DORSEY
METROLOGY INTERNATIONAL

	Exten. No.	Range (Inches)	Range (Metric)
Dial Bore Gage No. 2	0	1 - 1.0625	25.4 - 27mm
	1	1.0625 - 1.125	27 - 28.5
	2	1.125 - 1.875	28.5 - 30
	3	1.1875 - 1.250	30 - 32
	4	1.250 - 1.313	32 - 33.5
	5	1.313 - 1.375	33.5 - 35
	6	1.375 - 1.438	35 - 36.5
	7	1.438 - 1.500	36.5 - 38
	8	1.500 - 1.563	38 - 39.5
Dial Bore Gage No. 3	1	1.500 - 1.625	38 - 41mm
	2	1.625 - 1.750	41 - 44.5
	3	1.750 - 1.875	44.5 - 47.5
	4	1.875 - 2	47.5 - 51
	5	2 - 2.156	51 - 55
Dial Bore Gage No. 4	1	2.125 - 2.375	54 - 60mm
	2	2.375 - 2.625	60 - 67
	3	2.625 - 2.875	67 - 73
	4	2.875 - 3.125	73 - 79
Dial Bore Gage No. 5	1	3.094 - 3.500	78 - 89mm
	2	3.500 - 3.938	89 - 100
	3	3.938 - 4.375	100 - 111
	4	4.375 - 4.813	111 - 122
	5	4.813 - 5.250	122 - 133
	6	5.250 - 5.688	133 - 144
	7	5.688 - 6.125	144 - 156
Dial Bore Gage No. 6	1	6 - 7	153 - 178mm
	2	7 - 8	178 - 203
	3	8 - 9	203 - 229
	4	9 - 10	229 - 254
	5	10 - 11	254 - 279
	6	11 - 12.125	279 - 308

Instructions

For

Dorsey Metrology Dial Bore Gages

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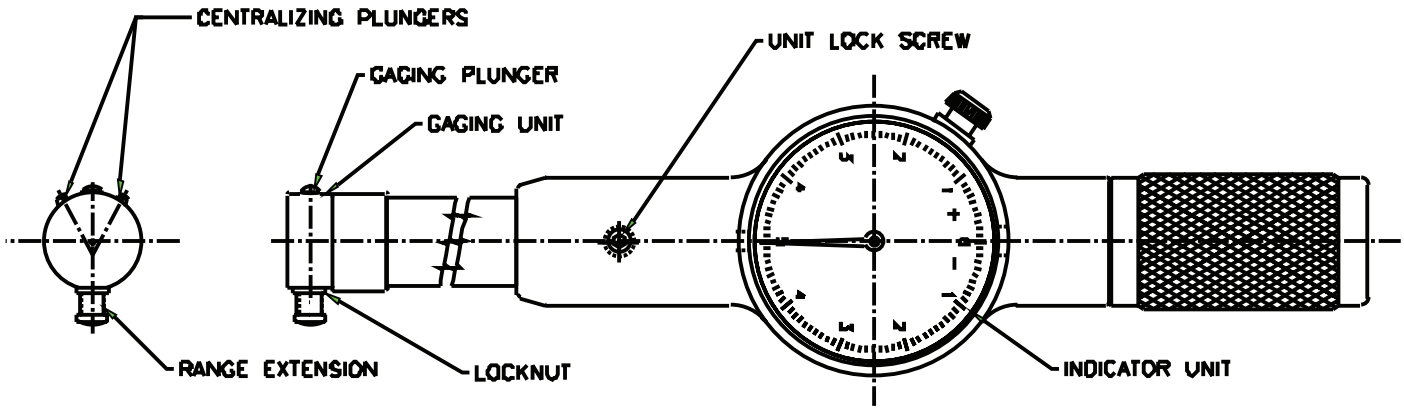
Instructions for "Standard" Dial Bore Gage



(1) Unit Lock Screw Setting:

The unit Lock Screw is set at the factory and need not be reset unless the user desires to rotate the Indicator Unit to face in another direction.

This can be done by the following steps:

1. Loosen Unit Lock Screw.
2. Rotate indicator unit on tube to desired position.
3. Move gaging unit toward indicator until contact is indicated by a slight movement of the pointer. Then back it away slightly (.002" to .005") which will allow a corresponding movement to the gaging plunger before actuating the indicator.
4. Tighten Unit Lock Screw.
5. Check the setting by pressing the gaging plunger with the finger. For gages of 1" or larger bore size (with 2" dial) the pointer should move approximately .030".

