DIMENSIONAIR I AIR GAGING INSTRUMENTS
DIMENTRON I PRECISION BORE GAGES

Mahr FEDERAL

EXACTLY

Experience with Gaging Technology

Technical innovation and quality-oriented thinking are the core competencies of successful businesses. Both competencies are not possible without metrology. Measurement instruments verify research and development results and document product quality. Without continuous advancement of metrology there would be no technical progress.

Mahr Federal has been an innovator of precision hole gaging since the first air gaging was introduced in the 1940's. Mahr Federal has perfected the Single Master Air Gage system that out performs other systems with its accuracy and linearity. The quality is built into the tooling and display units.

Over this period of time Mahr Federal has designed 100,000's of air gages - from the most basic air plug to complex automated air gaging systems. All capable of measuring the most demanding manufactured pieces - critical for today's automotive, medical and aerospace requirements.

Recently Mahr Federal as further advanced its leadership with a new line of the most universal Dimensionair systems that allow for unmatched performance from adjustable magnification air gaging systems. Our breakthrough products bring easy to use and high performance to any air gaging system.

There are precision hole applications where mechanical fixed plugs may best fit the application. In the 1970's Mahr Federal again was an innovator in fixed plug gaging with the introduction of the Dimentron Plug in the 1970's. Again through the subsequent years thousands of successful Dimentron plug solutions have been employed in the manufacturing environment.

Engineering Solutions to these tough measuring application demands is done all within Mahr Federal. From the initial concept, through engineering design, precision manufacturing and finally assembling and test are all performed in house. We take full responsibility and accountability for the gages produced - right until they are delivered and performing on your shop floor.

To be a Metrology Supplier - one has to know and understand metrology. Mahr Federal has built one of the best Precision Measurement facilities in the country. Mahr Federal's calibration system is certified to ISO-9001:2000 by NQA, USA and accredited to ISO 17025 NVLAP Lab Code 200605-0.

We are committed to Metrology and to bringing the best metrology solutions to you.

Dimensionair® Air Gages

Why Mahr Federal Air Gaging?

Mahr Federal has been an innovator in air gaging since it's introduction in the 1940's. With the Dimensionair system the accuracy is built into the readout and the tooling. With the new Universal Systems - precision magnification adjustments allow for the most linear two master systems available.

Experience

Over this period of time Mahr Federal has designed 100,000's of air gages - from the most basic air plug to complex automated air gaging systems. All capable of measuring the most demanding manufactured pieces - critical for today's automotive, medical and aerospace requirements.

Innovation

Mahr Federal offers a wide range of display and tooling options. Offering basic and proven performance along with some of the most progressive portable gaging systems bring precision to the shop floor. New materials for air tooling such a Stainless Steel, Chrome products, 10V, D2 and Tungsten Carbide are some of the options for manufacturing tooling that meets the requirements of your specific application.

Delivery Performance

Ordering Tooling and not having it when you need it just does not work. Mahr Federal has put in place manufacturing principles that can get the tools you want when you need them. We deliver on time - to customer's expectations and demonstrate it time after time.

Value and Service

Mahr Federal offers one of the largest trained sales teams to offer expertise to solve your measurement problems. A team of Direct Field Sales personnel, Providence based Application Engineers and Factory Trained Distribution are all available to support you both before and after the sale. Combine this with new processes that actually allow for more cost effective tooling helps to provide the best value for your measurements solution.

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Dimensionair® Air Gages

The Need for Air gaging

Air Gaging is the inspection tool that allows you to measure many jobs faster, more conveniently, and more accurately than by other gaging methods. In the measurement of all hole conditions, air gaging is unsurpassed for speed and accuracy, while in checking any dimensional characteristic, air offers sufficient magnification and reliability to measure tolerances well beyond the scope of mechanical gages.

Easy to Use

Production workers do not require special training to use air gages. To check a hole, for instance, it is not necessary to develop skill in rocking the gage to find the true diameter, merely insert the air plug in the hole and read the meter. It is as simple as that.

Economical

Once the basic gage is purchased, additional tooling for a wide variety of jobs can be used with it. It is not necessary to buy a complete gage for each new dimension that requires checking. Because of its adaptability, air gaging often becomes the primary measuring system in a complete quality control program.

Versatile

Air gages effectively measure all common types of dimensions and are particularly suited to checking dimensional relationships. Some of these are taper, parallelism, squareness, straightness, and center distance. Match gaging, which permits the selection of mating parts for a specific amount of clearance or interference, is easily accomplished with just one reading on one dial.

The non-contact characteristic of air gaging makes them particularly useful for checking soft, highly polished, thin-walled or otherwise delicate material.

Small gage heads and remote reading meters give air gages a distinct advantage in measuring multiple dimensions. Fixtures are smaller and remote meters permit placing contacts in positions that are inaccessible for other types of gages. Air gaging is often combined with electronic signaling to provide instant indication of part size.

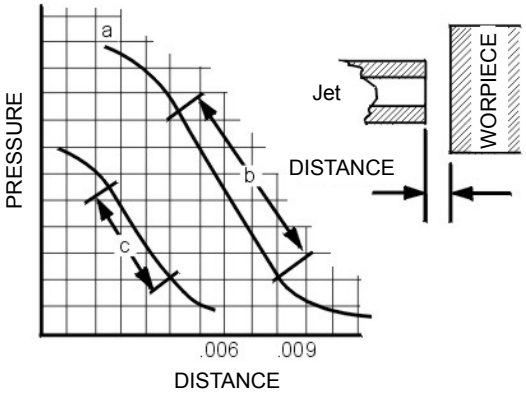
Air gages are readily adaptable to measuring parts in the machine. Their small gage heads make most dimensions accessible with new displays that can bring the measurement results right to the point of manufacture. Thus speeding the process and making it easier for the operator to make his critical measurements. A unique advantage is that the stream of air tends to clean the measuring area from coolant or oil, providing accurate measurement without first cleaning the part.

What is Air Gaging and why does it work

Air gaging is a measuring system that uses airflow and/or air pressure to determine the size of measured part. With the laws of physics to make the measurement the system relies on the fact that flow and pressure are directly proportionate to clearance and react inversely to each other.

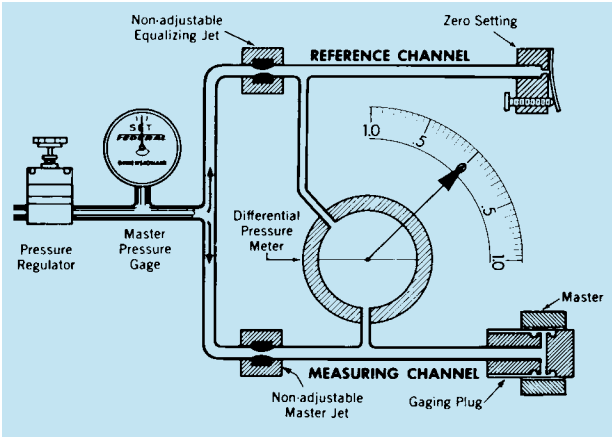
The relationship between air pressure and distance of a restriction (workpiece) to the air escape (jets) can be plotted on a graph - (line a). As the distance between jets and work surface increases, the pressure decreases and the ratio becomes linear as represented by the straight section "B".

This straight portion of the curve can be accurately calibrated, and represents the scale of the Dimensionair. Compare its length with "C" on the other curve, which is the usable portion of other air gage scales. This longer linear scale gives the Dimensionair its longer usable measuring range. Note also that the Dimensionair scale is displaced further to the right, providing more initial clearance between the air plug and workpiece surface for easier gaging.



Dimensionair Air Gages
Mahr Federal's Dimensionair Air Gages are unique among dimensional air gages. Basically a differential air pressure type, they are the only instruments that give you the advantages of fixed magnification and a balanced air system. A linear, precisely calibrated scale provides graduations of definite, known values. Greater tooling clearance for increased wear life, setting to "Zero" with only a single master with no other masters required, and immunity to normal air pressure fluctuations are additional advantages of the exclusive Dimensionair system. With the Mahr Federal differential system the accuracy is built into the tooling and the display.

How the Balanced Air System Works
With the balanced air system, air from the supply line first passes through a regulator, then is divided into two channels. Air in one leg (the reference channel) escapes into the atmosphere through the adjustable zero restrictor, while air in the opposite leg (the measuring channel) escapes through the gage head jets. The two channels are bridged by an extremely precise indicating meter which responds immediately to any differential in air pressure between the two channels.



Zero Setting Simple and Stable
With the Dimensionair's balanced system, setting zero is entirely independent of the measuring and magnifying functions of the gage. Magnification is fixed and cannot be affected by the setup process.

To set up the gage, a master is placed on the measuring head (producing a back pressure). The zeroing knob is then adjusted to equalize the air pressure in the two channels. When this condition exists, the dial reads zero. No further adjustment is necessary. Any deviation in the size of the workpiece from the master size will change the pressure in the measuring leg and produce a change in meter reading.

Advances in Adjustable (2 Master) air systems -
Mahr Federal has taken the adjustable magnification back pressure system and adapted it for use with its precision differential meter and air/electronic transducers. The Universal Dimensionair's magnification is controlled matching the pressure to the precise balance between the tool and the reference channel. The second adjustable restriction releases excess air to the atmosphere to adjust the zero position. This system is capable of the broad magnification adjustment of any air gage system. It accommodates almost any size nozzles, as large as 0.050 in. or as small as 0.020 in.

Two setting masters - minimum and maximum - are used to calibrate the system, defining and displaying both ends of the particular tolerance range. With modern electronic systems this process can be automated so that the gage leads the operator through the mastering routine. The zeroing and magnification adjustments are done automatically - without operator intervention.

Dimensionair® Air Gages

Additional advantages of Mahr Federal long gaging range – single master

The long measuring range of the Dimensionair system permits a smaller bodied air plug, which provides greater plug clearance. Even with greater clearance, there is no centralizing error. The total clearance between plug body and setting ring is detailed in the table below. Direct Benefits of Greater Clearance:

Tolerance Clearance from Nominal Size

Plug I.D.	Nominal Size above mm/in	To & include mm/in	Clearance from Nominal Size mm/in
DP100, DP60	.63/ ***.248"***	76.3/ ***3.004"***	0.081/ ***.0032"***
DP50	3/ ***.123"***	3.5/ ***.140"***	0.015/ ***.0006"***
	3.5/ ***.140"***	4.7/ ***.185"***	0.027/ ***.0011"***
	4.7/ ***.185"***	6.3/ ***.248"***	0.030/ ***.0012"***
	6.3/ ***.248"***	76.3/ ***3.004"***	0.045/ ***.0018"***
	76.3/ ***3.004"***	127/ ***5"***	0.071/ ***.0028"***
	Above 127/ ***5"***		0.081/ ***.0032"***
DP20	3/ ***.123"***	3.5/ ***.140"***	0.009/ ***.00035"***
	3.5/ ***.140"***	4.7/ ***.185"***	0.013/ ***.0005"***
	4.7/ ***.185"***	6.3/ ***.248"***	0.015/ ***.0006"***
	6.3/ ***.248"***	76.5/***3.004"***	0.023/ ***.0009"***
	76.5/ ***3.004"***	127/ ***5"***	0.071/ ***.0028"***
	Above 127/ ***5"***		0.081/ ***.0032"***
DP10	All sizes to 1.750		0.014/ ***.00055"***
DP5	All sizes to 1"		0.005/ ***.0002"***

More versatile gaging - Dimensionair plugs easily enter irregular holes to check conditions such as taper, out-of-round, barrel shape, etc. that are inaccessible to plugs with less clearance.

Increased gaging speed - Quicker entrance into the hole and no jet positioning problem makes gaging faster with Dimensionair plugs than with plugs which require less clearance.

Less plug wear - Greater clearance eliminates much of the wear caused by the plug body rubbing on the edge and walls of the hole. If, after long hard use, a Dimensionair plug should wear, there is no effect on magnification, as frequently occurs with air gages that do not use fixed magnification.

Large, deep-set Air Jets - Longer range permits the measuring jets to be set deep into the plug body, providing good protection. Dimensionair jets are larger and less likely to become clogged.

Measuring range/magnification

Type	Measuring range	Magnification
DP 50	76µm/ ***.003"***	2500:1
DP 20	38µm /***.0015"***	5000:1
DP 10	15µm/ ***.0006"***	10,000:1

For applications greater than 1000 feet, special calibration is required.

The Dimensionair System is known as the One Master Air Gage because only one zero master is required for each size to be measured. This economical feature is the result of fixed magnification - the accuracy is built in! Because its magnification cannot be adjusted or changed accidentally, or drift because of air-line surges, the Dimensionair has a linear, calibrated scale with meaningful graduations.
It's easy to set zero
Step one - place the Master on air tooling.
Step two - Adjust zero setting screw until meter hand is on zero or - press Auto Zero on Electronic Systems

That's all. Set-up is completed in just a few seconds.

Stability - Once Set, Stays Set
An outstanding feature of the Dimensionair is its stability. Once set, zero does not drift. Because the air pressure in the balanced system is split between two channels, any normal changes in pressure from the regulator or larger surges in the factory air system affect each channel equally and thus cancel out. Therefore, the gage setting is not affected. The only change in measuring pressure is through the variation of workpiece size.

Dependability
Fixed magnification, which is never disturbed by searching for zero or by changes in source pressure, and the stability of its zero setting are why the Dimensionair is so dependable. Tolerance limits never shift during the working day, remaining the same for the last piece as for the first.

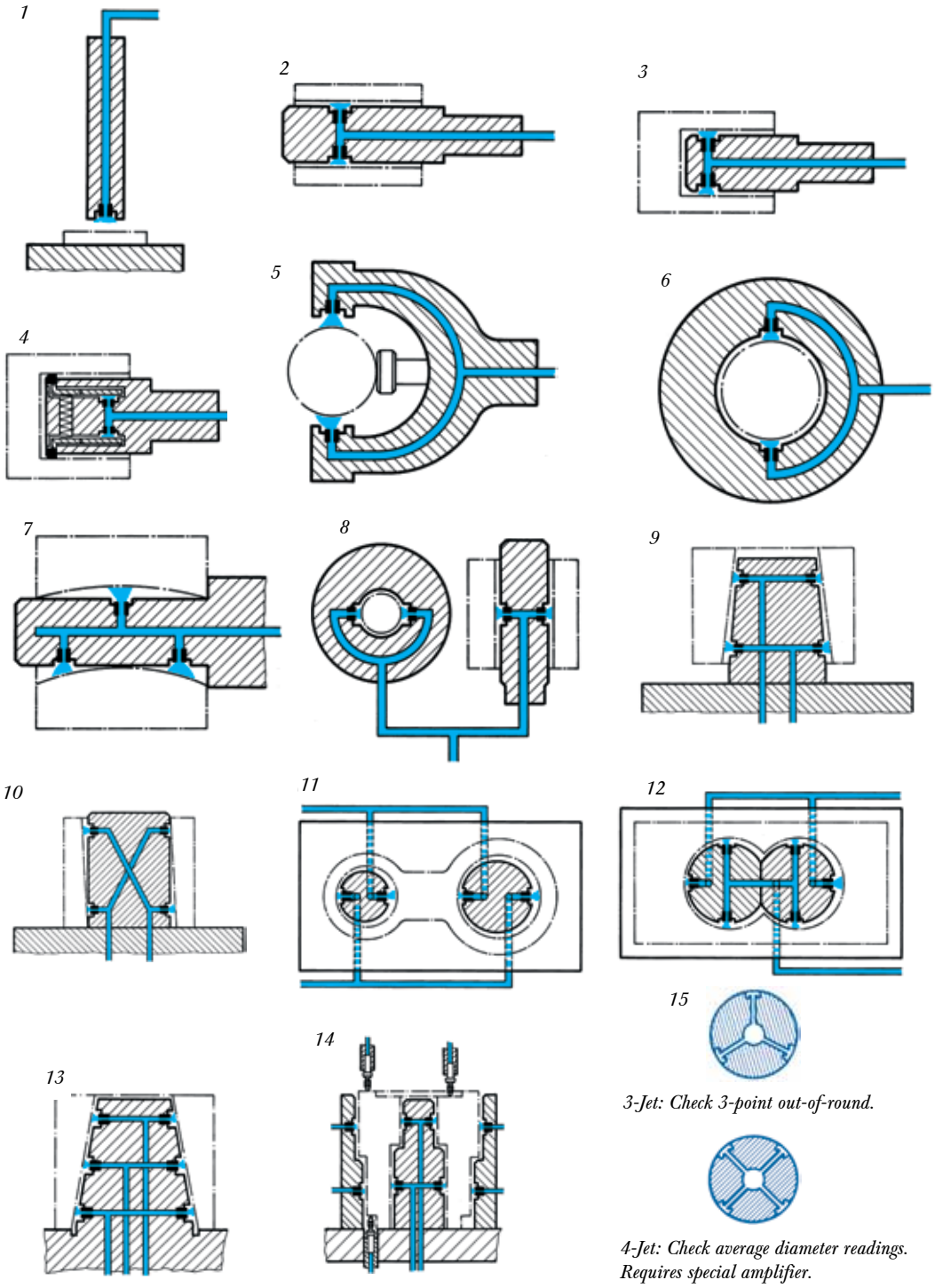
Dimensionair is the gaging of choice in automatic machine control where a lack of reliability in the gaging process can upset an entire production schedule.

Advances for Two Master Systems
Mahr Federal has taken the adjustable magnification system to new limits. For those applications where min-max mastering systems have been incorporated the flexibility of the Universal Dimensionair and two mastering electronic amplifiers provide new read out capabilities. The Universal Dimensionair can act as a single master set-up with all its advantages - or can be adapted to virtually any existing dual master air tooling. Therefore, it is not necessary to switch air gaging systems - just choose the adaptability of a Mahr Federal display and put your system to use.

Dimensionair® Air Gages

Dimensionair® Air Gaging Applications

Though most frequently used for diameter measurement, many other types of dimensional conditions can be checked more conveniently, more accurately, and more economically with the Dimensionair than with other types of gages. Though it would be impossible to show every type of measurement successfully accomplished by air, here are a few representative examples:



3-Jet: Check 3-point out-of-round.

4-Jet: Check average diameter readings. Requires special amplifier.

1 Thickness or wall thickness measurement with jet air probe.

2 Diameter measurement of cylindrical through bores with air plug gage.

3 Diameter measurement of cylindrical blind bores with air plug gage.

4 Diameter measurement at a given distance from the face of a part. Most plugs can be supplied with a Stop Collar.

5 Diameter or thickness measurement with air snap gage.

6 Diameter measurement of cylindrical shafts with air ring gage.

7 Straightness measurement of a cylindrical bore with special air plug gage.

8 Match measurement between bore and shaft with air plug gage and air ring gage.

9 Taper measurement of an inner cone with taper air plug gage. Measurement based on differential measurement method.

10 Perpendicularity measurement of a cylindrical bore to the end face with special air plug gage. Measurement based on differential measurement method.

11 Measurement of spacing between separate cylindrical bores with air plug gages. Measurement based on differential measurement method.

12 Measurement of spacing between incomplete cylindrical bores with air plug gages. Measurement based on differential measurement method.

13 Taper measurement, form measurement and diameter measurement of inner cone with taper air plug gage.

14 Multiple internal and external measurements with measuring jets and contact gages in conjunction with a seven-column gage.

15 Multi-Jet Air Plugs can be provided. Jet placement determines the information read by the amplifier.

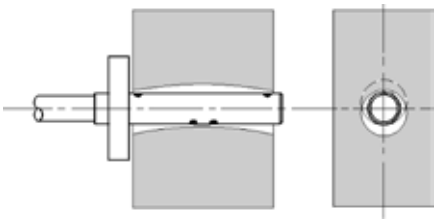
Dimensionair® Air Gaging Applications

Though most frequently used for diameter measurement, many other types of dimensional conditions can be checked more conveniently, more accurately, and more economically with the Dimensionair than with other types of gages. There are thousands of gaging applications successfully accomplished by air, here are a few representative examples of the more frequently encountered applications.

The balanced system of the Dimensionair offers unique advantages in gaging certain dimensional conditions such as concentricity, squareness, or straightness. Not only can one Dimensionair do the job for which two gages are usually required but, for these applications, it requires no master.

Straightness

Dimensionair gages can be used to check straightness of either inside or outside surfaces as well as diameter. For internal measurement, an air plug is furnished with a pair of opposed jets to check diameter and a set of four jets arranged as shown in the diagram for inspecting straightness. The diameter air jets and the straightness jets are each connected to separate Dimensionair meters. As the plug is passed through the part, both diameter and any lack of straightness are clearly displayed on their respective meters. An air ring can be similarly equipped to check both diameter and straightness of external surfaces.



Clearance and Interface (Match Gaging)

Balanced calibrated system of Dimensionair permits reading clearance or interference of mating parts, as well as the actual diameter of each part, on one dial without any adjustment or resetting.

Air plug and ring are connected through "T" fitting to measuring side of special air meter. One part (serving as reference) is placed in gaging position and various mating pieces checked in turn until proper clearance reading (left of zero) is obtained. Readings to right of dial indicate interference. Diameter of either part can be sized directly by comparing against master of mating part.

Center Distance

Center distance between bores is checked without influence from piece to piece variation in size on a differential Dimensionair. Two dual jet air plugs are used as a pair, with the two "near" jets channeled together as are the two "far" jets. These combinations are then introduced to opposite sides of a differential meter. Spacing of air plugs in the fixture is set to show the ideal condition, so the meter hand reads zero with a master or nominal workpiece in place. With this arrangement, any change in diameter will affect each pair of jets equally so that center distance checks will be independent of hole diameter. Same type of arrangement using air rings serves center distance of O.D.'s. In each case, only one Dimensionair is required at considerable cost saving over competitive makes.

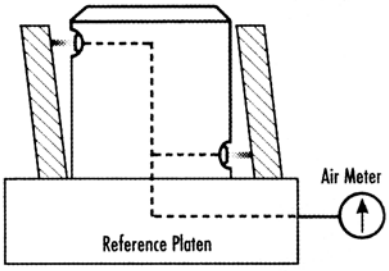
Dimensionair® Air Gages

Squareness

Bore-to-face: Method A

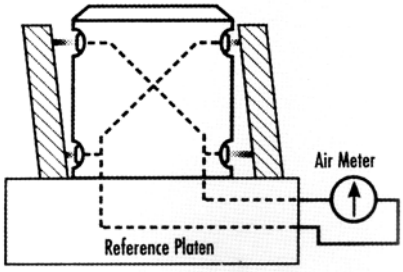
An air plug having offset jets is mounted on platen. Part is rotated 180 degrees. Comparison of total indicator readings shows relative squareness as compared to that of master or a nominal condition workpiece.

A 2-jet air plug mounted on a precision platen is connected to a regular Dimensionair meter. Inset shows location of offset air jets on opposite sides of air plug.



Bore-to-face: Method B

Top and bottom jets on each side of air plug are channeled to opposite sides of a special air meter to provide differential type measurement. Lack of squareness is indicated by movement of meter hand as part is rotated on reference platen. This method is used primarily when squareness reading should not be influenced by any taper condition.



Flatness

When small parts are involved either contact or non contact measurement can be made using an airprobe or jet probe set in a small surface plate . Proper probe depth is accomplished by an adjusting bracket. The inspection of the part is made by simply moving it over the probe and reading flatness variations directly on the Dimensionair readout.

Flatness gage specifications: Surface plate of black Granite, typical 12" x 12" x 4" (inspection grade A). Three point support provides accuracy to 50µ" Other plate sizes and accuracies are available.

For large parts that are too large to move over a surface plate the probe can be mounted into a serrated plated that has been lapped flat. This assembly is moved over the part and read out on the air gage readout.

Automatic Gaging Applications

Special tooling can be designed and manufactured for use in automatic gaging systems. Plugs with multiple jets and circuits can be configured for virtually any size and geometric condition.

Diameter, taper, straightness, concentricity and center location can be checked quickly and accuracies with an engineered air plug. Because air jets can be machined into locations there electronic probes would not fit they provide unmatched gaging capabilities. When the parts are rotated, dynamic checks such as out of roundness and max or min diameters can be found.

Also special wear strips and floating tooling adaptors can be designed into the automatic gaging station to provide long life of the plug for thousands of dimensional checks.

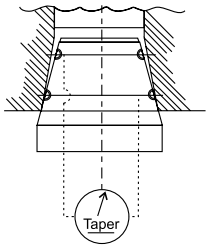
Dimensionair® Air Gages

Taper Gages

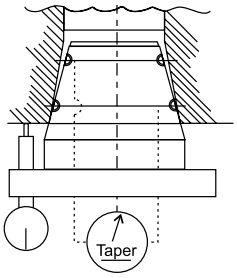
The use of tapers has never been more important than it is today. In the manufacture of tool holders and spindles, the control of taper and size determines how well the machine can perform during its cutting cycle. In orthopedic parts, the matching of tapers is critical to how well the knee or shoulder replacement will perform. Air gaging is ideal for these applications. Multiple circuit air jets can be placed in very small tapers where another method can be used to match air gaging speed and performance.

Two conditions most important in controlling taper are taper size and angle. Size is controlled by tolerance, and is, therefore, identical to a cylindrical I.D. or O.D. Taper angle, on the other hand, can be controlled by at least three different methods:

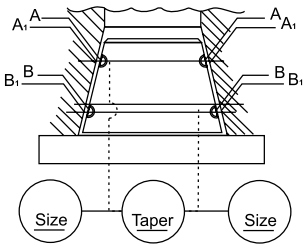
1. Included angle or angle per side.
2. Taper per inch or per foot.
3. Controlling two diameters at specified datum locations.



Simple "Jam Fit" design provides measurement of taper angle



Addition of indicator provides indication of taper diameter



Shoulder style allows for independent circuits allow for taper and diameter measurement. Addition third circuit can help determine straightness of taper side.

Regardless of the method used, the effect on tapered air gaging is the same, since it produces a differential change between two diameters at a fixed distance apart.

The two styles of tooling are *Shoulder* and *Jam* Fit. The function of the tapered part to be measured determines the style.

Jam Fit tooling measures taper angle as a differential change between two diameters, ignoring change in taper size. For example, if the tapered size increased by .254mm/.010", but the angle had not changed, the differential meter would indicate no change in reading. These parts have no shoulder or a controlling face, and become joined at the point of taper. If a tapered hole is not controlled for size, for example, the mating taper is allowed to drop deeper or ride higher in the hole as the size changes. A typical example is (NMTB) machine tool tapered spindles and collets.

Shoulder style tooling is capable of checking both taper size and angle simultaneously. Typically, one or both of the parts to be measured will have a shoulder or a face from which the size of the taper is dimensioned. The function of these parts demand that both the size and angle be controlled. Manufacturers of some type of orthopedic joints require that size and angle, and often times runout of the tapered diameter, be measured.

Mahr Federal can provide taper tooling for a wide variety of standard machine tool tapers including ISO7388 and 297 along with tools for checking HSK holders. Contact your Mahr Federal representative for ordering details.

When specifying a taper requirement, always consider:

What is to be measured?

- Taper angle,
- Diameters at certain locations,
- Taper and diameter.

Length of taper and possible location for sensing points.

Should the gage be portable or bench mounted?

What does the operator need for readout?

The Millimar S 1841 Vmeasuring instrument with LED display is most suitable for use on the shop floor.

Dimensionair® Air Gages – Air Plugs

Calibrated I.D. tooling for the Dimensionair® Air Gaging Systems

Features

- Tooling is interchangeable without adjusting system magnification.
- Federal Air Plugs have large clearance (see table below), allowing easy entrance into the hole being measured and greater measuring range.
- Long life - wide clearance and hard chrome (optional) body extends useful life of the Air Plug.
- Deep, recessed jets - Air jets are recessed into the plug body which protects them from damage.
- Large jet size eliminates clogging from dirt and oils.

