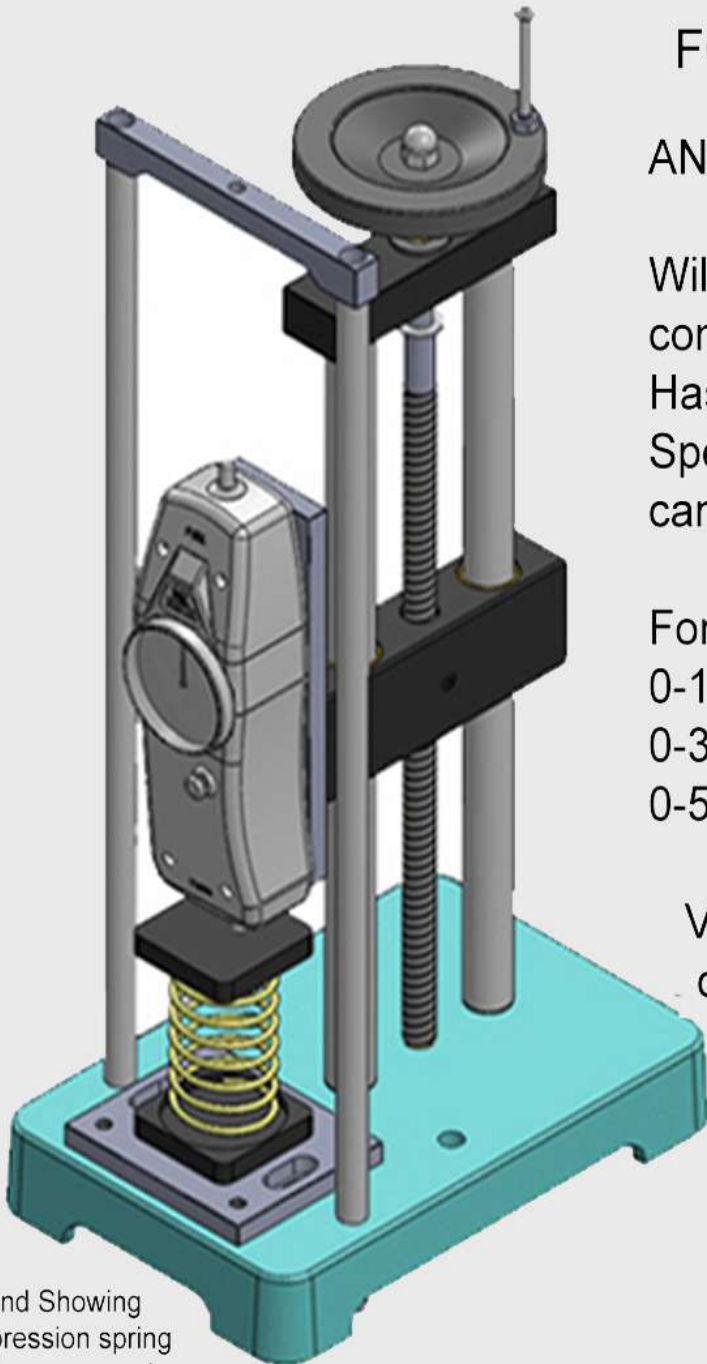


**LARGE THROAT
DISTANCE IS AVAILABLE
WHEN USED ON SURFACE
PLATE**

HEAVY DUTY COMPARATOR STAND APPLICATION ON SURFACE PLATE.

Heavy duty comparator stand can be used to great effect in conjunction with surface plate. The accuracy of measurement can be better than the expensive height gauges. This is achieved by the use of slip gauges and other masters for comparative application to measurement.

FORCE GAUGE



Stand Showing
compression spring
being measured

FORCE GAUGE:-

ANALOG and DIGITAL

Will measure force in
compression and in tension.
Has many applications.
Special application
can be Quoted for.

Force Range-
0-10kg
0-30kg
0-50kg

Vertical Digital scale
can be fitted.



Spray can load
test



Key board
test



Tensile load testing.

