



Government of Maharashtra

Directorate of Vocational Education and Training

Craftsman Training Scheme

SPECIFICATION FOR MECHANICAL MEASURING EQUIPMENTS

Version 4, 2024

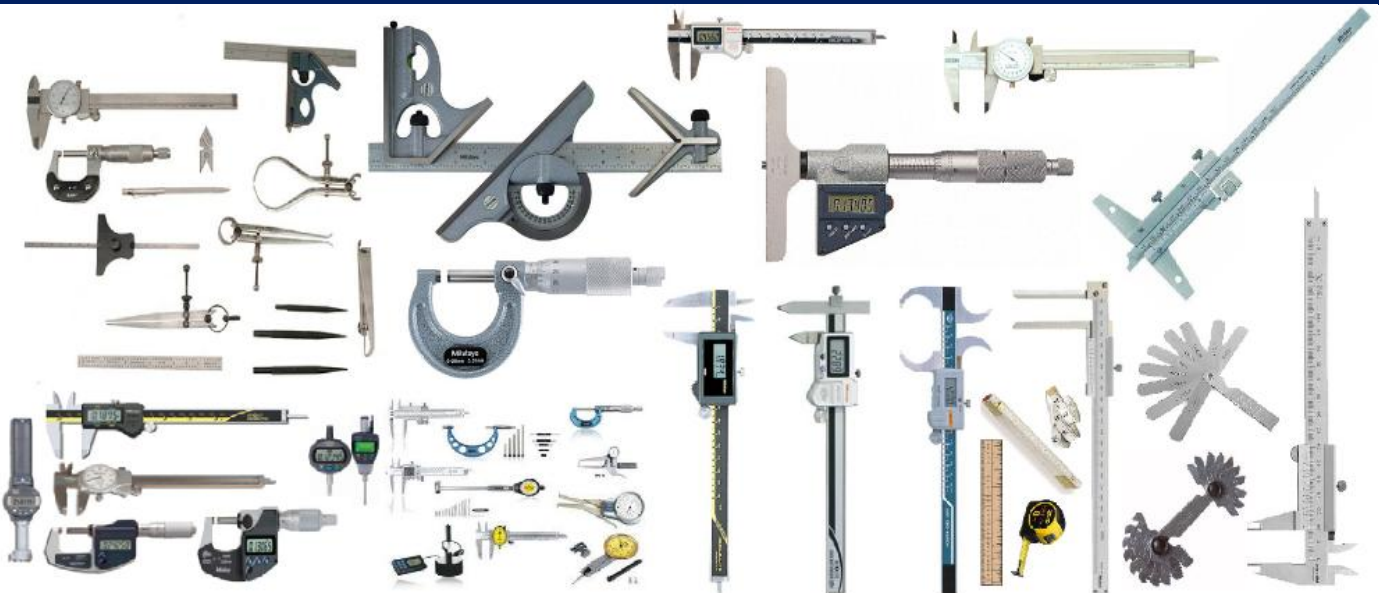


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1 Caliper - Inside, Spring Type, 150 mm

1.1 Basic Indicative Diagram



1.2 Inside calipers with Size: 150 mm

1.3 Material for

- | | | |
|-------|---------|----------------------|
| 1.3.1 | Legs: | Carbon & Alloy Steel |
| 1.3.2 | Spring: | Spring Steel |
| 1.3.3 | Others: | Free Cutting Steel |

1.4 Finish for

- | | | |
|-------|-------------|------------|
| 1.4.1 | Legs: | Polished |
| 1.4.2 | Rest parts: | Auto Black |

1.5 Hardness for

- | | | |
|-------|---------|-------------|
| 1.5.1 | Tip: | 50 - 55 HRC |
| 1.5.2 | Spring: | 45 - 50 HRC |

1.6 Proper rust preventive packing

2 Caliper - Outside, Spring Type, 150 mm

2.1 Basic Indicative Diagram



2.2 Outside Calipers with Size: 150 mm

2.3 Material for

- 2.3.1 Legs: Carbon & Alloy Steel
- 2.3.2 Spring: Spring Steel
- 2.3.3 Others: Free Cutting Steel

2.4 Finish for

- 2.4.1 Legs: Polished
- 2.4.2 Rest parts: Auto Black

2.5 Hardness for

- 2.5.1 Tip: 50 - 55 HRC
- 2.5.2 Spring: 45 - 50 HRC

2.6 Proper rust preventive packing

3 Divider - Spring Type, 150 mm

3.1 Basic Indicative Diagram



- 3.2 Spring Divider Size(L): 150 mm
- 3.3 Material for
 - 3.3.1 Legs: Carbon & Alloy Steel
 - 3.3.2 Spring: Spring Steel
 - 3.3.3 Others: Free Cutting Steel
- 3.4 Finish for
 - 3.4.1 Legs: Polished
 - 3.4.2 Rest parts: Auto Black
- 3.5 Hardness for
 - 3.5.1 Tip: 50 - 55 HRC
 - 3.5.2 Spring: 45 - 50 HRC
- 3.6 Proper rust preventive packing

4 **Divider - Wing Type, 250 mm**

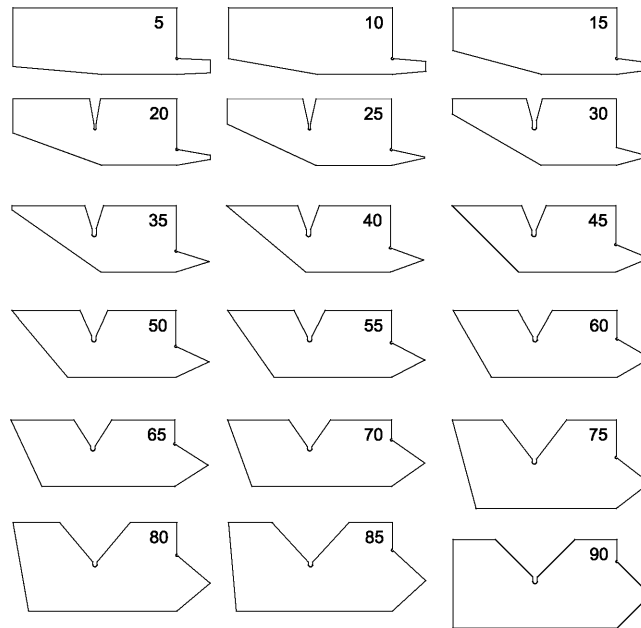
4.1 Basic Indicative Diagram



- 4.2 Made from hard chrome steel
- 4.3 Hardened and ground point Tip: 50-55 HRC Spring: 45-50 HRC
- 4.4 Fitted with strong pivot for smooth movement
- 4.5 Positive serrated locking screw
- 4.6 Proper rust preventive packing

5 Angle Gauge for Tool Grinding

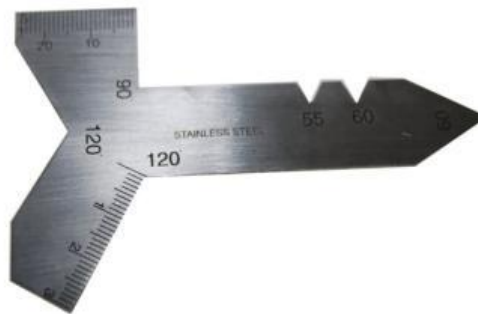
5.1 Basic Indicative Diagram



- 5.2 Material 0.5 thick Stainless Steel, 420 H & T
- 5.3 Range 5 to 90 Degree (18 leaves) incremental of 5 Degree
- 5.4 Finish polished by tumbling
- 5.5 Should be able to check internal & external angles
- 5.6 To check the dovetail angle of shafts
- 5.7 5° to 90° (18 individual leaves)
- 5.8 Packing all 18 Leaves should be supplied in Wooden / Plastic Box with proper cushioning

6 Center Gauge - Various Angles

6.1 Basic Indicative Diagram



- 6.2 Total length: 95 mm \pm 1 mm
- 6.3 Width: 45 mm \pm 0.2 mm
- 6.4 Blade thickness: 1.5 mm \pm 0.05 mm
- 6.5 Blade material: Stainless Steel
- 6.6 Should be handy and useful for grinding & setting thread cutting tools.
- 6.7 Satin chrome finish.
- 6.8 Should have permanently deep etched graduations also edge profile ground.
- 6.9 Should be useful to find numbers of thread per inch by mean of given value.
- 6.10 Different angles are as per profile (rectangular, conical or edge cutting) .

7 Dial Snap Gauge - Go and No Go, 25 to 50 mm

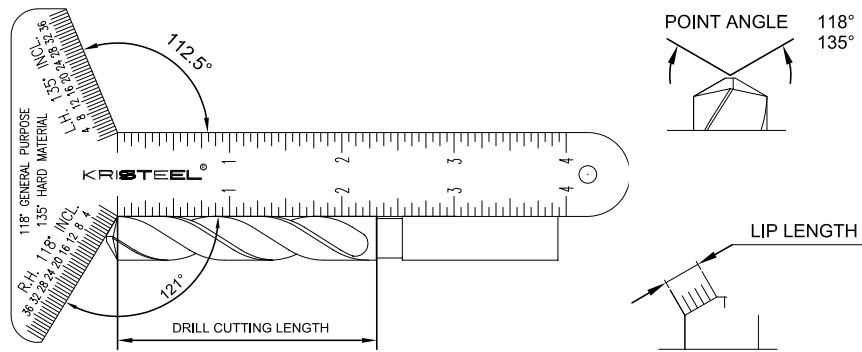
7.1 Basic Indicative Diagram



- 7.2 Quick Go / No-Go measurement for mass production
- 7.3 Anvil retracting stroke: 2.5 mm
- 7.4 Dial indicator: Measuring range ± 0.07 mm, graduation $1 \mu\text{m}$, accuracy $1 \mu\text{m}$
- 7.5 Constant measuring force over the whole range: 8.5 N
- 7.6 Carbide measuring faces
- 7.7 IP54 dust / Waterproof
- 7.8 Zero position of dial indicator is adjustable and can be locked (should be supplied with locking wrench)
- 7.9 Adjustable platform height
- 7.10 Should be supplied in Wooden / Plastic Box with proper cushioning

8 Drill Point Angle Gauge

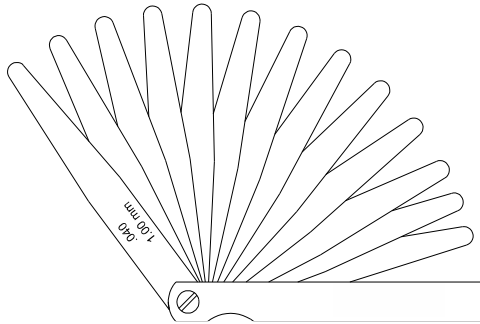
8.1 Basic Indicative Diagram



- 8.2 Material: 1.0 mm thick S.S.202
- 8.3 Range: 118° to 135° drill point angles
- 8.4 Least count: 1.0 mm lip length & 1/16 inch drill length scale
- 8.5 Finish: Polished
- 8.6 Should be supplied in Wooden / Plastic Box with proper cushioning