Plug Identification

Air Plugs are marked with an identification number which identifies its size, number of jets, plug style, and the Dimensionair® Model the plug should be used with.

For example: **DP50-T2-1.000** is the identification number of an Air Plug for a **2095184** or a standard magnification 832 Dimensionair (DP50), through-hole style with two jets (-T2), and 25mm/1.000in nominal size (-1.000).

The number (50) which identifies the Dimensionair intended is marked on the plug and also appears on the dial of the Dimensionair to help in matching the tooling to its corresponding Dimensionair Model.

Total Clearance from Nominal Size

Plug Identification	Nominal Size from mm/in	To & include mm/in	Clearance from Nominal Size mm/in
DP100*, DP60	3/***.123"*** 3.5/ ***.140"*** 4.7/ ***.185"*** 6.3/ ***.248"*** 76.3/ ***3.004"*** above 127/ ***5.000"***	3.5/ ***.140"*** 4.7/ ***.185"*** 6.3/ ***.248"*** 76.3/ ***3.004"*** 127/***5.000"***	0.030/ ***.0012"*** 0.045/ ***.0018"*** 0.061/ ***.0024"*** 0.081/ ***.0032"*** 0.089/ ***.0035"*** 0.107/ ***.0042***"
DP50	3/ ***.123"*** 3.5/ ***.140"*** 4.7/ ***.185"*** 6.3/ ***.248"*** 76.3/ ***3.004"*** Above 127/ ***5.000"***	3.5/ ***.140"*** 4.7/ ***.185"*** 6.3/ ***.248"*** 76.3/ ***3.004"*** 127/***5.000"***	0.015/ ***.0006"*** 0.027/ ***.0011"*** 0.030/ ***.0012"*** 0.045/ ***.0018"*** 0.071/ ***.0028"*** 0.081/ ***.0032***"
DP20	3/ ***.123"*** 3.5/ ***.140"*** 4.7/ ***.185"*** 6.3/ ***.248"*** 76.3/ ***3.004"*** Above 127/ ***5.000"***	3.5/ ***.140"*** 4.7/ ***.185"*** 6.3/ ***.248"*** 76.3/ ***3.004"*** 127/***5.000"***	0.009/ ***.00035"*** 0.013/ ***.0005"*** 0.015/ ***.0006"*** 0.023/ ***.0009"*** 0.071/ ***.0028"*** 0.081/ ***.0032"***
DP10	1.57/***.062***" 44.5/***1.750"*** up	44.5/***1.750"***	0.009/ ***.00035***" 0.014/***.00055***"
DP5	1.57/***.062***" 25.40/***1.000***" 44.45/***1.750"*** up	25.40/***1.000***" 44.45/***1.750***"	0.004/***.000175***" 0.005/***.0002"*** 0.007/***.0003***"

** DP-100 not available below 9.525mm/.375in*

Ordering Information

When ordering Air Plugs please specify:

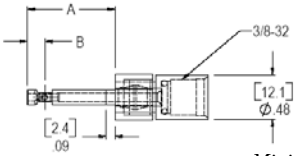
1. Nominal I.D. Size and Tolerance.
2. Dimensionair Model to be used.
3. Air Plug style (Through Hole, Blind Hole, or Counterbore).
4. Air Plug finish (Chrome-plated or Hardened Steel).
5. Order Master Setting Ring at same time.

Through Hole and Blind Hole Air Plugs

Unless otherwise specified, Mahr Federal will furnish a 2-jet, Through Hole, High Chrome Air Plug for a 2500:1 Dimensionair.

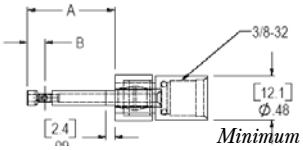
Through Hole Plugs (DP50 – DP20 & 60)

3-4.7mm/ ***.123-.185"***



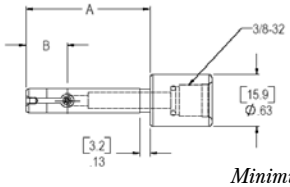
Minimum recommended hole length: 4.8mm/ .187in

3-4.7-6.3mm/ ***.185-.248"***



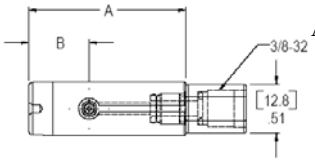
Minimum recommended hole length: 4.8mm/ .187in

6.3-9.5mm/ ***.248-.3735"***



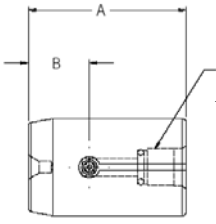
Minimum recommended hole length: 6.35mm/ .250in
With guide sleeve or stop collar: 1.8mm/ .070in

9.5-14.9mm/ ***.3735-.588"***



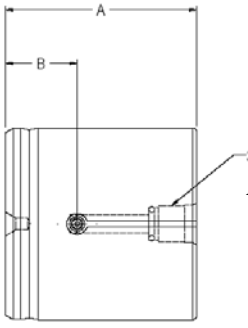
Minimum recommended hole length: 6.35mm/ .250in
With guide sleeve or stop collar: 1.77mm/ .070in
May be used with AEX-1 or -2 Extensions for deep holes.

14.9-37.8mm/ ***.588-1.484"***



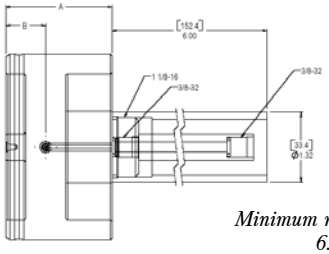
Minimum recommended hole length: 6.35mm/ .250in
With guide sleeve or stop collar: 1.77mm/ .070in
May be used with AHA-4 or -5 Extensions for deep holes.

37.8-76.5mm/ ***1.484-3.004"***



Minimum recommended hole length: 6.35mm/ .250in
With guide sleeve or stop collar: 1.77mm/ .070in
May be used with AHA-4 or -5 Extensions for deep holes.

76.5-114.3mm/ ***3.004-4.50"***



Minimum recommended hole length: 6.35mm/ .250in
With guide sleeve or stop collar: 1.8mm/ .070in

Through Hole Plugs

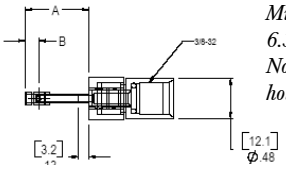
Measured Size mm/inch

Above	To & include	"A"	"B"	Minimum Hole Length*	Measuring Range DP50	DP20	DP60
3/ ***.123"***	3.5/ ***.140"***	23.8/ ***.9375"***	4.8/ ***.1875"***	4.7/ ***.187"***	0.025/ ***.001"***	0.013/ ***.0005"***	.051/ ***.002"***
3.5/ ***.140"***	4.7/ ***.185"***	23.8/ ***.9375"***	4.8/ ***.1875"***	4.7/ ***.187"***	0.038/ ***.0015"***	0.020/ ***.00075"***	.076/ ***.003"***
4.7/ ***.185"***	6.3/ ***.248"***	38/ ***1.5"***	12.7/ ***.500"***	4.7/ ***.187"***	0.051/ ***.002"***	0.025/ ***.001"***	.102/ ***.004"***
6.3/ ***.248"***	9.5/ ***.3735"***	38/ ***1.5"***	12.7/ ***.500"***	6.4/ ***.250"***	0.076/ ***.003"***	0.038/ ***.0015"***	.152/ ***.006"***
9.5/ ***.3735"***	14.9/ ***.588"***	38/ ***1.5"***	12.7/ ***.500"***	6.4/ ***.250"***	0.076/ ***.003"***	0.038/ ***.0015"***	.152/ ***.006"***
14.9/ ***.588"***	37.8/ ***1.490"***	41.3/ ***1.625"***	15.9/ ***.625"***	6.4/ ***.250"***	0.076/ ***.003"***	0.038/ ***.0015"***	.152/ ***.006"***
37.8/ ***1.490"***	76.5/ ***3.004"***	50/ ***2"***	19/ ***.750"***	6.4/ ***.250"***	0.076/ ***.003"***	0.038/ ***.0015"***	.152/ ***.006"***
76.5/ ***3.004"***	114.3/ ***4.5"***	50/ ***2"*** **	19/ ***.750"***	6.4/ ***.250"***	0.076/ ***.003"***	0.038/ ***.0015"***	.152/ ***.006"***

**If a guide sleeve or stop collar is used, minimum hole length can be as small as 1.8mm/.070in for holes larger than 6.3mm/.248in.*
***A handle 152mm/6in long and 33.3mm/1.31in diameter is supplied with plugs over 76.5mm/3.010in.*

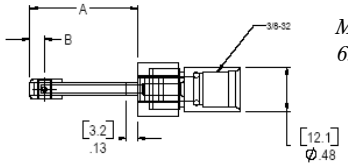
Blind Hole/Counterbore Plug (DP50 – DP20 & 60)

3.9-4.7mm/ ***.155-.185"***



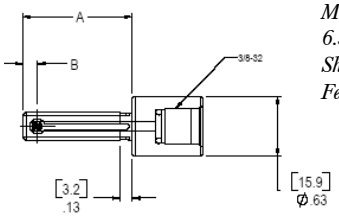
Minimum recommended hole length: 6.35mm/ .250in.
Note: Masters must simulate workpiece for holes of this size.

4.7-6.3mm/ ***.185-.248"***



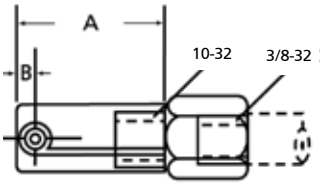
Minimum recommended hole length: 6.35mm/.250in.

6.3-9.47mm/ ***.248-.373"***



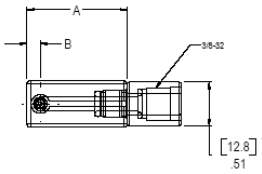
Minimum recommended hole length: 6.35mm/ .250in
Shorter bores can be checked. Consult Mahr Federal Customer Resource Center.

9.47-11.8mm/ ***.373-.467"***



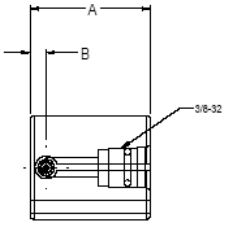
Minimum recommended hole length: 6.35mm/ .250in. Shorter bores can be checked. Consult Mahr Federal Customer Resource Center. May be used with Extension AHA-28 for deep holes.

11.8-14.9mm/ ***.467-.588"***



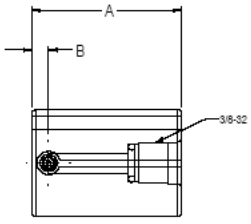
Minimum recommended hole length: 6.35mm/ .250in.
Shorter bores can be checked. Consult Mahr Federal Customer Resource Center. May be used with Extensions AEX-1 or -2 for deep holes.

14.9-37.8mm/ ***.588-1.484"***



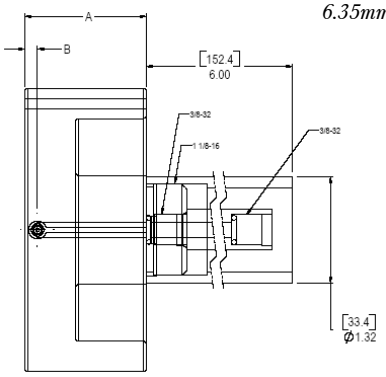
Minimum recommended hole length: 6.35mm/ .250in. Shorter bores can be checked. Consult Mahr Federal Customer Resource Center. May be used with AHA-4 or -5 Extensions for deep holes.

37.8-76.5mm/ ***1.484-3.004"***



Minimum recommended hole length: 6.35mm/ .250in. Shorter bores can be checked. Consult Mahr Federal Customer Resource Center. May be used with AHA-4 or -5 Extensions for deep holes.

76.5-108.2mm/ ***3.004-4.50"***



Minimum recommended hole length: 6.35mm/ .250in.

Super-blind Plugs

Blind Hole Air Plugs can be furnished to check shorter holes than listed above, and can be furnished to check closer to the bottom of a hole. Holes must be at least 2.79mm/.110in long, and the distance from the end of the plug to the center-line of the jets can be as short as 2.16mm/.085in for plugs below 6.3mm/.248in or 1.90mm/.075in for plugs above 6.3mm/.248in.

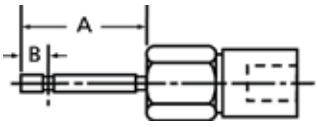
Blind Hole/Counterbore Plugs

Measured Size mm/inch				Minimum Hole Length*	Measuring Range		
Above	To & Include	"A"	"B"		DP50	DP20	DP60
3.9/ ***.155"***	4.7/ ***.185"***	19/ ***.750"***	4/ ***.156"***	6.4/ ***.250"***	0.038/ ***.0015"***	0.01905/ ***.00075"***	.076/ ***.003"***
4.7/ ***.185"***	6.3/ ***.248"***	29.4/ ***1.156"***	4/ ***.156"***	6.4/ ***.250"***	0.051/ ***.002"***	0.025/ ***.001"***	.102/ ***.004"***
6.3/ ***.248"***	11.8/ ***.467"***	29.4/ ***1.156"***	4/ ***.156"***	6.4/ ***.250"***	0.076/ ***.003"***	0.038/ ***.0015"***	.152/ ***.006"***
11.8/ ***.467"***	14.9/ ***.588"***	29.4/ ***1.156"***	4/ ***.156"***	6.4/ ***.250"***	0.076/ ***.003"***	0.038/ ***.0015"***	.152/ ***.006"***
14.9/ ***.588"***	37.8/ ***1.484"***	29.4/ ***1.156"***	4/ ***.156"***	6.4/ ***.250"***	0.076/ ***.003"***	0.038/ ***.0015"***	.152/ ***.006"***
37.8/ ***1.484"***	76.5/ ***3.004"***	35.7/ ***1.406"***	4/ ***.156"***	6.4/ ***.250"***	0.076/ ***.003"***	0.038/ ***.0015"***	.152/ ***.006"***
76.5/ ***3.004"***	114.3/ ***4.5"***	38/ ***1.5" */****	4/ ***.156"***	6.4/ ***.250"***	0.076/ ***.003"***	0.038/ ***.0015"***	.152/ ***.006"***

**If a guide sleeve or stop collar is used, minimum hole length can be as small as 1.8mm/.070in for holes larger than 6.3mm/.248in.*
***A handle 152mm/6in long and 33.3mm/1.31in diameter is supplied with plugs over 76.5mm/3.010in.*

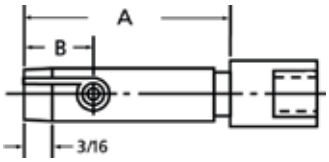
Through Hole Plug (DP10 – DP5)

1.6-6.4mm/ *.062-.250"*



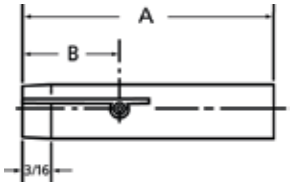
Minimum recommended hole length: 3.18mm/ .125in.

6.4-9.5mm/ *.250-.3735"*



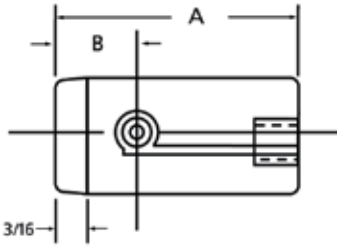
Minimum recommended hole length: 3.18mm/ .125in.
With guide sleeve or stop collar: 1.14mm/ .045in.

9.5-11.1mm/ *.3735-.437"*



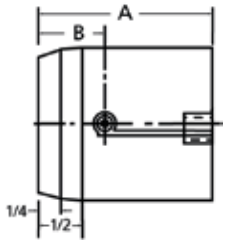
Minimum recommended hole length: 3.8mm/ .125in. With guide sleeve or stop collar: 1.14mm/ .045in. May be used with AHA-23 or -24 Extensions for deep holes.

11.1-44.5mm/ *.437-1.750"*



Minimum recommended hole length: 3.18mm/ .125in with proper support min. is 1.14mm/ .045in. May be used with AHA-23 or -24 Extensions for deep holes.

44.5mm & Up/ *1.750" & Up*



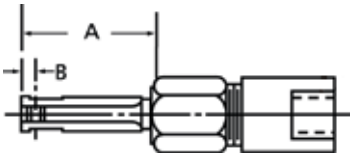
Minimum recommended hole length: 3.18mm/ .125in. With guide sleeve or stop collar: 1.14mm/ .045in. May be used with AHA-23 or -24 Extensions for deep holes.

Through Hole Plugs

Measured Size mm/inch				Minimum Hole Length*	Measuring Range	
Above	To & Including	"A"	"B"		DP10	DP5
1.6/***.062"***	6.4/***.250"***	23.8/***.9375"***	4.8/***.1875"***	3.2/***.125"***	0.015/***.0006"***	0.008/***.0003"***
6.4/***.250"***	9.5/***.3735"***	38/***1.5"***	12.7/***.500"***	3.2/***.125"***	0.015/***.0006"***	0.008/***.0003"***
9.5/***.3735"***	11.1/***.437"***	41.3/***1.625"***	15.9/***.625"***	3.2/***.125"***	0.015/***.0006"***	0.008/***.0003"***
11.1/***.437"***	44.5/***1.750"***	41.3/***1.625"***	15.9/***.625"***	3.2/***.125"***	0.015/***.0006"***	0.008/***.0003"***
44.5/***1.75"***	76.5/***3.010"***	50/***2"***	19/***.750"***	3.2/***.125"***	0.015/***.0006"***	0.008/***.0003"***

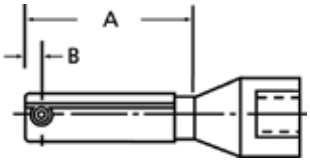
Blind Hole Plugs (DP10 - DP5)

3.2-6.4mm/ *.125-.250"*



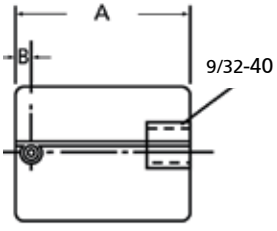
Minimum recommended hole length: 3.96mm/ .156in.

6.4-11.1mm/ *.250-.437"*



Minimum recommended hole length: 3.18mm/ .125in.

11.1mm & Up/ *.437" & Up*



Minimum recommended hole length: 3.18mm/ .125".
Use AHA-23 or -24 Extensions for deep hole applications.

Blind Hole/Counterbore Plugs

Measured Size mm/inch				Minimum Hole Length*	Measuring Range	
From	To & Include	"A"	"B"		DP10	DP5
3.2/***.125"***	6.4/***.250"***	21.4/***.844"***	2.4/***.094"***	3.9/***.156"***	0.015/***.0006"***	0.008/***.0003"***
6.4/***.250"***	11.1/***.437"***	27.8/***1.094"***	2.4/***.094"***	3/***.120"***	0.015/***.0006"***	0.008/***.0003"***
11.1/***.437"***	76.5/***3.010"***	27.8/***1.094"***	2.4/***.094"***	3/***.120"***	0.015/***.0006"***	0.008/***.0003"***

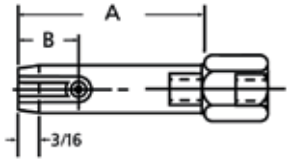
Super-blind Plugs

Blind Hole Air Plugs can be furnished to check shorter holes than listed above, and can be furnished to check closer to the bottom of a hole. Holes must be at least 1.9mm/.075in long, and the distance from the end of the plug to the center-line of the jets can be as short as 1.4mm/.055in for plugs below 6.4mm/.250in or 1.1mm/.045in for plugs above 6.4mm/.250in.

**If a guide sleeve or stop collar is used, minimum hole length can be as small as 1.1mm/ .045in for holes larger than 6.4mm/.250".*

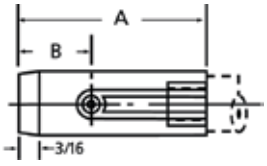
Through Hole Plug (DP100)

9.525-12.7mm/ *.375-.500"*



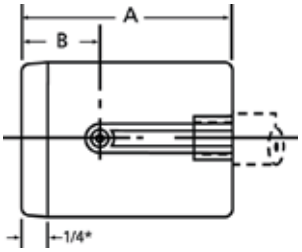
Minimum recommended hole length: 6.35mm/ .250in, with proper support min. is 3.18mm/ .125in. May be used with AEX-1 or -2 Extensions for deep holes.

12.7-37.8mm/ *.500-1.490"*



Minimum recommended hole length: 6.35mm/ .250in, with proper support min. is 1.14mm/ .125in. May be used with AHA-4 or -5 Extensions for deep holes.

37.8-76.5mm/ *1.490-3.004"*

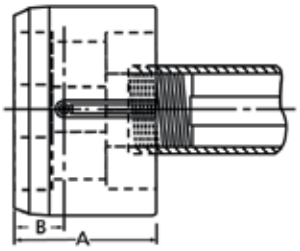


Minimum recommended hole length: 6.35mm/ .250in.

May be used with AHA-4 or -5 Extensions for deep holes.

76.5mm & Up/ *3.004" & Up*

Minimum recommended hole length: 6.35mm/ .250in.

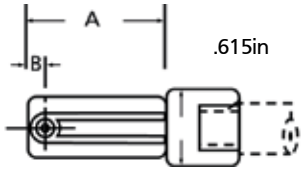


Through Hole Plugs

Measured Size mm/inch Above	To & Include	"A"	"B"	Minimum Hole Length*	Measuring Range
9.525/***.375"***	12.7/***.500"***	38/***1.5"***	12.7/***.500"***	6.4/***.250"***	0.152/***.006"***
12.7/***.500"***	37.8/***1.490"***	41.3/***1.626"***	15.9/***.625"***	6.4/***.250"***	0.152/***.006"***
37.8/***1.490"***	76.5/***3.004"***	50/***2"***	19/***.750"***	6.4/***.250"***	0.152/***.006"***
76.5/***3.004"***	114/***4.5"***	50/***2"***	19/***.750"***	6.4/***.250"***	0.152/***.006"***

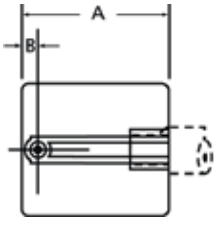
Blind Hole/Counterbore Plugs

9.525-14.25mm/ *.375-.561"*



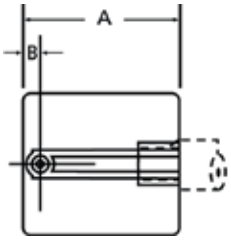
Minimum recommended hole length: 7.9mm/ .312in.

14.25-37.8mm/ *.561-1.490"*



Minimum recommended hole length: 7.9mm/ .312in. Use with AHA-4 or -5 handles for deep hole applications.

37.8-76.3mm/ *1.490-3.004"*



Minimum recommended hole length: 7.9mm/ .312in. Use with AHA-4 or -5 handles for deep hole applications.

76.3-108.2mm/ *3.004-4.500"*

Super-blind Plugs

Blind Hole Air Plugs can be furnished to check shorter holes than listed above, and can be furnished to check closer to the bottom of a hole. Holes must be at least 4.45mm/.175in long, and the distance from the end of the plug to the center-line of the jets can be as short as 2.5mm/.100in

Blind Hole Plugs

Measured Size mm/inch Above	To & Include	"A"	"B"	Minimum Hole Length*	Measuring Range
9.525/***.375"***	14.1/***.556"***	30/***1.187"***	4.7/***.187"***	7.9/***.312"***	0.152/***.006"***
41.5/***.556"***	37.8/***1.490"***	30/***1.187"***	4.7/***.187"***	7.9/***.312"***	0.152/***.006"***
37.8/***1.490"***	76.3/***3.004"***	36.5/***1.438"***	4.7/***.187"***	7.9/***.312"***	0.152/***.006"***
76.3/***3.004"***	114/***4.500"*** */**	36.5/***1.438"***	4.7/***.187"***	7.9/***.312"***	0.152/***.006"***

*Notes: *If a guide sleeve or stop collar is used, minimum hole length can be as small as 1.8mm/.070in for holes larger than 6.3mm/.248in.*
***A handle 152mm/6in long and 33.3mm/1.31in diameter is supplied with plugs over 76.5mm/3.010in*
For smaller or larger plugs than those shown above, or for any modification to the specifications shown, contact Mahr Federal Customer Resource Center.

Measuring Deep Holes with Air Plugs

Non-Relieved Air Plugs

When precise plug alignment must be maintained through the entire length of a deep hole, Non-Relieved Air Plugs can be provided. The entire length of these plugs is held to the clearances of Air Plugs described on page 4. Extra lengths of up to 101.85mm/4.010in can be provided for plugs from 6.3mm/.248in to 63.75mm/2.510in diameter. Contact Mahr Federal Customer Resource Center to specify Non-Relieved Air Plugs.

Relieved Air Plugs

When only the "A" length dimensions (see pages 10 through 13) need to be held to Air Plug clearances, several options exist, depending on the size of the hole being measured:

Small: 4.75mm/.187in to 9.4mm/.370in (Through Hole Plugs) and. 4.75mm/.187in to 11.86mm/.467in (Blind Hole Plugs). Plugs are provided as a solid piece, with the "A" dimensions held to Air Plug clearances, and the remainder machined to a slightly smaller diameter.

Contact Mahr Federal Customer Resource Center to specify Air Plugs in these sizes.

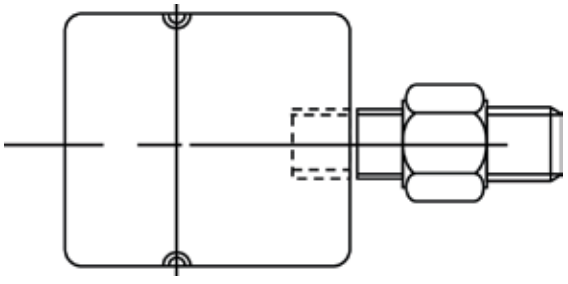
Larger Bores: Both Through Hole and Blind Hole Plugs larger than 9.53mm/.375in have no shoulder to prevent deep hole gaging, and require using either handles or extensions to facilitate gaging.

Extended Range Air Plugs – Oil Industry

Air tooling is available for measuring long bores, such as pump barrels used in the oil field industry. The tooling is modified to have up to a 0.254mm/.010in total range. It carries a DPS model number and is basically 2500:1 tooling with extra clearance, a 1/4in polished, trailing and leading edge radius, as well as a full .006in thickness on diameter of hard chrome plate for increased wear life.

The tooling is designed for use on model DA-SPEC-190 Dimensionair® with a choice of three available ranges:

5-0-5:	±0.127mm/±.005in,
8-0-2:	+0.200/-0.050mm
	+.008/-.002in
9-0-1:	+0.225/-0.025mm
	+.009/-.001in.



The plugs are typically used with a 30ft long hose. AHO-SPEC-102 is a rubber hose and AHO-SPEC-175 is a heavy duty hydraulic hose. The system is ideal for accurately measuring size within ±.005in of zero, but also when extended range is needed for approach and over or to monitoring bore wear typical for pump barrels.

Contact Style Air Plugs

Mahr Federal's Dimentron® Plugs can be used with 2500:1 Dimensionair systems as a 2-point contact type Air Plug.

AirProbe® and Handle Assemblies for these Plugs are available in three ranges:

Model	AirProbe (included)	Range mm/in	Matching Dial for Dimensionair Amplifier	
			Metric	Inch
AAT-192	**AA-2-3**	0.076/***.003"***	**ADL-28**	**ADL-95**
AAT-194	**AA-2-6**	0.152/***.006"***	**ADL-16**	**ADL-96**
AAT-193	**AA-2-15**	0.381/***.015"***	**ADL-20**	**ADL-97**

Assembly includes AirProbe, AD-140 Adaptor, HA-88 Handle, AL-1737 Flat Contact Point, and AHO-1 Hose. Order Dial separately.

