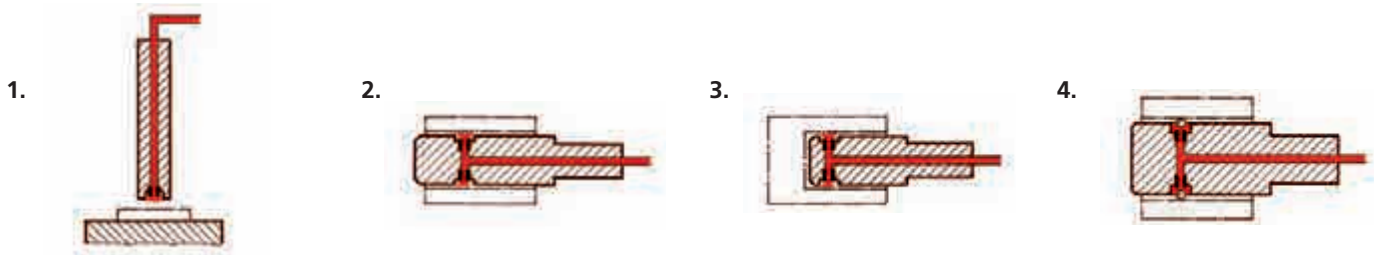


PRECISION BEGINS AT THE START OF THE MEASURING PROCESS

Air gages use the measuring effect of the change in pressure when a workpiece approaches a measuring jet. As the distance between jets and work surface decreases, the pressure increases while the velocity of flow and the respective volume flow decrease. The air measuring procedure has a relatively short but very linear measuring range.

