



INSIDE MICROMETERS



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Inside Micrometers and End Measuring Rods

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The following pages show our varied line of precision end measuring rods and inside micrometers. The variations are fixed-range or adjustable-range micrometers and solid or tubular measuring rods.

Unless otherwise noted under the individual tools, all have these features:

- ◆ Balanced design for better feel and accurate measurement
- ◆ All contact points are hardened and ground for better accuracy and long life
- ◆ Satin chrome finish on all micrometer heads and reading surfaces that resist rust and also make for easy reading by providing a no-glare background for the sharp lines and figures
- ◆ Hardened and stabilized spindle for accuracy and long life
- ◆ Advanced sleeve design with staggered lines and distinct figures for precise and easy readability
- ◆ Quick and easy adjustment
- ◆ Starrett workmanship
- ◆ Inside Micrometers Nos. 121, 124, 823 and 824 by design have a firmer rotation than regular micrometers. This is to limit the tendency of the micrometer head to rotate when withdrawn from the workpiece.



Measuring Tips for Inside Measurements

Whether to use a two-point or three-point contact measuring tool is usually a matter of preference, but there are some differences.

A two-point contact rod-type inside micrometer shown in this section is usually lighter, easier to handle, and more versatile over long ranges from approximately 6-107" (150-2700mm). Any two-point contact micrometer, regardless of range, can probe a hole better to find the geometry of that hole than a three-point contact.

Most three-point contact tools have setting rings to insure accuracy. If you desire very close tolerance work with

two-point contact inside micrometers, it is recommended that they be set to a ring gage or to an outside micrometer.

A three-point contact micrometer shown in the Bore Gages section has an advantage in that it can be seated in position more quickly than a two-point contact tool. Usually these tools can also be read to a finer accuracy. The three-point tool will tell the maximum true diameter that can enter the hole a little faster than a two-point contact tool.

Micrometer heads used in these tools are accurate to ± 0.0001 " or 0.002mm, but overall accuracy on tools that add rods is dependent on good practice and technique.

To insure accuracy, these practices should be followed:

- ◆ Always make sure that there are no specks of dirt between the clamping surfaces of the rods and micrometer heads
- ◆ Tighten all rods uniformly, not too tight, not too loose, but a fairly firm assembly
- ◆ Assemble long sections vertically or, with support, horizontally
- ◆ Because temperature can affect long rods used in these tools, they should be assembled in the same environment in which they will be used

(For additional information, refer to the Bore Gage Section)



**End Measuring Rods
with spherical ends**

1-24" / 25-600mm Lengths

No. 234 Series 1-24"

**No. 234M Series
25-600mm**

These rods or "standards" are for checking and setting micrometers of 2" capacity and larger, and are also used on machine tools for comparing gages, checking precision measuring tools, for measuring parallel surfaces, and many other types of work.

They are made of special tool steel in rod form with ends hardened and accurately lapped to a spherical radius.

Available plain or with insulated handles to minimize expansion by heat when held in the hand. 1-6" (25-150mm) sizes are 1/4" (6.3mm) diameter; 7-11" (175-275mm) sizes, 3/8" (9.5mm) diameter; 12-24" (300-600mm) sizes are 7/16" (11mm) diameter.



No. 234 Rods shown with or without insulated handles.

NOTE: These standards are the ones used for all micrometers that are furnished with standards. Larger sizes are available on special order.