9 Feeler Gauge - 0.3 mm to 1 mm, 25 Leaves

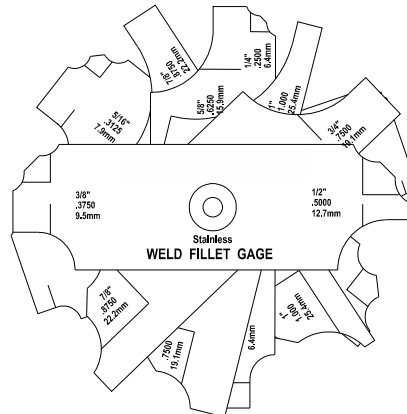
9.1 Basic Indicative Diagram



- 9.2 Material: Spring steel C-60
- 9.3 Hardness: 55 - 58 HRC
- 9.4 Range: 0.03 mm to 1.0 mm (0.001 inch to 0.39 inch)
- 9.5 Accuracy: As per T2 grade tolerances
- 9.6 No. of Blades: 25
- 9.7 Finish: Fine Polished
- 9.8 Uses: Feeler gauges each leaf should be made by fine blanking
- 9.9 Each leaf should have permanent marked leaf thickness in metric & English
- 9.10 Packing: Each assembly should be stacked with external cover duly marked with model size with tightening screw in plastic pouch

10 Fillet Weld Gauge

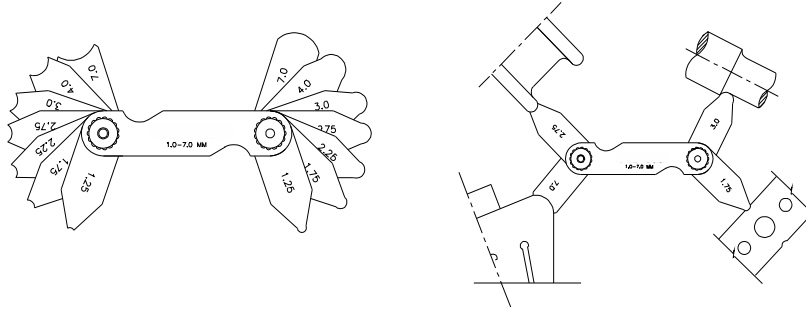
10.1 Basic Indicative Diagram



- 10.2 For inspection of concave or convex fillet welds
- 10.3 Fillet weld gauge should allow fast accurate measurement of eleven (11) fillet weld
- 10.4 Size: 1/8, 3/16, 1/4, 5/16, 3/8, 7/16, 1/2, 5/8, 3/4, 7/8 and 1 inch and their metric equivalent to determine weld size either concave or convex
- 10.5 Each gauge blade should be made of 1.25 inch X 4 inch cold rolled stainless steel to resist rust.
- 10.6 Gauge blade must be flush to the base material with the tip touching the vertical member
- 10.7 Bending blades should be deburred to remove rough edged all the size
- 10.8 Numerals should be chemically etched
- 10.9 Set of eleven blades
- 10.10 Packing: Handy 2 inch X 2.5 inch pocket case
- 10.11 User manual should be provided
- 10.12 Weight (Approximate): 100 - 120 grams

11 Gauge - Radius Set, 1 mm to 25 mm by 0.5 mm

11.1 Basic Indicative Diagram



- 11.2 Material: 0.5 Thickness S.S.420 H & T
- 11.3 Range: 1-7, 7.5-15, 15.5-25 mm incremental of 0.5 mm
- 11.4 Finish: Polished by Tumbling

12 Gauge Block Accessories - Set of 14 pieces

12.1 Basic Indicative Diagram



- 12.2 The set includes:
- | | | |
|---------|--------------------------------------|----------|
| 12.2.1 | 60 mm holder: | 1 number |
| 12.2.2 | 100 mm holder: | 1 number |
| 12.2.3 | 160 mm holder: | 1 number |
| 12.2.4 | 250 mm holder: | 1 number |
| 12.2.5 | 35 mm holder base: | 1 number |
| 12.2.6 | 2 mm half round jaw: | 2 number |
| 12.2.7 | 5 mm half round jaw: | 2 number |
| 12.2.8 | 8 mm half round jaw: | 2 number |
| 12.2.9 | Scriber point: | 1 number |
| 12.2.10 | Center point: | 1 number |
| 12.2.11 | 100 mm triangular straightness edge: | 1 number |
- 12.3 Material: Alloy Steel
- 12.4 Should be supplied in Wooden / Plastic Box with proper cushioning
- 12.5 Hardened and Grounded

13 Thread Plug Gauge - Double Ended, 5 to 27 mm, Set of 12 Pieces

13.1 Basic Indicative Diagram



- 13.2 Size: M5, M6, M8, M10, M12, M14, M16, M18, M20, M22, M24 and M27
- 13.3 Double - end GO and NO GO
- 13.4 Class 2B
- 13.5 Taper lock design
- 13.6 ANSI Standard
- 13.7 Should be supplied in Wooden / Plastic Box with proper cushioning

14 Gauge Slip Box - Metric, Set of 87 pieces

14.1 Basic Indicative Diagram



- 14.2 Made of high-quality alloy steel
- 14.3 Ultra-micro-lapped surface finish heat treated and aged to give good wear resistance.
- 14.4 Should have inter-set wringing properties.
- 14.5 Each gauge should be marked with an identification number
- 14.6 Blocks should be heat treated to HRC65 / HV820
- 14.7 All edges should be Chamfered edges
- 14.8 Each set should be supplied with a UKAS 5 point Calibration Certificate (or equivalent)
- 14.9 Should be supplied in Wooden / Plastic Box with proper cushioning
- 14.10 Grade - 2

15 **Gauge Telescopic Set - 8 mm to 150 mm, Set of 6 pieces**

15.1 Basic Indicative Diagram



15.2 Spring-loaded plunger should expand within the bore (or groove), allowing determination of the internal diameter (or groove width).

15.3 Knurled clamp

15.4 Material: Alloy Steel

15.5 6 - Gage set - 8 - 150 mm consisting of

15.5.1 8 - 12.7 mm

15.5.2 12.7 - 19 mm

15.5.3 19 - 32 mm

15.5.4 32 - 54 mm

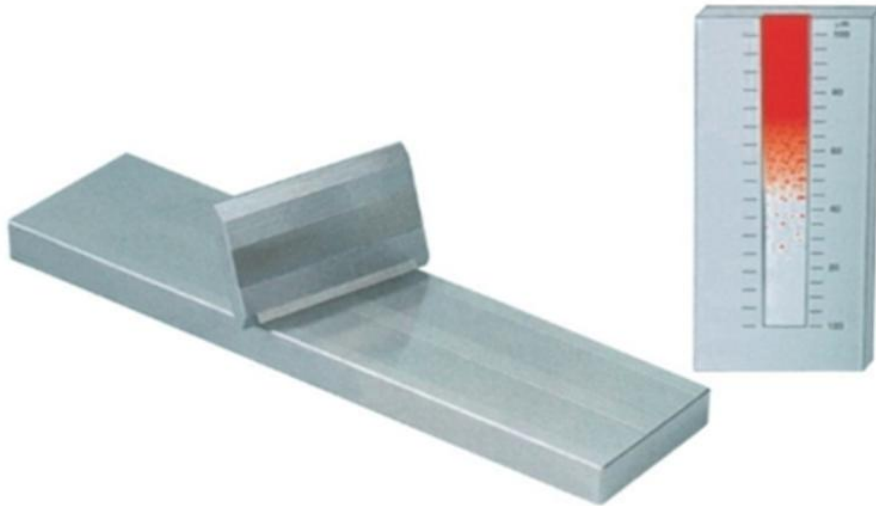
15.5.5 54 - 90 mm

15.5.6 90 - 150 mm

15.6 Should be supplied in Wooden / Plastic Box with proper cushioning

16 **Hegman Gauge**

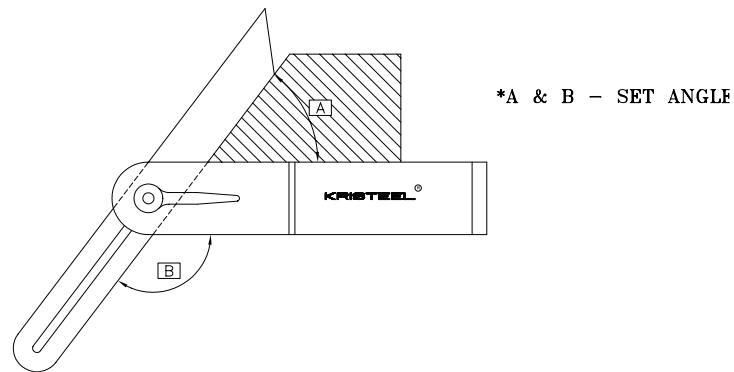
16.1 Basic Indicative Diagram



- 16.2 Manufactured from hardened stainless steel
- 16.3 Should have two ground channels giving scales of both microns and hegman
- 16.4 Should be supplied with scraper blade
- 16.5 Should be supplied in Wooden / Plastic Box with proper cushioning

17 **Metal Sliding Bevel and Center Finder**

17.1 Basic Indicative Diagram



- 17.2 Material: Blade 1.0 thickness S.S.420 & Base in Mild Steel
- 17.3 Range: 6 inch blade length & 4 inch base length
- 17.4 Accuracy: +0.04 mm
- 17.5 Finish: Polished
- 17.6 Should be supplied in Wooden / Plastic Box with proper cushioning

18 **Morse Taper Plug Gauge Set - MT 1, 2, 3, 4 and 5**

18.1 Basic Indicative Diagram



- 18.2 The Morse Taper Gauges, Plug gauge are made of superior quality high Carbon Chrome alloy Steel.
- 18.3 Heat treated and, hardened to 58-60 HRC, to provide a high Degree of wear resistance.
- 18.4 Fine lapped to get maximum seating and surface finish.
- 18.5 Rough ground and kept for a long period of time before finishing is given; this is done to prevent any distortions and ensure stability through their use.
- 18.6 Should be supplied in Wooden / Plastic Box with proper cushioning

19 **Morse Taper Ring Gauge Set - MT 1, 2, 3, 4 and 5**

19.1 Basic Indicative Diagram



- 19.2 Taper gage should be as per ANSI standard
- 19.3 The machine taper ID should be made with a decreasing taper and the tool holder's OD is made should be made with an increasing taper
- 19.4 Should be supplied in Wooden / Plastic Box with proper cushioning

20 **Parallel Blocks - 150 X 42 X 18 mm, Hardened and Ground**

20.1 Basic Indicative Diagram



20.2 Material: Steel

20.3 Hardness: HRC55-62

20.4 Accuracy: $\pm 0.01\text{mm}$

20.5 Length: 150mm

20.6 Should be supplied in Wooden / Plastic Box with proper cushioning

21 Reduction Sleeve Set - Set of 5 pieces

21.1 Basic Indicative Diagram:



| I.D X O.D | DIAMETER | LENGTH | MATERIAL | HARDNESS |
|-----------|------------------|---------------|--------------|-----------|
| MT0 X MT1 | 13 mm ± 0.2 mm | 145 mm ± 2 mm | Carbon Steel | 45-50 HRC |
| MT1 X MT2 | 19 mm ± 0.2 mm | 160 mm ± 2 mm | | |
| MT2 X MT3 | 24.2 mm ± 0.2 mm | 194 mm ± 2mm | | |
| MT3 X MT4 | 32.2 mm ± 0.2 mm | 240 mm ± 2 mm | | |
| MT4 X MT5 | 45.2 mm ± 0.2 mm | 300 mm ± 2mm | | |