Sangha Force measuring instruments are an essential addition to a Laboratory or inspection area. Often we engage in gauge work when a force gauge needs to be used to ensure repeatability of results. Some typical examples are shown and it can be seen that conformance to force required specification can only be met with accurate measurement.



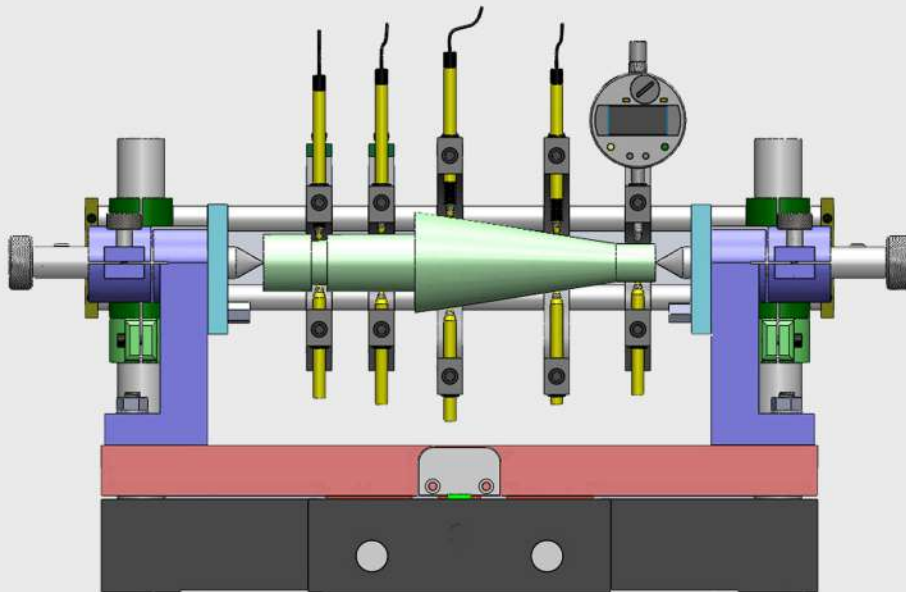
**SANGHA FORCE GAUGE
MOUNTED WITH
DIGITAL SCALE**



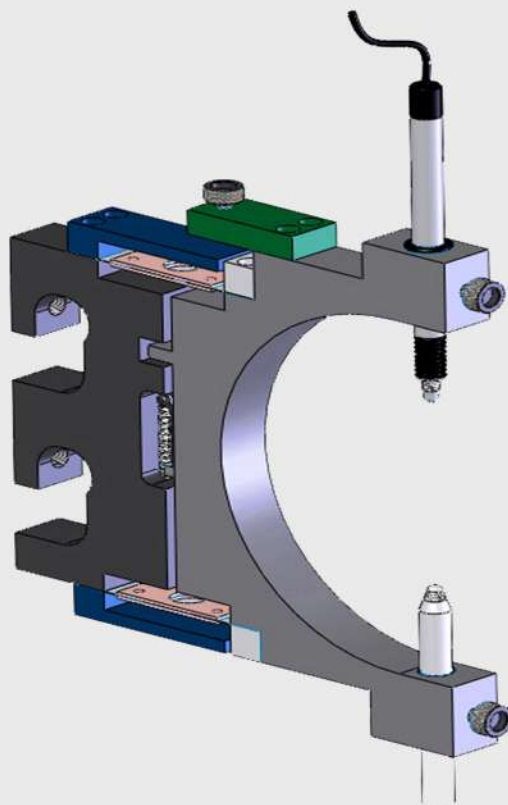
**BOTH ANALOGUE AND
DIGITAL FOCE GAUGE
HEADS ARE AVAILABLE**



The scale mounted Force gauge can solve many problems for percission instrumentation. Springs can be effectively measured for the rate, both in compression and in tention. Many applications require force test with graph where movement over indicated force needs to be analysed.