Length	With Insulating Handle		Without Insulating Handle	
	Catalog No.	EDP No.	Catalog No.	EDP No.
1"	234A-1	50969	234B-1	51017
2"	234A-2	50971	234B-2	51019
3"	234A-3	50973	234B-3	51021
4"	234A-4	50975	234B-4	51023
5"	234A-5	50977	234B-5	51025
6"	234A-6	50979	234B-6	51027
7"	234A-7	50981	234B-7	51029
8"	234A-8	50983	234B-8	51031
9"	234A-9	50985	234B-9	51033
10"	234A-10	50987	234B-10	51035
11"	234A-11	50989	234B-11	51037
12"	234A-12	50991	234B-12	51039
13"	234A-13	50993		
14"	234A-14	50995		
15"	234A-15	50997		
16"	234A-16	50999		
17"	234A-17	51001		
18"	234A-18	51003		
19"	234A-19	51005		
20"	234A-20	51007		
21"	234A-21	51009		
22"	234A-22	51011		
23"	234A-23	51013		
24"	234A-24	51015		

Length	With Insulating Handle		Without Insulating Handle	
	Catalog No.	EDP No.	Catalog No.	EDP No.
25mm	234MA-25	50970	234MB-25	51018
50mm	234MA-50	50972	234MB-50	51020
75mm	234MA-75	50974	234MB-75	51022
100mm	234MA-100	50976	234MB-100	51024
125mm	234MA-125	50978	234MB-125	51026
150mm	234MA-150	50980	234MB-150	51028
175mm	234MA-175	50982	234MB-175	51030
200mm	234MA-200	50984	234MB-200	51032
225mm	234MA-225	50986	234MB-225	51034
250mm	234MA-250	50988	234MB-250	51036
275mm	234MA-275	50990	234MB-275	51038
300mm	234MA-300	50992	234MB-300	51040
325mm	234MA-325	50994		
350mm	234MA-350	50996		
375mm	234MA-375	50998		
400mm	234MA-400	51000		
425mm	234MA-425	51002		
450mm	234MA-450	51004		
475mm	234MA-475	51006		
500mm	234MA-500	51008		
525mm	234MA-525	51010		
550mm	234MA-550	51012		
575mm	234MA-575	51014		
600mm	234MA-600	51016		

Sizes 1-23" packed one in a box.
Size 24" packed one in a package.



No. 128 Series Sets 6-294"

No. 128M Series Sets 150-7350mm

These sets of inside micrometers are ideal for a wide range of precision inside measurements in aircraft, metalworking and other industries.

Each set consists of a satin-chrome micrometer head which can be used in combination with any one or more of a series of rigid, tubular steel measuring rods to obtain the required length.

The micrometer head is a modification of our No. 63, which has a 2" (50mm) range. The head has a basic length of 4" (100mm) which can be lengthened to 6" (150mm) by means of its measuring range. Besides those listed on the lead page of this section, the No. 128 Series have these additional features:

- ◆ For inside measurements from 6-294" (150-7350mm) (longer sizes are also available on special order)
- ◆ Interchangeable tubular steel measuring rods and extension rods are lightweight with extreme rigidity. Rods screw into each other and seat against hardened ground and lapped surfaces necessary for high accuracy. Rod diameter 5/8" (16mm)
- ◆ Rods are provided with insulated handles to minimize expansion from hand heat. All rods marked with length
- ◆ All rod anvil contacts are hardened and ground
- ◆ All measuring rod anvil contacts are adjustable (plain extension rods are not adjustable)
- ◆ Adjustable, ground steel supporting collars (placed in "V" grooves when used in the horizontal position)

6-294" / 150-7350mm Ranges



6-294" range

Range with Micrometer Head	Move-ment of Screw	Grad-uation	Description	Range with Combination Head*	Catalog No.	EDP No.
6-78"	2"	.001"	With (1) 4-6" Head, (1) each 2", 4", 6", 8", 10", 12" Rods, (1) 12" Ext., (2) 24" Ext.	11-83"	128AZ	64375
6-150"	2"	.001"	With (1) 4-6" Head, (1) each 2", 4", 6", 8", 10", 12" Rods, (1) 12" Ext., (5) 24" Ext.	11-155"	128BZ	64376
6-294"	2"	.001"	With (1) 4-6" Head, (1) each 2", 4", 6", 8", 10", 12" Rods, (1) 12" Ext., (11) 24" Ext.	11-299"	128CZ	64377