21.2 Material: High Speed Steel or High Carbon Chromium Bearing Steel

21.3 Should be supplied in Wooden / Plastic Box with proper cushioning

22 Ring Gauge Set - 5 mm to 50 mm by 1 mm (Go & No Go)

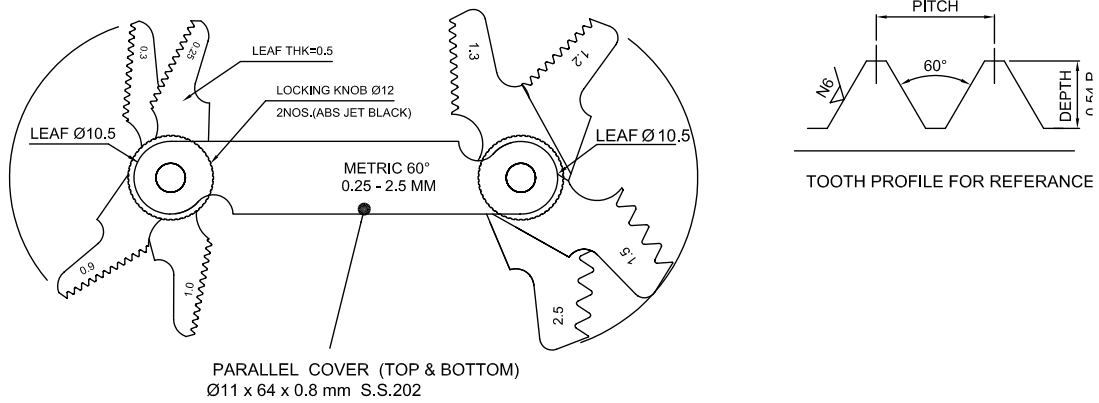
22.1 Basic Indicative Diagram



- 22.2 Should be useful for setting any type of internal or external measuring instruments such as bore gauges etc.
- 22.3 Material: High Carbon Chromium Bearing Steel
- 22.4 Hardness: 60 to 62 HRC
- 22.5 Actual dimensions: Duly Etched on individual Rings
- 22.6 Precision hand lapped to provide superior accuracy, optimum finish and maximum wear ability
- 22.7 Should be calibrated at 20 Degree Celsius under standards room conditions
- 22.8 Should be supplied in Wooden / Plastic Box with proper cushioning

23 Screw Pitch Gauge Set - Metric and British, 0.25 to 6 mm, 21 Leaves

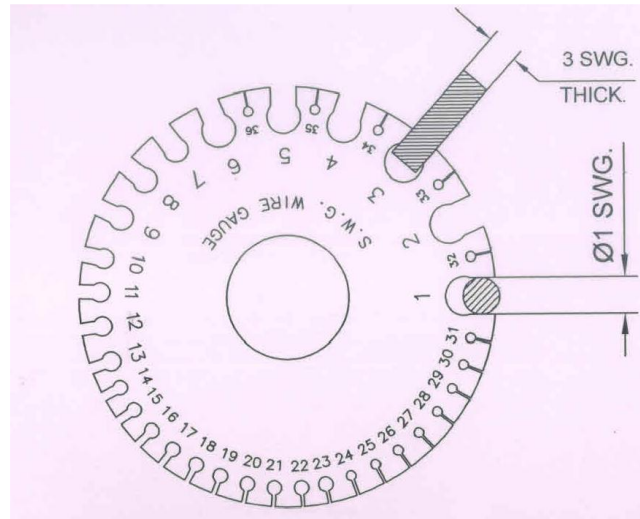
23.1 Basic Indicative Diagram



- 23.2 Material: Carbon Steel
- 23.3 Range: 21 Leaves 4 - 80 TPI (55°) and Metric 60°
- 23.4 Finish: Polished
- 23.5 Should be supplied in Wooden / Plastic Box with proper cushioning

24 Sheet Metal Gauge

24.1 Basic Indicative Diagram



- | | | |
|-------|---|--------------------------------------|
| 24.2 | Material: | Stainless - X12CrMnNiN18-9-5 |
| 24.3 | Thickness: | 1.0 mm |
| 24.4 | Hardness: | 30-35 HRC (specially hardened) |
| 24.5 | Finish: | Polished 2B / Antiglare Satin Chrome |
| 24.6 | Surface roughness: | 0.6 microns max |
| 24.7 | Range: | 0-36 SWG (incremental of 1 gauge) |
| 24.8 | Measuring least count: | 36 swg (0.19 mm) |
| 24.9 | Accuracy: | Within + 0.05 mm |
| 24.10 | Should be supplied in Wooden / Plastic Box with proper cushioning | |

25 **Sine Bar - 200 mm**

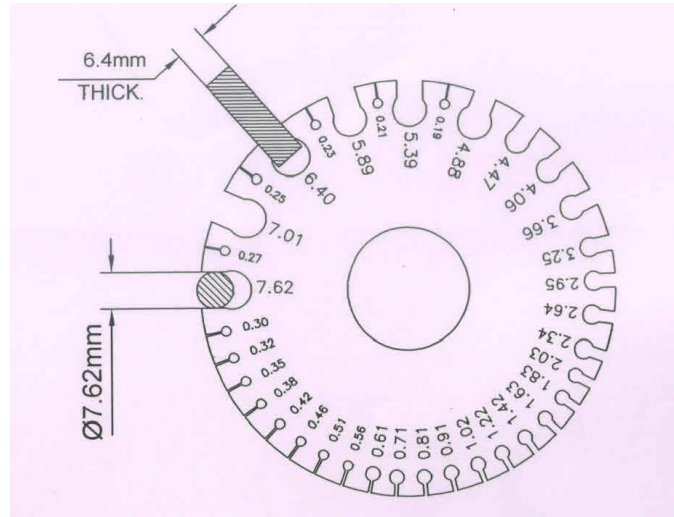
25.1 Basic Indicative Diagram



| | | |
|------|--------------------------|--|
| 25.2 | Total length: | 245 mm ± 2 mm |
| 25.3 | Total width: | 60 mm ± 2 mm |
| 25.4 | Distance Between Roller: | 200 mm ± 0.001 mm |
| 25.5 | Hardness: | 55 to 60 HRC |
| 25.6 | Material | Quality Tool Steel, Hardened & Ground of extreme |

26 Standard Wire Gauge - Metric

26.1 Basic Indicative Diagram



- | | | |
|-------|---|--|
| 26.2 | Material: | Stainless - X12CrMnNiN18-9-5 |
| 26.3 | Thickness: | 1.0 mm |
| 26.4 | Hardness: | 30-35 HRC (Specially Hardened) |
| 26.5 | Finish: | Polished 2B / Antiglare Satin Chrome |
| 26.6 | Surface roughness: | 0.6 microns max |
| 26.7 | Range: | 0-36 SWG (incremental of 1 gauge) |
| 26.8 | Measuring least count: | 36 SWG - Standard Wire Gauge (0.19 mm) |
| 26.9 | Accuracy: | +0.05 mm |
| 26.10 | Should be supplied in Wooden / Plastic Box with proper cushioning | |

27 **Universal Surface Gauge - Arm 300 mm**

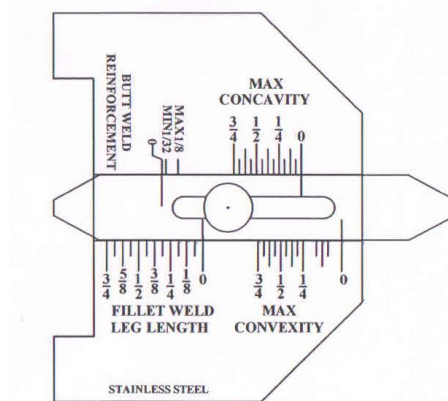
27.1 Basic Indicative Diagram



- 27.2 Base should be made from case hardened steel, ground on bottom and at one end.
- 27.3 Should have provision for Fine adjustment. This adjustment should be made by a knurled thumbscrew
- 27.4 Height: 450 mm
- 27.5 Base length: 100 mm
- 27.6 Width: 85 mm
- 27.7 Scriber: 150 mm
- 27.8 Should be supplied in Wooden / Plastic Box with proper cushioning

28 Universal Weld Measuring Gauge

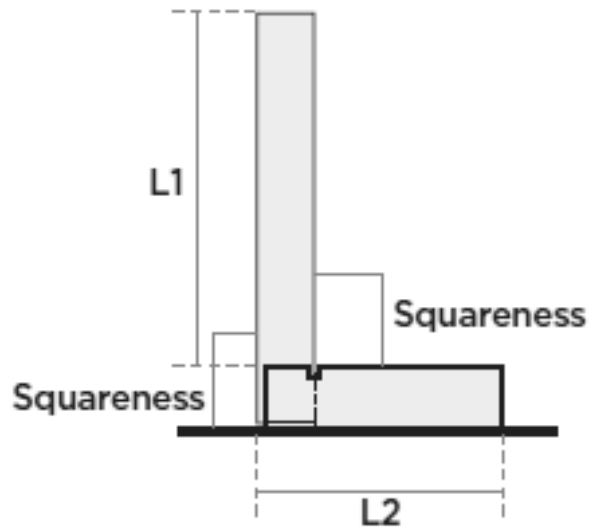
28.1 Basic Indicative Diagram



- 28.2 Material: Base in Stainless Steel x6Ce17 thick 2.0 and scale in S.S.
- 28.3 Thickness: 1.0 mm
- 28.4 Range: As per given in following diagrams
- 28.5 Least count: Linear 1.0 mm & Angular-1 Degree
- 28.6 Accuracy: Metrology Standard EEC-1
- 28.7 Finish: Polished 2B finish / Antiglare Satin Chrome
- 28.8 Should be supplied in Wooden / Plastic Box with proper cushioning

29 **Engineer's Square - 150 mm Blade**

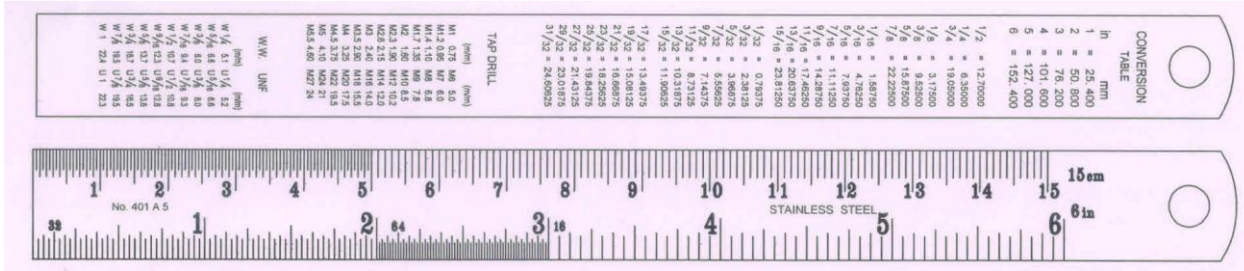
29.1 Basic Indicative Diagram



- 29.2 Blade length (L1): 150 mm
- 29.3 Stock length (L2): 100 mm
- 29.4 Squareness: 16 microns
- 29.5 Material for Blade: Spring Steel
- 29.6 Stock: MS
- 29.7 Hardness of Blade: 40 - 50 HRC
- 29.8 Groove on the inner corner of the stock