Dimensionair® Air Gages

Accessories

Handles and Extensions

When an Air Plug is used with a hose, it should be equipped with a Handle to avoid excessive strain on the air connection and corrosion on the polished plug body. Handles may be combined for gaging deep holes.

Selection of a handle or extension is determined by the bore itself and whether or not it is preceded by a larger C-bored diameter. Corresponding thread sizes of the handle or extension must also be considered.

If no portion of the handle or extension enters the part, only thread sizes must be considered. If the plug does enter the part, then both O.D. and thread size must be considered.

AHA-4 and AHA-5 Extensions — accept AHO-1 Hose on one end and the following plug sizes on the opposite end: all 1250:1 thru 8000:1 plugs up to 76.45mm/3.010in (except 2500:1 thru 8000:1 blind hole plugs with 9.53mm/.375in – 11.86mm/.467in diameters).

AHA-6 Handle — accepts AHO-1 Hose on one end and the following plug sizes on the opposite end: all 1250:1 thru 8000:1 plugs up to 76.45mm/3.010in (except 2500:1 thru 8000:1 blind hole plugs with 9.53mm/.375in – 11.86mm/.467in diameters). Has Bakelite insulating cover. Recommended for 37.85mm/1.490in up to 76.45mm/3.010in diameters.

2237666 — High impact and coolant resistant, light weight composite handle — normally furnished with uDimensionair and air snaps.

AHA-66 and 2236070 — light weight aluminum handles without or with air shutoff valve.

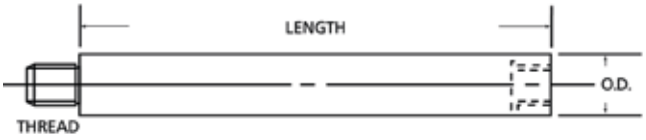
AHA-15 Handle — Used and furnished with 1250:1 thru 8000:1 through or blind hole plugs.

AHA-23 and AHA-24 Handles — Used with 10000:1 thru 32000:1 plugs.

AHA-28 Handle — Used with 2500:1 thru 8000:1 Blind hole plugs in the 9.47mm/.373in to 11.86mm/.467in range, using an AAD-315 Adaptor.

AEX-1 and AEX-2 Extensions — Used with 2500:1 thru 8000:1 Through hole air plugs in the 9.5mm/.3735in to 14.1mm/.556in range and with 11.86mm/.467in to 14.1mm/.556in range blind hole plugs, using an AAD-55 Adaptor.

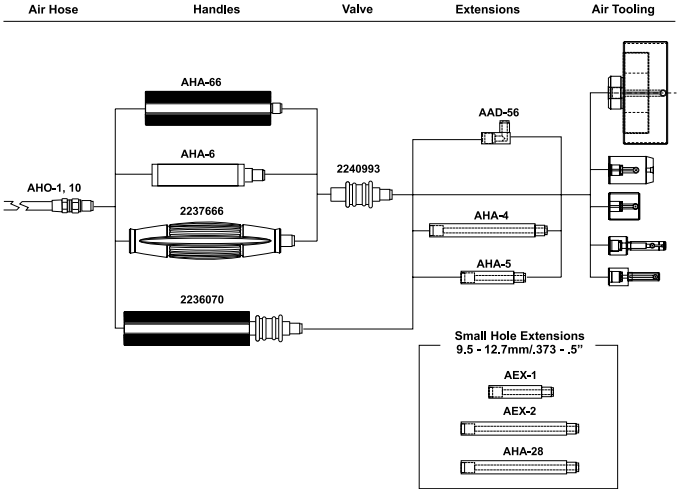
2201975 — extension used with BA-100 adjustable base. Provides easily configured base for bench-mounted air tooling fixturing.



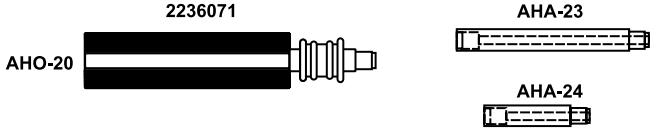
Order no.	Thread	O.D. mm/in	Length mm/in
AHA-4	3/8-32	12.07/***.475"***	102/***4"***
AHA-5	3/8-32	12.07/***.475"***	51/***2"***
AHA-6	3/8-32	25/***1.0"***	102/***4"***
AHA-15	1-1/8-18	33.4/***1.315"***	152/***6"***
AHA-20	3/8-32	12.7/***.500"***	144.8/***5.70"***
AHA-23	9/32-40	9.14/***.360"***	51/***2"***
AHA-24	9/32-40	9.14/***.360"***	102/***4"***
AHA-28	10-32	9.14/***.3603"***	102/***4"***
AEX-1	5/16-32	9.02/***.355"***	51/***2"***
AEX-2	5/16-32	9.02/***.355"***	102/***4"***
2201975*	3/8-32	9.5/***.374"***	61.7/***2.43"***

** Use on BA-100*

Accessory Configuration for DP60/DP50/DP20 Systems — Low Magnification



Accessories for High Magnification Systems — DP10/DP5



Dimensionair® Air Gages

Options for Air Plugs

Materials:

Air plugs are normally furnished in High Chrome contain stainless steel or can be flashed chromed for extra protection. Mahr Federal can manufacture air plugs in other materials for extreme use applications. Materials can include CMP-10, Ferritec, Tungsten carbide wear strips and others are available to get the most from your air gage tooling.

Non-relieved air plugs

Normally when using an air plug in a deep hole extensions are combined with the plug to reach the bottom of the bore. In some cases lands and interruptions can interfere with plug movement. In these case a non-releived plug can be specified. Here the plug is made to a specific length (in 1 inch increments) so the land will help guide the plug through the part.

Special Jet locations/multiple bore diameter

For certain blind hole applications the location of the jets are critical to measuring the diameter at precisely the location as called out on the part print. Special jet locations can be called out as part of the plug requirements. Or, requirements may call of multiple diameters (the same or different) To be measured simultaneously. Special plugs have multiple jets at different diameter positions can speed up the gaging process.

Special shapes

Air tooling for precision bores are by far the most common air gaging application. However, air tooling can be configured to meet virtually any gaging requirements. These may include square plugs, plugs for measuring partial chords in a ball socket or "mouse gages" designed to measure and explore slot widths in parts.

Guide pins

For rifle bores or specific part orientation grooves may be incorporated into the part. Guide pins can be attached to the plug to guide the plug and orient the jets to assure fast easy plug alignment to the surface to be gaged.

Marking and kit bundling

Often tooling is purchased as a package for specific applications. Kits can be created that include the air plug and master all contained in a storage box and all individual items marked to include the specific kit number, operation to be used and serial numbers.

Special front ends

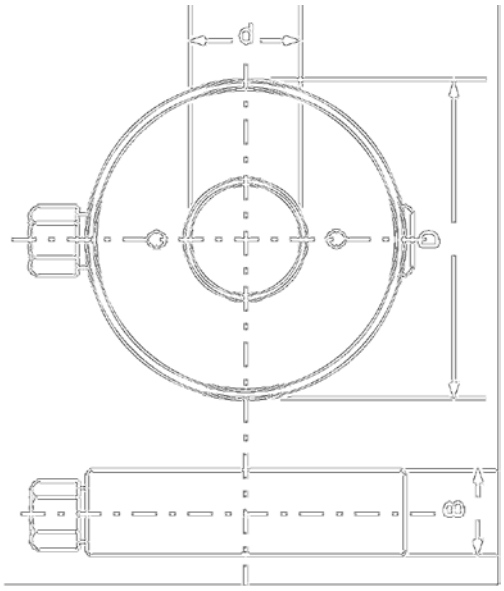
The leading edge of the air plug is critical for either making entry into the part easy or aligning the part to the bore - as in the case of a shallow bore. Normally an easy entry nose cut out is provided for standard through hole applications. There are times when a straight entry lead is required. Prints provided at the time of requesting the quote will help in configuring these applications.

Stop Collars

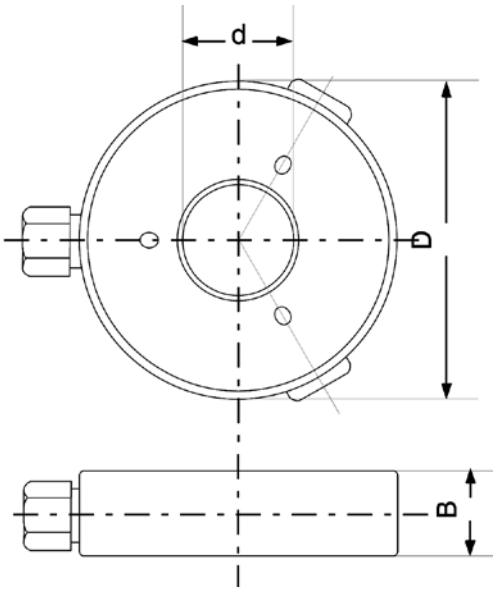
For precisely positioning the plug at specified depths a stop collar is the effective solution. These inexpensive options are a must for short bores. They position the measuring jets at the proper location while assuring the plug is square to the bore. See page 50 for selecting a Stop Collar.

Dimensionair® Air Gages – Air Rings

Air rings are supplied in several styles for external measuring. Two and three jet rings are most common, used for checking outside diameters for sizes out of round conditions from 6.3mm/.248in to 63.5mm/2.500in. Four and six jet rings are also available for special applications. All Air Rings have chrome-plated wear surfaces unless otherwise specified.

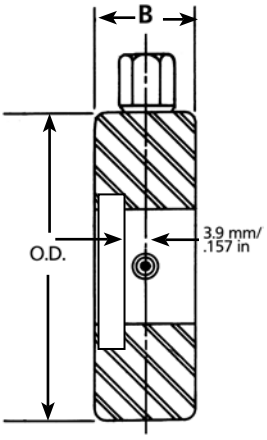


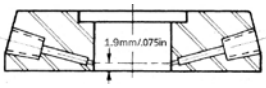
Jet air ring gage with 2 measuring jets



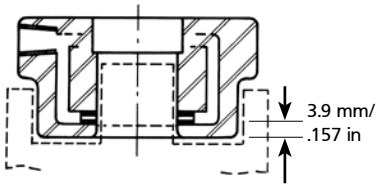
Jet air ring gage with 3 measuring jets

For applications where O.D.'s need to be checked near a shoulder, or where part length is restricted, contact Mahr Federal for technical assistance about shoulder and SnoutType Air Rings.





Shoulder Type
(for 2500:1 & 4000:1
5000:1 & 8000:1 only)



Snout Type

Diameter d mm/in	Diameter D mm/in	Width B mm/in
6.3-7.6/ ***.248-.299"***	76.2/ ***3.00"***	25.4/ ***1.00"***
7.6-9.3/ ***.299-.366"***	76.2/ ***3.00"***	25.4/ ***1.00"***
9.3-13.0/ ***.366-.512"***	76.2/ ***3.00"***	25.4/ ***1.00"***
13.0-21.0/ ***.512-.827"***	76.2/ ***3.00"***	25.4/ ***1.00"***
21.0-25.4/ ***.827-1.00"***	76.2/ ***3.00"***	25.4/ ***1.00"***
25.4-38.4/ ***1.00-1.51"***	101.6/ ***4.00"***	25.4/ ***1.00"***
38.4-44.5/ ***1.51-1.75"***	101.6/ ***4.00"***	25.4/ ***1.00"***
44.5-50.8/ ***1.75-2.00"***	127.0/ ***5.00"***	25.4/ ***1.00"***
50.8-63.5/ ***2.00-2.50"***	127.0/ ***5.00"***	25.4/ ***1.00"***
63.5-76.2/ ***2.50-3.00"***	139.7/ ***5.50"***	25.4/ ***1.00"***

When ordering ring gages, please specify the following:

- Nominal workpiece dimensions
- Tolerance
- Desired magnification
- Instrument used
- Setting plug to be supplied?

Air Rings may be attached directly to a Dimensionair or used on a base and connected to the gage with a plastic hose. Vee type Guide Chutes can be furnished on one or both sides if Air Rings from 6.3mm/.248in through 44.5mm/1.750in. Tube type guide can be furnished on sizes from 6.3mm/.248in through 63.5mm/2.500in.

Dimensionair® Air Gages

Options for Air Rings

Carbide Wear strips

Air plugs are normally furnished chromed for long life. Other materials can be provided to improve the life of the ring when high volume or grinding grit may still remain on the part. Materials such as Ferrotic and addition of carbide strips can be provided.

Bases for air rings

Depending on the application there are many ways to hold an air ring. They may be hand held and placed over the part if the part is still on the machine. They may be front mounted, horizontally or vertically on the Dimensionair or for larger parts the can be mounted to a base and held vertically or horizontally. Special bases are available the mount the ring horizontally and incorporate a part lifting mechanism to aid in part removal.

Guide chutes

Guide chutes and vees are available in a host of options to improve the inspection process. Vee type guide chutes can be furnished on one or both sides of an air ring from 6.3mm/ ***.248***" through 44.5mm/ ***1.75***". Other options include tube type guide chutes for sizes 6.3mm/ ***.248***" through 63.5mm/ ***2.5***".
Standard length of the guide chutes are 6.3mm/ ***2.5***" and affix to the side of the air ring. Normal length of the chute is 6.3mm/ ***2.5***". Other options including heavy duty out riggers and universal vee stands can be provided.

Options for Air Snaps

Since side clearances can present gaging problems with crankshaft diameters or similar applications, Mahr Federal designed a new line of air snaps that make the tough measurements easier and affordable.

We based our new air snap design on our own proven air tooling techniques, known for providing long life and high-resolution in tough shop environments. Now you can measure fixed sizes from 12.5mm/ ***.49***" through 184mm/ ***7.25***" using D-2500 and D-5000 systems. Widths are typically 19mm/ ***.75***" but can be customized to reach diameters having tight clearances.

Jet locations can be located central in the snap or positioned close to either side for exploring close to a shoulder.

Multiple circuit air snaps are available for speeding the process while checking the journal for size variation, taper, barrel or hourglass shape.

Dimensionair® Air Gages – AirProbes and JetProbes

Features

- AirProbes and JetProbes provide modular, convenient gage heads for use in hand-held gages and for designing into fixture gages.
- 9.5mm/.375in bodies provide standardized mounting configurations.
- Compact size allows easy access to hard-to-reach dimensions.
- AirProbes and JetProbes are calibrated for instant use with Dimensionair® systems - just set zero and measure!
- Available in single-probe and matched-probe configurations.

AA-1-3 AirProbe and AAT-19 JetProbe Assembly

AirProbes

For use where contact-type measurement is required with 2500:1 Dimensionair Systems. AirProbes are available in Regular Action (counter-clockwise meter movement when spindle is depressed) or Reverse Action (clockwise meter movement when spindle is depressed) and in various ranges. When used with Model 2500:1 Dimensionair, the Meter Dial must be specified to match the AirProbe range (see table below). AirProbe and Dial are color coded - just match the color band on the AirProbe to the colored dot on the Dial to be sure that the AirProbe range matches the readout on the Dimensionair. AirProbes are provided with AAD-55 Straight Adaptor for attaching to Air Hoses.

Order no.	Range	Style/ Color Code***	Matching Dial Model		Graduations mm/in
			Inch	Metric	
AA-1-3*	0.076mm/***.003"***	Regular/Red	**ADL-28****	**ADL-95****	1µm/***.00005"***
AA-2-3*	0.076mm/***.003"***	Reverse/Red	**ADL-28****	**ADL-95****	1µm/***.00005"***
AA-1-6	0.152mm/***.006"***	Regular/Green	**ADL-16**	**ADL-96**	2µm/***.0001"***
AA-2-6	0.152mm/***.006"***	Reverse/Green	**ADL-16**	**ADL-96**	2µm/***.0001"***
AA-1-15	0.301mm/***.015"***	Regular/Yellow	**ADL-20**	**ADL-97**	5µm/***.0002"***
AA-2-15	0.301mm/***.015"***	Reverse/Yellow	**ADL-20**	**ADL-97**	5µm/***.0002"***
AA-1-30	0.762mm/***.030"***	Regular/Blue	**ADL-24**	**ADL-98**	10µm/***.0005"***
AA-2-30	0.762mm/***.030"***	Reverse/Blue	**ADL-24**	**ADL-98**	10µm/***.0005"***

**.003in Range AirProbes can also be used with 5000:1 Dimensionairs, but the working range is reduced to .0015in.*
***These dials are the same as normally supplied on 2500:1 Dimensionairs, except for the color code.*
****Regular AirProbes have single color band; reverse AirProbes have double color band.*
AirProbes can be supplied in matched pairs, either two Regular Action AirProbes or one Regular and one Reverse Action AirProbe. Contact Mahr Federal Customer Resource Center to specify.

AirProbes JetProbes

JetProbes are similar to AirProbes, except they have an open jet at the end, instead of a contacting spindle. JetProbes are ideal for measuring flatness of surfaces which cannot be touched, or for building into fixture designs where air gaging is called for. JetProbes can be used with 2500:1, 5000:1 Dimensionairs, and are supplied singly or in matched pairs. **Order No. AAT-19** for single JetProbe or **AAT-20** for a matched pair. JetProbes are supplied with AHO-1 Air Hose, a zero setting valve, and hardware for mounting to the Dimensionair.

Dimensionair® Air Gages – Accessories

Magnification Kits (1, 2, or 3 Jet Systems)

Magnification Kits provide a means for checking Amplifier accuracy, traceable to the National Institute of Standards and Technology (NIST). Each Kit contains restrictors that provide pressure characteristics at zero and at both ends of the scale, a calibrated dial diagram and a Certification of Calibration.

Order No.	For use with:	Tooling
AMR-SPEC-136	1250:1	DP/DR100
2094182	1260:1	DP/DR60
AMR-12	2500:1/4000:1	DP/DR50
AMR-13	5000:1/8000:1	DP/DR20
AMR-14	10000:1/16000:1	DP/DR10
AMR-15	20000:1/32000:1	DP/DR5

AMR-12

Pressure Meter

Provides a means for assuring Dimensionair is set for optimum operating air pressure. Order No. **2095924.**

Manifolds

Manifolds allow connecting multiple pieces of air tooling to one Dimensionair. Toggle valves allow activation of the selected tool. Manifolds are compatible with Dimensionairs 1250:1 through 8000:1M Manifolds for use with other Dimensionairs, contact Mahr Federal Customer Resource Center – **1-800-333-4243.**

Order No.	Description
AAD-82	2-way Manifold
AAD-83	3-way Manifold
AAD-84	4-way Manifold
AAD-85	5-way Manifold

Manifold AAD-83

Adaptors

Adaptors allow interconnections between air tooling such as Air Plugs and Air Rings, Air Probes and JetProbes to Dimensionair readout units.

Order No.	Description	Thread
AAD-55	Straight Adaptor between AirProbes or JetProbes and air hoses.	3/8-32
AAD-59	Right Angle Adaptor between AirProbes/JetProbes and air hoses.	5/16-32
AAD-56	Right Angle Adaptor between Air Plugs and air hoses.	3/8-32
AAD-102	Adaptor between Dimensionair and air hoses – for 1250:1 and 8000:1 (normally furnished on front of Dimensionair unit).	3/8-32
AAD-165	Adaptor between Dimensionair and air hoses – for 10000:1 and 32000:1 (normally furnished on front of Dimensionair unit).	9/32-40

Right Angle Adaptor AT-55

Model EKT-1230 Universal Air Probe® Adaptor Kit

Furnished with an Adjustable Bleed Jet (AJT-131) and Hose Adaptor (AAD-201), permitting plugs and probes manufactured by Moore, Edmunds, Sheffield, Standard and Pratt & Whitney to be used with Mahr Federal Dimensionair gages.

Adaptors for Sheffield Air Plugs

Adaptors are available to retrofit Sheffield Air Plugs for use with Mahr Federal Dimensionair Models 2500:1 and 5000:1. Use adaptor with bleed when using Dimensionair systems having single master capability. No bleed adaptors can be used with displays having dual mastering functions.

Sheffield Thread	Plug Type Measured size	Order no. With bleed	Order no. No bleed
10-32	2.7686mm/ ***.109"*** to 12.547mm/***.494"***	**AAD-194**	**AAD-313**
1/4-28	12.547mm/ ***.494"*** to 23.876mm/ ***.940"***	**AAD-193**	**AAD-312**
1/2-20	23.876mm/ ***.940"*** to 139.7mm/ ***5.500"***	**AAD-195**	**AAD-314**

Dimensionair® Air Gages

Hoses

Supply hoses and hoses between Dimensionair and air tooling.

Order No.	Description	Thread
AHO-2	1.5m/5ft Air Supply Hose. Fits all Dimensionair models. (rubber)	7/16-20
AHO-1	0.9m/3ft Air hose for tooling for Models 1250:1 – 8000:1. (Tygon)	3/8-32
AHO-8	1.5m/5ft Air hose for tooling on Models 2500:1 – 8000:1. (Tygon)	3/8-32
AHO-10	1.8m/6ft Air hose for Models 1250:1 – 8000:1. (Tygon)	3/8-32
AHO-20	0.9m/3ftAir hose for tooling on Models 10000:1 – 32000:1. (Tygon)	9/32-40
ARG-1	Replacement O-ring for AHO-1, -8, -10 Hoses and AHA-4, -5, -6, -20 Handles.	
ARG-6	Replacement O-ring for AHO-20 Hose, AHA-23 and -24 Handles.	
ARG-10	For AEX-1, AEX-2 and AHA-28	

Traps and Filters

Good gaging practice requires clean, dry air for gage performance. Dimensionair Models are furnished with a particle filter. Shop air contains water and oil, which should be removed, using Model **AFL-24** Oil and Water Separator Trap.

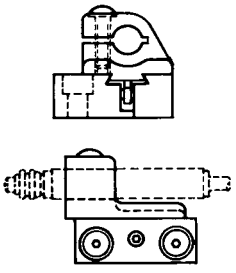
Model No.	Description
AFL-10	Particle Filter (normally furnished on all Dimensionair Models). Filter size: 5 microns; Maximum pressure: 250 p.s.i.; maximum working temperature: 175°F.
AFL-24	Oil and Water Separator Trap, includes mounting hardware. Filtering capacity: 99.7% removal of oil and water; filter size: 3-6 microns; maximum pressure: 150 p.s.i.; flow rate: 20 cubic feet of air/minute @ 80 p.s.i.
AFL-23	Replacement cartridge for AFL-24.
AFL-21	Replacement cartridge for AFL-10.
AAD-263	Retrofit Kit for AFL-9

AFL-24 Trap

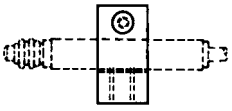
Mounting Brackets for AirProbes® and JetProbes

Adjustable Mounting Bracket
Order No. AT-29

Allows for ±7/16in adjustment of probe using a hex wrench.

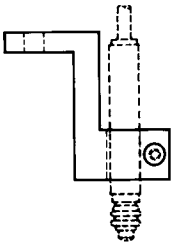


Square Bracket
Order No. AAD-67
1/4-20 mounting thread.

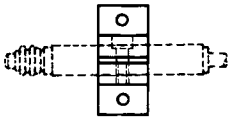


"L" Bracket
Order No. AAD-66

For mounting AirProbes and other .375in dia. Gage Heads on Comparator Stands.



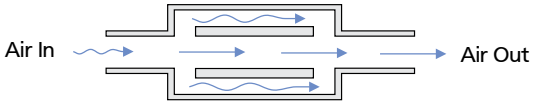
"T" Bracket
Order No. AAD-91
Flange mounted, two 4.3mm/.169in through holes.



Dimensionair® Air Gages - Zero Master System

Features

- Uses regular shop air (40 -150 psig).
- Internal pressure regulator keeps measuring pressures within calibrated range.
- Adjust meter to zero using a single setting master and the zero setting screw.
- High visibility meter has fine line graduations and a needle-thin hand for clear, precise readings. An air filter is included to remove dust and dirt contaminants from air line.
- Tooling mounts to the front of the unit. Connections are tight with finger pressure.
- No recalibration necessary when changing tooling. Just set zero and measure!
- Models available in 5 magnifications, 2 dial styles, and either Metric or Inch.



Unique "silencer" built into every Dimensionair removes air's natural turbulence from the measuring line, resulting in a fast and responsive measuring system.

Dimensionair Systems

Nine metric models and nine inch models, regular size and large size dials, single and multiple units.

Air Plugs

Through-hole, Blind hole, and Counterbore styles. Fractional sizes carried in stock for fast delivery. Sizes as small as 3.12mm/.123in (or even smaller on special order). Special configurations for specific applications are available.

Air Rings

2-jet and 3-jet versions available for external diameters. Sizes as small as 6.3mm/.248in to as large as 76.5mm/3.010in. Other sizes available on special request.

Size/Measuring Range Chart

Magnification	Plug size Group (mm/in)	Measuring Range (mm/in)
2500:1 & 4000:1	3-3.5/***.123-.140"***	±0.0127/***.0005"***
	3.5-4.7/***.140-.185"***	±0.01905/***.00075"***
	4.7-6.3/***.185-.248"***	±0.025/***.001"***
	6.3-127/***.248-5"***	±0.038/***.0015"***
	127-Up/***5-up"***	±0.038/***.0015"***
5000:1 & 8000:1	3-3.5/***.123-.140"***	±0.0064/***.00025"***
	3.5-4.7/***.140-.185"***	±0.00953/***.000375"***
	4.7-6.3/***.185-.248"***	±0.01905/***.00075"***
	6.3-127/***.248-5"***	±0.01905/***.00075"***

The long measuring range of the Dimensionair permits a smaller bodied air plug, which provides greater plug clearance. Even with greater clearance, there is no centralizing error.

AirProbes® and JetProbes

9.5mm/.375in diameter probes for adapting existing mechanical gages to use the Dimensionair System, or for designing into special fixtures to solve measuring problems.

Accessories

A complete line of accessories such as hoses, handles, extensions, bench stands, air filters, and calibration kits to extend the usefulness of the Dimensionair System. Master Setting Rings and Plugs - Available from Class XXX to Class Z for setting nominal value.

Applications Assistance

For special applications* or for technical assistance, contact Mahr Federal Customer Resource Center — **1-800-333-4243**.

** For applications where the local elevation is greater than 305M/1000 feet, special calibration is required.*

Dimensionair® Air Gages

Dial Styles

Dial Sizes: Regular Dials 82.6mm/***3.25"*** diameter
Large Dials 152.4mm/***6"*** diameter

Housing Dimensions 127mm x 187mm x 197mm(high)
5" x ***7.125"*** x ***7.75"***

Weight (including filter) approx. 6.7kg/14.25 lbs.

Operating Pressure 276-1034kPa/40-150 psig

Each Dimensionair is furnished with an adaptor (for connecting air tooling to instrument), an air filter and a 1.5m/5ft rubber hose (for connecting to air line or separator trap).