150-7350mm range

150-1950 mm	50mm	0.01 mm	With (1) 100-150mm Head, (1) ea. 50, 100, 150, 200, 250, 300mm Rods, (1) 300mm Ext., (2) 600mm Ext.	300-2100 mm	128MAZ	64378
150-3750 mm	50mm	0.01 mm	With (1) 100-150mm Head, (1) ea. 50, 100, 150, 200, 250, 300mm Rods, (1) 300mm Ext., (5) 600mm Ext.	300-3900 mm	128MBZ	64379
150-7350 mm	50mm	0.01 mm	With (1) 100-150mm Head, (1) ea. 50, 100, 150, 200, 250, 300mm Rods, (1) 300mm Ext., (11) 600mm Ext.	300-7500 mm	128MCZ	64380

All sets furnished in nicely finished cases. Packed one in a box.

* See following page for information on the optional No. 128 Combination Head.



Combination Head with Inside Micrometer

No. 128

No. 128M

The Starrett combination head for inside micrometers combines the precision of a dial indicator sensor and the linear accuracy of a micrometer. This combination of indicator and micrometer reduces the need for operator “feel” and provides faster readings with increased reliability.

This head is interchangeable with the Starrett No. 128 Series end rods and extension combinations.

For direct measurements, the dial indicator hand and the telltale hand must both register zero before reading the micrometer. As a comparator, the micrometer is first set to the nominal dimension and \pm deviation from zero is read from the dial indicator. The gage should be rocked to obtain a minimum reading on the indicator. Out-of-roundness can also be checked – any variation being shown by the indicator.

For inch-reading tools, the head can be adjusted within a range of 2". It extends the overall range by an additional 5". The special No. 81-138J jeweled non-shock Indicator is graduated .0005", range $\pm .040$ " and reads 0-40 on both the plus and minus dials.

For millimeter-reading tools, the head can be adjusted within a range of 50mm. This extends the overall range an additional 125mm. The special No. 81-181J jeweled non-shock Indicator is graduated 0.01mm, range ± 1 mm and reads 0-100mm on both the plus and minus dials.

The 10" (250mm) master should be used vertically with the shoulder on the indicator end of the head, seated squarely, as shown in photo.



Combination Head in master.

Catalog No.	EDP No.	Description
128	64381	Inch-reading Combination Head with Setting Master
128M	68117	Millimeter-reading Combination Head with Setting Master



Solid-Rod Inside Micrometers

No. 124 Series Sets 2-32"

No. 124M Series Sets 50-800mm

These are the most popular inside micrometers because of their lightness, ease of use, and range. They are very useful for measuring inside diameters of cylinders and rings, measuring parallel surfaces, etc.

The desired range is obtained by assembling rods and spacing collars to the micrometer head. Measuring rods are provided with a shoulder that is set accurately in the micrometer head and locked in position. When assembling rods to the A and B heads, the reading line on the micrometer head should be lined up with the marking on each rod (except for the 2-3" and the 50-75mm rods).

Rod diameters are approximately 1/4" (6mm) on the A and B sizes, and approximately 11/32" (8.5mm) on the C size. Each rod has individual length adjustment for the anvil by means of special wrenches furnished.

- ◆ Measuring rods are solid and assembled on one side of the micrometer head
- ◆ Rods are insulated
- ◆ Each rod marked with length
- ◆ Hardened and ground anvils on rods, adjustable for length. Head anvil is hardened and ground
- ◆ Quick-reading figures – every thousandth numbered on inch reading tools
- ◆ A 6-1/2" (165mm) long convenient handle is available to provide reach for use in deep holes. Handle screws into the micrometer head in place of the dummy screw, which is opposite a rod lock screw



Measuring I.D. with micrometer and rod.



No. 124AZ (2-8" set) with tool, rods and wrenches.