30 Steel Rule - 150 mm, Graduated both in Metric and English Unit

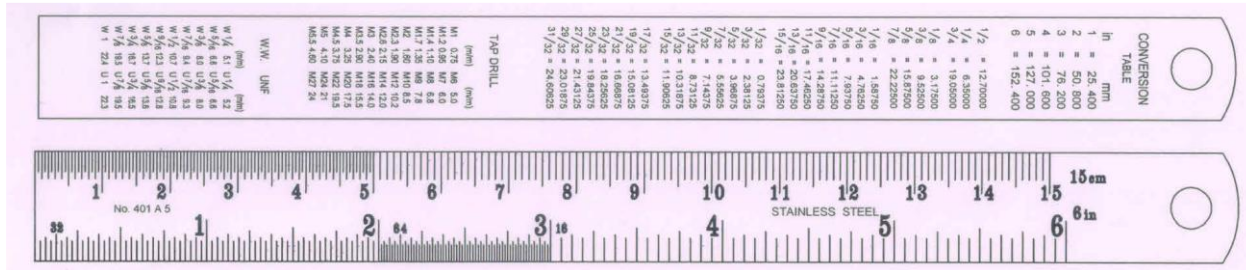
30.1 Basic Indicative Diagram



- 30.2 Material: Stainless Steel
- 30.3 Thickness: 0.5 mm
- 30.4 Hardness: 30 - 35 HRC (Specially Hardened)
- 30.5 Finish: Polished 2B / Anti-Glare Satin Chrome
- 30.6 Surface roughness: 0.6 Microns max
- 30.7 Range: 150 mm Scale
- 30.8 Measuring least count: Metric Graduation +0.5 mm and English graduation 1 /64 inch
- 30.9 Accuracy: Metrology Standard EEC Class - I

31 Steel Rule - 300 mm, Graduated both in Metric and English Unit

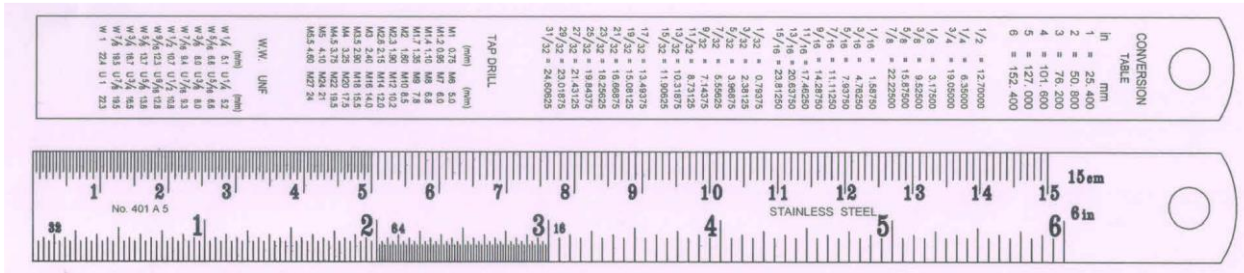
31.1 Basic Indicative Diagram



- 31.2 Material: Stainless Steel
- 31.3 Thickness: 0.5 mm
- 31.4 Hardness: 30 - 35 HRC (Specially Hardened)
- 31.5 Finish: Polished 2B / Anti-Glare Satin Chrome
- 31.6 Surface roughness: 0.6 Microns max
- 31.7 Range: 300 mm
- 31.8 Measuring least count: Metric Graduation +0.5 mm and English graduation 1 /64 inch
- 31.9 Accuracy: Metrology Standard EEC Class - I

32 Steel Rule - 600 mm, Graduated both in Metric and English Unit

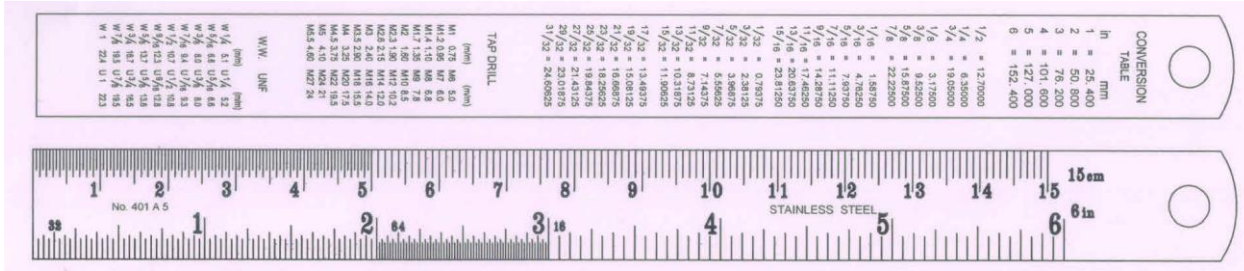
32.1 Basic Indicative Diagram



- 32.2 Material: Stainless Steel
- 32.3 Thickness: 0.5 mm
- 32.4 Hardness: 30 - 35 HRC (Specially Hardened)
- 32.5 Finish: Polished 2B / Anti-Glare Satin Chrome
- 32.6 Surface roughness: 0.6 Microns max
- 32.7 Range: 600 mm
- 32.8 Measuring least count: Metric Graduation +0.5 mm and English graduation 1 /64 inch
- 32.9 Accuracy: Metrology Standard EEC Class - I

33 Steel Rule - 1000 mm, Graduated both in Metric and English Unit

33.1 Basic Indicative Diagram



- 33.2 Material: Stainless Steel
- 33.3 Thickness: 0.8 mm
- 33.4 Hardness: 30 - 35 HRC (Specially Hardened)
- 33.5 Finish: Polished 2B / Anti-Glare Satin Chrome
- 33.6 Surface roughness: 0.6 Microns max
- 33.7 Range: 1000 mm
- 33.8 Measuring least count: Metric Graduation +0.5 mm and English graduation 1 /64 inch
- 33.9 Accuracy: Metrology Standard EEC Class - I

34 **Steel Square - 600 mm X 400 mm**

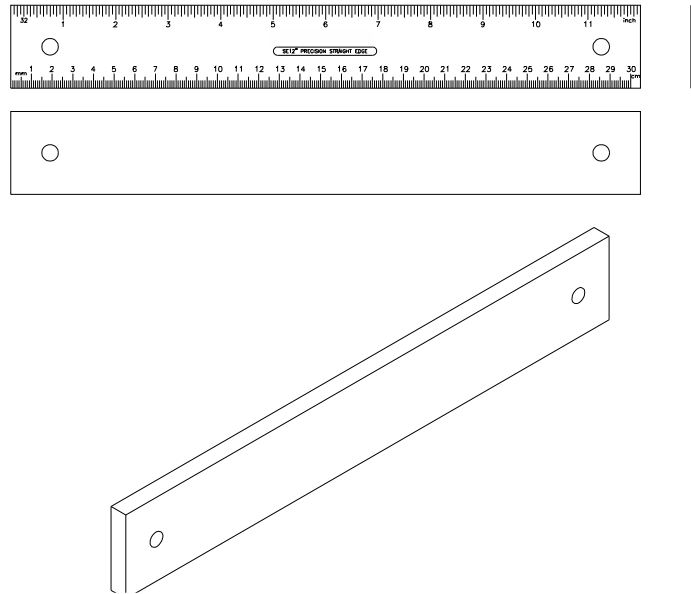
34.1 Basic Indicative Diagram



- 34.2 Tempered and steel design for durability
- 34.3 Deep graduations for easy reading on face and back
- 34.4 Surfaced protected with a clear finish that resist rust
- 34.5 Reverse reading scale
- 34.6 Graduation imperial / metric
- 34.7 Buffed finish
- 34.8 Size: 600 mm X 400 mm

35 Straight Edge - Steel, 450 mm

35.1 Basic Indicative Diagram



- | | | |
|------|------------|--------------------|
| 35.2 | Material: | Tool steel |
| 35.3 | Thickness: | 5 mm |
| 35.4 | Width: | 25 mm |
| 35.5 | Length: | 450 mm |
| 35.6 | Range: | Graduated One Side |
| 35.7 | Finish: | Chrome Plated |

36 Measuring Steel Tape - 10 meter

36.1 Basic Indicative Diagram



- 36.2 Tape length: 10 meters
- 36.3 Tape width: 9.5 mm
- 36.4 Tapes coated with Epoxy based scratch guard material to ensure longer life
- 36.5 Bold & Easy to read printing
- 36.6 Ensures Class II Accuracy at 20 Degree when subjected to tension of 50 Newton
- 36.7 Strong Copper Rivet to ensure stronger end hook

37 Measuring Steel Tape - 5 meter

37.1 Basic Indicative Diagram



- 37.2 Tape length: 5 meters
- 37.3 Tape width: 13 mm
- 37.4 Tapes coated with Epoxy based scratch guard material to ensure longer life
- 37.5 Bold & Easy to read printing
- 37.6 Ensures Class II Accuracy at 20 Degrees when subjected to tension of 50 Newton
- 37.7 Strong Copper Rivet to ensure stronger end hook

38 Measuring Tape - Fiber, 30 meter

38.1 Basic Indicative Diagram



- 38.2 Digitalized UV cured printing
- 38.3 Uniform thickness and width of blade
- 38.4 Water Resistant
- 38.5 Non Crease
- 38.6 Non Conductive
- 38.7 Zero Start
- 38.8 Steel Case

39 Combination Set - 300 mm, Set of 4 piece

39.1 Basic Indicative Diagram



39.2 Should consist of Centre head, Protractor head, Square head, Blade

39.3 Centre head:

39.3.1 Should be able to locate center of cylinder of diameter 30 to 100 mm

39.3.2 Accuracy: + 0.15 mm

39.4 Protractor head:

39.4.1 Should be able to set the blade at desired angle to an edge of work piece

39.4.2 Should be able to measure angles

39.4.3 Range: 0 to 180 Degree

39.4.4 Accuracy: 7 min

39.5 Square head:

39.5.1 Should be able to set the blade at 90 or 45 Degree to an edge of an work piece

39.5.2 Accuracy: + 8 min for 90 Degree

39.5.3 Accuracy: + 10 min for 45 Degree

39.6 Blade:

39.6.1 Range: 300 mm

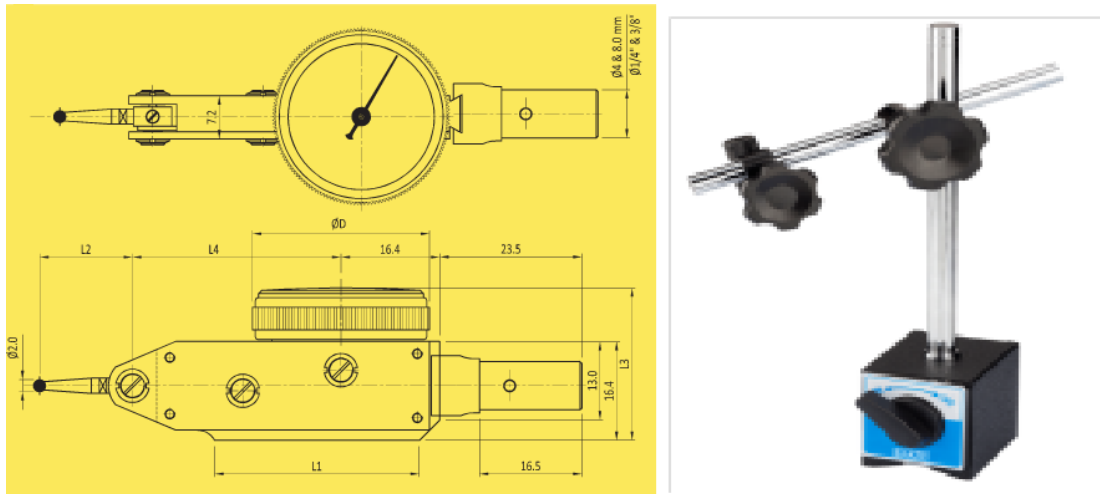
39.6.2 Graduation: 0.5 mm and 1 /32 inch on front face