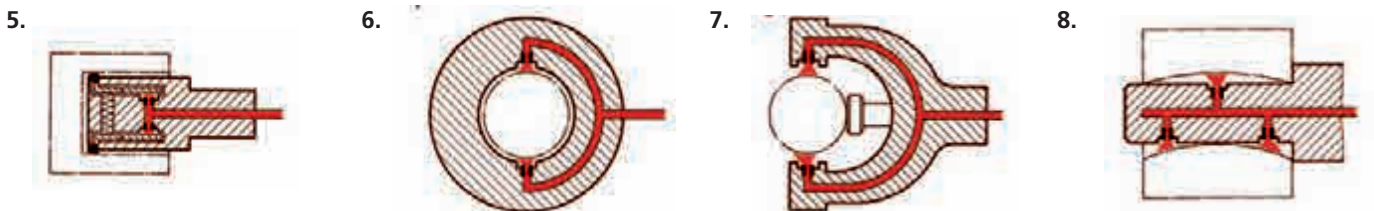


1. Thickness or wall thickness measurements with jet air gage.

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

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

4. Diameter measurement of cylindrical through bores with ball contact plug gage.

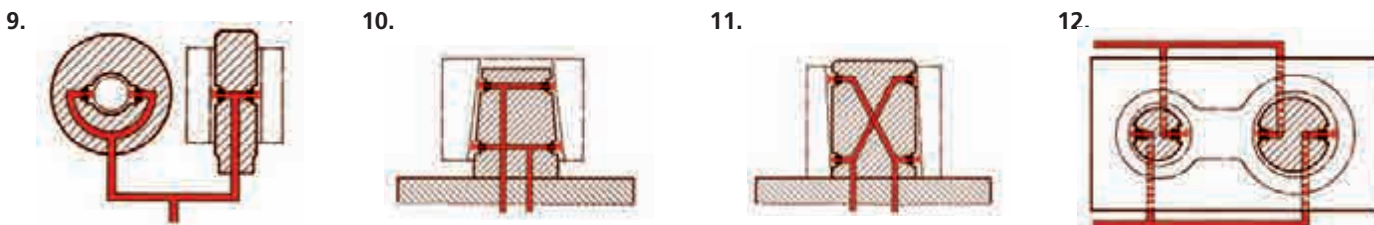


5. Diameter measurement of cylindrical blind bores with lever contact plug gage.

6. Diameter of thickness measurement with adjustable jet air caliper gage.

7. Diameter measurement of cylindrical shafts with jet air ring gage.

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

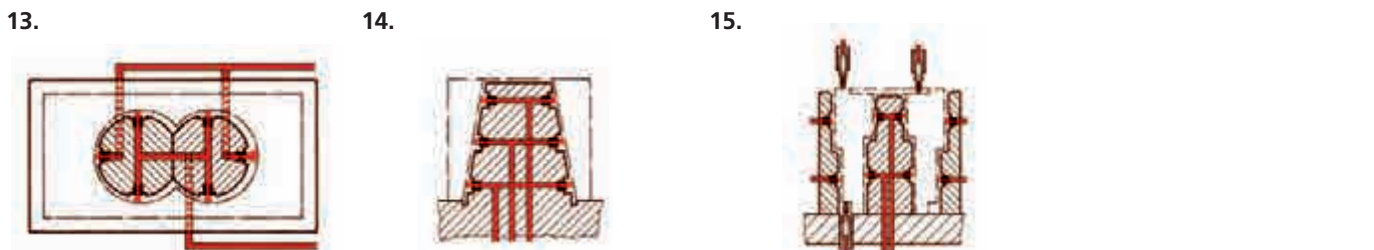


9. Mating measurement between bore and shaft with jet air plug gage and jet air ring gage.

10. Taper pitch measurement of an inside taper with taper jet air plug gage measurement as per the differential measuring method.

11. Measurement of a perpendicular position of a cylindrical bore to the front face with a special jet air plug gage measurement as per the differential measuring method.

12. Measurement of hole distances of separated cylindrical bores with jet air plug gage measurement as per the differential measuring method.



13. Measurement of hole distances of truncated cylindrical bores with jet air plug gages measurement as per the differential measuring method.

14. Taper pitch measurement as well as form and diameter measurement of an inside taper with taper jet air plug gage.

15. Multiple inside and outside measurements with measuring jet air gages and contact probes in connection with a seven-column unit.

Millimar. Air Gage Metrology

Metrology

Millimar evaluation units work according to the principle of determination of changes in air pressure; the pressure differential between two chambers is measured. While one of the two chambers provides a constant reference pressure, the pressure of the other chamber (measuring chamber) is determined by the distance of the measuring jet of an air measuring value recorder to the test specimen.

Millimar evaluation units have two connection points that are each directly connected to one of the two pressure chambers. Thus, the measuring value is measured directly, without any conversion via a Piezo pressure sensor, and is then digitalized.

Magnifications from 2500:1 to 10000:1 are realized with exchangeable instrument jets.

Millimar measuring units must be supplied with constant air pressure through a pressure reducing valve. Measuring units with pressure reducing valves can be connected to all compressed air lines from 3.5 bar to 10 bar overpressure, whereby an air filter should be interconnected.

The air must be dry and oil free.



Metrological

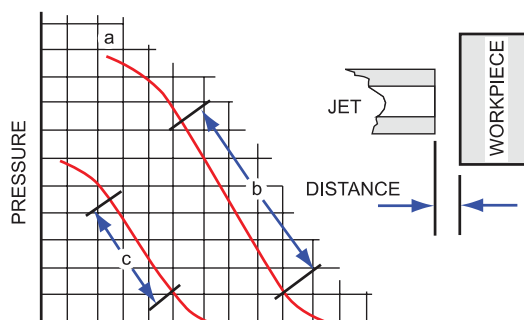
- Universal, reliable, proven, especially high-performing
- All measuring methods: individual, total and differential measurements
- High accuracy, long-term stability, insensitive to environmental influences
- Up to 10000x magnification of the measuring values, large measuring ranges
- High measuring accuracy and reproducibility for the measuring results: depending upon the magnification 0.5 μm to 20 μm
- Contact free measurements with measuring jets, no damage to the workpieces
- Reliable measurements of even uncleaned, oiled and lubricated workpieces, or workpieces with lapping paste. Measuring points are cleaned by the measuring air
- Linear display of the measuring values on a clear, large or long scale, easy and error-free reading of measuring results
- Measurement of diameters, distance between holes, tapers, eccentricities, alignment of bores, mating measurements, etc.
- Various measuring possibilities due to the corresponding