Graduation – .001"

Range	Movement of Screw	No. Measuring Rods	No. Spacing Collars	Catalog No.	EDP No.
2-8"	1/2"	6	One 1/2"	124A** 124AZ*	50540 50542
2-12"	1/2"	10	One 1/2"	124B** 124BZ*	50544 50546
8-32"	1"	4	One 1" Two 2"	124C** 124CZ*	50548 50550
2-32"	1/2 and 1" (2 Heads)	Comprised of Sets 124A and 124C		124D** 124DZ*	50552 50554

Graduation – 0.01mm

50-200mm	13mm	6	One 12mm	124MA** 124MAZ*	50541 56141
50-300mm	13mm	10	One 12mm	124MB** 124MBZ*	50545 56142
200-800mm	25mm	4	One 25mm Two 50mm	124MC** 124MCZ*	50549 56143
50-800mm	13 & 25mm (2 Heads)	Comprised of Sets 124MA and 124MC		124MD** 124MDZ*	50553 56144

Accessory

6-1/2" (165mm) Handle	124H	50556
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* With Case ** Without Case

Available with case. Sent without case unless otherwise ordered. Packed one in a box.



Tubular Inside Micrometers

1-1/2-40" / 40-1000mm Ranges

No. 823 Series Sets 1 1/2-40"

No. 823M Series Sets 40-1000mm

The Starrett 823 Series micrometers are highly useful tools for internal linear measurements such as measuring cylinders, rings, setting calipers, comparing gages and measuring parallel surfaces.

The extension rods are made of steel tubing, light in weight, yet extremely rigid. Rods are approximately 3/8" (9.5mm) diameter to meet the requirements of mechanics who prefer this larger diameter. By removing the hardened and ground anvil ends (end caps) of the micrometer head, the rods may be attached to either or both ends of the micrometer as preferred. Each rod may be individually adjusted for wear by the hardened and ground anvil at the end.

- ◆ **Rods attachable as shown to either one or both ends of the head ensures the best balance, feel, and ease of reading**



- ◆ Tubular measuring rods are lightweight, yet extremely rigid. Rods are insulated, with the exception of 1/2" (13mm) and 1" (25mm) sizes
- ◆ Each rod is marked with length
- ◆ Hardened and ground anvils on rods are adjustable for length. Head anvil is hardened and ground
- ◆ Interchangeable anvils on both 1/2" (13mm) and 1" (25mm) heads
- ◆ Quick reading figures – every thousandth numbered on inch reading tools
- ◆ Lock nut furnished on 1" (25mm) heads
- ◆ 5-1/2" (140mm) long, convenient handle furnished on A, B, F micrometers may be clamped where it will provide correct balance and reach

Each set furnished in attractive, protective case with assembly instructions for various measurements. Packed one in a box.



(Above) No. 823AZ 1-1/2-8" set with tool, rods, handle and wrenches. (Right) Measuring inside diameter using convenient handle attached to the micrometer.