When choosing your Dimensionair model, consider:

1. Surface finish
2. Part tolerance
3. Accuracy/minimum graduation requirements
4. Length of measurement surface

Magnification	Tooling ID no.	Range	Minimum Graduation	Dial Style	Surface Finish (recommended)	Part Tolerance (recommended)	Order no.
1250:1	100	***.006"***	***.0001"***	Regular	***100µ"***	***±.002"***	**2095183**
2500:1	50	***.003"***	***.00005"***	Regular	***50µ"***	***±.001"***	**2095184***
5000:1	20	***.0015"***	***.00002"***	Regular	***20µ"***	***±.0005"***	**2095185***
10000:1	10	***.0006"***	***.00001"***	Regular	***10µ"***	***±.0002"***	**2095186**
20000:1	5	***.0003"***	***.000005"***	Regular	***5µ"***	***±.0001"***	**2095189**
1250:1M	100	152µm	2µm	Regular	2.5µm	±50µm	**2095190**
2500:1M	50	76µm	1µm	Regular	1.3µm	±25µm	**2095191***
5000:1M	20	38µm	0.5µm	Regular	0.5µm	±13.5µm	**2095192***
10000:1M	10	15.2µm	0.2µm	Regular	0.25µm	±5µm	**2095193**
20000:1M	5	7.6µm	0.1µm	Regular	0.13µm	±2.5µm	**2095194**
4000:1	50	***.003"***	***.000025"***	Large	***50µ"***	***±.001"***	**2095195***
8000:1	20	***.0015"***	***.000010"***	Large	***20µ"***	***±.0005"***	**2095196***
16000:1	10	***.0006"***	***.000010"***	Large	***10µ"***	***±.0002"***	**2095197**
32000:1	5	***.0003"***	***.000005"***	Large	***5µ"***	***±.0001"***	**2095198**
4000:1M	50	76µm	0.5µm	Large	1.3µm	±25µm	**2095199***
8000:1M	20	38µm	0.2µm	Large	0.5µm	±13.5µm	**2095200***
16000:1M	10	15.2µm	0.2µm	Large	0.25µm	±5µm	**2095201**
32000:1M	5	7.6µm	0.1µm	Large	0.13µm	±2.5µm	**2095202**

Regular Dial Dimensionair units are available with 2 or 3 multiple displays.

** Contingent upon plug having equivalent range, see chart on previous page.*

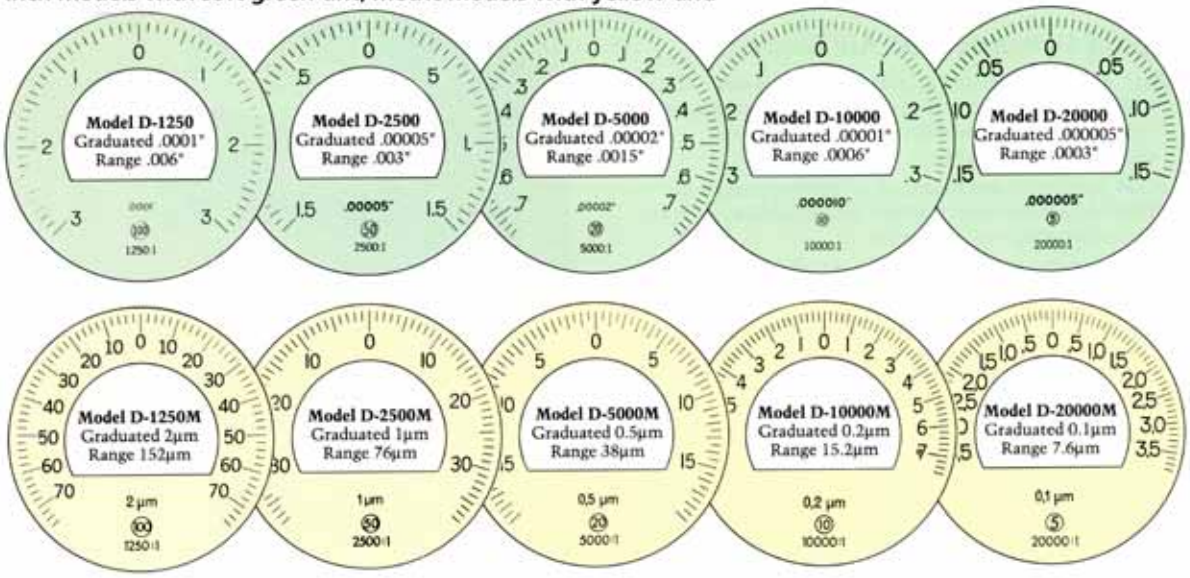
Accessory

Protective Cover	Order no.
A plastic protective cover for Dimensionairs is available.	**ACV-1.**

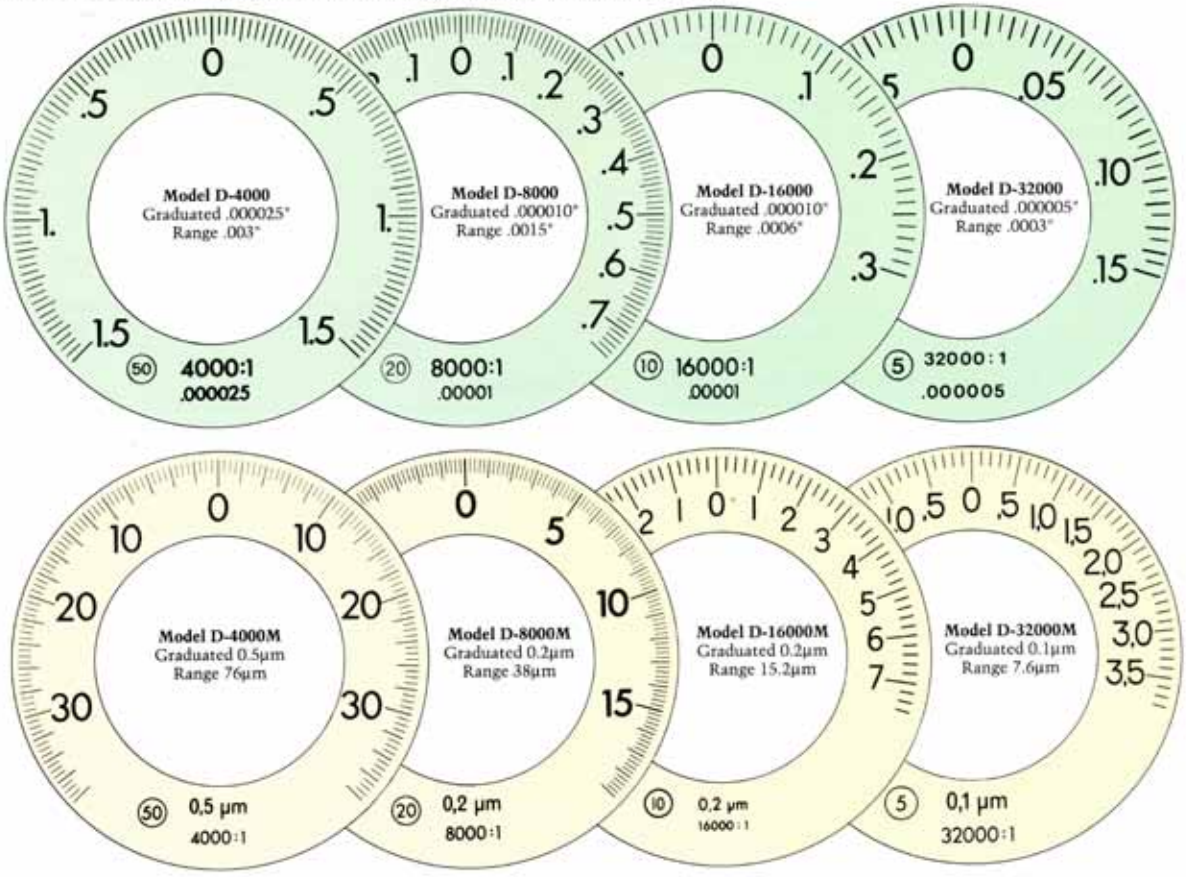
Dimensionair® Air Gages

Dial Styles for Dimensionair Gages

Regular Dials
Inch models with soft green tint; metric models with yellow tint.



Large Dials
(Inch models with soft green tint; metric models with yellow tint)



Universal Dimensionair® Air Gaging Comparator (zero plus Min./Max. Master System)

Selecting either a single or dual master gaging system involves trade offs. The single master system is simple and economical to operate while the dual master system offers greater flexibility with the requirement of limit masters.

Mahr Federal can now provide the essential high quality air gage tooling to satisfy both gaging requirements. The Universal Dimensionair is part of a new series of adjustable magnification air comparators from Mahr Federal. Based on the precision of the standard Dimensionair - the new model offers the ability to work both as a single master or dual master air gaging system.

When calibrated with Mahr Federal restrictor kits for 2500:1, the Universal Dimensionair maintains the same performance and stability as a standard 2500:1 Dimensionair. Use it with your Mahr Federal tooling and one master for fast single mastering air gage applications.

With built in magnification and zeroing controls the Universal Dimensionair also takes on the role of a dual master air gage comparator. Select the appropriate dial configuration and use it with virtually any dual master air tooling and span masters to master the gaging span to the meter. Usually, product tolerance limits are selected as the mastering dimensions, assuring that parts can be easily classified as good or bad within the range of the comparator.

The user sets system sensitivity (scale factor) by adjusting the air comparator span to correspond to the difference between minimum and maximum setting masters, thus setting the sensitivity of all the components of the gaging system.

Features

- Uses regular shop air (60 -150 psig).
- Internal pressure regulators and differential meter assure ultimate stability over full operating range.
- Adjust span and zero setting to tune the gaging range to the interchangeable dial ranges.
- Interchangeable dials - dials provide an easy, inexpensive means to accommodate various ranges
- High visibility meter has fine line graduations and a needle thin hand for clear, precise readings.
- An air filter is included to remove dust and dirt contaminants from airline.
- Tooling mounts to the front of the unit. Adaptors are available for virtually any tooling configuration.

Interchangeable Dials

Universal Dimensionair® Air Gaging Comparator

Technical Data

Dial Size	82.6mm/3.25in diameter
Housing Dimensions	127mm x 187mm x 197mm(high) 5in x 7.125in x 7.75in
Weight (including filter) approx.	6.7kg/14.25 lbs.
Operating Pressure	414-1034kPa/60-150 psig

A plastic protective cover for Universal Dimensionair is available Order No. **ACV-1**

Each Universal Dimensionair is furnished with an adaptor (for connecting standard Mahr Federal air tooling) Optional adaptors are available for virtually any air tooling application.

Ordering Information

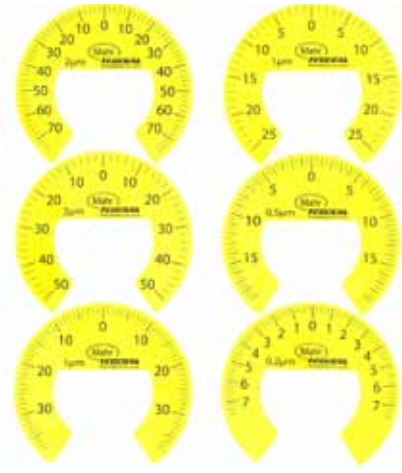
Universal Dimensionair, complete with air filter and tooling adaptor for standard Mahr Federal single master air tooling. Supplied with one **2242662** Dial. Order No. **2098125**

Optional Dials

	Total Range	Range	Dial Graduations	Magnification	Order No.
(Inch)	***.006"***	***±.003"***	***.0001"***	**1260:1**	**2242760**
	.004"	***±.002"***	***.0001"***	**1875:1**	**2242761**
	.003"	***±.0015"***	***.00005"***	**2500:1**	**2242762**
	.002"	***±.001"***	***.00005"***	**3750:1**	**2242763**
	.0015"	***±.00076"***	***.00002"***	**5000:1**	**2242764**
	.001"	***±.0005"***	***.00002"***	**7500:1**	**2242765**
	.0006"	***±.0003***	***.00001"***	**10000:1**	**2242766***
(Metric)	152µm	±76µm	2µm	**1260:1**	**2242770**
	100µm	±50µm	2µm	**1875:1**	**2242771**
	76µm	±38µm	1µm	**2500:1**	**2242772**
	50µm	±25µm	1µm	**3750:1**	**2242773**
	38µm	±19µm	0.5µm	**5000:1**	**2242774**
	15.2µm	±7.6µm	0.2µm	**10000:1**	**2242776***

Tooling Adaptors
Adaptors are available for many standard-tooling configurations:

Thread/Adaptor style	Plug Type Measured size	Order No.
10-32	2.7686mm/ ***.109"*** to 12.547mm/***.494"***	**AAD-194* AAD-313**
1/4-28	12.547mm/ ***.494"*** to 23.876mm/ ***.940"***	**AAD-193* AAD-312**
1/2-20	23.876mm/ ***.940"*** to 139.7mm/ ***5.500"***	**AAD-195* AAD-314**
1/8 Barb	3/8-32 Female	**2242767**
Setlock	Moore	**2242777**
8mm	Mahr Row	**2240621**
12mm	Mahr Row	**2240623**
9/32-40	Mahr Federal High Mag	**AAD-165**



** Includes bleed to simulate MFI jetting.*

µDimensionair® (Zero Master System)

Features

• Affordable • Versatile • Innovative • Rugged

No other air gaging system offers so much – in the palm of your hand – mounted to the workbench or even right to the machine tool. µDimensionair is rated IP-54, so, it can be used on the shop floor – and, the air tooling cleans dirt from the part for high performance measurements – fast and easy!

- Air gage readout is right in front of you – simple and clear.
- Fixed resolution and balanced air system makes the gage stable and reliable for your manufacturing environment.
- Single mastering for fast setup.

All other features of the µMaxµm Digital Indicator:

- Inch/metric units
- Digital and analog display
- Bi - and uni-lateral tolerances with presets
- Absolute transducer for eliminating travel errors
- Calibratable – battery retains settings
- Multiple data output formats
- Auto-zeroing
- Normal-reverse settings for ID/OD measurements

The µDimensionair is the ultimate of portability and versatility – in your hand or at the workbench or machine tool. Shown with optional ***2239307*** *Bench Kit*

Versatility

The ultimate in configuration – interchangeable handle allows for pistol grip or normal end-mount for easy application of the plug to the part. For large, heavy plugs, mount the handle between the tooling and the display – assures a well-balanced, ergonomic measuring system. Can also be mounted to a bench stand when parts are brought to the gage.

All parts of the µDimensionair are completely interchangeable and included with the gaging system – versatility is built-in.

All µDimensionair gages are supplied with output capability.

Accessories

Bench stand provides safe and secure µDimensionair storage between measurements.

Order no. ***2241109***

Slide valve controls air to tooling – saves cost of wasted air, reduces air noise.

Order no. ***2240993***

Swivel coupling allows for rotating tooling to fully explore bore.

Order no. ***2240594***

For applications where the local elevation is greater than 305M/1000 feet, special calibration is required.

µDimensionair® Air Gages

Technical Data

Measuring Range	Digital Resolution	Tooling I.D. Number
± 0.080mm/± ***0.003"***	0.002, 0.001mm/***0.0001"***, ***0.00005"***	60
± 0.040mm/± ***0.0016"***	0.0005mm/***0.00002"***	50
± 0.020mm/± ***0.0007"***	0.0005mm/***0.00002"***	20

Operating Temperature	5-35° C/41-95° F
Storage Temperature	0-60° C/32-140° F
Repeatability	± 1 digit
Calibration Accuracy	± 1 digit
Linear Error	± 1 digit
Response Time	Approximately 1 second
Thermal Stability	0.1% of full scale/F
Data Output	ASCII/Digimatic
Tolerance Indicators	Two – over/under
Weight	25kg/5.5lbs.
Dimensions	Main body – approximately 100 x 60 x 70mm/4 x 2.5 x 3 in
Auto Power Off	15 minutes of non-use
Power Requirements	3 volt lithium battery coin cell, 2 per unit – CR-2450
Battery Life	9 months normal usage – 3000 hours
Air Supply	2.10 ±.01 bar/30.4 ±.15 psi
Display	Rotates through 270 degrees

Ordering Information	Order Number
µDimensionair, complete with handle, adaptor and hose	**2095389**
Pressure Regulator with filter	**2238020**
Pressure Meter	**2095924**
Bench Kit with adaptor	**2239307**
Output cable – Digimatic	**2001025**
Serial output cable to DB-9 pin	**SCB-4**
Battery 3V type CR-2450	**EBY-1018 or 4102520**
Insulated Handle	**2237666**
Shut off slide valve	**2240993**
Rest Stand	**2241109**
Swivel coupling Adaptor	**2240594**
Air Regulator Trap	**AFL-24**
20' Long Hose	**2237713**

Dimensionair® Air Gages (Zero plus Min./Max. Master System)

Column format air measuring systems

Assess and judge single or dual mastering type measuring results at a glance – nothing is easier than that with the Millimar S 1840 column amplifier.

The Millimar S 1840 column amplifier offers a broad range of functions for combining the signals from both static and dynamic measurements.

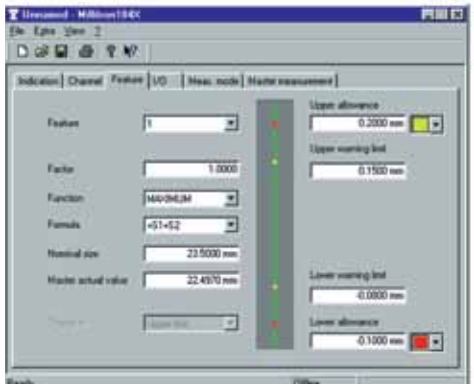
Measuring results are indicated by way of 101 three-color LEDs. When the programmable warning and tolerance limits are exceeded, the LEDs change their color from green to yellow or red, accordingly – high visibility from any distance.

Features

Display
- Three-color illuminated bar graph with analog warning and tolerance limit display
- Two-line backlit LCD for indicating measured values, help texts, and measuring units
- Up to two characteristics can be displayed simultaneously.

Connections
- Single input.
- RS 232 interface.
- Analog output.
- Three digital inputs for measuring start, master measurement, etc.
- Three digital outputs for Accept – Reject – Rework classification, measuring time, etc.

Functions
- Static measurements: ± A, ± B, and all combinations.
- Dynamic measurements: Max, Min, Max-Min, Max+Min, mean.
- Single Master or Dual Master setup.
- Password lockout in Setup Mode.



The Millimar S 1840 column amplifier can be programmed either menu-guided via the integrated membrane keypad or with MS Windows® configuration software.

Technical Data

Air/electronic converter for Millimar S 1840 PE

Measuring principle	differential pressure		
Measuring value acquisition	piezo		
Magnification	2500:1	5000:1	10000:1
Pneumatic measuring range in µm (in)	+/- 50 (+/-.00196)	+/-25 +/-.00098)	+/-12.5 +/-.00049)
Digital resolution (adjustable)	0.01mm/0.0001", 0.0001mm/0.000005"	0.001mm/0.00001"	
Measuring error in µm (in)	< 1 % of measuring range, better 0.5 %		
Signal noise in µm (µin)	<= 0.4 (15.748)	<= 0.2 (7.874)	<= 0.1 (3.937)
Setting time in sec. (1 m/3.3 ft hose)	<= 0.3	<= 0.3	<= 0.5
Setting time in sec. (2 m/6.6 ft hose)	<= 0.5	<= 0.5	<= 0.7
Operating temperature	0 ... 40 °C (32 ... 104 °F)		
Supply pressure	2 bar +/- 5 % (> 4 bar before pressure reducer)		

Air supply connection	PU hose, dia 8 x 1 (.315 x .0394 in)
Measuring air connection	PU hose, dia. 6 x 1 (.236 x .0394 in)
Zero setter (OFFSET)	electrical
Amplification (GAIN)	electrical
Air consumption	approx. 1-2 m^3 (1.308-2.616 cu.yd.)

			Tooling I.D.	
Millimar S1840PE/F:	low magnification	for 1 Air Gage 2500:1/5000:1 without regulator	50/20	**5330104***
	High magnification	for 1 Air Gage 10000:1 without Regulator	10, 5	**5330106***
Accessories:	Base foot	With 1 Regulator for 1 1840PE Column Unit		**5330910**
		With 2 Regulators for 2 1840PE Column Units		**5330911**
		With 3 Regulators for 3 1840PE Column Units		**5330912**
	Air Supply Adaptor Kit	Includes AFL-24 Filter and AHO-2 Hose		**2121236**

For applications where the local elevation is greater than 305M/1000 feet, special calibration is required.

** Base with Regulator required and sold separately. Air Supply Kit recommended.*

832 Dimensionair® Air Gaging (Zero master system)

Features

- Digital and analog displays in a single unit. Large, high contrast digital readout shows exact deviation from zero; analog display shows measurement conditions at a glance.
- Fixed resolution and balanced air system makes the Digital Dimensionair a stable and reliable system for manufacturing environments.
- Only a single master required to set zero; system is precalibrated for correct magnification.
- Ranges and resolutions for virtually any air gage application, including 2-, 3-, 4- and 6-jet tooling plus AirProbes and JetProbes.
- Dynamics measurement capability.
- RS-232 Output – for communicating with a data collector, computer or printer, permitting statistical process control.
- Master Deviation – enhances measurement by making Auto Zero even more accurate.

Technical Data

Model	Measuring Range	Digital Resolution	Analog Resolution	Tooling I.D. Number
Low Magnification Single or Dual Input	±0.080mm/± ***.003"*** ±0.040mm/± ***.0015"*** ±0.020mm/± ***.00075"***	0.0002mm/***10µ"***	0.004mm/***150µ"*** 0.002mm/***75µ"*** 0.001mm/***38µ"***	60 50 20
High Magnification Single or Dual Input	±0.008mm/± ***.0003"*** ±0.004mm/± ***.00015"***	0.0001mm/***5µ"***	0.0004mm/***15µ"*** 0.0002mm/***8µ"***	10 5

Operating Temperature	5~35° C/41~95° F
Storage Temperature	0~60° C/32~140° F
Repeatability	±1 digit or ±1% of range, whichever is greater
Calibration Accuracy	±1 digit*
Linear Error	±1 digit
Response Time (Electronics)	43 msec.
Response Time (Air))	approx. 1 sec. (dependent on hose length of air tooling)
Thermal Stability	0.1% of full scale/°F
Digital I/O	five TTL opto-isolated outputs
Data Output	RS-232, transmits Channels A, B, (or both – dual input models only)
Analog Output	±5 VDC full scale for displayed value signal ±A, ±B
Measuring Modes	Actual, Minimum, Maximum, T.I.R., Nominal
Tolerance Indicators	five LED
Weight (approx.)	11 lbs./5kg
Dimensions	254mmh x 197mmw x 216mmd/10inh x 7.75inw x 10.25ind
Display Modes	A, (or B or both – dual input models only)
Auto Power Off	after 30 minutes of non-use (selectable)
Power Requirements	100 Vac to 240 Vac, 50-60Hz with power module (Furnished)

Note: All models listed may be ordered for: 1-Jet, 2-Jet, 3-Jet, 4-Jet, or 6-Jet applications. At time of ordering, PLEASE designate the number of jets to be used on the system.

** For applications where the local elevation is greater than 305M/1000 feet, special calibration is required.*

832 Dimensionair® Air Gaging System

Technical Data

Number of Jets	Voltage/Adaptor	Low Magnification Single Input Order no.	High Magnification Single Input Order no.	Low Magnification Dual Input Order no.	High Magnification Dual Input Order no.
1, 2, 3	110/U.S.	**2004100**	**2004103**	**2004106**	**2004109**
4	110/U.S.	**2004101**	**2004104**	**2004107**	**2004110**
6	110/U.S.	**2004102**	**2004105**	**2004108**	**2004111**
1, 2, 3	240/International	**2004112**	**2004115**	**2004118**	**2004121**
4	240/International	**2004113**	**2004116**	**2004119**	**2004122**
6	240/International	**2004114**	**2004117**	**2004120**	**2004123**

Accessories

Order no.	Description
7024634	RS-232 Cable, Amplifier to MSP-2 Printer or computer, 2m/6ft cable
ECV-1276	Oil/Splash Cover (opaque)–provides protection for the 832 Digital Dimensionair® when used in harsh environments
ECV-1285	Oil/Splash Cover (clear)–provides protection for the 832 Digital Dimensionair when used in harsh environments
ECB-1857	Footswitch for HOLD/RESUME, 3m/10ft cable
ECB-1858	Footswitch for DYNAMIC RESET, 3m/10ft cable
ECB-1859	Footswitch for SEND DATA, 3m/10ft cable
ECB-1855	Pushbutton for DYNAMIC RESET, 1.5m/5ft cable
ECB-1860	Pushbutton for SEND DATA, 1.5m/5ft cable
ECB-1861	Pushbutton for HOLD/RESUME, 1.5m/5ft cable
ECB-1868	Pushbutton for HOLD/RESUME and SEND DATA, 3m/10ft cable
EKT-1236-W3	Relay Box – five relays each with Normally Open/Normally Closed contacts: Contact Rating – 30 Vdc/120 Vac, 3 amps Power Supply – 120 Vac Dimensions – 39mm x 129mm x 134.6mm d/1.53in x 5.08in x 5.3in with ECB-1886-W2*, 6.1mm/24in interconnect cable amplifier/relay box
EKT-1236-W4	Same as W3, except with 220 Vac Power Supply
EKT-1236-W5	Same as W3, except with 240 Vac Power Supply
2010000	Power Supply, U.S. Adaptors (120V)
2010001	Power Supply, International Adaptor (120/240V)
Mating Connectors	
ECN-1695-W2	Digital I/O (15 pin male)
ECN-1693	Reset Data (3/32 microphone plug)
ECN-1695-W1	RS-232 Digital Output (9 pin female)

** Order* **ECB-1886-W1** *for 305mm/12in interconnect cable, or,* **ECB-1886-W3** *for 914mm/36in cable.*

Millimar C 1208/1216 & Millimar C 1245 Zero plus Min./Max. Master System

Millimar C 1208

The pneumatic version of Millimar C 1208/1216 features a built-in air-electronic converter. This enables air gages of different magnifications to be connected directly to the Millimar C 1208/1216.

Millimar C1208
Functions
- Favorites: with the SELECT button the most frequently required settings can be directly called up
- Static measurements ± A
- Dynamic measurements: Max, Min, Max-Min, Max+Min, Mean
- Programmable via the integrated key pad or by RS232 interface in conjunction with the MS-Windows Configuration Software

Display
- Background lit LCD-Display with an analog and a two line digital display
- 5 three color status lamps for warning and tolerances limits
- Up to 2 features can be simultaneously displayed

Connections
- RS232 interface
- 3 digital inputs for measuring start, master measurement, send measured values, . . .
- 3 digital outputs for GO, NO GO, rework, measuring time, . . .

Millimar C1216
Features are identical to Millimar C1208, in addition:
- Analog output
- Programmable analog output voltage (max. ±5V)
- Additional resolution from 0.01µm/1µ" with a measuring range from ±200µm

Millimar C 1245

Display
- Analog indicator instrument for display of measurement value.
- Two-line LCD display for values and menu text
- 5 three-color status lamps for warning and tolerance limits.
- Up to 3 characteristics can be displayed at the same time.

Functions
- 16 characteristics can be defined using an equation editor (80 characters), input channels C1 to C8 are mathematically linked with factors and brackets using the 4 basic mathematical functions.
- Static measurements: Current value, square root, arc tangent.
- Dynamic measurements: Max, Min, Max-Min, Max+Min, Mean value.
- Statistical functions: n, x-bar, S, Xmax, Xmin, R.
- Measured value memory for 5000 measured values.
- Measurement start / stop via keyboard, digital input, RS232.

Connections
- 1 or 2 input for air gages (by model).
- 4 inputs for DC and inductive signals.
- 2inputs for incremental signals.
- RS232 interface.
- 3 digital inputs for start of measurement, master measurement / zero, send data.
- 6 digital outputs for GO - NOT GO - rework, ALL GO, measuring time, 4 classes, BCD interface.

For applications where the local elevation is greater than 305m/1000 feet, special calibration is required.