- adaption to existing measuring problems
- Airgage display unit for all applications
- Small, handy and easy to use
- Fully automatic working electrical units for measuring, control and sorting processes
- Measurement control unit for production machines
- **Millimar** single and multi-column units to set-up complete testing control units
- Due to their modularity and ability to be mounted close to each other, as well as their long-range scale readings, Millimar single and multi-column units can be set up as complete testing control systems
- Versatile measuring elements: jet air probes, jet air plugs gage, jet air ring gages, air caliper gages, angularity plug gages, angularity measuring rings, taper jet plug gages, taper jet ring gages and measuring units for mating parts for contact-free measurement
- Unusually long lifetime of the air measuring elements
- Robust model for the shop floor. Models for all applications.
- Special models for special tasks

General Technical Data of Air Gages

Air gaging is a measuring system that uses air pressure to determine the size of the measured part. 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.



Dimensionair® Air Gages



- Operated with regular workshop compressed air (40–125 psi).
- An internal pressure regulator keeps the measuring pressure within the calibrated range.
- Zero offset of the instrument with just one setting standard and the zero adjuster.
- Clear display with fine dial graduation and needle thin pointer gives an accurate, reliable readout. An integrated air filter removes dust and dirt particles from the air supply.
- Equipment connection on the front of the device; hand tightening is sufficient for tight connections
- No recalibration required after changing the measuring equipment; measurement can be resumed immediately after setting the instrument to zero
- 4 models available, choice of mm or inches
- **Scope of delivery:** Adapter for pneumatic plug gages, Mahr Federal compatible, Air filter, Supply hose AHO-2

Technical Data

Order no.	2095183	2095184	2095185	2095186	2095189	2095195	2095196	2095197	2095198	
Product type	D-1250	D-2500	D-5000	D-10000	D-20000	D-4000	D-8000	D-16000	D-32000	
Magnification	1250:1	2500:1	5000:1	10000:1	20000:1	4000:1	8000:1	16000:1	32000:1	
Tooling ID	100	50	20	10	5	50	20	10	5	
Inputs for pneumatic measuring equipment	1									
Number of Jets	1, 2, or 3									
Scale reading	Dial Diameter 82.6 mm / 3.25"					Dial Diameter 152.4 mm / 6"				
Range of analog display	inch	± .003"	± .0015"	± .00075"	± .0003"	± .00015"	± .0015"	± .00075"	± .0003"	± .00015"
Graduation value	inch	.0001"	.00005"	.00002"	.00001"	.000005"	.000025"	.00001"	.000005"	
Display	Large analog scale with 2 tolerance markers									
Compatibility	Federal									
Air pressure	1 3 – 10 bar / 40–125 psi									
Roughness surface parameters		Ra 100 μm / 2,54 μm	Ra 50 μm / 1,27 μm	Ra 20 μm / 0,50 μm	Ra 10 μm / 0,25 μm	Ra 5 μm / 0,12 μm	Ra 50 μm / 1,27 μm	Ra 20 μm / 0,50 μm	Ra 10 μm / 0,25 μm	Ra 5 μm / 0,12 μm
Workpiece tolerance		± .002"	± .001"	± .0005"	± .0002"	± .0001"	± .001"	± .0005"	± .0002"	± .0001"

Order no.	Depth		Height		Width	
	mm	inch	mm	inch	mm	inch
2095183	187	7.125"	197	7.75"	127	5"
2095184	187	7.125"	197	7.75"	127	5"
2095185	187	7.125"	197	7.75"	127	5"
2095186	187	7.125"	197	7.75"	127	5"
2095189	187	7.125"	197	7.75"	127	5"
2095195	187	7.125"	197	7.75"	127	5"
2095196	187	7.125"	197	7.75"	127	5"
2095197	187	7.125"	197	7.75"	127	5"
2095198	187	7.125"	197	7.75"	127	5"