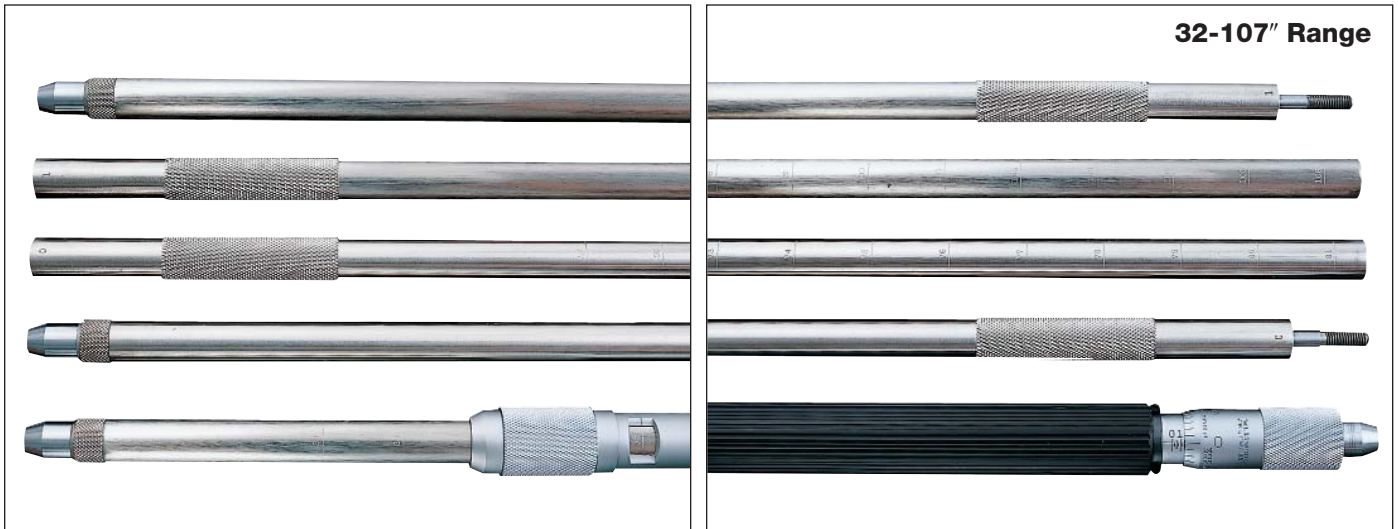


Graduation – .001"

Range	Movement of Screw	Description	Catalog No.	EDP No.
1-1/2-8"	1/2"	With 5 Rods and Handle	823AZ	53050
1-1/2-12"		With 8 Rods and Handle	823BZ	53052
4-24"	1"	With 7 Rods	823CZ	53054
4-32"		With 8 Rods	823DZ	53055
4-40"		With 10 Rods	823EZ	53056
1-1/2-32"	1/2 and 1" (2 heads)	With 10 Rods and Handle	823FZ	53058

Graduation – 0.01mm

40-200mm	13mm	With 6 Rods and Handle	823MAZ	53051
40-300mm		With 8 Rods and Handle	823MBZ	53053
100-1000mm	25mm	With 10 Rods	823MEZ	53057



The No. 121CZ Set covers a wide range, from 32-107". Furnished in case (not shown).

Long Range Tubular Inside Micrometers

No. 121 Series Sets 32-107"

Starrett No. 121 tubular inside micrometers are designed for large internal measurements beyond the capacity of most other micrometers. Each set consists of a micrometer head mounted at the end of a tubular holder in which measuring rods can be inserted and adjusted to the desired size. Final size reading in thousandths of an inch (.001") is obtained using the micrometer head.

Rods and holder are made of steel tubing, light in weight, yet very rigid. Each rod is accurately graduated with inch divisions, which are set to the size desired by a line on the holder, and firmly held by a large, knurled clamping nut. The collet has a design, insuring an extremely tight grip on the rods at any setting.

Features

- ◆ Insulated rod holder to eliminate expansion by heat when hand held
- ◆ Attractive nickel-plated finish; satin-chrome finish on micrometer head reading surfaces
- ◆ Rods are accurately graduated in inches – micrometer head in thousandths of an inch
- ◆ Hardened and ground anvils. All rod anvils are adjustable
- ◆ Quick, easy adjustment for micrometer screw

Graduation – .001"

Range	Movement of Screw	Description	Catalog No.	EDP No.
32-57"	1"	With 1 Graduated Measuring Rod	121AZ	50492
32-82"		With 2 Graduated Measuring Rods and 1 Extension Rod	121BZ	50493
32-107"		With 3 Graduated Measuring Rods and 2 Extension Rods	121CZ	50494

Each set furnished in attractive, protective case. Packed one in a box.



Fixed Range Inside Micrometers

2-12" Range

No. 824 Series 2-12"

No. 824M Series
50-150mm

No. S824 Series Sets 2-12"

No. S824M Series Set
50-150mm

For those who prefer inside micrometers without interchangeable rods, Starrett offers this series of fixed range inside micrometers. The Nos. 824 and 824M Series can be ordered individually or in sets. All Nos. 824 and 824M Series micrometers feature:

- ◆ Insulating handles on all sizes minimize possible expansion by heat when hand held
- ◆ Lock nuts (except Nos. 824AA and 824MAA)
- ◆ Adjustable contacts on thimble end
- ◆ Adjustable sleeve for head accuracy



Top-to-bottom: Nos. 824B 4-5", 824C 5-6", 824K 6-8".