Millimar C 1208 & Millimar C 1245

Measuring Laboratory Precision on the shop floor

Technical Data

	Millimar 1208	Millimar 1245
Power consumption	10 VA	11 VA
System of protection	IP 53 With conductive dust, IP43	IP 53 With conductive dust, IP43
Casing dimensions (HxWxD)	Approx. 210 mm x 160 mm x 155 mm (8.27" x 6.30" x 6.11")	Approx. 210 mm x 160 mm x 155 mm (8.27" x 6.30" x 6.11")
Weight	Approx. 1.6 kg/4.4 lbs	Approx. 2 kg/ 4.4 lbs
Tolerance display	5 LEDs, 3-color	5 LEDs, 3-color
Display ranges	± 10 µm, 30 µm, 100 µm, 300 µm, 1000 µm, 3000 µm, 10000 µm ± 0.0001 inch 0.0003 inch; 0.001 inch 0.003 inch; 0.01 inch; 0.03 inch; 0.1 inch; 0.3 inch or tol.-related	± 10 µm, 30 µm, 100 µm, 300 µm, 1000 µm, 3000 µm, 10000 µm ± 0.0003 inch; 0.001 inch 0.003 inch; 0.01 inch; 0.03 inch; 0.1 inch; 0.3 inch
Resolution	0.1µm/ .000005" (measured value display)	0.1µm/.000005µ" (measured value display)
Settling time		
- Measured value memory	0.010 s	0.005 s
- Scale display	0.020 s	0.300 s
- Numerical display	0.050 s to 0.300 s	0.050 s to 0.300 s
- Outputs	0.020 s	0.020 s
Error thresholds		
- 10x scale display	2% (51 pixels)	2%
- Digital display	± 0.5%	± 1 digit
Temperature coefficient	± 0.005% / °C	± 0.005% / °C
Operating temperature range	0 °C to 45°C	0 °C to 50°C
Interfaces		
Computers, printers	RS232, 9-pin male (PC-compatible assignment)	RS232, 9-pin male (PC-compatible assignment)
Control outputs	3 optocoupler outputs, 24 V, 10 mA	6 optocoupler outputs, 24 V, 10 mA
Control inputs	3 optocoupler inputs, 24 V, 100 mA	3 optocoupler inputs, 24 V, 100 mA

Millimar C 1208 PE/F	For 1 Air Gage 2,500:1/5,000:1 with Regulator	**5312095**
Millimar C 1216 PE/F	For 1 Air Gage 10,000:1 with Regulator	**5312093**
Millimar C 1245 PE/F	For 1 air gage 2,500:1/5,000:1 with Regulator	**5331271**
Millimar C 1245 PE/F	For 1 air gage 10,000:1 with Regulator	**5331273**
Millimar C 1245 PE/F2	For 2 air gages 2,500:1/5,000:1 with Regulator	**5331275***
Millimar C 1245 PE/F2	For 2 air gages 10,000:1 without Regulator	**5331277***

Air Supply Adaptor Kit	includes AFL-24 Filter and AHO-2 Hose	**2121236**
	**Baseplate with 2 Regulators (required for 2 Air Gage Units)*	**5330909**

Millimar C1841- Zero plus min/max master system

Millimar C1841 Intelligent recording and clear display of complex measuring tasks

The Millimar C 1841 multiple column measuring instrument is the ideal multi-gaging unit for the production environment. It combines the power of a state-of-the-art measuring computer with the clarity of an illuminated bar graph. With this modular design, Millimar C 1841 can be easily adapted to a variety of measurement tasks.

The instrument consists of a base unit and at least one indicating and operating column. Depending on the scope, up to 3 additional indicating and operating columns can be attached.

Millimar C 1841 can be equipped with different measuring amplifier modules. The electronic control and evaluation system is identical in all versions.

Application examples:

- Standard measuring units with up to 16 inductive probes for shaft measurements
- Measuring station for the inspection workpieces with several electronic or air plug gages
- Customized multi-gaging units
- Ideal for Machine Tool or Orthopedic taper applications. With a taper jet plug gage or jet ring gage with 3 indicating columns and 2 air/electronic converter inputs, the following parameters are evaluated:
  M1: Large diameter
  M2: Small diameter
  M3: Taper D2 - D1
  M4: Taper ratio L / (D2 - D1)
  M5: Nominal diameter at a defined height
  D1 + ((D2-D1)*L1 / L)

Features

Display
- Up to 4 indicating strips with three-color illuminated bar graph and LCD display

Functions
- Static and dynamic measurements
- Equation editor
- Auto detect mode: Up to 6 measuring devices can be operated independently of each other
- One or two point measurement

Connections
- 1 to 16 measuring device inputs
- RS232 interface
- Analog output
- 6 digital inputs and 12 digital outputs

Accessories and versions

Millimar S 1841
Up to 4 displays and up to 4 modules with mesuring channels for each of the following: 4 inductive probes,1 pneumatic measuring device, 2 incremental probes, 4 DC signals

Gage-Chek - Zero plus min/max master system

Gage-Chek Intelligent recording and clear display of complex measuring tasks

The Gage-Chek is a fully integrated, dimensional measuring amplifier that can accommodate 1, 4 or 16 inputs. A variety of input types can be algebraically processed and manipulated to provide dimensional measurement values for the most common to the most elaborate applications.

The only limitation to what the Gage-Chek can provide to your measurement application is your imagination. With a wide assortment of programming protocol to choose from the Gage-Chek offers an almost limitless number of ways it can be programmed and used on the shop floor.

An extensive array of options, features and accessories make this amplifier one of the most adaptable in the marketplace. Increased adaptability means you can provide standard user interface for your operators to use that covers all your metrological application needs.

Input Options

Inductive

- Full Bridge or Half Bridge
- Accommodate a wide variety of coil specs (Mahr, Marposs, Federal, Solartron, etc)
- Intuitive calibration procedure
- One touch single mastering
- 1, 4 or 8 input

Incremental/Digital

- Compatible with a wide variety of probe types (Mahr, Heidenhain, Solartron, etc)
- Accommodates various plug types (round, rectangle, D-sub, 9,10,12,15 pin, etc)
- No calibration required
- One touch single mastering
- 1, 4, 8 or 16 input

Pneumatic

- Compatible with all air tooling manufacturers
- Accommodates all magnifications (2500:1, 5000:1, 10,000:1, etc)
- Single or dual mastering
- 1, through 8 inputs

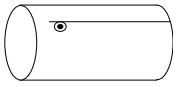
Dimensionair® Air Gages

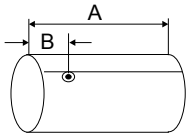
Worksheet for Ordering Air Plugs

There are two basic styles of Air Plugs, Thru Hole and Blind Hole Styles. Dimension "B" refers to the dimension of the Jet Centerline to the Nose of the Air Plug. The overall dimension is indicated by Dimension "A". There is an option for Super Blind Plugs that further reduces Dimension "B", permitting checking closer to the bottom of the part.

If extra length is necessary and an extension or handle will not work, you can specify extra plug length in 1" /25mm increments. NON-Relieved should only be specified for valve bores where obstructions like lands could make it difficult to remove the tool.

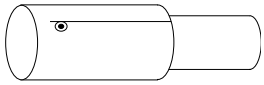
When possible specify the Dimensionair model number you are ordering the tooling for.

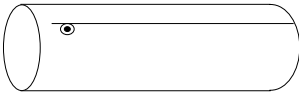

Through Hole



Blind Hole

Non-Relieved body diameter means the same for entire length


Relieved


Non-Relieved

Company _____ Contact: _____ Part Number: _____

Phone: _____ Fax: _____ E-mail: _____

Required Information:

Feature Size (bore dia):

Size Tolerance:

Number of Jets*:

Plug Style: Thru, Blind

Location Jets:

Extra Body length Req'd?

Extra length* =

Quantity:

Overall Bore Length*:

Dimensionair/Display to be used:

Part prints for other then non-standard plugs are required.

** 2 jet check size, ovality, taper, bellmouth; 3 jet check 3 point out of round; 4 jet Average Diameter, requires special Dimensionair; 6 jet Average 2 point and 3 point out of round, requires special Dimensionair.*

Options for Air Plugs:

Stop Collar:

OD Restrictions:

Special Plug Markings:

Extensions Required / length:

ISO Long Form Certification of Air Plug required?

Tooling Hose Required:

Handle Required:

Shut-off

Master required?

Nominal?

AMR Calibration kit required?

AFL-24 Oil/Water trap required?

Technical Assistance at Mahr Federal:
Phone: 401-784-3100
Fax: 401-784-3246 E-mail: information@mahr.com

Dimensionair® Air Gages

Worksheet for Ordering Air Rings

Special care MUST be taken when preparing proposals for Air Rings. There are five basic styles of Air Rings. Centered jets, offset jets, shoulder type, counter bored type, and snout type. Air rings may be attached directly to the Dimensionair, or used with base and guide chutes that can only be provided at time of manufacture. Mahr Federal strongly recommends a drawing (CAD preferred) accompany this inquiry.

Company _____ Contact: _____ Part Number: _____

Phone: _____ Fax: _____ E-mail: _____

Required Information:

Feature Size mm/inch):

Size Tolerance:

Number of Jets*:

Air Ring Style:

- Center jets
- Offset jets
- Shoulder style
- Counter bored
- Snout

Overall length of diameter:

Quantity:

Dimensionair/Display to be used:

Part prints for other then non-standard plugs are required.

Options for Air Plugs:

OD Restrictions:

Special Plug Markings:

Base required:

Guide chutes required:

- Vee Style
- Tube Style
- Length of chute: 63mm/2.5" or 152mm/6"

ISO Long Form Certification of Air Ring required?

Tooling Hose Required:

Shut-off

Master required?

Nominal?

AMR Calibration kit required?

Technical Assistance at Mahr Federal:
Phone: 401-784-3100
Fax: 401-784-3246 E-mail: information@mahr.com

Dimensionair® Air Gages

Multiple jet plugs for average diameters, multiple diameters, taper and straightness.

Air snaps combined with column gages for multiple diameters read easily at the point of manufacture.

Partial diameter air tooling for half bearing measurement

Air plug with multiple diameters and taper for automatic gage measurement of cylinder liners

Air tooling for I.D. and O.D. tapers — angle, size and side straightness

Squareness Fixture Gage

Dimentron® Plug Gages

The Need for Fixed Plug Gaging

Fixed Plug Gaging is the inspection tool that allows you to measure many jobs faster, more conveniently, and more accurately than by other gaging methods. In the measurement of all hole conditions, the Dimentron System is unsurpassed for speed and accuracy. In standard applications it offers sufficient magnification and reliability to measure tolerances well beyond the scope of mechanical gages. For critical dimension applications special designs can be implemented to enhance the performance for some of the most demanding requirements

Easy to Use

Production workers do not require special training to use Dimentron Plugs. To check a hole, for instance, it is not necessary to develop skill in rocking the gage to find the true diameter, merely insert the air plug in the hole and read the meter. It is as simple as that.

Fixed Size I.D. Gaging

- Designed for high production I.D. gaging.
- Chromed, hardened steel bodies ground precisely for specified size measurement.
- Plug tooling interchangeable for quick changeover.
- Measurement is easy – just insert plug into diameter and read. No rocking needed.
- Set to nominal dimension with a single master ring.
- Long life: tungsten carbide contacts and vee rod insure durable motion transfer.
- Three styles of plugs available – Thru-hole, Blind-hole and Super-blind hole.
- Open design rinses clean easily.
- Explore bores for taper, barrel-shape, bell-mouth and 2-point out-of-round.
- Stop Collars available for all standard sizes.
- Captive vee rod design.
- Easy entry lead makes for part entry with even the tightest tolerances.

Economical

Once the basic gage readout is purchased, whether it be a digital indicator or electronic amplifier is purchased, additional tooling for a wide variety of jobs can be used with it. It is not necessary to buy a complete gage for each new dimension that requires checking. Because of its adaptability, Dimentron Gaging often becomes the primary measuring system in a complete quality control program.

Versatile

Dimentron Plugs effectively measure precision holes. Because of the differential nature of the two contact measuring system the plug can be used to explore the dimension for variances due to out of round, taper, barrel or bell mouth conditions

The simple and proven operating characteristics of the Dimentron plug make them particularly useful for checking a wide variety of hole configurations. A full list of optional configurations allow for measuring of virtually any hole requirements.

Dimentron Plugs are readily adaptable to measuring parts in the machine. Their small gage heads make most dimensions accessible with portable displays that bring the measurement results right to the point of manufacture. Thus speeding the process and making it easier for the operator to make his critical measurements.

Thru-hole and Blind Hole Dimentron Plugs

Dimentron® Plug Gages

The Dimentron System - Built for Performance -

Dimentron Plug Assembly — shown with Maxμm® III Indicator, Housing and Handle

The Dimentron plug gage, which is formed by the plug body, the panto-assembly with contacts and the transfer rod, is the measuring system comprising the Dimentron plug. It can be interchanged by simply unscrewing it from the display assembly.

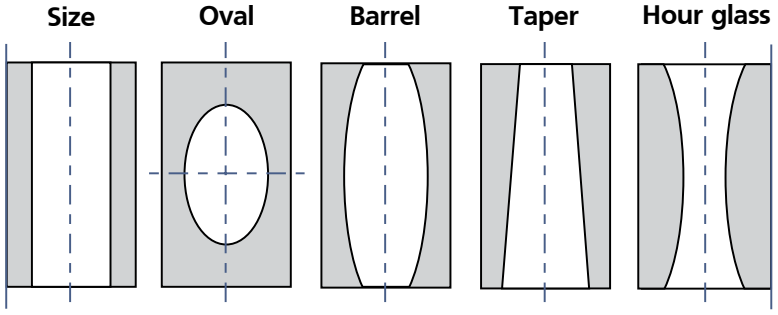
The **plug body** is made from through hardened 440 stainless steel, tempered and ground, with hardness 52-56 HRC, guides the plug gage; its easy entry guide facilitate introduction into the bore.

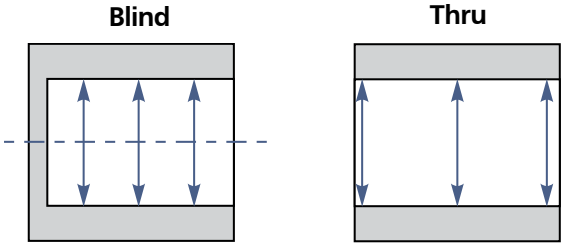
Standard **contacts** are made of tungsten carbide and based on the bore diameter range, come in two possible radii. Other contact materials are available based on the part being measured. Diamond, Ruby or hard-chrome-covered contacts are also available. Diamond or ruby contacts are suggested for soft aluminum or highly wearing applications; hard chromed ones (1000 HV) for aluminum and relevant alloys. Also based n the thickness of the surface available options cylindrical contacts may be ordered.

Either 2 or 4 steel spring assemblies **form panto-spring assemblies**. The design of the transfer assembly is determined by the diameter of the plug. This panto-design produces true straight-line transfer to the Vee-rod.

A **transfer rod**, with spherical tungsten carbide tip, slides on a tempered steel V-shaped guide and inclined plane, transferring the measurement to the display device. This unique floating system has been designed and tested to resist for over 10,000,000 measuring cycles.

Though designed for the toughest shop conditions, wear items do occasionally need replacement. Because of the individual components **service is fast and easy**. All parts are available separately from Mahr Federal and with standard tools, can be replaced in minutes to help maintain up time on the floor.





Dimentron® Plug Gages

Dimentron Plug Applications

Two-Point Gaging

Provides fast measurement of diameters. While exploring the part with the gage will help evaluate the part for ovality, taper, barrel or hour-glass conditions

Thru or Blind Hole Designs

Dimentron plugs are available in Thru, Blind, Super Blind and Super-Super Blind hold designs to assure that the part is inspected for the exact parameter desired.

Ordering Information

When ordering specify:
1. Diameter
2. Tolerance
3. Gaging depth
4. Plug style
5. Contact type – polished chrome steel or tungsten carbide
6. Stop collar

Gaging Range:
Dimentron Plugs are ground to one of four measuring ranges, based on part tolerance.

Technical Data

Sizes above	To and include	Maximum Part Tolerance Metric M01 Inch 050	M02 100	M05 200	M08 400
3.18 mm/ ***.1250"***	3.62 mm/ ***.145"***	±0.025 mm/ ***±0010"***	±0.038 mm/ ***±0015"***		
3.62 mm/ ***.1426"***	5.52 mm/ ***.217"***	±0.025 mm/ ***±0010"***	±0.046 mm/ ***±0018"***	±0.076 mm/ ***±0030"***	
5.50 mm/ ***.2171"***	7.94 mm/ ***.312"***	±0.025 mm/ ***±0010"***	±0.046 mm/ ***±0018"***	±0.069 mm/ ***±0027"***	±0.102 mm/ ***±0040"***
7.94 mm/ ***.3125"***	9.5 mm/ ***.375"***	±0.030 mm/ ***±0012"***	±0.051 mm/ ***±0020"***	±0.069 mm/ ***±0027"***	±0.127 mm/ ***±0050"***
9.50 mm/ ***.3750"***	12.7 mm/ ***.50"***	±0.038 mm/ ***±0015"***	±0.058 mm/ ***±0023"***	±0.086 mm/ ***±0034"***	±0.137 mm/ ***±0054"***
12.7 mm/ ***.5000"***	19.05 mm/ ***.75"***	±0.038 mm/ ***±0015"***	±0.069 mm/ ***±0027"***	±0.102 mm/ ***±0040"***	±0.165 mm/ ***±0065"***
19.05 mm/ ***.750"***	25.4 mm/ ***1.00"***	±0.038 mm/ ***±0015"***	±0.076 mm/ ***±0030"***	±0.127 mm/ ***±0050"***	±0.180 mm/ ***±0071"***
25.4 mm/ ***1.000"***	38 mm/ ***1.50"***	±0.038 mm/ ***±0015"***	±0.076 mm/ ***±0030"***	±0.152 mm/ ***±0060"***	±0.221 mm/ ***±0087"***
38 mm/ ***1.500"***	114.3 mm/ ***4.5"***		±0.076 mm/ ***±0030"***	±0.152 mm/ ***±0060"***	±0.254 mm/ ***±0100"***
114.3 mm/ ***4.5"***	229 mm/ ***9.00"***			±0.152 mm/ ***±0060"***	±0.254 mm/ ***±0100"***

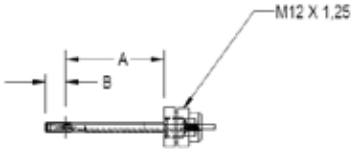
Order Maxμm Indicator and Accessories separately.

Accuracy Specification Dimentron Plugs

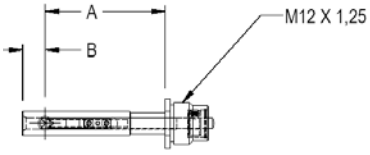
Hysteresis 0.5μm/ 20 μ"
Repeatability 0.5μm/ 20μ"
Linearity 2% of measuring range

Dimentron® Plug Gages

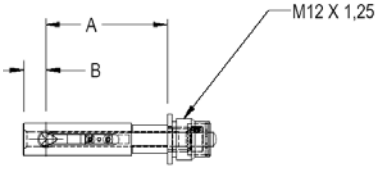
Through Hole Dimentron Plugs



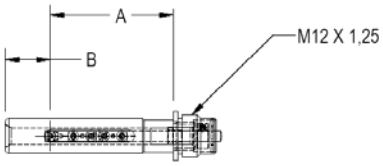
Size range: .1250 to .2170"



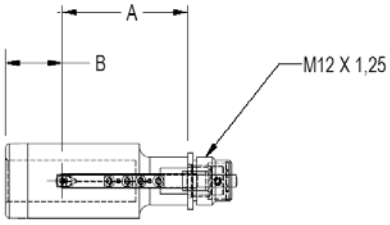
Size range: .2171 to .3220"



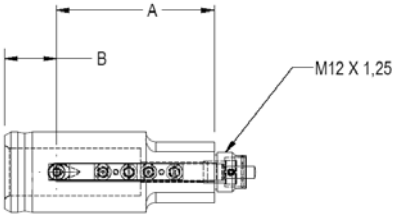
Size range: .3221 to .3750"



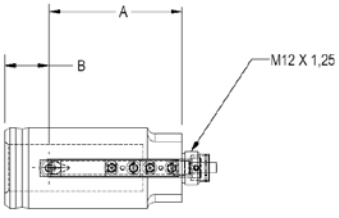
Size range: .3751 to .5000"



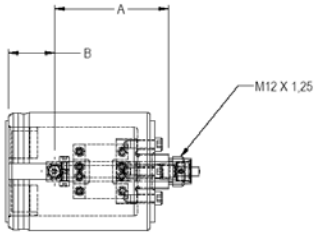
Size range: .5001 to .7500"



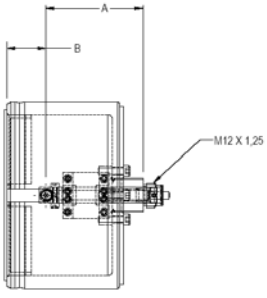
Size range: .7501 to 1.000"



Size range: 1.0001 to 1.5000"



Size range: 1.5001 to 2.5000"

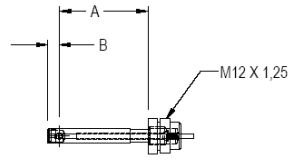


Size range: 2.5001 to 4.5000"

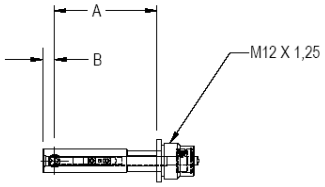
Sizes above	To and include	A	B	Group*
3.2mm/ *.125"*	5.5mm/ *.217"*	31.2mm/ *1.23"*	6.4mm/ *.25"*	no group**
5.5mm/ *.217"*	8.2mm/ *.322"*	34.8mm/ *1.37"*	6.5mm/ *.256"*	5
8.2mm/ *.322"*	9.5mm/ *.375"*	34.8mm/ *1.37"*	6.5mm/ *.256"*	6
9.5mm/ *.375"*	12.7mm/ *.50"*	35.3mm/ *1.39"*	13mm/ *.512"*	8
12.7mm/ *.50"*	19.05mm/ *.75"*	35.3mm/ *1.39"*	13mm/ *.512"*	8
19.05mm/ *.75"*	25.40mm/ *1.0"*	48.3mm/ *1.90"*	16mm/ *.63"*	12
25.40mm/ *1.0*"	38.10mm/ *1.5*"	48.3mm/ *1.90*"	16mm/ *.63*"	12
38mm/ *1.50"*	63mm/ *2.50"*	46.7mm/ *1.84"*	19mm/ *.748"*	12
63mm/ *2.50"*	114.3mm/ *4.5"*	46.7mm/ *1.84"*	19mm/ *.748"*	12
114.3mm/ *4.50"*	228.6mm/ *9.0"*	46.7mm/ *1.84"*	9.5mm/ *.375"*	12

Dimentron® Plug Gages

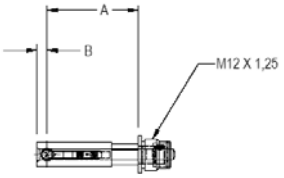
Blind-Hole Dimentron Plugs



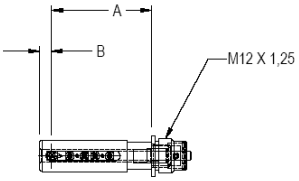
Size range: .1250 to .2170"



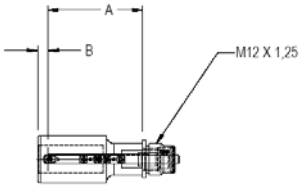
Size range: .2171 to .3220"



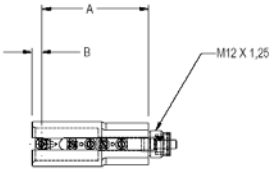
Size range: .3221 to .3750"



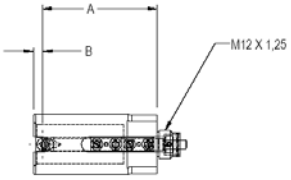
Size range: .3751 to .5000"



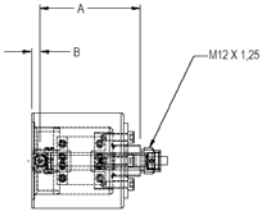
Size range: .5001 to .7500"



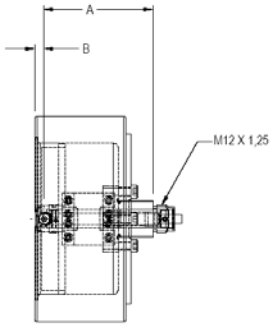
Size range: .7501 to 1.000"



Size range: 1.0001 to 1.5000"



Size range: 1.5001 to 2.5000"



Size range: 2.5001 to 4.500"

Blind-Hole Plugs***
Use Dimension "A" below. Dimension "B" is 4mm/ **.157 in.**

Super-Blind Plugs
Use Dimension "A" Below. Dimension "B" is 2mm/**.08 in** for 5.5mm/**.217 in** and up.

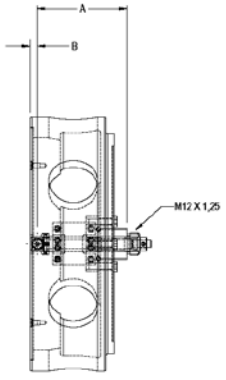
Super-Super Blind Plugs
Use Dimension "A" Below. Dimension "B" is 0.79mm/**.031 in**
(**4.5000 in to 9.00 in** not avilable with this model)

Sizes above	To and include	A	Group*
3.2mm/ ***.125"***	5.5mm/ ***.217"***	31.2mm/ ***1.23"***	no group**
5.5mm/ ***.217"***	8.2mm/ ***.322"***	34.8mm/ ***1.37"***	5
8.2mm/ ***.322"***	9.5mm/ ***.375"***	34.8mm/ ***1.37"***	6
9.5mm/ ***.375"***	12.7mm/ ***.50"***	35.3mm/ ***1.39"***	8
12.7mm/ ***.50"***	19.05mm/ ***.75"***	35.3mm/ ***1.39"***	8
19.05mm/ ***.75"***	25.40mm/ ***1.0"***	48.3mm/ ***1.90"***	12
25.40mm ***.1.0***"	38.1mm/ ***1.50***"	48.3mm/ ***1.90"***	12
38.1mm/ ***1.50"***	63.5mm/ ***2.50"***	46.7mm/ ***1.84"***	12
63.5mm/ ***2.50"***	114.3mm/ ***4.50***	46.7mm/ ***1.84"***	12
114.3mm/ ***4.50"***	228.6mm/ ***9.00"***	46.7mm/ ***1.84"***	12

** Group number specifies thread size on gaging plugs. Threaded bushings are provided with each plug to allow mounting to Maxμm® Adaptor or Electronic Handle Assembly.*

*** Only available as Thru- and Blind-Hole Small Bore Probe. For larger or smaller plugs, alternate contact materials, extended gaging depths, more clearance, or other plug modifications, contact Mahr Federal for assistance.*

**** A Blind-hole Dimentron® Plug Gage with μMaxμm® Digital Electronic Indicator makes a compact, lightweight, portable hand tool.*



Size range: 4.5001" Up

Dimentron® Plug Gages

Options for Dimentron Plugs

Extended Range

Plug measuring range can be extended to have a measuring range of nearly ±0.38mm / ±0.015".
Used for applications where plug centralizing errors are a small portion of the part tolerance.

Extra Body Length Plugs

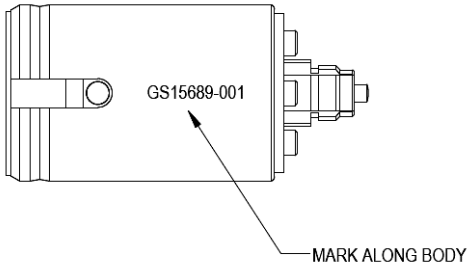
Normally when using a Dimentron plug in a deep hole extensions are combined with the plug to reach the bottom of the bore. In some cases lands and interruptions can interfere with plug movement. In these case a non-relieved plug can be specified. Here the plug is made to a specific length (in 1inch increments) so the land will help guide the plug through the part.

Toleranced Contact Length

For certain blind hole (and parts with lands) the location of the contacts are critical to measuring the diameters at precisely the location as called out on the part print. By reviewing the print special contact locations can be specified for the application.