**SANGHA MULTI
GAUGING APPLICATION
VARIOUS ELECTRONIC
AND MECHANICAL
READ OUTS CAN BE USED**



**UNIQUE CALIPER DESIGN
USES PARALEL SPRINGS
ONE SENSOR GAUGE CAN
BE USED AND ONE FIX
POINT TO MAESURE
DIAMETER**

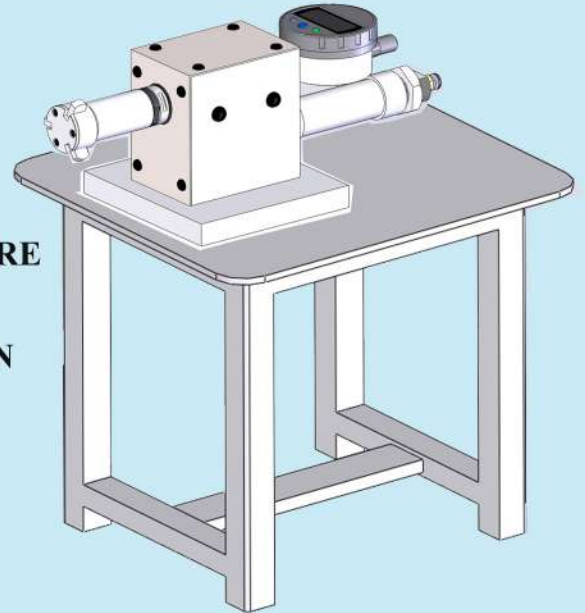
Multiple measurements can be taken on shafts using this system. One gauge per measurement is required. The results can be interfaced with Data logging devices for processing measured results. Loading and unloading of parts is very fast and can be automated with Robotic applications.



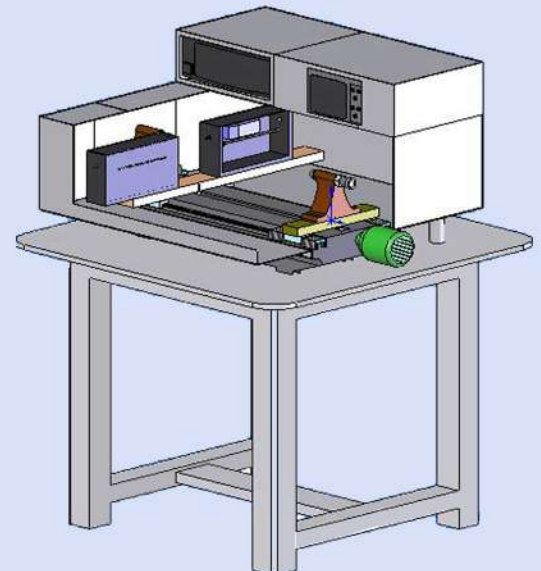
**CRITICAL SHAFT SHOULDER
MEASURING APPLICATION**



**ROBOTIC BORE
GAUGING
APPLICATION**



**RAPID LASER
MEASUREMENT
APPLICATION**



CUSTOMER SPECIFIED PROJECTS.

Sangha Metrology has long experience of Designing, manufacturing and application of special Turn Key projects.

The above examples are some of the projects that we have undertaken in UK and India.

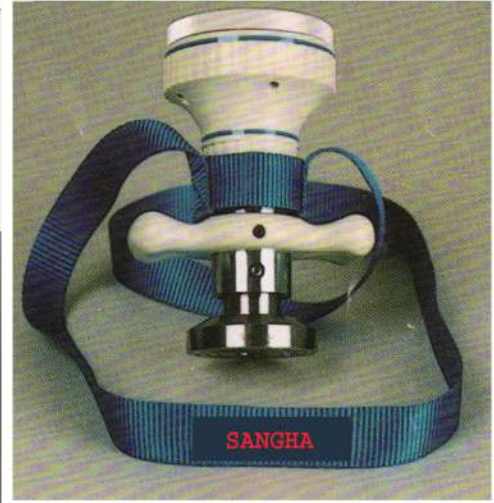


TESTER CAN BE USED ON A BENCH STAND APPLICATION FOR RAPID TESTING OF SMALL PARTS FOR HARDNESS.

NEAR MICRO INDENTATION MAKES THIS POSSIBLE TO TEST ON FINISHED COMPONENTS.