Graduation – .001"

Range	Movement of Screw	Catalog No.	EDP No.
2-3"	1"	824AA	56665
3-4"		824A	56666
4-5"		824B	56667
5-6"		824C	56668
6-7"		824D	56669
7-8"		824E	56670
8-9"		824F	56671
9-10"		824G	56672
10-11"		824H	56673
11-12"		824J	56674
6-8"	2"	824K	56675
8-10"		824L	56676
10-12"		824N	56677

Graduation – 0.01mm

50-75mm	25mm	824MAA	64192
75-100mm		824MA	64193
100-125mm		824MB	64194
125-150mm		824MC	64195

Packed one in a box.

No. 824 Series Sets – Inch

Total Range	Description	Catalog No.	EDP No.
2-6"	4 Micrometers, 1" Range: 2-3", 3-4", 4-5", 5-6", with case	S824AZ	56678
2-12"	10 Micrometers, 1" Range: 2-3", 3-4", 4-5", 5-6", 6-7", 7-8", 8-9", 9-10", 10-11", 11-12", with case	S824BZ	56679
6-12"	3 Micrometers, 2" Range: 6-8", 8-10", 10-12", with case	S824CZ	56680
2-12"	7 Micrometers, (4) 1" Range, (3) 2" Range: 2-3", 3-4", 4-5", 5-6", 6-8", 8-10", 10-12", with case	S824DZ	56681

No. 824M Series Set – Millimeter

50-150mm	4 Micrometers, 25mm Range: 50-75mm, 75-100mm, 100-125mm, 125-150mm, with case	S824MAZ	64196
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Each set furnished in attractive, protective case.



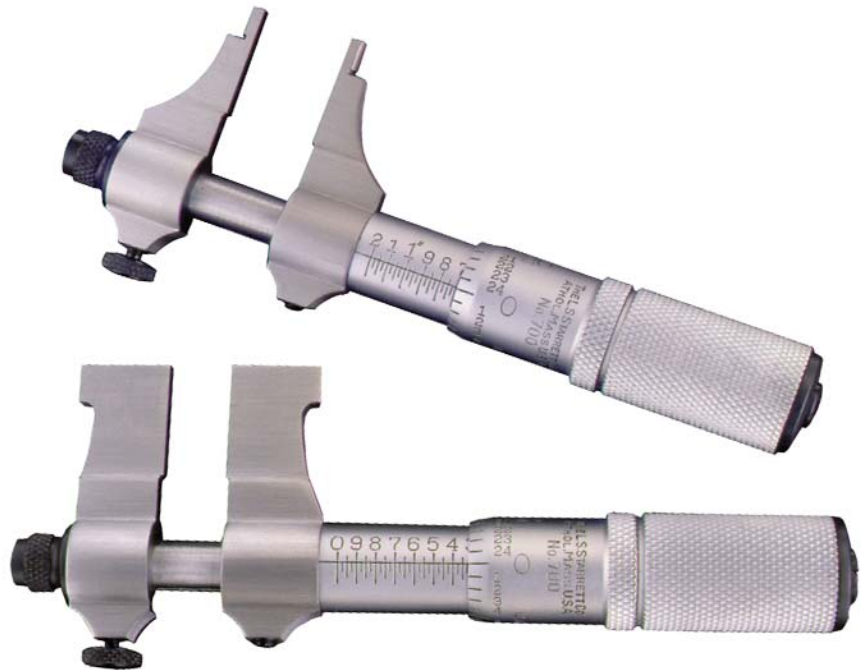
Inside Micrometer Calipers

No. 700 Series .200-2"

No. 700M Series 5-50mm

Caliper-type jaws permit quick inside measurements accurate to $\pm .0002''$ or $\pm 0.003\text{mm}$. Jaws are hardened and ground on a radius for accurate feel without cramping.