Marking on Plugs

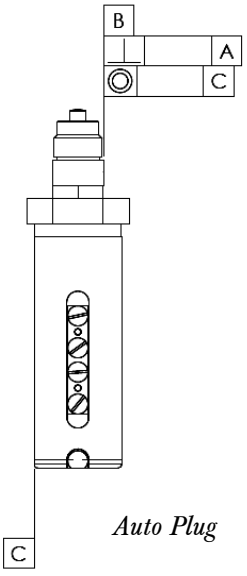
Often tooling is purchased as a package for specific application. Kits can be created that include the Dimentron plug and masters contained in a storage box. Each individual item may be marked with it's own specific part number, operation it's to be used on and reference drawing number.



Reduced Body Clearance

For extremely tight tolerances such as on can dies, Dimentron plugs can be modified to reduce the clearance between the plug and the part to be measured. This allows for the best fit and alignment of the plug to the part and therefore reduces variability and increases performance. These plugs are then often mounted in fixtures to even further reduce operator error.

Contact Mahr Federal for tight tolerance applications.



Auto Plug

Dimentron® Plug Gages

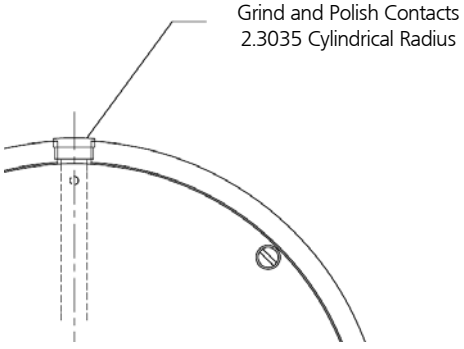
Dimentron Plug Application Available Configurations

Contact Shapes

Dimentron Plug contact points can be made to various shapes and from different materials depending on the application:

The Big Foot Contact - For spanning rough or interrupted surfaces.

Cylindrical ground contacts - for checking thin walled parts or rotor laminators.



Optional Contact Materials

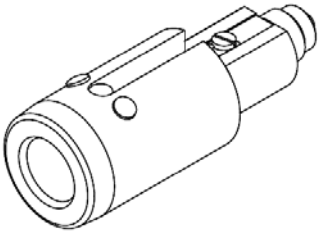
Diamond contacts - used when gaging abrasive materials or for extremely high usage applications.

Polished chrome plated contacts - used when checking soft, porous materials such as aluminum.

Ruby contacts - used when part marring must be prevented.

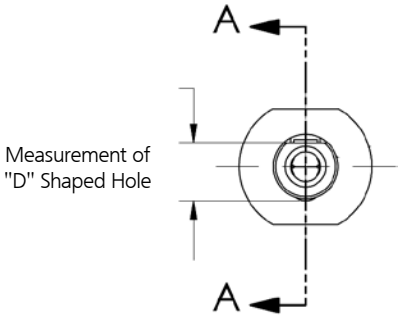
Plugs with guide pins for axial grooves

For rifle bores or specific part orientation grooves may be incorporated into the part. Guide pins can be attached to the plug to guide the plug and orient the jets to assure fast easy plug alignment to the surface to be gaged.



Plugs with special shapes

Dimentron plugs for bores is by far the most common measurement application. However Dimentron plugs can be configured to meet virtually any gaging requirement. These may include square plugs or plugs to get into slot grooves. Send us your application.



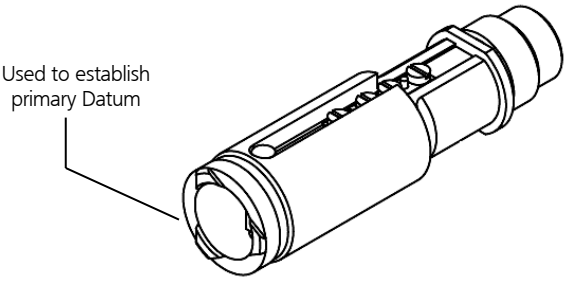
Plugs from special materials

Dimentron plugs are normally furnished in High Chrome contain stainless steel or can be flashed chromed for extra protection. Mahr Federal can manufacture air plugs in other materials for extreme use applications. Materials can include CPM-10, Ferrotic, Tungsten carbide ware strips and others are available to get the most from your hole gage tooling.

Special entry features

Measurement of
"D" Shaped Hole

The leading edge of the Dimentron plug is critical for either making entry into the part easy or aligning the part to the bore - as in the case of a shallow bore. Normally an easy entry nose cut out is provided for standard through hole applications. There are times when a straight entry lead is required. Prints provided at the time of requesting the quote will help in configuring these applications.



Dimentron® Plug Gages

Portable Plug Gaging Systems

This EDI-550P-50 is a compact and self-contained display system used with mechanical fixed plug gaging for evaluating high precision, high volume manufactured parts. The gage uses a µMaxµm as the readout, which makes the system ideal for the manufacturing environment.

The EDI-550P-50 features a dial that can be rotated through 270° for easy viewing. A built-in transducer assembly is prepositioned for use with Dimentron® gaging plugs. With use of optional adaptors, Series 844D and Diatest style plugs may be used.

The gage can be configured in multiple ways due to the interchangeability of the parts and can be used as a pistol grip or normal end mount. The gage can also be bench mounted using the optional bench kit. See accessory list.

The µMaxµm based gaging system incorporates the following features:

- Inch/Metric Operation
- Digital and Analog Display
- Bi and Unilateral tolerances with presets
- Absolute transducer - no travel errors
- Multiple data output formats
- Auto-zeroing
- Normal - Reverse settings for ID/OD measurements

The dial indicator version incorporates:

- Inch or metric dial indicator
- Shockproof movement
- Yellow (metric) or Green (inch) dial for easy reading

Technical Data

Description	Order No.
Inch Dial Indicator version .0001" graduations	**550P-10**
Metric Dial Indicator version .002mm graduations	**550P-20**
µMaxµm standard version with selectable 1µm/50µ" resolution	**EDI-550P-10***
µMaxµm HR version with selectable .5um/20µ" resolution	**EDI-550P-20**
Output cable - Digimatric	**2001025**
Serial output cable to DB-9 pin	**SCB-4**
Battery 3 volt Type CR-2450 (2 required)	**EBY-1018**
Connector (Data Output)	**ECN-1720**

** No data output*

Dimentron® Plug Gages

Adaptors, Handles and Accessories

EKT-1120- adaptors are required to mount the Digital or Dial Indicators to Dimentron Plugs. This adaptor kit includes mounting adaptor, hex wrench, and flat-end, carbide faced contact point for the Indicator.

Models include:

EKT-1120-W1- Maxμm III with .375" stem - 4-48 thread
EKT-1120-W2- Maxμm III with 8mm stem - 2.5mm thread
EKT-1120-W3- EDI/Dial .375" stem - 4-48 thread
EKT-1120-W4- EDI/Dial 8 mm stem - 2.5mm thread
EKT-1120-W6- 1002 - 1010 8mm stem - 2.5 thread

Right angle Adaptor offers added versatility to provide easy entry into narrow access opening*.

Order **AT-155**

** Not recommended for plugs over 1.500"/38.1mm*

Protective Housings

Protective Housings for Digital and Dial Indicators clamp over **EKT-1120-WX** adaptor

EHG-1172 For MaxμmIII Indicators without Output. Requires in-line or pistol style grip Handle (**HA-88** Handle and **AT-124** Adaptor).

EHG-1198 For MaxμmIII Indicators with Output. Requires pistol style grip Handle (**HA-88** and **AT-124** Adaptor).

B-12668 For MaxμmIII Indicators with Output. Complete with in-line style handle.

EHG-102 protective housing for AGD group 2 dial and digital indicators

AT-125 Bench Stand Adaptor permits the Maxμm Indicator in a Protective Housing to be clamped in **BA-26** Bench Stand.

With Electronic Gage Heads and Maxum Transducers

Gage heads are mounted to Dimentron Plugs using **HA-88** and **AD-140** Adaptor. Electronic Gage Heads can be ordered separately. The following Handle Assemblies include Adaptor, Wrenches and Gage Head:

Description	Order No.
Flat Contact, 3 m / 11 ft. coiled cable	**EHA-1146**
Flat Contact, 3 m / 5 ft. straight cable	**EHA-1145**

For 1" barrel Maxμm transducers **HA-141** provides protection for transducer while easy mounting to the plug.

Remote Maxum Transducers
Dimentron Plug Handle
Adaptor HA-141

Extensions

Extensions for Dimentron Plugs are available for Plugs over 9.5mm/ ***.375"***. See table below:

Group 8 Plugs 9.3mm/ ***.366"*** O.D.	Group 12 Plugs Extension 16mm/ ***.63"*** O.D. Length
EX-204	EX-210 50mm/ ***1.97"***
EX-205	EX-211 100mm/ ***3.94"***
EX-206	EX-212 200mm/ ***7.87"***

Bases

Base, BA-100

Heavy cast base has tooling plate allowing plug to be mounted vertically or horizontally. Can be used with Electronic Gage Heads or Maxμm Remote Transducers or MaxμmIII Digital Transducer

Dimentron® Plug Gages

Stop Collars

Ring Style

Ring style Stop collars limit the depth a measuring head can be inserted into a bore. They are clamped onto the measuring head and are adjustable to set contact depth. Stop collars improve performance by assuring the same depth is measured consistently. Additionally, they help with alignment when plugs are used with shallow bores.

Spider Style for Large Plugs

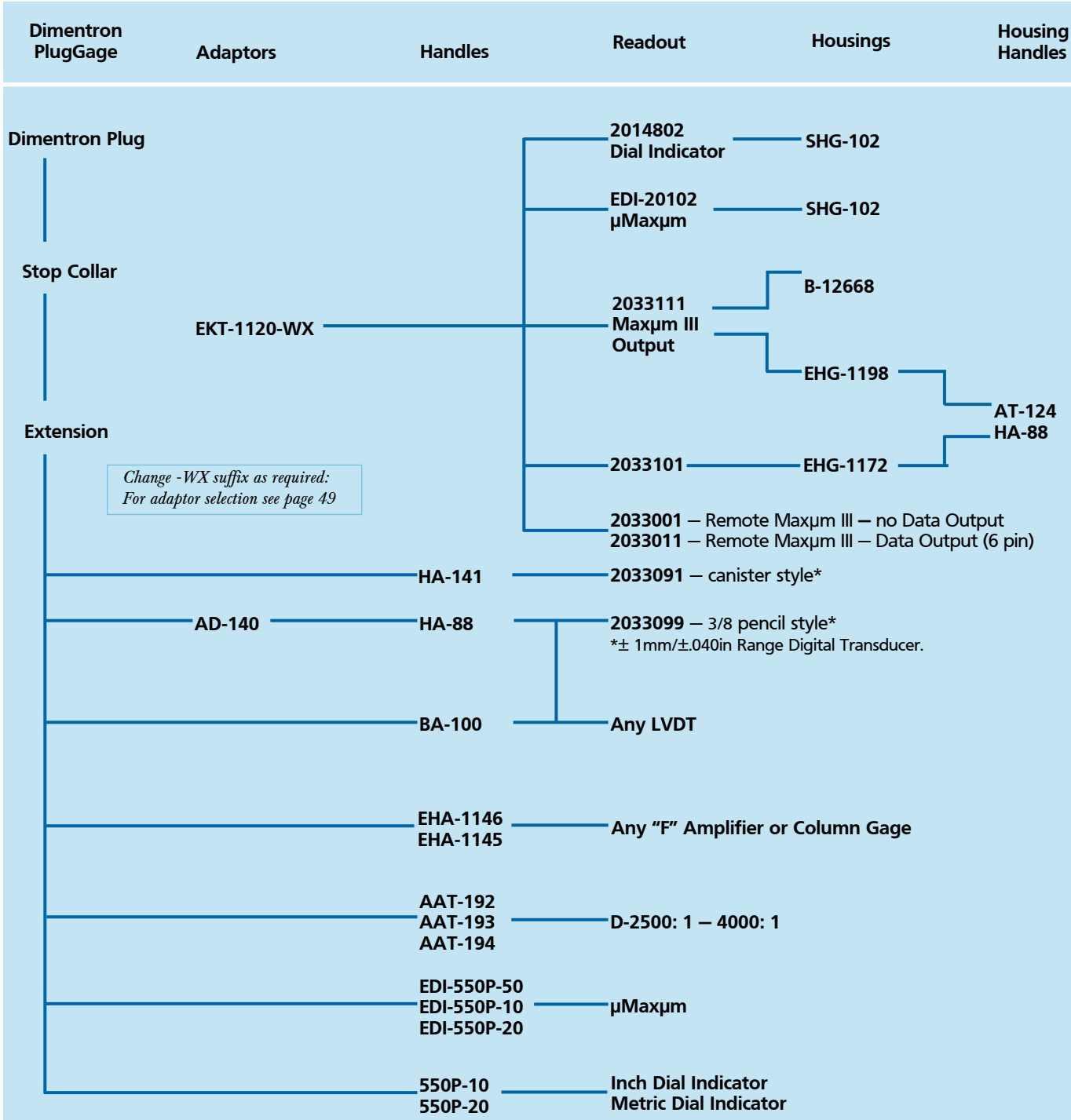
Special stop collars are available for diameters greater than 76mm/3". They provide the same function as the ring style except their design helps to reduce weight and can be used to set depth in deep holes.

Contact Mahr Federal Technical Assistance for application Information.

Order No.	Bore Size Thru & including		Outside Diameter		Width	
	mm	inch	mm	inch	mm	inch
CR-20010-W1	3.18	0.13	12.70	.500	6.35	.250
CR-20010-W2	4.76	.1875	17.48	.688	7.95	.313
CR-20010-W3	6.35	.2500	17.48	.688	7.95	.313
CR-20010-W4	7.94	.3125	17.48	.688	7.95	.313
CR-20010-W5	9.53	.3750	22.23	.875	9.53	.375
CR-20010-W6	11.11	.4375	23.83	.938	9.53	.375
CR-20010-W7	12.70	.5000	28.58	1.125	10.31	.406
CR-20010-W8	14.29	.5625	33.35	1.313	11.13	.438
CR-20010-W9	15.88	.6250	33.35	1.313	11.13	.438
CR-20010-W10	17.46	.6875	36.53	1.438	11.13	.438
CR-20010-W11	19.05	.7500	38.10	1.500	12.70	.500
CR-20010-W12	20.64	.8125	41.28	1.625	12.70	.500
CR-20010-W13	22.23	.8750	41.28	1.625	12.70	.500
CR-20010-W14	23.81	.9375	44.45	1.750	12.70	.500
CR-20010-W15	25.40	1.0000	44.45	1.750	12.70	.500
CR-20010-W16	26.99	1.0625	47.63	1.875	12.70	.500
CR-20010-W17	28.58	1.1250	47.63	1.875	12.70	.500
CR-20010-W18	30.16	1.1875	52.40	2.063	12.70	.500
CR-20010-W19	31.75	1.2500	52.40	2.063	12.70	.500
CR-20010-W20	33.34	1.3125	53.98	2.125	14.30	.563
CR-20010-W21	34.93	1.3750	57.15	2.250	14.30	.563
CR-20010-W22	36.51	1.4375	57.15	2.250	14.30	.563
CR-20010-W23	38.10	1.5000	60.33	2.375	14.30	.563
CR-20010-W24	39.69	1.5625	60.33	2.375	14.30	.563
CR-20010-W25	41.28	1.6250	66.68	2.625	17.48	.688
CR-20010-W26	42.86	1.6875	69.85	2.750	17.48	.688
CR-20010-W27	44.45	1.7500	69.85	2.750	17.48	.688
CR-20010-W28	46.04	1.8125	70.03	2.875	17.48	.688
CR-20010-W29	47.63	1.8750	70.03	2.875	17.48	.688
CR-20010-W30	49.21	1.9375	76.20	3.000	17.48	.688
CR-20010-W31	50.80	2.0000	76.20	3.000	17.48	.688
CR-20010-W32	53.98	2.1250	82.55	3.250	19.05	.750
CR-20010-W33	55.56	2.1875	82.55	3.250	19.05	.750
CR-20010-W34	57.15	2.2500	82.55	3.250	19.05	.750
CR-20010-W35	60.33	2.3750	85.73	3.375	19.05	.750
CR-20010-W36	61.91	2.4375	85.73	3.375	19.05	.750
CR-20010-W37	63.50	2.5000	95.25	3.750	22.23	.875
CR-20010-W38	68.26	2.6875	101.60	4.000	22.23	.875
CR-20010-W39	69.85	2.7500	101.60	4.000	22.23	.875
CR-20010-W40	73.03	2.8750	107.95	4.250	22.23	.875
CR-20010-W41	74.61	2.9375	107.95	4.250	22.23	.875
CR-20010-W42	76.20	3.0000	107.95	4.250	22.23	.875

** Stop Collars may require boring to measuring size. Specify measuring size of plug when ordering*

Dimentron® Plug Gages — Configurations



This table depicts available readouts for Dimentron Plug inside diameter gages. After making a plug selection, follow the chart for all the components needed to make up a gaging system suited to your application.

* 3/8" body LVDT. 8mm body LVDT's require BU-197 Bushing Adaptor (flat contact point ordered separately).

Maxµm III Indicator

Inch: Specify 2033201 (2033211 if Digital Output is required) for .00005" resolution. .0001" graduation and "0" on the indicator in the 12 O'clock position. For "0" at 6 o'clock position, specify 2033101 Digital (no Output).

Metric: Specify 2033201 (2033211 if Digital Output is required) for 0.001mm resolution, 0.01mm graduation, and "0" in the 12 o"clock position. Specify 203301 for "0" at 6 o'clock position not digital with Output.

Millimar 1840 Compact column amplifier

Features

- Easy to read 3 color analog display
- For measurement with inductive probes (e. g. Mahr P2004) or electronic plug gages etc
- Two inputs for Inductive Probes (alternatively compatible with probes from Mahr, Mahr-Federal, Tesa, Marposs)
- Extensive calculation of input signals: ±A, ±B and all combinations
- Dynamic measurements: Max, Min, Max-Min, Max+Min, Mean
- Programmable either via the integrated keyboard or the RS232 interface by means of MS-Windows configuration software
- Programmable warning and tolerance limits, exceeding the limit causes the color to change from green to yellow to red
- Background lit 2 lined LCD to display measured values, help text and measuring units.
- Analog output:
  3 digital inputs (e.g. start of measurement, master measurement)
  3 digital outputs for GO – NO GO – rework, measuring time
- Scope of supply:
  Mains cable

Technical Data

Analog display	101 LED elements, 3 colors
Range and Text display 14 Segment, alphanumeric	7 point LCD,
Measured value display	7 point LCD, 7 Segments
Tolerance display analog display	via color changes in the
Display ranges 10000 µm ***+/–.0003; .001; .003; .01; .03;*** ***.1; .3 inch*** or tolerance related	+/–10, 30, 100, 300, 1000, 3000,
Measuring range of inductive probe	4000 (+/– 2000) µm, resolution 0.1 µm (Digital display)
Response time	
- Meas. value memory	0.008 s
- Analog display	0.020 s
- Outputs	0.020 s
Error limits	
- 10 x Analog display	1% (101 LEDs)
- Digital display	± 1 digit
Temperature coefficient	± 0.005% / °C
Oper. temperature range	0°C to 45°C / 32°F to 113°F
Interfaces	
computer, printer (PC-compatible layout)	RS232, 9 pin. male
- Control outputs Outputs, 24 V, 10 mA	3 Optocoupler
- Control inputs Inputs, 24 V, 100 mA	3 Optocoupler
Analog output	Voltage 1V/mm
Power supply	90 ... 264 V, 47 ... 63 Hz
Power consumption	20 VA
Protection class IP43 with conductive dust	IP53
Dimensions (HxWxD) ***(19.173" x 1.850" x 5.669")***	approx. 487 x 47 x 144 mm
Weight	approx. 1.6 kg / 3.53 lbs

Order no.

		Order no.
S 1840 M	Mahr compatible	**5330001**
S 1840 T	Tesa compatible	**5330002**
S 1840 F	Marposs compatible	**5330107**
S 1840 F	Mahr-Federal compatible	**5330107**

Appropriate inductive probes please see pages 7-6 to 7-13 in Mahr Dimensional Metrology Catalog

Accessories

Order no.	
Base Plate, for up to 3 columns	**5330901**
Connection Cable (9 pin D-Sub-jack to D-Sub-jack), length 3 m / 10 ft	**7024634**
Control Unit with 3 push buttons	**5330950**
Foot Switch for Millimar	**5330955**

Millimar C1208 / C1216 Compact amplifier with backlit display

Millimar C1208
Functions
- Favorites: with the SELECT button the most frequently required settings can be directly called up
- Static measurements ± A
- Dynamic measurements: Max, Min, Max-Min, Max+Min, Mean
- Programmable via the integrated key pad or by RS232 interface in conjunction with the MS-Windows Configuration Software

Display
- Background lit LCD-Display with an analog and a two line digital display
- 5 three color status lamps for warning and tolerances limits
- Up to 2 features can be simultaneously displayed

Connections
- RS232 interface
- 3 digital inputs for measuring start, master measurement, send measured values, . . .
- 3 digital outputs for GO, NO GO, rework, measuring time, . . .

Millimar C1216
Features are identical to Millimar C1208, in addition:
- Analog output
- Programmable analog output voltage (max. ±5V)
- Additional resolution from 0.01µm/1µ"

C1208

C1216

Display	Background lit LCD, 4.527" x 2.755" / 115 mm x 70 mm
Analog scale	Pointer, 61 graduations
Range and text display	7 digit LCD, 5 x 7 dot matrix, alpha-numeric
Measured value display	7 digit LCD, 7 segments
Tolerance display	5 LEDs, 3 colors
Displayed ranges	±0.0001, 0.0003, 0.001, 0.003, 0.01, 0.03, 0.1, 0.3 inch ±3, 10, 30, 100, 300, 1000, 3000, 10000 µm also tolerance related
Response time	
- Meas. value memory	0.010s
- Digital display	0.100s
- Analog display	0.100s
- Outputs	0.020s

Error limits	
- 10 x analog display	2% (51 Pixel)
- Digital display	±0.05%
Temperature coefficient	±0.005%/°C
Operating temperature	32° - 122°F / 10 - 40°C0°C to 45°C
Interfaces	
Computer, printer	RS232, 9 pin. male (PC-compatible assignment)
- Control outputs	3 Opto-coupler-outputs, 24V, 10mA 24V, 100mA
- Control inputs	3 Opto-coupler-inputs, 24V, 100mA 24V, 10mA
Analog output (only 1216)	±5V, adjustable sensitivity
Power supply via	
Mains power pack	100V to 264V, 47Hz to 63Hz
Power consumption	10 VA
Protection class	IP53, with conductive dust IP43
Housing dimensions	approx. 8.07" x 6.29" x 6.49"
(H x B x T)	approx. 205 mm x 160 mm x 165 mm
Weight	approx. 4.63 lbs / 2.1 kg

		Order no.
C 1208 M	Mahr-compatible	5312080
C 1208 T	Tesa-compatible	5312081
C 1208 F	Mahr Federal-compatible	5312082
C 1216 M	Mahr-compatible	5312160
C 1216 T	Tesa-compatible	5312161
C 1216 F	Mahr Federal-compatible	5312162

		Order no.
Extension cable (9 pin D-Sub-jack to a D-Sub-socket), length 3 m		7024634
Control Unit with 3 push buttons		5330950
Foot switch for Millimar	for Input 1	5330955
	for Input 2	5330956
	for Input 3	5330957

Millimar C 1245 compact amplifier

C 1245

Display
- Analog indicator instrument for display of measurement values
- Two-line LCD for measuring values and help texts
- 5 three color status lamps for warning and tolerance limits
- Up to 3 features can be simultaneously displayed

Functions
- 16 characteristics can be defined
- With a equation editor (80 characters), input channels C1 to C8 are mathe-matically linked with factors and brackets using the 4 basic arithmetical functions
- Static measurements: current value, square root, arc tangent
- Dynamic measurements: Max, Min, Max-Min, Max+Min, mean,
- Statistical functions: n, x-bar, S, Xmax, Xmin, R
- Programmable either via the in-tegrated keyboard or the RS232 interface by means of MS-Windows configuration software
- Meas. value memory for 5000 meas.
- Measurement Start / Stop

Connections
- 2 input modules can be inserted into base unit
- Following modules are available:
- 4 inputs for Inductive Probes (alter-natively compatible with probes from Mahr, Mahr-Federal, Tesa, Marposs)
- 2 inputs for Incremental Probes
- RS232 interface
- 1 Analog output
- 3 digital inputs for meas. start, master meas. / zeroize, send data
- 6 digital outputs for GO, NO GO, rework, ALL GO, meas. time, 4 classes

Technical Data

Display 53 mm x 40 mm ***(2.087" x 1.585")***	analog indicator instrument, LCD
Analog scale	145 mm x 80 mm ***(5.709" x 3.149")***
Range and Text display	7-point LCD, 5 x 7 dot matrix, alphanumeric
Measured value display	7-point LCD, 7 Segment
Tolerance display	5 LEDs , 3-colors
Display ranges 3000, 10000µm ***+/.0.0003; 0.001; 0.003; 0.01; 0.03; 0.1; 0.3 inch***	+/.10, 30, 100, 300, 1000,
Measuring range of inductive probe	4000 (+/.2000) µm, resolution 0.1µm (measured value display)
Response time	
- Meas. value memory	0.005s
- Digital display	0.300s
- Analog display	0.050s - 0.300s
- Outputs	0.020s
Error limits	
- 10 x Analog display	2 %
- Digital display	±1 digit
Temperature coefficient	± 0.005%/°C
Oper. temperature range	0°C to 50°C / 32°F to 122°F
Interfaces	
computer, printer (PC-compatible layout)	RS232, 9 pin. male
- Control outputs	6 Optocoupler-outputs, 24V, 10mA
- Control inputs	3 Optocoupler-inputs, 24V, 100mA
Analog output, voltage	programmable
Power supply	90V to 264V, 47Hz to 63Hz
Power consumption	11 VA
Protection class	IP53
with conductive dust	IP43
Housing dimensions (H x W x D) approx. ***(8.268" x 6.299" x 6.1032")***	210 mm x 160 mm x 155 mm
Weight approx.	2 kg / 4.40 lbs

Order no.

		0.1µm	0.01µm
C 1245 M	Mahr compatible	**5331250**	**5331256**
C 1245 T	Tesa compatible	**5331251**	**5331257**
C 1245 F	Marposs compatible	**5331253**	
C 1245 F	Mahr-Federal compatible	**5331253**	

Appropriate inductive probes please see pages 7-6 to 7-13

C 1245 I	for probes P1508, P1514, P1526	**5331254**

Accessories

	Order no.
Extension Cable (9 pin D-Sub-jack to D-Sub-jack), length 3 m / 10ft	**7024634**
Control Instrument with 3 push buttons	**5330950**
Foot Switch for Millimar	**5330955**

Worksheet for Ordering Dimentron® Plugs

There are four basic styles of Dimentron Plugs: Through Hole, Blind, Super Blind and Super Super Blind Style. Dimension "B" refers to the dimension of the Contact Centerline to the Nose of the Dimentron Plug. The gaging length dimension is indicated by Dimension "A". There are 4 different range codes to choose from depending on bore tolerance.