(2) Zero Setting:

Use Master Ring of desired size and proceed to set as follows:

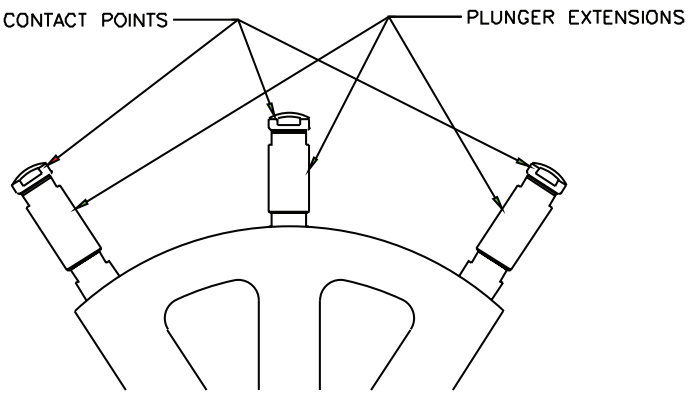
1. Select the proper range Extension - see chart.
2. Screw Extension into gaging Unit far enough to permit easy entrance of gage into the ring, keeping Lock nut loose.
3. Rock the gage in the ring to try adjustment of the Range Extension and screw it out until the maximum movement of the pointer will at least cover the required plus tolerance of the work. For most indicators one half a revolution of the pointer is convenient. The first trial rocking of the gage in the Master or Work should always be done cautiously to avoid damage from forcing the working parts beyond their normal limits of travel.
4. Tighten the Locknut with wrenches provided.
5. Turn the dial bezel so that zero line is at the extreme pointer position or point of reverse while rocking in the master.
6. Zero setting should be done close to operating temperature and checked frequently with master during use.

(3) Plunger Extensions:

Dial Bore Gage No. 6 requires Plunger Extensions for diameters from 9" to 12-1/8". to install extensions:

1. Remove Gaging Plunger Contact Point, using two wrenches provided, and screw it firmly into Extension B, furnished.
2. Screw Extension B into Gaging Plunger, again using two wrenches, one on the Plunger and one on the Extension, to avoid damage to internal parts of the gage.
3. Extend Centralizing Plungers by replacing short Contact Points with longer ones (A) provided.

Adapters are also available for checking 12-1/8" to 24" diameter – prices on application.



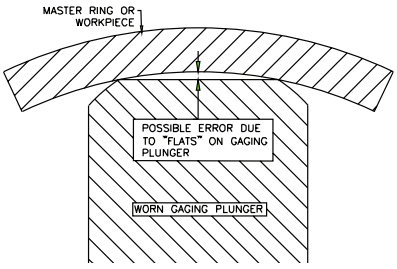
Dial Bore Gages Setup and Surveillance

Ring Masters or Parallel Flats?

A dial bore gage must be "set" to a reference master that has a known dimension. The master may be a cylindrical master ring or two flat surfaces that are accurately spaced to a given dimension.

Mastering a dial bore gage to a master ring gage is the preferred method because the ring gage duplicates the geometry of the workpiece being gaged. It is accepted as the fastest and most economical for high-production gaging. It is also the most accurate, especially for bore sizes under 1 inch, or any bore sizes that require master quality finer than "X" accuracies. Master rings have the further advantage of being more directly traceable to the National Institute of Standards and Technology than any adjustable or multiple component device.

Mastering to flat parallel surfaces is a practice generally associated with dial bore gaging of larger tolerances – or on short-run job-shop applications that do not justify the cost of a special master ring gage. Mastering to flat parallel surfaces requires considerable operator skill in establishing an accurate gaging contact axis in two right-angle planes at one time.

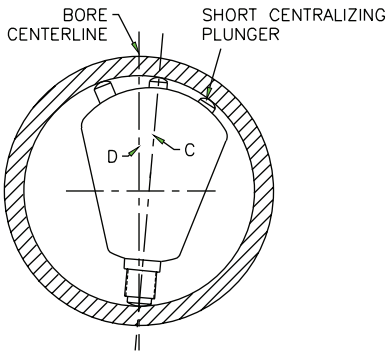


Any dial bore gage "set" between parallel flat surfaces (as with gage blocks or bore gage setting master) must have gaging contacts free from wear. Any "flats" on the gaging contacts will cause an error in "setting" that is roughly equivalent to twice the height of the chordal segment that is produced by the radius of the bore and the width of the flat on the gaging point. The use of maximum wear-resistance material substantially reduces the possibility of worn contact point errors. Tungsten carbide, or diamond-tipped gage points are examples of the materials that should be used.

"In-Line" Gage Head

The gaging plunger and reference contact of the dial bore gage head must be "in-line" on a common axis. Any deviation from this will result in a triangulation effect and cause an error in any comparison between flat master surfaces and a cylindrical master. The manufacturing technique used in making Dorsey Metrology Dial Bore Gages assures an "-in-line" condition in every gage.

A used dial bore gage should be periodically checked to determine if crossed or damaged threads on the range extension or in the corresponding tapped hole in the gage head are causing any misalignment of the gaging points. Always be sure that the proper range extension is being used to assure adequate thread engagement between the range extension and the gaging head.



Centralization

Factory-installed centralizing plungers are matched for length. In normal use both plungers wear equally. However, through some unusual occurrence, such as improper repair or attempting to use the gage while the part is turning, one centralizing plunger may be shorter than the other. This will result in improper centralization. The illustration above is greatly exaggerated view of this condition. The gage is not measuring the true diameter D but rather the chord C. The larger the diameter of the bore being measured, the less this chordal error will be.

Gage No.	Bore Diameter	Error*
3	2.00 inches	.00030 inch
5	4.00 inches	.00025 inch
6	8.00 inches	.00010 inch

* Possible chordal errors resulting from .015 inch difference in length of two centralizing plungers.