Sangha Portable Hardness Tester has been in production for over 25 years. This was branded for an Exclusive Distribution to a major Multinational company. Sangha Metrology now has the IP to market this directly through its own Distribution network.

This Tester was the worlds first to make use of synthetic diamond which has unique properties over and above the natural diamond. Sangha Metrology now has redesigned this to be more relevant to current market needs.



MODEL SELECTION



<p>British to BS860 (1967)</p> <p>Model no. 910-001 Vickers pyramid No. 100-1000VPNo Brinell hardness No. 100-500BhN Rockwell C 20-70HRC Rockwell B 50-100hRB</p>	<p>US to SAE handbook 1949-ASTM</p> <p>Model no. 910-002 Rockwell A 40-85hRA Rockwell B 50-100hRB Rockwell C 20-70hRC</p>	<p>German to DIN 50-150</p> <p>Model no. 910-003 Vickers pyramid No. 100-1000VPNo Brinell hardness No. 100-500BhN Rockwell C 20-70hRC Rockwell B 50-100hRB</p>
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<p>German to DIN 50-150 (Table 3)</p> <p>Model no. 910-004 N/mm 350-1400Nmm Brinell hardness No. 100-400BhN Rockwell B 50-100hRB Rockwell C 20-70hRC</p>	<p>Steel-Low range</p> <p>Model no. 910-005 Vickers pyramid No. 40-300VPNo Brinell hardness No. 40-300BhN</p>	<p>Non-ferrous Low range</p> <p>Model no. 910-006 Vickers pyramid No. 40-300VPNo Brinell hardness No. 40-300BhN</p>	<p>Aluminium Alloys Low-Range</p> <p>Model no. 910-007 Vickers pyramid No. 20-160VPNo</p>
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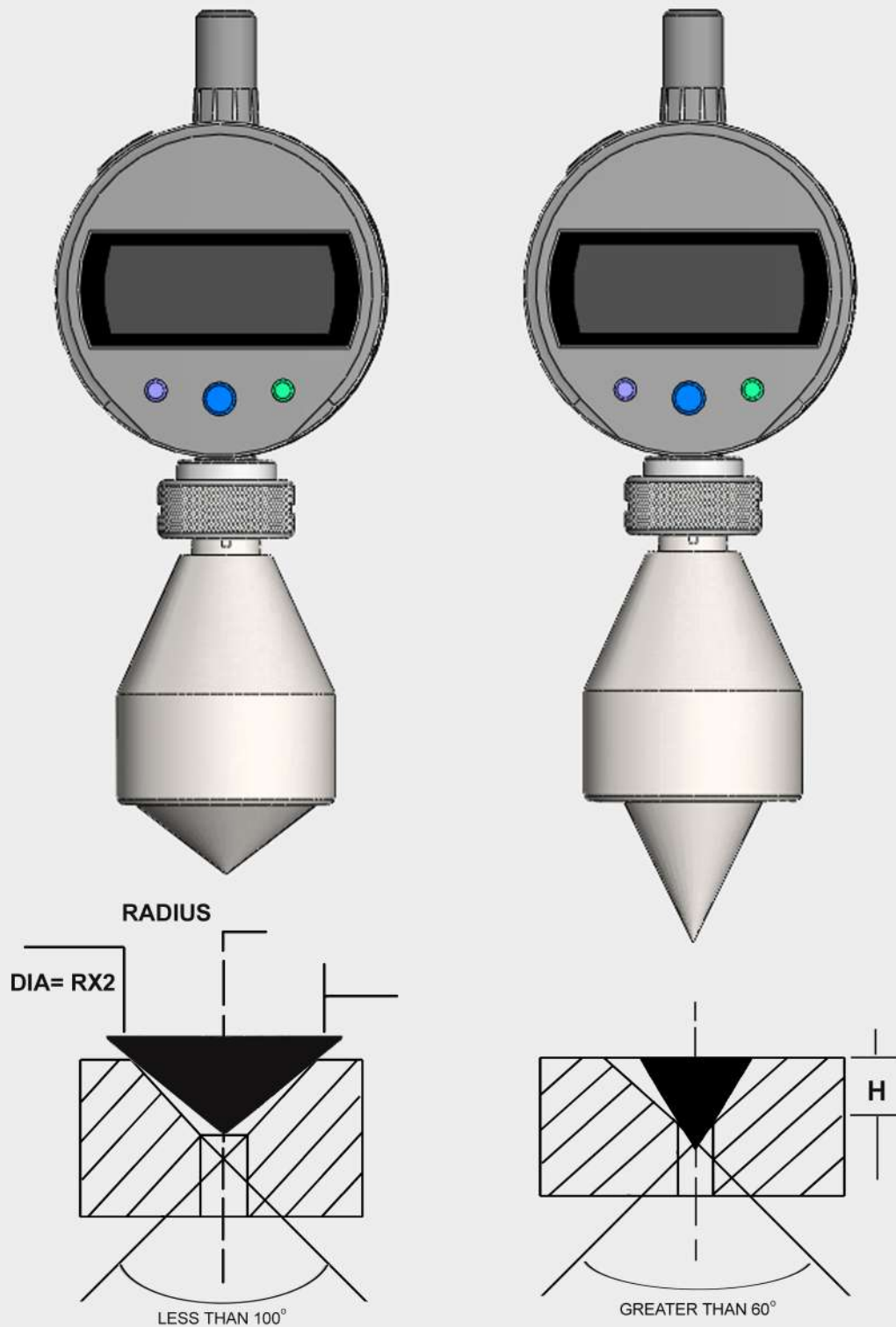
**HAND HELD DUROMETER
FOR SHORE A AND D SCALES**