Company _____ Contact: _____ Part Number: _____

Phone: _____ Fax: _____ E-mail: _____

Required Information:

Feature Size (bore diameter): _____

Size Tolerance: _____

Plug Style:: ☐Thru ☐Blind ☐Super Blind ☐Super Super Blind

Contact Material: ☐Carbide ☐Chrome

Extra Body Length Required: ☐Yes ☐No

Extra Length:* _____

Quantity: _____

Overall Bore Length:* _____

Display to be used: _____

***Part prints for other than non-standard plugs are required.**

Options for Dimentron Plugs

Stop Collar: ☐Yes ☐No

O.D. Restrictions: _____

Special Plug Markings: _____

ISO Long Form Certification of Air Plug Required: ☐Yes ☐No

Handle Required: _____

Master Required: ☐Yes ☐No

Nominal: ☐Yes ☐No

Technical Assistance at Mahr Federal: Phone: 401-784-3100; Fax: 401-784-3246
E-mail: information@mahr.com

Indicating Plug Gages 844 D

Features

- For the rapid testing of diameter, roundness and conicity of bores
- Especially suitable for testing batches with tight tolerances
- No rocking in the bore is required to determine the reversal point
- Therefore ideal for use in conjunction with a digital indicating instrument and for subsequent processing of measured values
- Measuring head has a hardened, hard chromium-plated guide cylinder and carbide-tipped anvils
- The carbide expanding pin transfers radial movement to indicating instrument
- Constant measuring force as a result of built-in spring, thus eliminating user influence
- Measuring head, holder, depth extension, right angle attachments and depth stops are part of an extensive modular system

Technical Data of the Measuring Heads

Nominal diameter of the bore measured 844 Dk/844Dkr	Measuring range starting from the minimum bore dimension to be 844 Dks (from 4 mm)	
2,98 - 8 mm	= - 0,02+ 0,1 mm	= - 0,02 + 0,1 mm
over 8 - 16 mm	= - 0,02+ 0,15 mm	= - 0,02 + 0,15 mm
over 16 - 32 mm	= - 0,02+ 0,2 mm	= - 0,02 + 0,15 mm
over 32 - 70 mm	= - 0,03+ 0,2 mm	= - 0,03 + 0,15 mm
over 70 - 200 mm	= - 0,04+ 0,2 mm	= - 0,04 + 0,15 mm

When placing an order please quote the nominal diameter and tolerances, for example:

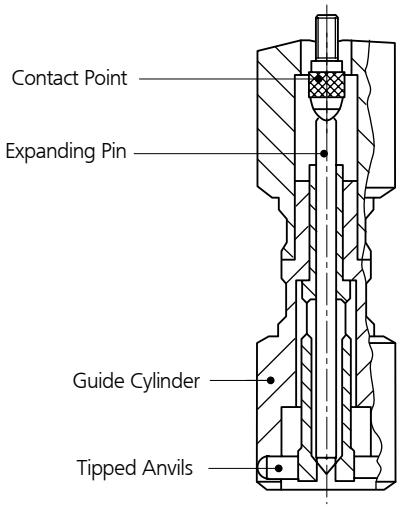
Bore diameter	Tolerance	
35 D7	+ 80	+105 µm
35 H7	+ 0	+25 µm
35 R7	- 50	-25 µm

The diameter of the guide cylinder is produced between 0.02 and 0.07 mm smaller than the minimum dimension of the bore to be checked.

Example:
Plug Gage 844 Dk for bore 35 D7
Nominal diameter: 35 mm
Minimum dimension: 35.080 mm
Maximum dimension: 35.105 mm
Meas. range: 35.050 - 35.280 mm

Accuracy

Hystersis	≤ 0.4 µm
Repeatability	≤ 1 µm
Linearity	≤ 1 %
Linearity 844 Dks >16 mm	≤ 2 %



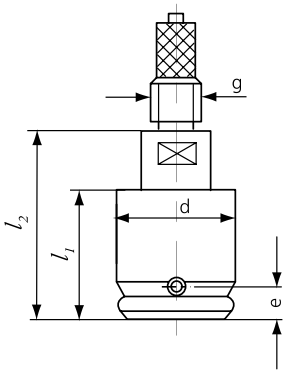
Plug Gages

Measuring Head 844 Dk

Standard version

Diameter d mm			Diameter d *inch*		l_1	Dimensions l_2 mm	e	Connection thread g
	2.98	- 8	***.12***	***.3"***	23	31	1.5	M6 x 0.75*
over	8	- 16	***.3***	***.6"***	25	33.5	3	M6 x 0.75
over	16	- 32	***.6***	***1.26"***	26	39	3.5	M10 x 1
over	32	- 44	***1.26***	***1.73"***	26	39	3.5	M10 x 1
over	44	- 70	***1.73***	***2.75"***	26	39	4	M10 x 1
over	70	- 200	***2.75***	***8"***	33	39	4	M10 x 1

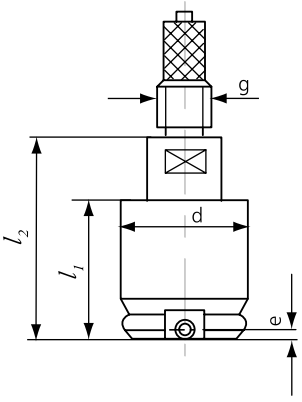
** With an Adapter for connection to the Holder*



Measuring Head 844 Dks

For the measurement of blind holes.

Diameter d mm			Diameter d *inch*		l_1	Dimensions l_2 mm	e	Connection thread g
	4	- 8	***.16***	***.3"***	23	31	0.6	M6 x 0.75*
over	8	- 16	***.3***	***.6"***	25	33.5	0.6	M6 x 0.75
over	16	- 32	***.6***	***1.26"***	26	39	1	M10 x 1
over	32	- 44	***1.26***	***1.73"***	26	39	1	M10 x 1
over	44	- 70	***1.73***	***2.75"***	26	39	1	M10 x 1
over	70	- 150	***2.75***	***6"***	33	39	1	M10 x 1

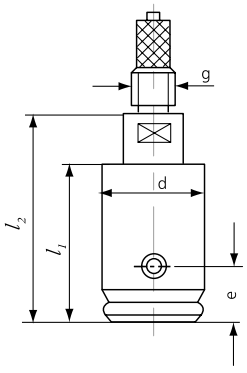


Measuring Head 844 Dkr

With an extended guide cylinder for the measurement of through holes from the edge of the bore. These are particularly suitable for narrow parts.

Diameter d mm			Diameter d *inch*		l_1	Dimensions l_2 mm	e	Connection thread g
	2.98	- 8	***.12***	***.3"***	28	36	6	M6 x 0.75*
over	8	- 16	***.3***	***.6"***	31	40	9	M6 x 0.75
over	16	- 32	***.6***	***1.26"***	32	45	9.5	M10 x 1
over	32	- 44	***1.26***	***1.73"***	32	45	9.5	M10 x 1
over	44	- 70	***1.73***	***2.75"***	26	46.5	10.5	M10 x 1
over	70	- 200	***2.75***	***8"***	33	51	15	M10 x 1

** With an Adapter for connection to the Holder*



Measuring Heads for Special Applications

Available for example with 3 anvils for concentricity and polygon tests, with flat anvils for plane-parallel surfaces, with anvils made of plastic, ruby, ceramic or diamond for particular material characteristics.

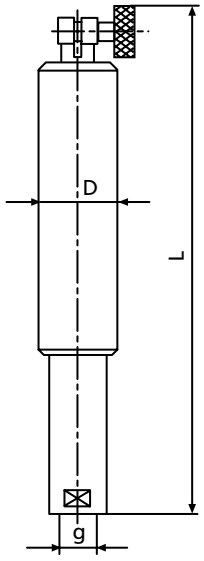
Modular Unit System 844 D

Standard Holder 844 Kg/844 Dg

With locking clamp for an indicating instrument and a connecting thread for a measuring head. Heat insulated handle. The model 844 Dg is made from **Invar steel.**

Cat. no. thread g	Connecting mm/*inch*	Length L mm/*inch*	Handle dia. D	Order no.
844 Kg	M6 x 0.75	50/ ***1.98"***	14/ ***.55"***	**4470851**
844 Dg	M10 x 1	150/ ***6"***	26/ ***1"***	**4478851**

844 Kg / 844 Dg

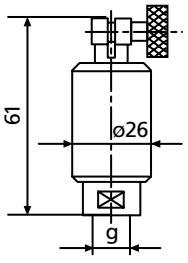


Short Holder 844 Dgk

With locking clamp for an indicating instrument and a connecting thread for a measuring head. Heat insulated handle.

Cat. no. thread g	Connecting mm/*inch*	Length L mm/*inch*	Handle dia. D	Order no.
844 Dgk	M10 x 1	61/ ***2.4"***	26/ ***1"***	**4478050**

844 Dgk

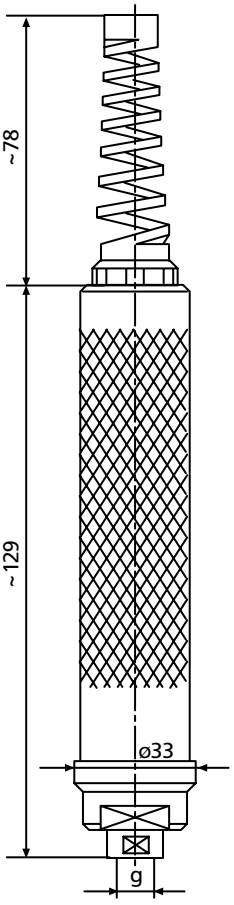


Holder 844 Dge for Inductive Measuring Probes

With long sleeve for shock and waterproof mounting of inductive measuring probes. Strain relief clamp for probe cable. Threaded connection for measuring heads. Heat insulated handle.

Cat. no. thread g	Connecting mm/*inch*	Length L mm/*inch*	Handle dia. D	Order no.
844 Dge	M6 x 0.75	195/ ***7.7"***	33/ ***1.3"***	**4478020**
M10 x 1	195/ ***7.7"***	33/ ***1.3"***	**4478021**	

844 Dge

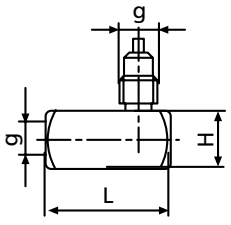


Right Angle (Elbow) Attachment

For measuring difficult to reach bores, e.g. in tight spaces, on a machine tool or when work piece bores are inconveniently located. For screwing in between holder and measuring head.

Cat. no. thread g mm	Connecting Length L mm/*inch*	Elbow Height H mm/*inch*		Order no.
844 Kw	M6 x 0.75	26.5/ ***1.04"***	22.5/ ***.89"***	**4470110**
844 Dw	M10 x 1	36.7/ ***1.44"***	17/ ***.67"***	**4478110**

844 Kw / 844 Dw



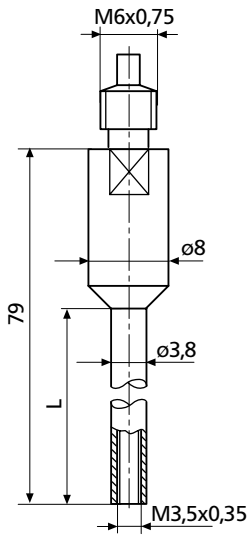
Modular System 844 D

Extensions

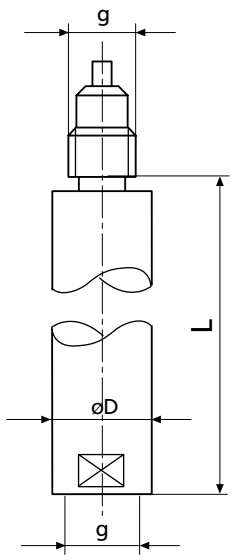
For extra-deep bores. Screws in between holder and measuring heads. Several extensions can be screwed together as of 8 mm. Models 844 Dv and 844 Dvk made of **Invar steel.**

Cat. no. thread g	Connecting mm/*inch*	Length L mm/*inch*	dia. D	Order no.
844 Dvk	M6x0.75/M3.5x0.35	64/***2.5"***	3.8/***.15"***	**4478080**
844 Kv	M6 x 0.75	64/***2.5"***	8/***.32"***	**4470070**
844 Dv	M10 x 1	64/***2.5"***	15/***.6"***	**4478070**
844 Dv	M10 x 1	80/***3"***	15/***.6"***	**4478071**
844 Dv	M10 x 1	100/***4"***	15/***.6"***	**4478072**
844 Dv	M10 x 1	125/***5"***	15/***.6"***	**4478073**
844 Dv	M10 x 1	250/***10"***	15/***.6"***	**4478074**
844 Dv	M10 x 1	500/***20"***	15/***.6"***	**4478075**
844 Dv	M10 x 1	750/***30"***	15/***.6"***	**4478076**

844 Dvk



844 Kv / 844 Dv

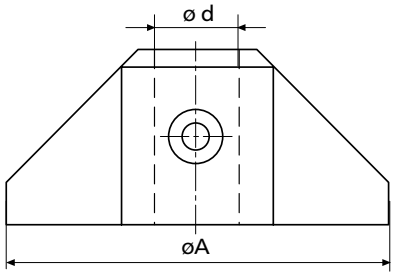


Depth Stops

For limiting depth of insertion of measuring head in bore. Can be attached to Extensions 844 Kv or 844 Dv. With clamping screw.

Cat. no. dia. d mm/*inch*	Mounting hole dia. A mm/*inch*	Stop surface	Order no.
844 Kt	8/ ***.32"***	25/ ***1"***	**4470115**
844 Dt	15/ ***.6"***	45/ ***1.8"***	**4478115**
844 Dt	15/ ***.6"***	75/ ***3"***	**4478116**
844 Dt	15/ ***.6"***	110/ ***4.3"***	**4478117**
844 Dt	15/ ***.6"***	160/ ***6.3"***	**4478118**
844 Dt	15/ ***.6"***	220/ ***8.6"***	**4478119**

844 Kt / 844 Dt

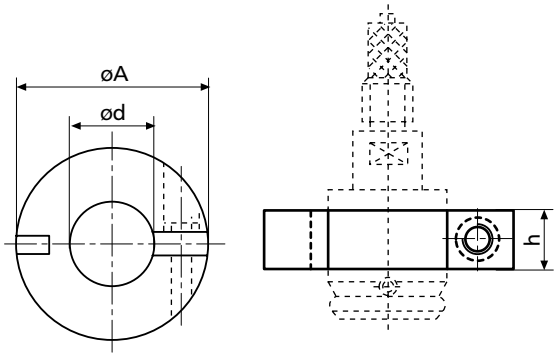


Depth Stop Rings

For limiting depth of insertion of measuring head in bore. Clamped onto the measuring head.

Cat. no. dia. d mm	Mounting hole **surface** dia. A mm/*inch*	Stop h mm/*inch*	Height	Order no.
844 Dtr	3 - 5	27/ ***1.1"***	10/ ***.4"***	**4478130**
5	- 830/ ***1.2"***	10/ ***.4"***	**4478130**	
8	-1133/ ***1.3"***	10/ ***.4"***	**4478130**	
11	-1537/ ***1.5"***	10/ ***.4"***	**4478130**	
15	-2042/ ***1.7"***	10/ ***.4"***	**4478130**	
20	-2551/ ***2.0"***	12/ ***.5"***	**4478131**	
25	-3056/ ***2.2"***	12/ ***.5"***	**4478131**	
30	-3561/ ***2.4"***	12/ ***.5"***	**4478131**	
35	-4066/ ***2.6"***	12/ ***.5"***	**4478131**	
40	-4471/ ***2.8"***	12/ ***.5"***	**4478131**	
44	-5076/ ***2.9"***	12/ ***.5"***	**4478132**	
50	-6086/ ***3.4"***	12/ ***.5"***	**4478132**	
60	-7096/ ***3.8"***	12/ ***.5"***	**4478132**	
70	-80106/ ***4.1"***	12/ ***.5"***	**4478132**	
80	-90116/ ***4.6"***	12/ ***.5"***	**4478133**	
90	-100126/ ***4.9"***	12/ ***.5"***	**4478133**	

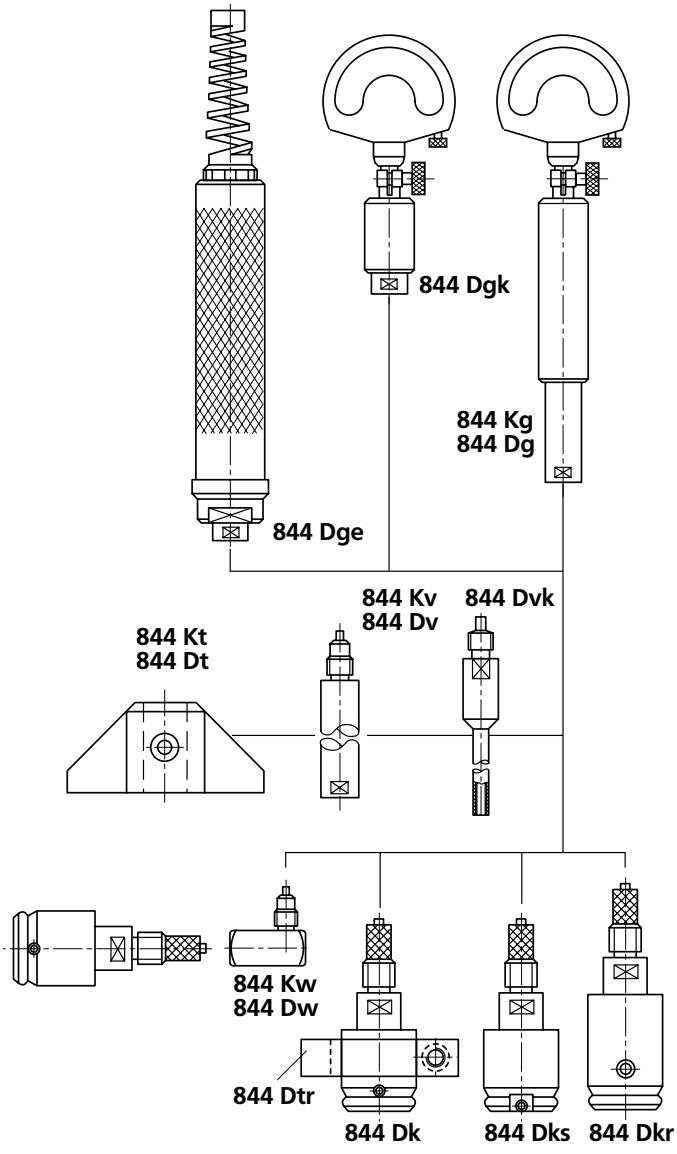
844 Dtr



Indicating Plug Gages 844 D

Modular Units	Diameter of Measuring Heads 2.98 - 8 mm *(.16 - .3")*	8 - 16 mm *(.3" - .6")*	over 16 mm *(over .6")*
844 Kg	4470851		
844 Dg			4478851
844 Dgk			4478050
844 Dge	4478020		4478021
844 Dvk 844 Kv 844 Dv	4478080	4470070	4478070 to 4478076
844 Kt 844 Dt		4470115	4478115 to 4478119
844 Kw 844 Dw	4470110		4478110
844 Dk 844 Dks 844 Dkr			

Modular Unit	Diameter of Measuring Heads 2,98 - 20 *(.16-.787")*	20 - 44 *(.787-1.72")*	44 - 80 *(1.72-3.15")*	80 - 100 *(3.15-3.94")*
844 Dtr	4478130	4478131	4478132	4478133



Indicating Instruments

All indicating instruments that have a 8 mm mounting shank may be used. Recommended are:

Dial Comparator	mm / *inch*	Readings mm / *inch*	Order no.
Compramess	1004 / *1004 Z*	5 µm/ *.0001"*	4333000/*4333900*
Millimess	1003 / *1003 Z*	1 µm/ *.00005"*	4334000/*4334900*
Supramess	1002 / *1002 Z*	0.5 µm/ *.00002"*	4335000/*4335900*
Extramess	2000	0.2 µm/ *.00001"*	
	0.5 µm/	*.00002"*	4346000*
	1 µm/	*.00005"*	
Extramess	2001	0.2 µm/ *.00001"*	
	0.5 µm/	*.00002"*	4346100*
	1 µm/	*.00005"*	
µMaxµm		0.5 µm/ *.00002"*	EDI-20302**

Digital Indicators see Chapter 5
Electrical Indicating Instruments see Chapter 7
** 230 V, for 115 V please refer to page 6-5 ** requires contact 4360107*

Adjustment of Plug Gages 844 D

Ring Gage 355 E:
Special wear-resistant gage steel. Hardened and lapped. With actual deviation engraved.

Dimensions: DIN 2250, type C
Manufacturing tolerance: DIN 2250
Available diameters: 0.5-200 mm

Self Centering Dial Bore Gages 844 K Intramess

Features

- Measuring the diameter, roundness and conicity of bores
- Spring-loaded halves of measuring probe are split via expanding pin with precision-lapped taper. This movement is transferred to indicating instrument
- Maximum wear-resistance due to hard chrome plating. From 4 mm alternatively with carbide tipped available on request
- Constant measuring force as a result of built-in spring thus eliminating user influence
- Highly versatile, each gage covers a large range. Within the respective limits, quickly and easily adjustable to any size and any type of measuring application
- Measuring probe, holder, depth extensions, right-angle attachments and depth stops are part of an extensive modular system

Technical Data

Complete Instrument

844 K Measuring heads hard chrome plated, expanding pin made of stainless steel

844 KH Measuring heads carbide tipped on both sides, carbide expanding pin

844 KS Blind hole measuring heads hard chrome plated, expanding pin made of stainless steel

Catalog no.	Measuring range of meas. mm	*(inch)*	Number of probes	Order no.*
844 K	0.47 - 0.97	***(.018 - .038")***	6	**4470000**
0.95 - 1.55		***(.037 - .060")***	5	**4470001**
1.5 - 4.2		***(.060 - .160")***	10	**4470002**
3.7 - 7.3		***(.145 - .29")***	7	**4470003****
6.7 - 10.3		***(.26 - .40")***	7	**4470004****
9.4 - 18.6		***(.37 - .73")***	9	**4470005****
844 KH	1.5 - 4.2	***(.060 - .160")***	10	**4471002**
3.7 - 7.3		***(.145 - .29")***	7	**4471003****
6.7 - 10.3		***(.26 - .40")***	7	**4471004****
9.4 - 18.6		***(.37 - .73")***	9	**4471005****
844 KS	1.5 - 4.2	***(.060 - .160")***	10	**4482163**
3.7 - 7.3		***(.145 - .29")***	7	**4482164****
6.7 - 10.3		***(.26 - .40")***	7	**4482165****
9.4 - 18.6		***(.37 - .73")***	9	**4482166****

* *Includes holder, measuring probe, expanding pin and wooden case, but not indicating instrument*

** *Additionally includes measuring force spring 4470828 and disk 4470821*

Accuracy

Deviation of linearity
≤ 2 % measuring ranges 0.47-1.55 mm
≤ 1 % measuring ranges 1.5-18.6 mm

Repeatability
1 µmmanual measurement
≤ 0.5 µm measurement with Stand 844 Kst and Floating Holder 844 Ksts

Indicating Instruments

All indicating instruments that has a 8 mm mounting shank may be used. Recommended are:

Dial Comparator	mm / *inch*	Readings mm / *inch*		Order no.
Comprames	**1004 / *1004 Z***	5 µm/	***.0001"***	**4333000/*4333900***
Millimess	**1003 / *1003 Z***	1 µm/	***.00005"***	**4334000/*4334900***
Millimess	**1003 XL**	2 µm		**4334001**
Supramess	**1002 / *1002 Z***	0.5 µm/	***.00002"***	**4335000/*4335900***
Extramess	**2000**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346000***
		1 µm/	***.00005"***	
Extramess	**2001**	0.2 µm/	***.00001"***	
		0.5 µm/	***.00002"***	**4346100***
		1 µm/	***.00005"***	
µMaxµm		0.5 µm/	***.00002"***	**EDI-20302****

Digital Indicators see Chapter 5 in Mahr Dimensional Metrology Catalog
Electrical Indicating Instruments see Chapter 7 Mahr Dimensional Metrology Catalog

* *230 V, for 115 V please refer to page 6-5*

** *Requires contact 4360107*

Modular System Unit For 844 K Standard Measuring Probes

In addition to complete Dial Bore Gages 844 K, modular units can also be compiled as required to suit a individual measuring task and or application.

Measuring Probe 844 Kk, Expander Pin, individual Ring Gage for 844 Ke

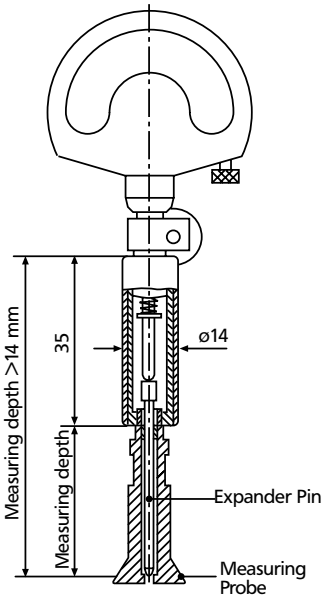
Nominal dimension mm	Measuring range mm	Measuring depth mm	Measuring probe hard chrome plated	Expanding pin steel	Measuring probe carbide tipped	Expander pin carbide	Ring gage
0.50	0.47 - 0.53	1.25	4470586	4470801			4482300
0.55	0.52 - 0.58	1.5	4470587				4482301
0.60	0.57 - 0.67	1.7	4470588				4482302
0.70	0.65 - 0.77	2.2	4470589	4470802			4482303
0.80	0.75 - 0.87	2.55	4470590				4482304
0.90	0.85 - 0.97	2.65	4470591				4482305
1.00	0.95 - 1.15	10.5	4470592				4482306
1.10	1.07 - 1.25	10.5	4470593				4482307
1.20	1.17 - 1.35	10.5	4470594	4470803			4482308
1.30	1.27 - 1.45	10.5	4470595				4482309
1.40	1.37 - 1.55	10.5	4470596				4482310
1.75	1.50 - 1.90	16	4470597		4471234		4482311
2.00	1.80 - 2.20	16	4470598	4470804	4471206	4471207	4482312
2.25	2.05 - 2.45	16	4470599		4471812		4482313
2.50	2.30 - 2.70	21	4470600		4471813		4482314
2.75	2.55 - 2.95	21	4470601		4471814		4482315
3.00	2.80 - 3.20	21	4470602		4471208		4482316
3.25	3.05 - 3.45	21	4470603	4470805	4471815	4471819	4482317
3.50	3.30 - 3.70	21	4470604		4471816		4482318
3.75	3.55 - 3.95	21	4470605		4471817		4482319
4.00	3.80 - 4.20	21	4470606		4471204		4482320
4.00	3.70 - 4.30	38	4470607		4471607		4482320
4.50	4.20 - 4.80	38	4470608		4471608		4482321
5.00	4.70 - 5.30	38	4470609		4471609		4482322
5.50	5.20 - 5.80	38	4470610		4471610		4482323
6.00	5.70 - 6.30	38	4470611		4471611		4482324
6.50	6.20 - 6.80	38	4470612		4471612		4482325
7.00	6.70 - 7.30	38	4470613	4470806	4471613	4471200	4482326
7.50	7.20 - 7.80	38	4470615		4471615		4482327
8.00	7.70 - 8.30	38	4470616		4471616		4482328
8.50	8.20 - 8.80	45	4470617		4471617		4482329
9.00	8.70 - 9.30	45	4470618		4471618		4482330
9.50	9.20 - 9.80	45	4470619		4471619		4482331
10.00	9.70 - 10.30	45	4470620		4471620		4482332
10.00	9.40 - 10.60	45	4470621		4471621		4482332
11.00	10.40 - 11.60	45	4470622		4471622		4482333
12.00	11.40 - 12.60	45	4470623		4471623		4482334
13.00	12.40 - 13.60	45	4470624		4471624		4482335
14.00	13.40 - 14.60	45	4470625	4470808	4471625	4471202	4482336
15.00	14.40 - 15.60	45	4470626		4471626		4482337
16.00	15.40 - 16.60	80	4470627		4471627		4482338
17.00	16.40 - 17.60	80	4470628		4471628		4482339
18.00	17.40 - 18.60	80	4470629		4471629		4482340

Modular System Unit For 844 K Blind Hole Measuring Probes

In addition to complete Dial Bore Gages 844 KS, modular units are available for assembly as required to suit an individual measuring task and or application.