- ◆ Satin chrome reading surface is glare free and resists rust
- ◆ Smooth friction thimble for consistent readings
- ◆ Lock screw



Top-to-bottom: Nos. 700A and 700B.

Graduation – .001"

Range	Description	Catalog No.	EDP No.
.200-1.200"	Friction Thimble, Lock Screw	700A	52909
1-2"	Friction Thimble, Lock Screw	700B	52911

Graduation – 0.01mm

5-30mm	Friction Thimble, Lock Screw	700MA	56063
25-50mm	Friction Thimble, Lock Screw	700MB	56064

Packed one in a box; sent without case – case is available by ordering No. 940, EDP 55359.



Internal Groove Micrometers

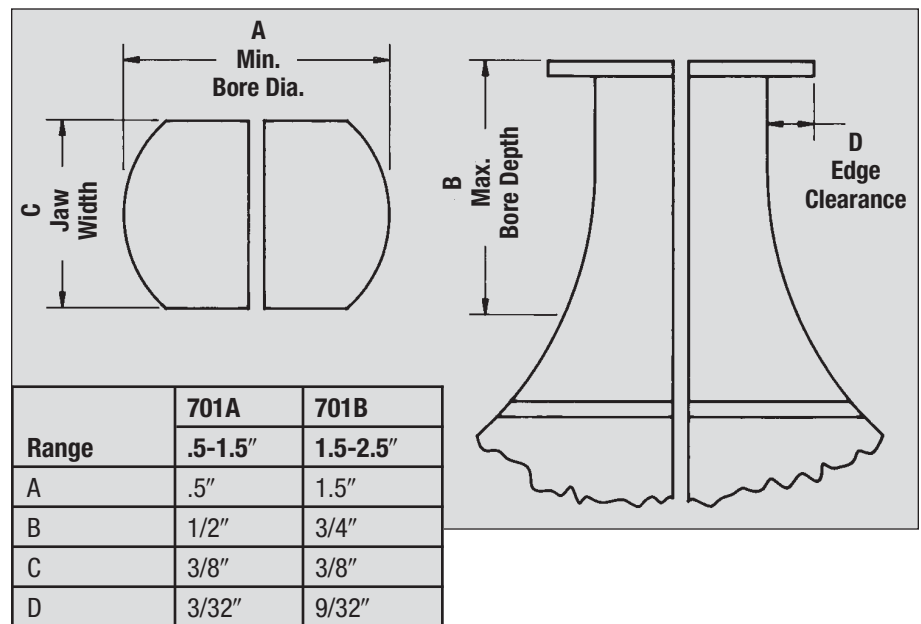
No. 701 Series .500-2.500"

Measures grooves for retaining rings and "O" rings, oil grooves, washer grooves, as well as bores and recesses. Depth of grooves up to 5/64" can be measured with No. 701A; and 7/32" with No. 701B. Tool is accurate to $\pm .0002$ ".

- ◆ Hardened and ground gaging contacts are .030" thick
- ◆ Contacts have flush ends to gage grooves at the bottom of blind holes
- ◆ Satin chrome reading surface is glare free and resists rust
- ◆ Smooth friction thimble for consistent readings
- ◆ Lock screw



Gaging contacts are only .030" thick.



Graduation – .001"

Range	Minimum Bore	Max. Depth Bore	Thickness Jaws	Description	Catalog No.	EDP No.
.500-1.500"	.500"	1/2"	.030"	Friction Thimble, Lock Screw	701A	52913
1.500-2.500"	1.500"	7/8"		Friction Thimble, Lock Screw	701B	52915

Packed one in a box; sent without case – case is available by ordering No. 940, EDP 55359.

Precision Measuring Equipment and Industrial Supplies since 1924.

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