**CALIBRATED TEST BLOCK SETS ARE
ALSO AVAILABLE FROM SANGHA METROLOGY**

BENCH MOUNTED DUROMETER WITH PRESET LOAD

Durometers are a range of instruments for measuring hardness of plastic, rubber and sponges of various densities. For most applications setting can be done from a hard flat face and for more critical applications calibrated blocks can be used to carry out a comparative measurement of hardness.

There are 2 main Shore scales which are used by industry. These are Shore A and Shore D. For softer and harder materials respectively. For more accurate results a stand with preset load can be used eliminating operator influence on results.



INNOVATIVE SOLUTION TO MEASURE ID MAJOR TAPER DIAMETER AND TAPER DEPTH

All instruments that are available require considerable expertise to measure major diameter of ID taper and height of taper. Sangha system using pre-sealable dial gauges can simplify measurement with increased accuracy.

Two units are proposed as standard instruments to measure major dia of 25 mm and height of 12.7 mm. Applications to measure larger sizes can be accommodated as specials.

repro rubber®

The Original Formula
Metrology Casting Material
From
FLEXBAR

Flexbar cast repro rubber is ideal for measuring details which are not accessible by normal means. Method of operation is to select suitable cast material and apply to part and obtain cast representative impression. Take the cast out of the part and then measure visually or with instruments. The cast material is a metrology grade material which is stable and gives a accurate impression.

It is extensively used in
Airo space, Defence, Automobile
and other critical applications.