Blind Hole Measuring Probe 844 Kk, Blind Hole Expander Pin

Nominal dimension mm	Measuring range mm	Measuring depth mm	Blind hole measuring probe hard chrome plated	Blind hole expander pin steel
1.751.50	- 1.90	16 **4482228**		
2.001.80	- 2.20	16 **4482229**	**4482176**	
2.252.05	- 2.45	16 **4482230**		
2.502.30	- 2.70	21 **4482301**		
2.752.55	- 2.95	21 **4482227**		
3.002.80	- 3.20	21 **4482178**		
3.253.05	- 3.45	21 **4482179**	**4482177**	
3.503.30	- 3.70	21 **4470300**		
3.753.55	- 3.95	21 **4482188**		
4.003.80	- 4.20	21 **4482180**		
4.003.70	- 4.30	38 **4482057**		
4.504.20	- 4.80	38 **4482162**		
5.004.70	- 5.30	38 **4482056**		
5.505.20	- 5.80	38 **4470953**		
6.005.70	- 6.30	38 **4482140**		
6.506.20	- 6.80	38 **4482055**		
7.006.70	- 7.30	38 **4482108**	**4482028**	
7.507.20	- 7.80	38 **4482204**		
8.007.70	- 8.30	38 **4482054**		
8.508.20	- 8.80	45 **4482206**		
9.008.70	- 9.30	45 **4482170**		
9.509.20	- 9.80	45 **4482182**		
10.009.70	- 10.30	45 **4470375**		
10.009.40	- 10.60	45 **4482205**		
11.0010.40	- 11.60	45 **4482042**		
12.0011.40	- 12.60	45 **4482112**		
13.0012.40	- 13.60	45 **4482102**		
14.0013.40	- 14.60	45 **4482181**	**4482192**	
15.0014.40	- 15.60	45 **4482202**		
16.0015.40	- 16.60	80 **4482021**		
17.0016.40	- 17.60	80 **4482203**		
18.0017.40	- 18.60	80 **4482113**		



844 Kk

Ring Gage Sets 844 Ke

For setting Dial Bore Gages 844 K, 844 KH and 844 KS. Supplied in sets to match the measuring ranges of these instruments. Can be stored in wooden case of bore gages.

Diameter tolerance ± 1 µm

Ring Gages 844 Ke are only available with the diameters given in the table on the right.
For all other dimensions use must be made of Ring Gages 355 E with dimensions as per DIN 2250 and with actual deviation engraved.

For Meas. range mm	Diameter mm	Order no.
0.47 - 0.97	0.5/0.55/0.6/0.7/0.8/0.9	**4470160**
0.95 - 1.55	1/1.1/1.2/1.3/1.4	**4470161**
1.5 - 4.2	1.75/2/2.25/2.5/2.75/ 3/3.25/3.5/3.75/4	**4470162**
3.7 - 7.3	4/4.5/5/5.5/6/6.5/7	**4470163**
6.7 - 10.3	7/7.5/8/8.5/9/9.5/10	**4470164**
9.4 - 18.6	10/11/12/13/14/15/ 16/17/18	**4470165**

Modular Unit System for 844 K

Holder 844 Kg
With locking clamp for an indicating instrument and a connecting thread for a **measuring head 844 Kk.** Heat insulated handle

Order no. 4470851

Extensions 844 Kv
For extra-deep bores. Screws in between Holder 844 Kg and Measuring head 844 Kk for measuring range 10-18 mm. Length 64 mm, ø 8 mm,

Order no. 4470070

Right Angle Attachment 844 Kw
For measuring bores which are difficult to reach, e.g. in tight spaces, on machine tools or when work piece bores are inconveniently located. For screwing in between Holder 844 Kg and Measuring Head 844 Kk

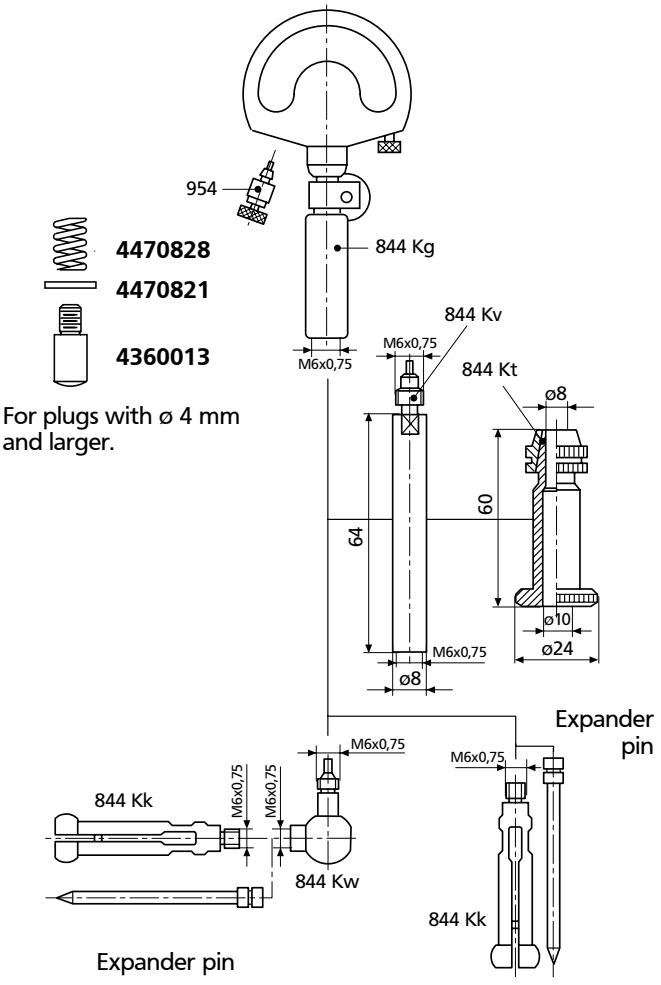
Order no. 4470110

Lifter 954
Facilitates insertion of measuring probe in bore by lifting measuring spindle of dial comparator.

Order no. 4372030

Depth Stop 844 Kt
For checking diameter of bores at prescribed depth. Only to be used with Extension 844 Kv.

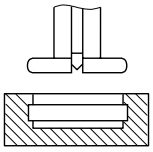
Order no. 4470115



Measuring Probes for Special Applications

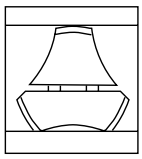
For measurement of blind holes, diameters of recesses, distances between plane-parallel surfaces, etc. special models of measuring probes are available on request.

1. Measurement of the diameter of recesses*

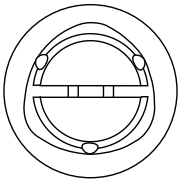


* *Requires holder 4471196*

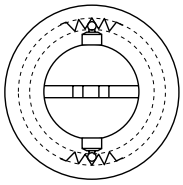
2. Measurement of plane-parallel surfaces



3. Measurement of polygon bores



4. Measurement of inside serrations, see 844 Z Page 9-60



Accessories

Stand 844 Kst

Features

For quick checks of bores in small work pieces. Hardened table plate can be raised with lever, thus moving test piece into position. Plate can be clamped at any height for checking eccentricity. Particularly suited to use with digital indicators, where appropriate in conjunction with data printers or computer equipment, in cases where determination of reversal point is inappropriate.

Table dia.	58 mm /***2.28"***
Throat depth of arm	45 mm / ***1.77"***
Table stroke	30 mm / ***1.18"***
Max. work piece height	approx. 100 mm / ***4"***

Order no. **4470100**

Angle Stop 844 Ka

Facilitates positioning of cylindrical work pieces under measuring instrument. For clamping to Stand 844 Kst.

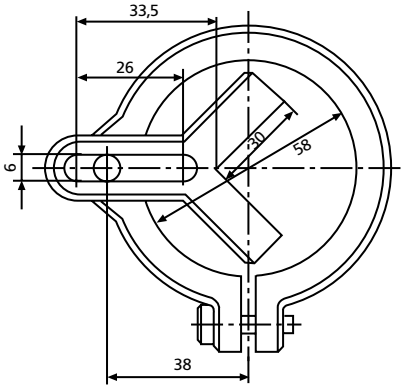
Order no. **4470120**

Floating Holder 844 Ksts

Features

For use in conjunction with Stand 844 Kst. Enables measuring probe to find common axis of bore and measuring instrument quickly and easily on insertion into hole, thus providing optimum measuring speed and high accuracy. Particularly suitable for small diameters, as measuring confidence is considerably enhanced.

Order no. **4470105**



Dimentron® Plug Gages

AGD Master Setting Rings, Discs, and Plugs

Master Rings

- Traceable certification and calibration available on request.
- Lapped to size and polished.
- Non-gaging areas black oxidized – ring faces ground.
- Meet all requirements of ANSI Specification B47.1-1988.
- Manufactured in accordance with ANSI Specification B89.1.6-1984.

Master Plugs

- Traceable certification and calibration available on request.
- Stabilized and hardened.
- 100% usable grinding surface.
- Ends ground square.
- Lapped finish.

Master Discs AGD Style 3

- Traceable certification and calibration available on request.
- Lapped to size and polished.
- Non-gaging areas black oxidized – ring faces ground.
- Meet all requirements of ANSI Specification B47.1-1988.
- Manufactured in accordance with ANSI Specification B89.1.5.
- Furnished with clear insulators.
- All dimensions are AGD style 3.

Classes and Tolerances

Size Range of Work (mm/inch)		Tolerance of Master		
To and Above	Including	Class XXX	Class XX	Class X
2.67/ ***.105"***	20.96/ ***.825"***	.00025/ ***.00001"***	.00051/ ***.00002"***	.00102/ ***.00004"***
20.96/ ***.825"***	38.35/ ***1.510"***	.00038/ ***.000015"***	.00076/ ***.00003"***	.00152/ ***.00006"***
38.45/ ***1.510"***	63.75/ ***2.510"***		.00102/ ***.00004"***	.00203/ ***.00008"***
63.75/ ***2.510"***	114.55/ ***4.510"***		.00127/ ***.00005"***	.00254/ ***.00010"***
114.55/ ***4.510"***	165.35/ ***6.510"***		.00165/ ***.000065"***	.00330/ ***.00013"***
165.35/ ***6.510"***	216.15/ ***8.510"***		.00203/ ***.00008"***	.00406/ ***.00016"***

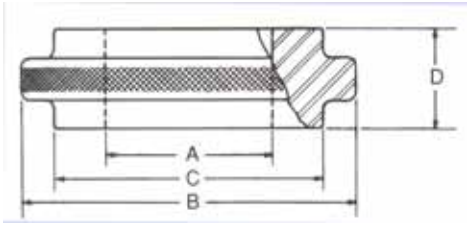
Master plugs and discs are furnished in hardened steel, either plain or chrome plated. They are made in Class XX and X for Air Gage applications. Discs are also available in Class Y.

Tolerances are divoded equaly plus and minus from the required size unless otherwise specified. Plug and disc certification supplied on request.

If Air Rings 1.5" and smaller are equipped with guide chutes, A.G.D. style 3 Discs are required.

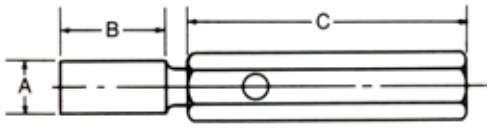
Dimentron® Plug Gages

Master Setting Rings



(mm/inch)			
"A"	**"B"**	**"C"**	**"D"**
1.52 - 3.8/ *.060 - .150"*	23.83/ *.938"*		6.35/ *.250"*
3.8 - 5.84/ *.150 - .230"*	23.83/ *.938"*		9.53/ *.375"*
5.84 - 9.27/ *.230 - .365"*	31.75/ *1.25"*		14.3/ *.563"*
9.27 - 12.95/ *.365 - .510"*	34.93/ *1.375"*		19.05/ *.750"*
12.95 - 20.95/ *.510 - .825"*	44.45/ *1.750"*		23.83/ *.938"*
20/95 - 28.83/ *.825 - 1.135"*	53.98/ *2.125"*		28.58/ *1.125"*
28.83 - 38.35/ *1.135 - 1.510"*	63.5/ *2.500"*		33.35/ *1.313"*
38.35 - 51.05/ *1.510 - 2.010"*	102/ *4"*	73.0/ *2.875"*	38.1/ *1.5"*
51.05 - 63.75/ *2.010 - 2.510"*	114.3/ *4.500"*	85.7/ *3.375"*	38.1/ *1.5"*
63.75 - 76.45/ *2.510 - 3.010"*	127/ *5"*	101.6/ *4.000"*	38.1/ *1.5"*
76.45 - 89.15/ *3.010 - 3.510"*	139.7/ *5.500"*	114.3/ *4.500"*	38.1/ *1.5"*
89.15 - 101.85/ *3.510 - 4.010"*	161.93/ *6.375"*	130.2/ *5.125"*	38.1/ *1.5"*
101.85 - 120.9/ *4.010 - 4.760"*	181.15/ *7.250"*	149.2/ *5.875"*	38.1/ *1.5"*
120.9 - 139.95/ *4.760 - 5.510"*	209.5/ *8.250"*	168.3/ *6.625"*	38.1/ *1.5"*
139.95 - 159/ *5.510 - 6.260"*	234/ *9.250"*	187.3/ *7.375"*	38.1/ *1.5"*
159 - 178.05/ *6.260 - 7.010"*	260.35/ *10.250"*	206.4/ *8.125"*	38.1/ *1.5"*
178.05 - 197.1/ *7.010 - 7.760"*	285.75/ *11.250"*	225.4/ *8.875"*	38.1/ *1.5"*
197.1 - 216.15/ *7.760 - 8.510"*	311.15/ *12.250"*	244.5/ *9.625"*	38.1/ *1.5"*

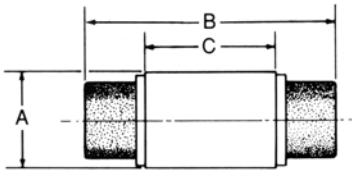
Master Setting Plugs



"A"	**"B"**	**"C"**
6.3 - 9.3/ *.248 - .365"*	19.05/ *.750"*	69.85/ *2.750"*
9.3 - 13.0/ *.365 - .510"*	25.4/ *1.0"*	76.2/ *3.0"*
13.0 - 21.0/ *510 - .825"*	31.75/ *1.25"*	82.55/ *3.25"*
21.0 - 28.8/ *.825 - 1.135"*	34.93/ *1.375"*	92.08/ *3.625"*
28.8 - 38.4/ *1.135 - 1.510"*	38.1/ *1.500"*	102/ *4"*
38.4 - 51.1/ *1.510 - 2.010"*	47.63/ *1.875"*	127/ *5"*
51.1 - 63.8/ *2.010 - 2.510"*	50.8/ *2.0"*	127/ *5"*
63.8 - 76.5/ *2.510 - 3.010"*	53.98/ *2.125"*	152.4/ *6"*

Indicating Plug Gages 844 D

Master Setting Discs



(mm/inch)		
"A"	**"B"**	**"C"**
3.8 - 6.1/ ***.150 - .240"***	41.28/ ***1.625"***	11.25/ ***.438"***
6.1 - 9.3/ ***.240 - .365"***	42.88/ ***1.688"***	12.70/ ***.500"***
9.3 - 13.0/ ***.365 - .510"***	47.63/ ***1.875"***	14.30/ ***.563"***
13.0 - 21.0/ ***.510 - .825"***	49.23/ ***1.938"***	15.88/ ***.625"***
21.0 - 28.8/ ***.825 - 1.135"***	57.15/ ***2.250"***	17.48/ ***.688"***
28.8 - 38.4/ ***1.135 - 1.510"***	60.33/ ***2.375"***	22.17/ ***.813"***
38.4 - 51.1/ ***1.150 - 2.010"***	60.33/ ***2.375"***	22.23/ ***.875"***
51.1 - 63.8/ ***2.010 - 2.510"***	60.33/ ***2.375"***	22.23/ ***.875"***
63.8 - 76.5/ ***2.510 - 3.010"***	85.73/ ***3.375"***	25.40/ ***1"***
76.5 - 89.2/ ***3.010 - 3.510"***	85.73/ ***3.375"***	25.40/ ***1"***
89.2 - 101.9/ ***3.510 - 4.010"***	85.73/ ***3.375"***	25.40/ ***1"***
101.9 - 114.3/ ***4.010 - 4.510"***	85.73/ ***3.375"***	25.40/ ***1"***
114.3 - 120.9/ ***4.510 - 4.760"***	85.73/ ***3.375"***	25.40/ ***1"***
120.9 - 127.3/ ***4.760 - 5.510"***	85.73/ ***3.375"***	25.40/ ***1"***
127.3 - 133.6/ ***5.510 - 5.260"***	85.73/ ***3.375"***	25.40/ ***1"***
133.6 - 140.0/ ***5.260 - 5.510"***	85.73/ ***3.375"***	25.40/ ***1"***
140.0 - 146.3/ ***5.510 - 5.760"***	85.73/ ***3.375"***	25.40/ ***1"***
146.3 - 152.7/ ***5.760 -6.010"***	85.73/ ***3.375"***	25.40/ ***1"***
152.7 - 159.0/ ***6.010 - 6.260"***	85.73/ ***3.375"***	25.40/ ***1"***
159.0 - 165.4/ ***6.260 - 6.510"***	85.73/ ***3.375"***	25.40/ ***1"***
165.4 - 171.7/ ***6.510 - 6.760"***	85.73/ ***3.375"***	25.40/ ***1"***
171.7 - 178.1/ ***6.760 - 7.010"***	85.73/ ***3.375"***	25.40/ ***1"***
178.1 - 184.4/ ***7.010 - 7.260"***	85.73/ ***3.375"***	25.40/ ***1"***
184.4 - 190.8/ ***7.260 - 7.510"***	85.73/ ***3.375"***	25.40/ ***1"***
190.8 - 197.1/ ***7.510 - 7.760"***	85.73/ ***3.375"***	25.40/ ***1"***
197.1 - 203.5/ ***7.760 - 8.010"***	85.73/ ***3.375"***	25.40/ ***1"***

Custom Part Masters

Custom Part Masters are used as a standard for many Engineered Gage Solutions. Almost every dedicated variable gage in use has at least one custom master associated with it. Typically these masters are used on shop floor inspection equipment as artifacts that reference the equipment. Some common examples include rotors, connecting rods, pistons, special tapers, cylinder liners, hydraulic and pump housings.

All masters are made of tool steel, hardened and double stabilized. Chrome plate is also available. In cases where the gage might be used in a corrosive environment, 440-C Stainless Steel may be used. Certain tight manufacturing tolerance applications may need min., mean and max. condition masters for greater accuracy when setting the gage fixture.

Our technical services department will be pleased to review your custom master needs.

Indicating Plug Gages 844 D

Master Rings for Calibration of Air and Dimentron Plugs

Requirement: (1) Nominal sized master or,
(optionally) (1) Minimum and (1) Maximum Deviation Master

Single (zeroing) Master Information:

Measurement Units: ☐Inch ☐metric Quantity required: 1 / 2 / 3 / _____
Nominal Master Size: _____ Class: ☐Y ☐X ☐XX ☐ XXX
Material: ☐Steel ☐Chrome ☐ Carbide Special Marking: _____
Certification to Class: ☐ Yes ☐ No Certification to Size: (extra cost) ☐ Yes ☐ No
Tolerance Applied: Bi-Lateral (Per rules for nominal masters) Uni-Lateral (Per rules for Go / NoGo masters)

Deviation Master Information:

Measurement Units: ☐Inch ☐metric Quantity required: 1 / 2 / 3 / _____
Minimum Master Size: _____
Maximum Master Size: _____ Class: ☐ Y ☐X ☐XX ☐ XXX
Material: ☐Steel ☐Chrome ☐ Carbide Special Marking: _____
Certification to Class: ☐ Yes ☐ No Certification to Size: (extra cost) ☐ Yes ☐ No
Tolerance Applied: Bi-Lateral (Per rules for nominal masters) Uni-Lateral (Per rules for Go / NoGo masters)

Master Plugs for Calibration of Air Rings

Requirement: (1) Nominal sized master or,
(optionally) (1) Minimum and (1) Maximum Deviation Master

Single (zeroing) Master Information:

Measurement Units: ☐Inch ☐metric Style: ☐Disc ☐Plug
Quantity required: 1 / 2 / 3 / _____
Nominal Master Size: _____ Class: ☐Y ☐X ☐XX
Material: ☐Steel ☐Chrome ☐ Carbide Special Marking: _____
Certification to Class: ☐ Yes ☐ No Certification to Size: (extra cost) ☐ Yes ☐ No
Tolerance Applied: Bi-Lateral (Per rules for nominal masters) Uni-Lateral (Per rules for Go / NoGo masters)

Deviation Master Information:

Measurement Units: ☐Inch ☐metric Style: ☐Disc ☐Plug
Quantity required: 1 / 2 / 3 / _____
Minimum Master Size: _____ Class: ☐Y ☐X ☐XX
Maximum Master Size: _____ Class: ☐Y ☐X ☐XX
Material: ☐Steel ☐Chrome ☐ Carbide Special Marking: _____
Certification to Class: ☐ Yes ☐ No Certification to Size: (extra cost) ☐ Yes ☐ No
Tolerance Applied: Bi-Lateral (Per rules for nominal masters) Uni-Lateral (Per rules for Go / NoGo masters)

Note: Mahr Federal recommends XX masters certified to size instead of XXX certified to class.

Calibration Services

International Standards require complete documentation and calibration of all gaging instruments. Mahr Federal Inc., as well as being a manufacturer of quality dimensional measuring instruments, is an established primary source for high accuracy dimensional measurement services.

Mahr Federal offers an inspection and recalibration program for dimensional standards including:

- gage blocks • master rings • master discs and plugs • master balls (roundness)
- cylindrical form and precision reference specimens surface roughness standards.

For these services, we have created an ideal environment - a metrology laboratory in Providence, Rhode Island that is ranked as one of the world's finest.:

- High quality measurements - 0.06 micron/2.3 micro inch uncertainty of measurement on gage blocks (up to 50 mm/2 in long).
- All measurements traceable to the Standards of the United States.
- Grand Masters/Primary standards used in our Measurement Center have been certified by NIST.
- Calibration system is certified to ISO-9001:2000 by NQA, USA and accredited to ISO 17025 NVLAP Lab Code 200605-0.
- We offer Fast turnaround and competitive prices.

Mahr Federal also specializes in the calibration and certification of the following gages including:

Dial, Digital & Test Indicators • Mikrokators® • Micrometers • Dial & Vernier Calipers • Pin & Radius Gages • Snaps, I.D. / O.D. & Bore Gages • Dimentron® Plugs • Plug & Ring Gages • Groove, Caliper, Thickness, Thread, Height & Depth Gages • Air Gages & Magnification Kits • Electronic Amplifiers & Gage Heads • Surface Finish Gages • Level Systems

Certificate of Registration

nqa usa

This is to certify that the Quality Management System of:

Mahr Federal Inc.
1144 Eddy Street
Providence, RI 02905

Includes facilities at:
11435 Williamson Road, Cincinnati, Ohio 45241
11155 Knott Avenue, Suite 1, Cypress, CA 90630
Col. Chepevera, C.P. 64030 Monterrey, Nuevo Leon, Mexico

applicable to:

Design, manufacture and servicing of dimensional gages and gaging systems and dimensional calibration services including field service for masters, standards and gages

has been assessed and approved by
National Quality Assurance, U.S.A., against the provisions of:

ISO 9001:2000

For and on behalf
of NQA, USA, Acton, MA 01720

Certificate Number: 10057
EAC Code: 19, 35
First Issued: October 6, 1995
Valid Until: September 1, 2010
Reissued: September 2, 2007

ANAB

This approval is subject to the company maintaining its system to the required standard, which will be monitored by NQA, USA, an accredited organization under the ANSI-ASQ National Accreditation Board.

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 200605-0

Mahr Federal Inc.
Providence, RI

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

CALIBRATION LABORATORIES

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated 18 June 2005).

2008-04-01 through 2009-03-31
Effective dates

For the National Institute of Standards and Technology

NVLAP-01C (REV. 2008-09-13)

Precision Measurement Center

Precision Measurement Center – Mahr Federal's Metrology Laboratory in Providence, RI.

The environment, by far, is the biggest contributor to measurement errors.

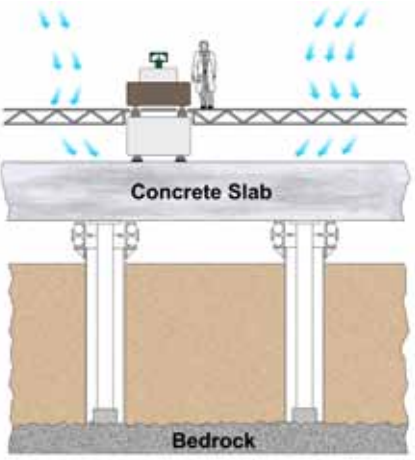
Mahr Federal's Precision Measurement Center in Providence was built to minimize environment related errors.

Structurally, the Center is different. All measurement equipment rests on a five-foot thick concrete slab located just below the floor. Weighing nearly 375 tons, the slab is independent of the surrounding building and is supported by three 30-foot tubular steel columns which rest on a vibrationally stable layer of rock.

This elaborate construction eliminates the influence of external vibrations which could cause measurement inaccuracies ... even eliminating the influence of laboratory personnel moving about the room. Because the slab is so well isolated from its local environment, other disturbances such as highway traffic and heavy equipment in the adjoining factory do not adversely affect the high accuracy gaging equipment.

Air and Atmosphere ... tightly controlled

A complex air conditioning, circulation and filtration system controls our Measurement Center's temperature and atmospheric conditions. Air cascades through the room from ceiling to floor, changing itself every half-minute. This important vertical down flow eliminates air stratification, helps control dust and provides a barrier of clean air between the gages and technicians. Since air temperature and humidity can adversely affect measurements, air temperature is maintained at 68°F/20°C, within 2/10 of 1°C and relative humidity is a constant 40%, ±10%.



Model 130B Gage Block Comparator

High Accuracy Measurements

High accuracy is realized with uncertainty measurements of 0.06 micron/2.3 microinch on gage blocks (up to 50 mm/2.3 inch long).

The Mahr 828 CiM in the Precision Measurement Center has a gaging uncertainty of as little as .000004". Its measuring precision, high measuring speed, innovative measuring processes, and ease of operation all combine to ensure fast, reliable measurements.

Additionally, the Mahr Federal Model 130B-24 and Model 130B-16 Gage Block Comparators, widely used and recognized as the finest of their kind, are employed in the Precision Measurement Center together with the Model 136B-3 Master Ring and Disc Comparators.

NIST Traceability Grand Master Sets

Working masters are remeasured annually against the Grand Master sets, which are calibrated at NIST on a regular schedule. This procedure provides Mahr Federal and its customers with a link directly traceable to NIST, assuring not only that our standards are accurate, but the lab itself, the equipment and measuring techniques used are rigidly maintained. Thereby, our commitment to a constant quest for the highest reliability in industrial metrology is also constantly maintained. Mahr Federal's Calibration system is certified to ISO-9001:2000 by NQA, USA and accredited to ISO 17025 NVLAP Lab Code 200605-0.


Mahr FEDERAL

REPORT OF MEASUREMENT

MASTER RING - CERTIFICATION OF SIZE

NVLAP

- 0 +

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EXACTLY

Mahr Federal Inc. • 1144 Eddy Street • Providence, RI 02905 • Phone: 1-800-486-8858 • Fax: 1-401-784-3246 • Internet: www.mahr.com

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