The table applies when the bore gage has been mastered or set to parallel flats. When set with a master ring the effect of unequal lengths of centralizing plungers or misalignment of contact/reference points is nullified because the similarity of the master ring and workpiece geometry causes the bore gage to assume the same position in both instances.

How to "Check" A Dial Bore Gage

The secret of good inspection is proper selection, care and maintenance of gage equipment. You should know your requirement well, and we think "How to CHECK a Dial Bore Gage" will help.

1. The first check to make on any dial bore gage is to be sure that all plungers are moving freely with no stickiness. Do this with your fingers by pushing one plunger at a time then both centralizers together. See figure #1.

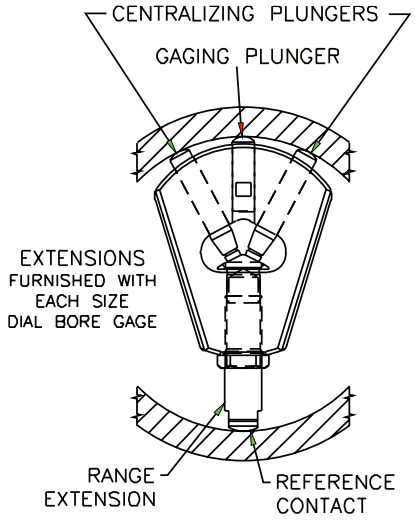


Figure #1

2. CHECK REPEATABILITY first and be sure the indicator hand has returned to its rest position when not in use. After moving the indicator housing, or if the gage is dropped, a check has to be made to insure a proper gap of at least .005" between the indicator plunger and extension plunger. See Figure #2. This gap allows for the varying degree in which the internal mechanism of the gage will relax after each use. If this gap did not exist, you would find a varying rest position of the indicator hand and could use up ALL OR A PORTION OF the most accurate first revolution of the indicator. You can set this gap easily as follows.

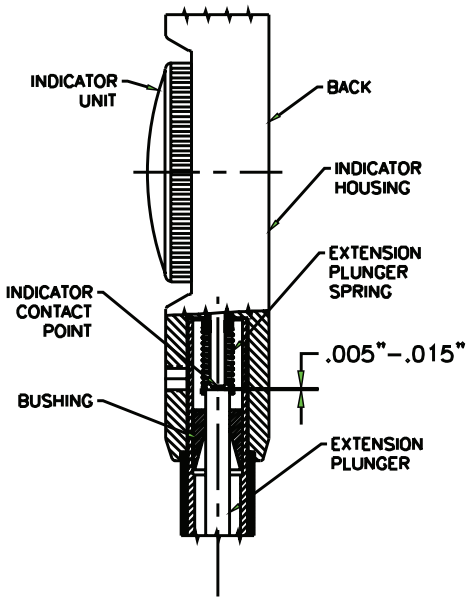


Figure #2

Bring the indicator housing down until the indicator contact touches the extension plunger and the pointer moves from its rest position. Pull the housing slightly back and lock when the indicator hand has returned to rest. You can check this gap by pushing the gaging plunger in with your finger. You should FEEL a .005 to .010 movement of the plunger before the indicator hand begins to move.

Set the gage in a master ring and take a passing reading in both directions. If you cannot get a duplicate repeat reading in both directions, the gaging plunger bearing is worn and a new gaging head is required. (This gage can be used, however, if readings are taken in one direction.)

2. CENTRALIZATION – Place the gage in a known size master ring and set to zero. Hold gage in zero position and push the gage off center to the right. See Figure #3. The pointer should move immediately to the minus side of zero. A push in the opposite direction should have the same result; pointer to the minus side. If the pointer moves to plus and then to minus, the gage is not centering properly. This condition is usually a result of one centralizing plunger being longer or shorter than the other.

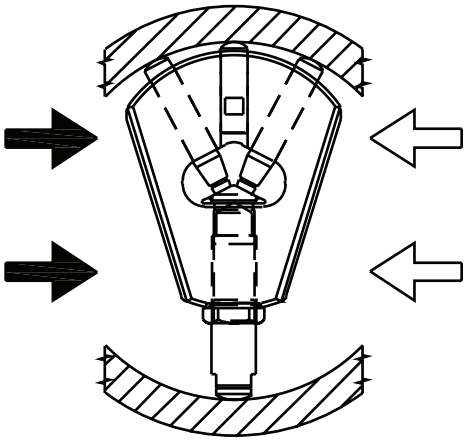


Figure #3

This test can also be made on Dorsey Metrology bore gage setting master. If so, the pointer indication will be opposite of that in a ring due to the fact that you are measuring between two parallel surfaces. For example: draw an imaginary straight line through the centers of the gaging plunger and the range extension as shown in the ring above. Now imagine these contacts are set between two parallel surfaces. If you move this imaginary center line from your zero position, the length of your imaginary center line increases immediately.

The preceding checks are simple and help to insure reliable bore gage operation. If you wish, we will supply reprints of these checks for use in your plant. Contact your Dorsey Metrology representative or write to:

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