Kit No. 16305
Repro rubber Orange



Quick
Setting
Putty



Thin Pour
Trial Kit
130ml



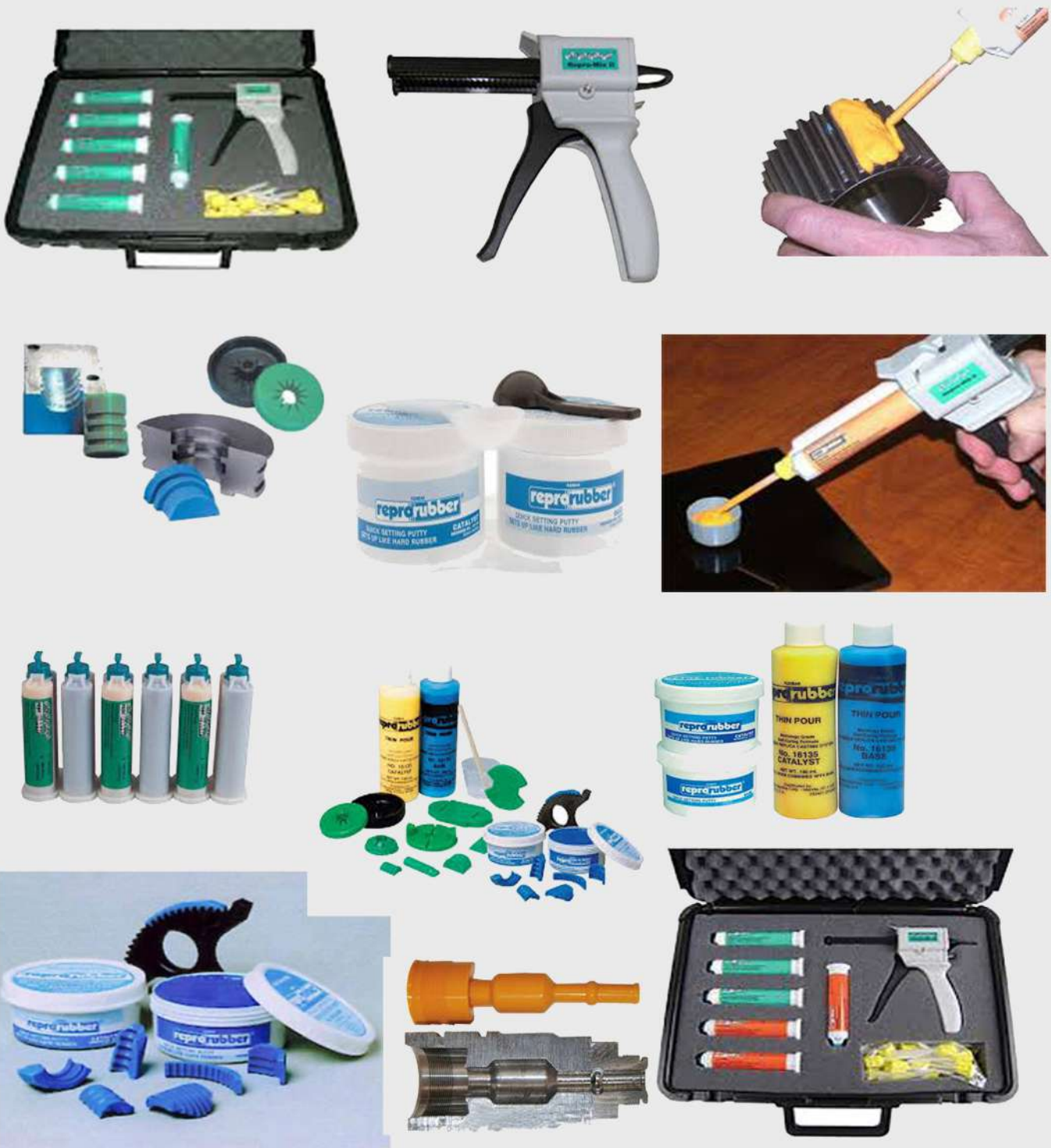
250 Gibbs Road, Islandia, NY 11749
800 879 7575, Fax: 631.582.8487
Email : sales@flexbar.com www.flexbar.com

SANGHA METROLOGY

SANGHA BUILDING BLANCHE STREET
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e-mail : sales@sanghametrology.com
website : www.sanghametrology.com

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FLEXBAR REPRORUBBER IMPORTED FROM USA



This material is imported from Flexbar in USA. It solves many inspection problems and is extensively used by high precision manufacturing companies in Aero Space, Defence and has approval from USA engaged in high tech manufacturing.

For more comprehensive information, this can be found from flexbar.com web site. There are many different forms of this material including, putty type and free flowing liquid type of applications. Sangha Metrology can supply a free sample for better understanding of this material.

FLEXBAR(USA) SURFACE-ROUGHNESS TESTER



FLEXBAR HAS A VERY EXTENSIVE RANGE OF SURFACE MEASURING EQUIPMENT AND COPARATOR PLATES.