39.6.3 1 mm and 1 /64 inch on back face

39.7 Should be supplied in Wooden / Plastic Box with proper cushioning

40 Lever Type Dial Indicator - LC = 0.01 mm with Clamping Devices and Magnetic Stand

40.1 Basic Indicative Diagram:



40.2 Compliance

40.2.1 Dial: Generally Conforming to IS 11498 / 1985

40.3 Reading: 0.01 mm

40.4 Range: 0.8 mm

40.5 Graduation: 0 - 40 - 0

40.6 System of Measurement: Metric

40.7 Accuracy: 15 μ m

40.8 Magnetic force for stand: 600 N (Approx.)

40.9 Stand (L X W X H): 60 X 50 X 55 mm (Approx.)

40.10 Stand weight: 1.5 Kg (Approx.)

40.11 Standard Accessories:

40.11.1 Spanner

40.11.2 Wooden / Plastic Box with proper cushioning for Lever Type Dial Gauge and
Corrugated Box with proper Cushioning for Magnetic Stand

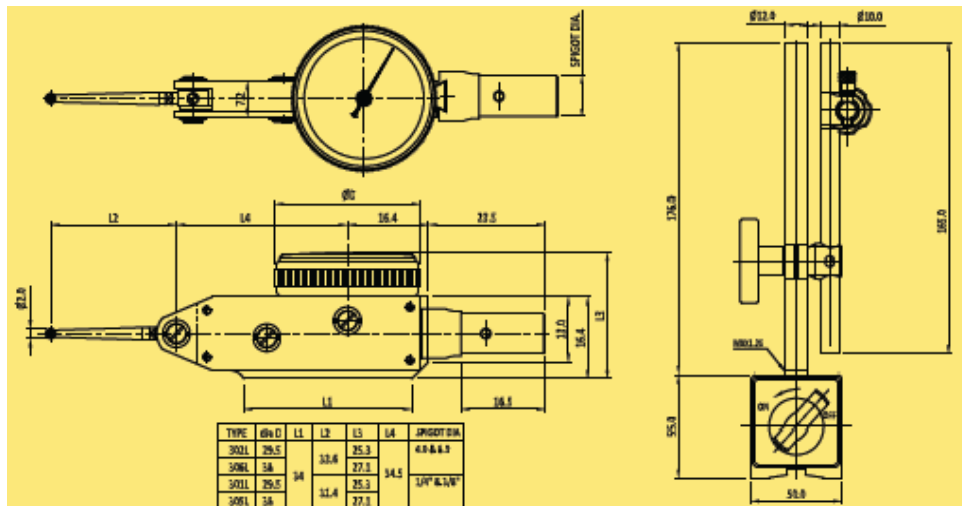
40.11.3 2mm Diameter T.C. ball stylus fitted to the gauge

40.11.4 8mm dovetail spigot assembly fitted to the gauge

40.11.5 Operating Manual

41 Lever Type Dial Indicator - Long Point, LC = 0.01 mm with Clamping Devices and Magnetic Stand

41.1 Basic Indicative Diagram



41.2 Compliance

41.2.1 Dial: Generally Conforming to IS 11498 / 1985

41.3 Reading: 0.01mm

41.4 Range: 0.8 mm

41.5 Graduation: 0-40-0

41.6 System of Measurement: Metric

41.7 Accuracy: 15 μ m

41.8 Anvil Length: 33.6 mm

41.9 Magnetic force for stand: 600 N (Approx.)

41.10 Stand (L X W X H): 58 X 60 X 50 55 X 50 X 55mm

41.11 Stand weight: 1.5 Kg (Approx.)

41.12 Standard Accessories:

41.12.1 Spanner

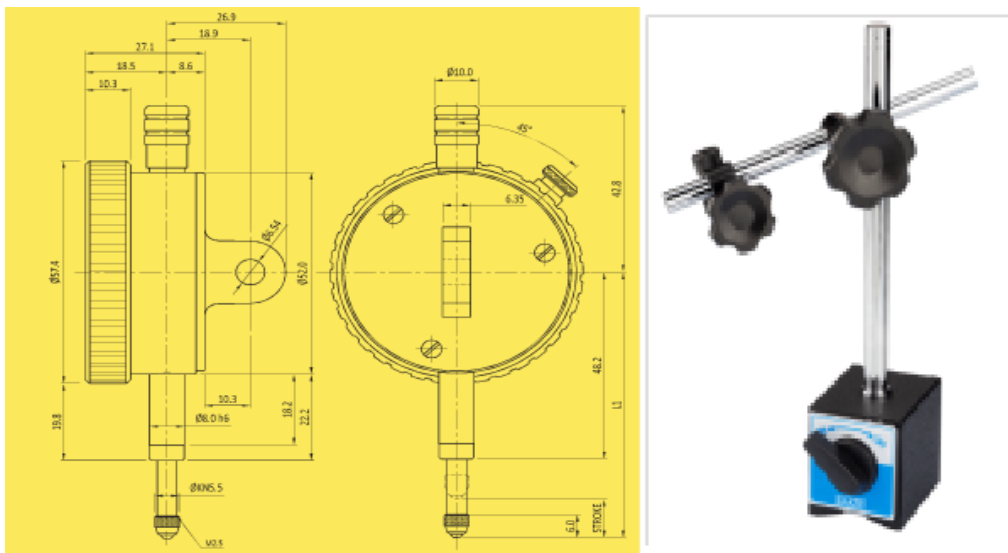
41.12.2 Plastic Box with proper cushioning for Lever Type Dial Gauge and Corrugated Box with proper Cushioning for Magnetic Stand

41.12.3 2mm Diameter T.C. ball stylus fitted to the gauge

41.12.4 8mm dovetail spigot assembly fitted to the gauge

42 Universal Dial Test Indicator - Plunger Type, Range 0 mm to 10 mm, LC = 0.01 mm

42.1 Basic Indicative Diagram:



42.2 Compliance

42.2.1 Dial: Generally Compliant to IS 2092 / 1983

42.3 Reading: 0.01 mm

42.4 Range: 0-10 mm

42.5 Graduation: 0-100

42.6 System of Measurement: Metric

42.7 Accuracy: 20 μ m

42.8 Magnetic force for stand: 600 N (Approx.)

42.9 Stand (L X W X H): 60 X 50 X 55 mm (Approx.)

42.10 Stand Weight: 1.5 Kg (Approx.)

42.11 Standard Accessories:

42.11.1 Universal Dial Test Indicator - Plunger Type with revolution Counter complete with Clamping Devices and Magnetic Stand

42.11.2 Spanner

42.11.3 Wooden/ Plastic Box with proper cushioning for Plunger Type Dial Gauge and Corrugated Box with proper Cushioning for Magnetic Stand

42.11.4 3mm Diameter T.C. ball Anvil fitted to the gauge

42.11.5 Operating Manual

43 Micrometer - Bore Gauge with Dial Indicator, 18 mm to 50 mm, LC = 0.01 mm

43.1 Basic Indicative Diagram:



43.2 Compliance

43.2.1 Dial: Generally Conforming to JISB 7503 / 1997

43.2.2 Stem: Generally Conforming to IS JISB 7515 / 1982

43.3 Range: 18 mm - 50 mm

43.4 Reading: 0.01 mm

43.5 Graduation: 0 - 50 - 0

43.6 Measuring Depth: 150 mm

43.7 Material: Stainless Steel / Alloy Steel

43.8 Standard Accessories:

43.8.1 Suitable spanner set

43.8.2 Washers 0.3mm, 0.5mm, 1mm and extension Rods

43.8.3 Wooden / Plastic Box with proper cushioning

43.8.4 Operating Manual

44 Micrometer - Bore Gauge with Dial Indicator, 50 mm to 150 mm, LC = 0.01 mm

44.1 Basic Indicative Diagram:



44.2 Compliance

44.2.1 Dial: Generally Conforming to JISB 7503 / 1997

44.2.2 Stem: Generally Conforming to IS 7515 / 1982

44.3 Range: 50 mm -150 mm

44.4 Reading: 0.01 mm

44.5 Graduation: 0 - 50 - 0

44.6 Measuring Depth: 250 mm

44.7 Material: Stainless Steel / Alloy Steel

44.8 Standard Accessories:

44.8.1 Suitable spanner set

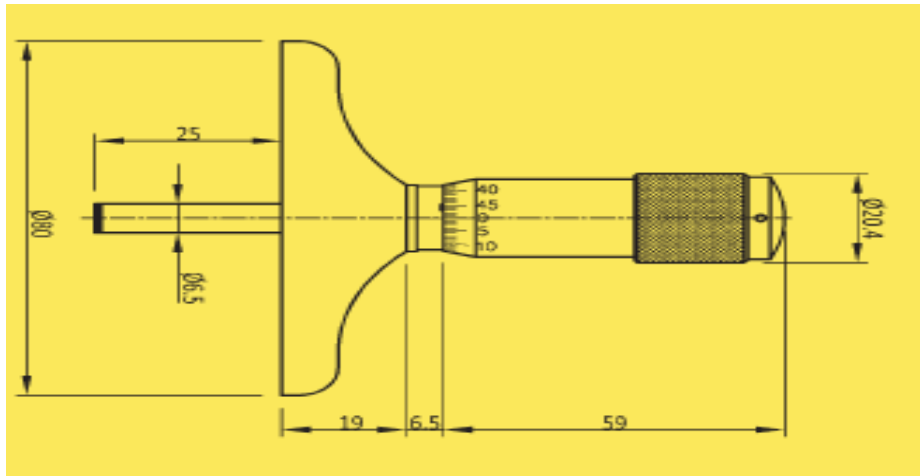
44.8.2 Washers 0.5mm, 1mm, 2mm,3mm and extension Rods

44.8.3 Wooden / Plastic Box with proper cushioning

44.8.4 Operating Manual

45 Micrometer - Depth, 0 mm to 100 mm, LC = 0.01 mm with standard set of extension rods

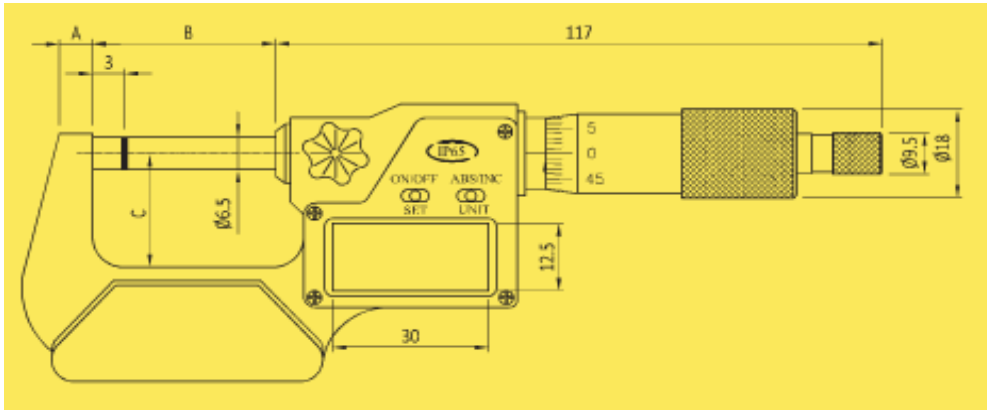
45.1 Basic Indicative Diagram:



- 45.2 Compliance: Generally Compliant to DIN 863
- 45.3 Range: 0 mm -100 mm
- 45.4 Reading: 0.01 mm
- 45.5 Accuracy: 10 μ m
- 45.6 Measuring Depth: 100 mm
- 45.7 Material: Stainless Steel / Alloy Steel
- 45.8 Standard Accessories:
 - 45.8.1 Suitable spanner
 - 45.8.2 Interchangeable rods
 - 45.8.3 Wooden / Plastic Box with proper cushioning
 - 45.8.4 Operating Manual

46 Micrometer - Digital, 0 mm to 25 mm, LC = 0.001 mm

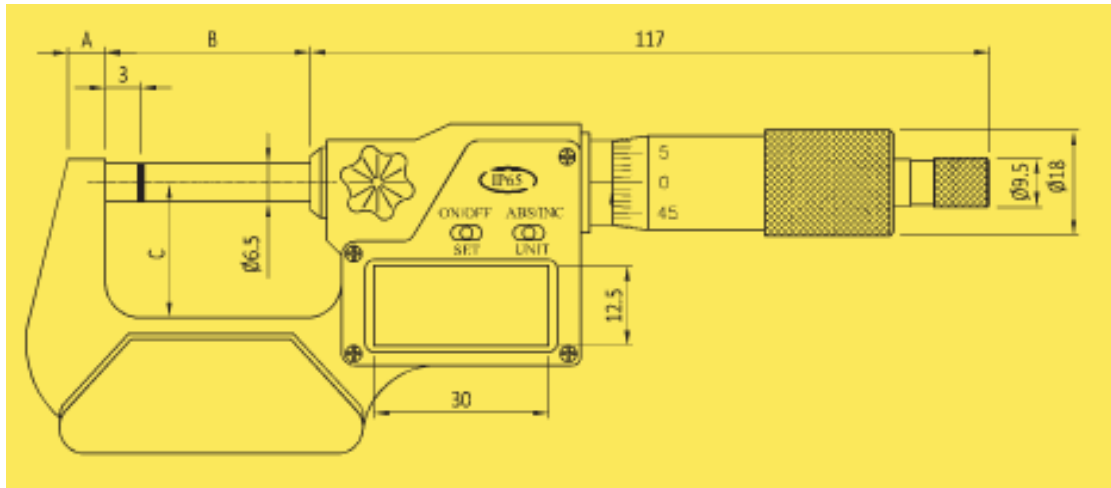
46.1 Basic Indicative Diagram



- 46.2 Compliance: Generally Compliant to DIN 863
- 46.3 Range: 0 mm -25 mm
- 46.4 Reading: 0.001 mm
- 46.5 Accuracy: 4 μ m
- 46.6 Protection level against dust and water: IP 65
- 46.7 Material: Stainless Steel / Alloy Steel
- 46.8 Standard Accessories
 - 46.8.1 Suitable spanner
 - 46.8.2 Should be supplied in Wooden / Plastic Box with proper cushioning

47 Micrometer - Digital, 25 mm to 50 mm, LC = 0.001 mm

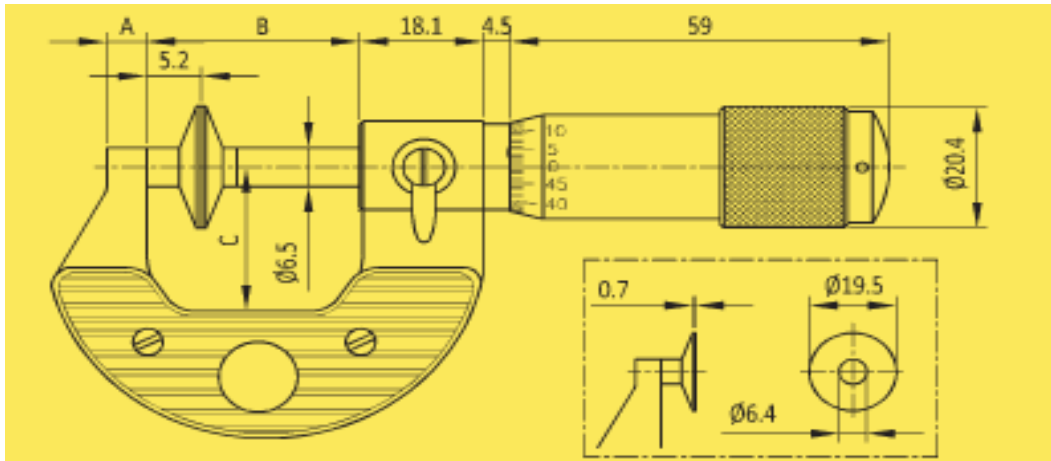
47.1 Basic Indicative Diagram



- 47.2 Compliance: Generally Compliant to DIN 863
- 47.3 Range: 25 mm - 50 mm
- 47.4 Reading: 0.001 mm
- 47.5 Accuracy: 4 μm
- 47.6 Protection level against dust and water: IP 65
- 47.7 Material: Stainless Steel / Alloy Steel
- 47.8 Standard Accessories
 - 47.8.1 Suitable spanner
 - 47.8.2 Should be supplied in Wooden / Plastic Box with proper cushioning

48 Micrometer - Disc, 0 mm to 25 mm, LC = 0.01 mm

48.1 Basic Indicative Diagram:



- 48.2 Compliance: Generally Compliant to IS 2967 / 1938
- 48.3 Range: 0 mm -25 mm
- 48.4 Reading: 0.01 mm
- 48.5 Accuracy: 4 μm
- 48.6 Spindle Material: Stainless Steel / Alloy Steel
- 48.7 Standard Accessories:
 - 48.7.1 Suitable spanner
 - 48.7.2 Wooden / Plastic Box with proper cushioning
 - 48.7.3 Operating Manual

49 Micrometer - Inside, 3 Point, 20 mm to 25 mm, LC = 0.001 mm

49.1 Basic indicative diagram



- 49.2 Generally conforming to DIN 863, part 4
- 49.3 Display Type: Analog / Digital
- 49.4 Range: 20 to 25 mm
- 49.5 Accuracy: 0.004 mm
- 49.6 Depth: 66 mm (Required Extension Rod)
- 49.7 Setting Ring: 20 mm
- 49.8 Graduation: 0.005 mm
- 49.9 Should have tungsten carbide measuring faces on all 3 point heads
- 49.10 Blind bore measurement should be possible
- 49.11 Ratchet stop to ensure consistent measurement
- 49.12 Should be supplied in Wooden / Plastic Box with proper cushioning
- 49.13 Certification from appropriate bodies should be supplied with setting ring & micrometer

50 Micrometer - Inside, 3 Point, 25 mm to 35 mm, LC = 0.001 mm

50.1 Basic indicative diagram



- 50.2 Generally conforming to DIN 863, part 4
- 50.3 Display Type: Analog / digital
- 50.4 Range: 25 to 35 mm
- 50.5 Accuracy: 0.001 mm
- 50.6 Depth: 66 mm (Required Extension Rod)
- 50.7 Setting Ring: 35 mm
- 50.8 Graduation: 0.005 mm
- 50.9 Should have tungsten carbide measuring faces on all 3 point heads
- 50.10 Blind bore measurement should be possible
- 50.11 Ratchet stop to ensure consistent measurement
- 50.12 Should be supplied in Wooden / Plastic Box with proper cushioning
- 50.13 Certification from appropriate bodies should be supplied with setting ring & micrometer

51 Micrometer - Inside, 3 Point, 35 mm to 50 mm, LC = 0.001 mm

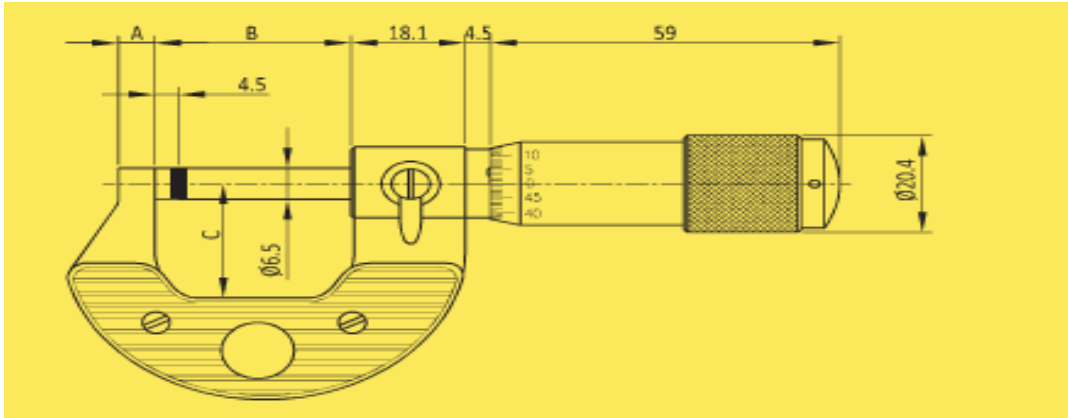
51.1 Basic indicative diagram



- 51.2 Generally conforming to DIN 863, part 4
- 51.3 Display Type: Analog / Digital
- 51.4 Range: 35 to 50 mm
- 51.5 Accuracy: 0.001 mm
- 51.6 Depth: 66 mm (Required Extension Rod)
- 51.7 Setting Ring: 35 mm
- 51.8 Graduation: 0.005 mm
- 51.9 Should have tungsten carbide measuring faces on all 3 point heads
- 51.10 Blind bore measurement should be possible
- 51.11 Ratchet stop to ensure consistent measurement
- 51.12 Should be supplied in Wooden / Plastic Box with proper cushioning
- 51.13 Certification from appropriate bodies should be supplied with setting ring & micrometer

52 Micrometer - Outside, 0 mm to 25 mm, LC = 0.01 mm

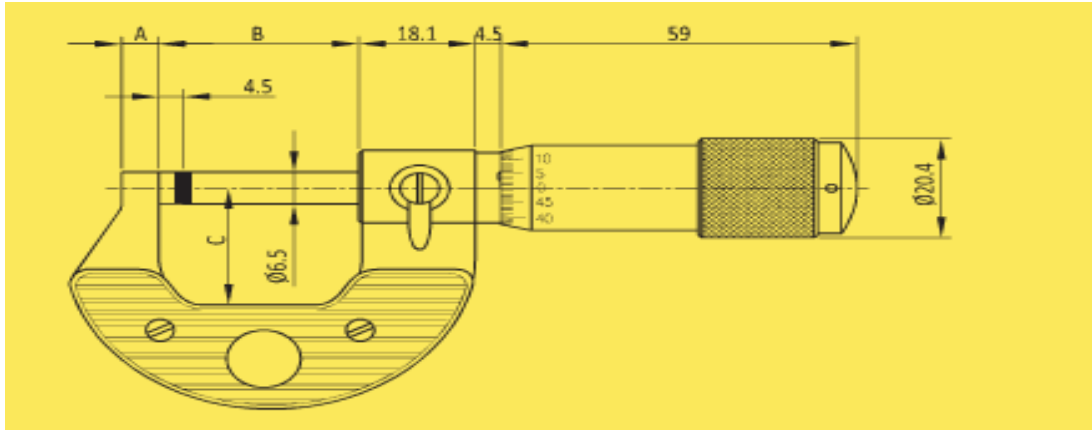
52.1 Basic Indicative Diagram:



- 52.2 Compliance: Generally Compliant to IS 2967 / 1938
- 52.3 Range: 0 mm -25 mm
- 52.4 Reading: 0.01 mm
- 52.5 Accuracy: 4 μ m
- 52.6 Spindle Material: Stainless Steel / Alloy steel
- 52.7 Standard Accessories:
 - 52.7.1 Suitable spanner,
 - 52.7.2 Wooden / Plastic Box with proper cushioning
 - 52.7.3 Operating Manual

53 Micrometer - Outside, 25 mm to 50 mm, LC = 0.01 mm

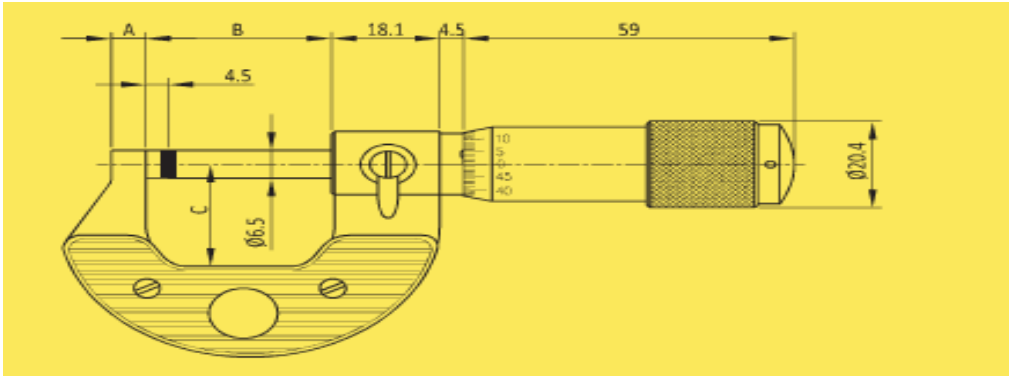
53.1 Basic Indicative Diagram:



- 53.2 Compliance: Generally Compliant to IS 2967 / 1938
- 53.3 Range: 25 mm -50 mm
- 53.4 Reading: 0.01 mm
- 53.5 Accuracy: 4 μ m
- 53.6 Spindle Material: Stainless Steel / Alloy Steel
- 53.7 Standard Accessories:
 - 53.7.1 Suitable spanner
 - 53.7.2 Distance Piece
 - 53.7.3 Wooden / Plastic Box with proper cushioning
 - 53.7.4 Operating Manual

54 Micrometer - Outside, 50 mm to 75 mm, LC = 0.01 mm

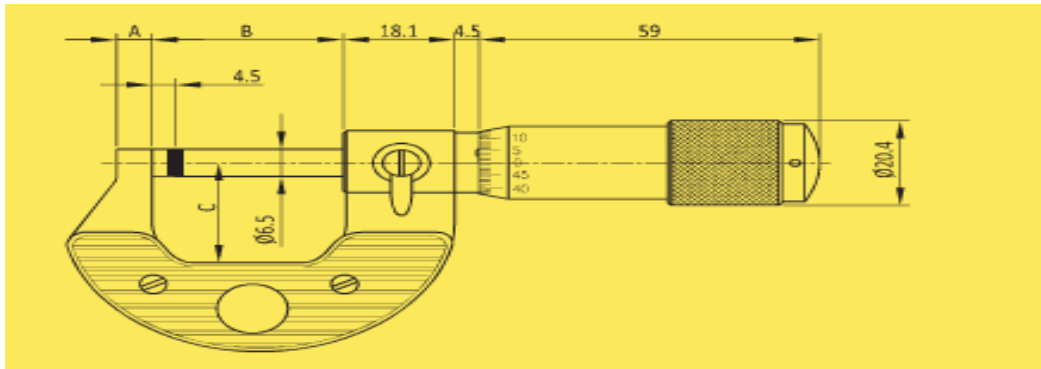
54.1 Basic Indicative Diagram:



- 54.2 Compliance: Generally Compliant to IS 2967 / 1938
- 54.3 Range: 50 mm -75 mm
- 54.4 Reading: 0.01 mm
- 54.5 Accuracy: 4 μ m
- 54.6 Spindle Material: Stainless Steel / Alloy Steel
- 54.7 Standard Accessories:
 - 54.7.1 Suitable spanner
 - 54.7.2 Distance Piece
 - 54.7.3 Wooden / Plastic Box with proper cushioning
 - 54.7.4 Operating Manual

55 Micrometer - Outside, 75 mm to 100 mm, LC = 0.01 mm

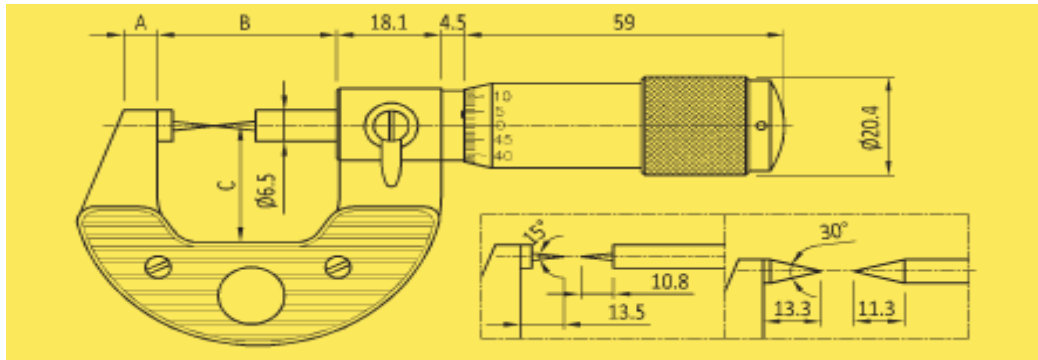
55.1 Basic Indicative Diagram:



- 55.2 Compliance: Generally Compliant to IS 2967 / 1938
- 55.3 Range: 75 mm - 100 mm
- 55.4 Reading: 0.01 mm
- 55.5 Accuracy: 4 μ m
- 55.6 Spindle Material: Stainless Steel / Alloy Steel
- 55.7 Standard Accessories:
 - 55.7.1 Suitable spanner
 - 55.7.2 Distance Piece
 - 55.7.3 Wooden / Plastic Box with proper cushioning
 - 55.7.4 Operating Manual

56 Micrometer - Screw Thread/ Point, 0 mm to 25 mm, LC = 0.01 mm

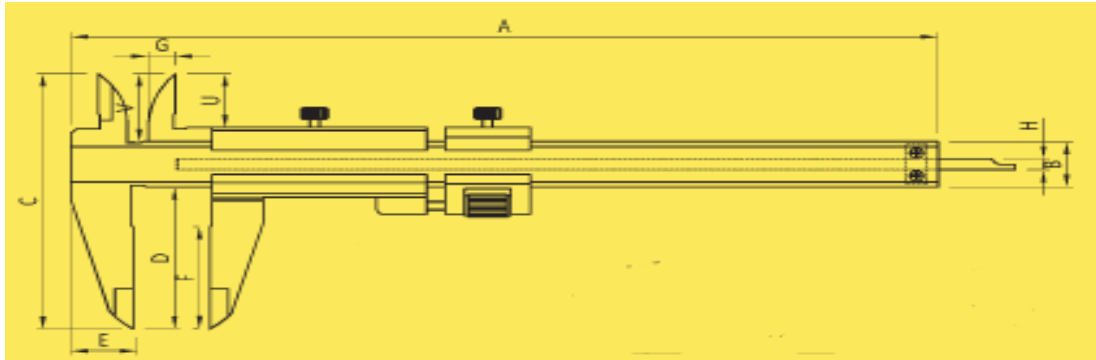
56.1 Basic Indicative Diagram:



- 56.2 Compliance: Generally Compliant to DIN 863
- 56.3 Range: 0 mm - 25 mm
- 56.4 Reading: 0.01 mm
- 56.5 Accuracy: 4 μ m
- 56.6 Point angle of spindle in Degree: 30 Degree
- 56.7 Material: Stainless Steel / Alloy Steel
- 56.8 Standard Accessories:
 - 56.8.1 Suitable spanner
 - 56.8.2 Wooden / Plastic Box with proper cushioning
 - 56.8.3 Operating Manual

57 Vernier Caliper - 0 mm to 180 mm, LC = 0.02 mm with fine adjustment

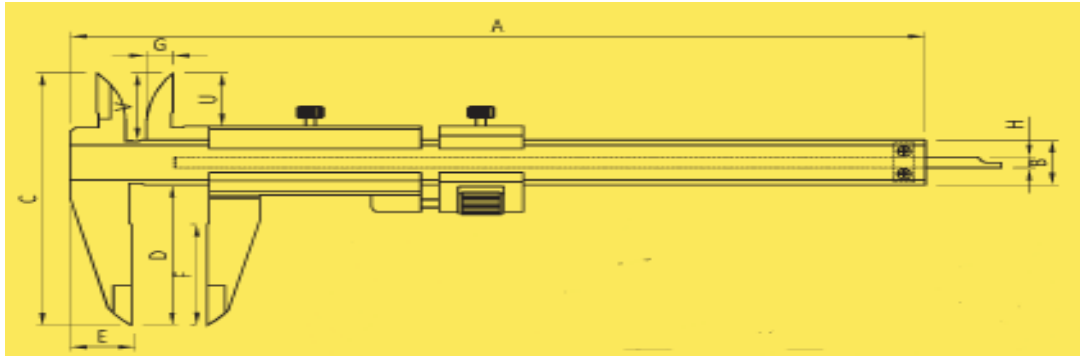
57.1 Basic Indicative Diagram:



- 57.2 Compliance: Generally Compliant to DIN 862
- 57.3 Range: 0 mm - 180 mm
- 57.4 Overall Length: 280 mm
- 57.5 Lower jaw length: Min. 50 mm
- 57.6 Upper jaw length: Min. 24 mm
- 57.7 Graduation: 0.02 mm
- 57.8 Accuracy: ± 0.05 mm
- 57.9 Material: Stainless Steel / Alloy Steel
- 57.10 Standard Accessories:
 - 57.10.1 Operating Manual
 - 57.10.2 Wooden / Plastic Box with proper cushioning

58 Vernier Caliper - 0 mm to 280 mm, LC = 0.02 mm with fine adjustment

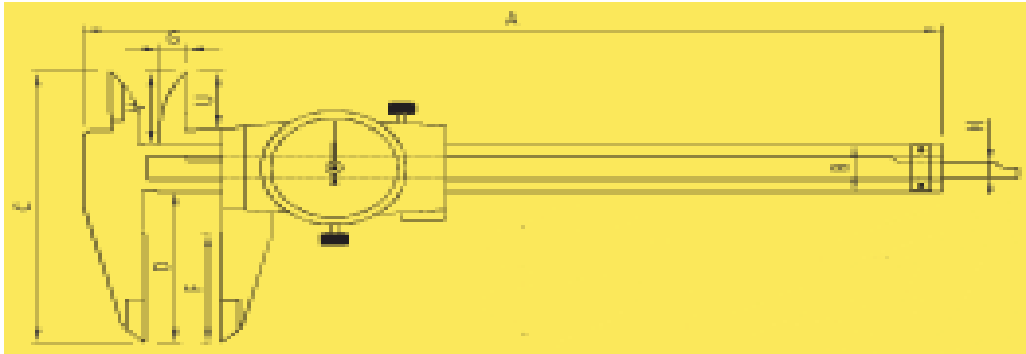
58.1 Basic Indicative Diagram:



- 58.2 Compliance: Generally Compliant to DIN 862
- 58.3 Range: 0 mm - 280 mm
- 58.4 Overall Length: 400 mm
- 58.5 Lower jaw length: Min. 60 mm
- 58.6 Upper jaw length: Min. 25 mm
- 58.7 Graduation: 0.02 mm
- 58.8 Accuracy: ± 0.05 mm
- 58.9 Material: Stainless Steel / Alloy Steel
- 58.10 Standard Accessories:
 - 58.10.1 Operating Manual
 - 58.10.2 Wooden / Plastic Box with proper cushioning

59 Vernier Caliper - Dial, 0 mm to 280 mm, LC = 0.02 mm

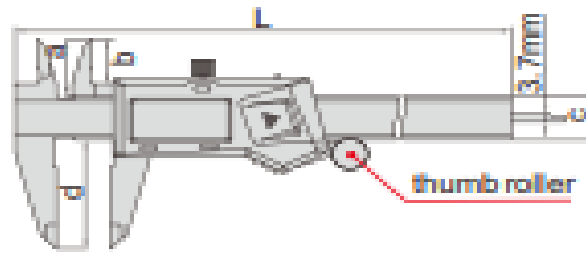
59.1 Basic Indicative Diagram



- 59.2 Compliance: Generally Compliant to DIN 862
- 59.3 Range: 0 mm - 280 mm
- 59.4 Overall Length: 350 mm
- 59.5 Lower jaw length: Min. 50 mm
- 59.6 Upper jaw length: Min. 24 mm
- 59.7 Graduation: 0.02 mm
- 59.8 Accuracy: ± 0.03 mm
- 59.9 Dial reading graduation: 0.02 mm
- 59.10 Material: Stainless Steel / Alloy Steel
- 59.11 Standard Accessories:
 - 59.11.1 Operating Manual
 - 59.11.2 Wooden / Plastic Box with proper cushioning

60 Vernier Caliper - Digital, 0 mm to 200 mm, LC = 0.01 mm

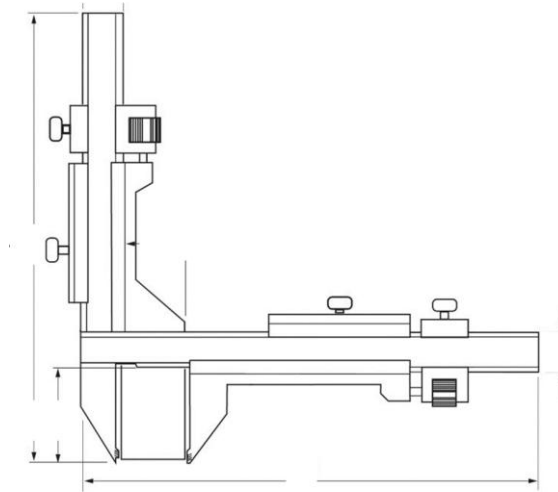
60.1 Basic Indicative Diagram



- 60.2 Compliance: Should generally comply with DIN 862 standards
- 60.3 Material: Stainless steel
- 60.4 Length: 285 mm (+ 5%)
- 60.5 Resolution: 0.01 mm
- 60.6 Range: 0 - 200 mm
- 60.7 Accuracy: 0.03 mm
- 60.8 Should be supplied with thumb roller
- 60.9 Buttons: On or Off, Zero, mm or inch
- 60.10 Automatic Power Off
- 60.11 Can turn on Power by moving the digital unit
- 60.12 High moving speed should be allowed
- 60.13 Should have facility of USB data output
- 60.14 Standard Accessories:
 - 60.14.1 Operating Manual
 - 60.14.2 Wooden / Plastic Box with proper cushioning

61 Vernier Caliper - Gear Tooth, 150 mm, LC = 0.02 mm

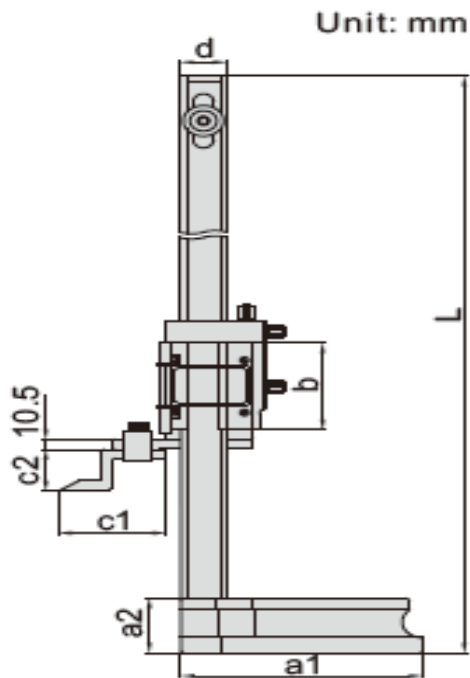
61.1 Basic Indicative Diagram



- 61.2 Resolution: 0.01 mm
- 61.3 Material: Stainless Steel
- 61.4 Should have carbide tips
- 61.5 Range: 1 to 25 mm
- 61.6 Accuracy: + 0.04 mm
- 61.7 Length arm 1: 170 + 1%
- 61.8 Length arm 2: 165 + 1%
- 61.9 Should be supplied with data output cable
- 61.10 Standard Accessories
 - 61.10.1 Operating Manual
 - 61.10.2 Wooden / Plastic Box with proper cushioning

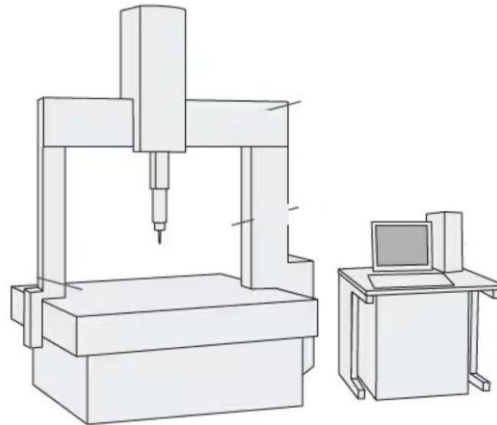
62 Vernier Height Gauge - 0 mm to 300 mm, LC = 0.02 mm

62.1 Basic Indicative Diagram:



- | | | |
|--------|---|-------------------------------|
| 62.2 | Range: | 0 mm - 300 mm |
| 62.3 | Overall Length: | 545 mm (Approx.) |
| 62.4 | Overall Width (Base) in mm: | 135 mm (Approx.) |
| 62.5 | Net Weight - Kg: | 3.1 Kg (Approx.) |
| 62.6 | Accuracy: | ± 0.02 mm |
| 62.7 | Material: | Stainless Steel / Alloy Steel |
| 62.8 | Standard Accessories | |
| 62.8.1 | Fine Adjusting Unit | |
| 62.8.2 | Carbide Tip Scriber point with clamping unit | |
| 62.8.3 | Operating Manual | |
| 62.8.4 | Magnifying Glass | |
| 62.8.5 | Wooden / Plastic Box with proper cushioning and corrugated box with proper cushioning for magnetic stand. | |

63 Co-ordinate Measuring Machine



- 63.1 Features
- 63.1.1 Bridge structure with integrated workbench
 - 63.1.2 High-precision air bearing system
 - 63.1.3 Unique Z axis anti-torque design to reduce rotation error
 - 63.1.4 Precision grating system (including grating and data acquisition device)
 - 63.1.5 Control system (including control box and manual operator)
 - 63.1.6 Probe system (including probe head, probe body and styli)
- 63.2 The set-up should consist of the following components.:
- 63.2.1 Main unit: 1 No.
 - 63.2.2 Probe system: Probe head: 1 No.
Probe body: 1 No.
 - 63.2.3 Styli set: 1 Set
 - 63.2.4 Control system: 1 Set
 - 63.2.5 Calibration sphere: 1 No.
 - 63.2.6 Universal sphere seat: 1 No.
 - 63.2.7 Computer: 1 No.
 - 63.2.8 Printer: 1 No.
 - 63.2.9 Software: 1 Set
 - 63.2.10 Table and chair: 1 Set
- 63.3 General Specifications of CMM
- 63.3.1 Measurement Range: 500 mm X 600 mm X 400 mm (X x Y x Z)
 - 63.3.2 Maximum Workpiece Weight: 500 kg
 - 63.3.3 Overall Dimensions: 1420 mm X 1135 mm X 2350 mm
- 63.4 Accuracy
- 63.4.1 Maximum Permissible Error of Length Measurement (MPEE): $\pm(2.3 + L/250)$ μm
 - 63.4.2 Maximum Permissible Probing Error (MPEP): 2.4 μm
- 63.5 Probe System
- 63.5.1 Probe Head: MH20i
 - 63.5.2 Probe Body: TP20
- 63.6 Probe Head Specifications
- 63.6.1 Angular Movement (Horizontal Axis): 0° to 105° in 15° steps
 - 63.6.2 Angular Movement (Vertical Axis): $\pm 180^\circ$ in 15° steps
 - 63.6.3 Number of Positions: 168
 - 63.6.4 Steering Mode: Manual
 - 63.6.5 Maximum Extension Length: 75 mm
 - 63.6.6 Weight: 210 g

63.7 Styli Set

| Material | Ball Diameter | Length | Stem Diameter | Effective Working Length | Qty |
|----------------------------------|---------------|--------|---------------|--------------------------|-------|
| Ruby ball / Stainless steel stem | 2.5 mm | 20 mm | 1.4 mm | 14 mm | 4 pcs |
| Ruby ball / Stainless steel stem | 4 mm | 20 mm | 1.5 mm | 20 mm | 1 pc |
| Ruby ball / Stainless steel stem | 3 mm | 10 mm | 1.5 mm | 7.5 mm | 1 pc |

63.8 Extensions

63.8.1 1 No.: $\varnothing 3$ mm \times 20 mm (stainless steel)

63.8.2 1 No.: $\varnothing 3$ mm \times 30 mm (stainless steel)

63.9 Center Base: 1 No. of 7 mm diameter X 7.5 mm length (stainless steel)

63.10 Operating Environment

63.10.1 Air Pressure: 0.6 - 0.8 MPa

63.10.2 Air Supply: 200 L/min

63.10.3 Temperature: $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$; $<0.5^{\circ}\text{C/h}$, $<1^{\circ}\text{C/24h}$

63.10.4 Humidity: 30% - 70%

63.10.5 Maximum Power: 1000 W

63.10.6 Power Supply: 220V \pm 5%, 50 Hz

63.11 Visual Dimensional Measuring Interface Standard (DMIS) CNC CAD+ software:

63.11.1 Geometric element measurement and evaluation of shape and position

63.11.2 Bidirectional data transfer with mainstream CAD systems

63.11.3 Complete graphical display