SANGHA METROLOGY WILL NOW BE DISTRIBUTING THESE.

FOR FUTHER TECHNICAL INFORMATION VISIT FLEXBAR.COM

A Precision, Fully Self-Contained Compact Tester Incorporating an Advanced Microprocessor. Performs data acquisition, data processing and display of all test measurements

The **Model No. 15950** Portable Surface Roughness Tester features an integrated processor, display and sensor, and allows for user selectable readings in Ra and Rz. Measures flat, round and sloping planes, grooves, and recesses greater than 3.1" x 1.2".

MICROINCH™ COMPARATOR PLATES



The largest variety of standards available for assessing and specifying, by symbol, the degree of roughness of machined parts - including every machining method known.

FLEXBAR(USA) ROUGHNESS STANDARDS



This set has 30 specimens, each are 7/8" x 3/8" comprising:

- 3 Specimens Flat Lapping: 2,4 and 8 μ " AA
- 3 Specimens Reaming: 16,32 and 63 μ " AA
- 6 Specimens Grinding: 2,4,8,16,32 and 63 μ " AA
- 6 Specimens Horizontal Milling: 16,32,63,125,250 and 500 μ " AA
- 6 Specimens Vertical Milling: 16,32,63,125,250 and 500 μ " AA
- 6 Specimens Turning: 16,32,63,125,250 and 500 μ "AA

The Scale conforms to SA.E. and military specifications for visual and tactile inspection

FLEXBAR(USA) SURFACE FINISH COMPARATOR



For Engineers, Inspectors, Purchasing Agents
HANDY, INEXPENSIVE, USE AS A GIVE-AWAY
For Classes on Drafting, etc.

ACCURATE - Exact Reproductions.

Range: 16 to 500 Microinch Finish.

CONVENIENT - Pocket Size (3 1/2" x 5"), Weight: 1 oz.

Has handy "hang-up hole".

VERSATILE - Specimens include Mill, End Mill, Grinding, Shape Turning, and Flame Cut.

EURO DESIGN SERVICES SPECIALISES IN
THE MANUFACTURE OF PRECISION CASTING FOR
ALUMINIUM, CAST IRON, BRASS & S.S

INVESTMENT CAST PARTS AND PRODUCTS



EURO DESIGN SERVICES has facility to do
Investment Casting of Customer specified
Parts Including tool Design and manufacture.

Also manufactures and supply Stainless Steel
Ball valve and flanges. Also has arrange of Stainless
Steel pipe Fittings.

SANGHA

METROLOGY

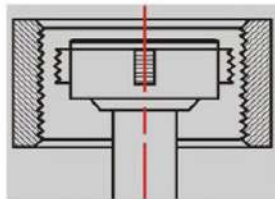
3-POINT & 2 POINT BORE GAUGING SYSTEM



Deep Bore Measurement

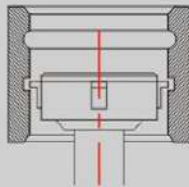


PLUG GAUGE
10-150mm



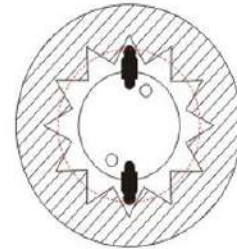
THREAD MEASUREMENT

"O" GROOVE MEASUREMENT



TRIGABORE

6-16mm
16-200mm



SPLINE
MEASUREMENT



TRUE BORE
6-16mm - 16-200mm

Sangha three point and two point measuring system are well established in Europe and USA. These are now distributed and serviced in India for the Indian market giving huge price advantage over imported systems from Europe and Japan. These are a must for advanced manufacturing economy such as India. Sangha Metrology is a specialist in measuring Internal diameters. Many other inspection products are also available.

**SANGHA
METROLOGY**

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SANGHA BUILDING U.K



SANGHA'S WELL EQUIPED LABORATORY



SANGHA BUILDING INDIA



EURO DESIGN SERVICES LABORATORY

SANGHA METROLOGY

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Website:www.sanghametrology.com

For continued development specification and sizes may change without notice.