Accessories

Order no.	Product name	Product type
2248282	2-way manifold - low mag	AAD-82
2248283	3-way manifold - low mag	AAD-83
2248284	4-way manifold - low mag	AAD-84
2248285	5-way manifold - low mag	AAD-85
2086965	Magnification kit, for calibrating pneumatic display units, Magnification: 1250:1	AMR-SPEC-136
2009183	Particle filter, filter size 5µm	AFL-10
2201994	Oil and Water Separator Trap	AFL-24
2201992	Replacement Filter Element for AFL-10 Filter	AFL-21
2201993	Replacement Filter Element for AFL-24 Filter	AFL-23
2009118	Magnification kit, for calibrating pneumatic display units, Magnification: 2500:1, 4000:1	AMR-12
2009119	Magnification kit, for calibrating pneumatic display units, Magnification: 5000:1, 8000:1	AMR-13
2086962	Magnification kit, for calibrating pneumatic display units, Magnification: 10000:1, 16000:1	AMR-14
2086963	Magnification kit, for calibrating pneumatic display units, Magnification: 20000:1, 32000:1	AMR-15



AMR-SPEC-136



AFL-24



AAD-83

Dimensionair® Air Gages



- Operated with regular workshop compressed air (40–125 psi).
- An internal pressure regulator keeps the measuring pressure within the calibrated range.
- Zero offset of the instrument with just one setting standard and the zero adjuster.
- Clear display with fine dial graduation and needle thin pointer gives an accurate, reliable readout. An integrated air filter removes dust and dirt particles from the air supply.
- Equipment connection on the front of the device; hand tightening is sufficient for tight connections
- No recalibration required after changing the measuring equipment; measurement can be resumed immediately after setting the instrument to zero
- 4 models available, choice of mm or inches
- **Scope of delivery:** Adapter for pneumatic plug gages, Mahr Federal compatible, Air filter, Supply hose AHO-2

Technical Data

Order no.	2095190	2095191	2095192	2095193	2095194	2095199	2095200	2095201	2095202
Product type	D-1250M	D-2500M	D-5000M	D-10000M	D-20000M	MD-4000M	D-8000M	D-16000M	MD-32000M
Magnification	1250:1	2500:1	5000:1	10000:1	20000:1	4000:1	8000:1	16000:1	32000:1
Tooling ID	100	50	20	10	5	50	20	10	5
Inputs for pneumatic measuring equipment	1								
Number of Jets	1, 2, or 3								
Scale reading	Dial Diameter 82.6 mm / 3.25"					Dial Diameter 152.4 mm / 6"			
Range of analog display	µm ± 76	± 38	± 19	± 7,6	± 3.8	± 38	± 19	± 7,6	± 3.8
Graduation value	µm 2	1	0,5	0,2	0,1	0,5	0,2	0,1	0,1
Display	Large analog scale with 2 tolerance markers								
Compatibility	Federal								
Air pressure	3 – 10 bar / 40–125 psi								
Roughness surface parameters	Ra 100 µ" / 2,54 µm	Ra 50 µ" / 1,27 µm	Ra 20 µ" / 0,50 µm	Ra 10 µ" / 0,25 µm	Ra 5 µ" / 0,12 µm	Ra 50 µ" / 1,27 µm	Ra 20 µ" / 0,50 µm	Ra 10 µ" / 0,25 µm	Ra 5 µ" / 0,12 µm
Workpiece tolerance	± 50 µm	± 25 µm	± 13,5 µm	± 5 µm	± 2,5 µm	± 25 µm	± 13.5 µm	± 5 µm	± 2,5 µm

Order no.	Depth mm	Depth inch	Height mm	Height inch	Width mm	Width inch
2095190	187	7.125"	197	7.75"	127	5"
2095191	187	7.125"	197	7.75"	127	5"
2095192	187	7.125"	197	7.75"	127	5"
2095193	187	7.125"	197	7.75"	127	5"
2095194	187	7.125"	197	7.75"	127	5"
2095199	187	7.125"	197	7.75"	127	5"
2095200	187	7.125"	197	7.75"	127	5"
2095201	187	7.125"	197	7.75"	127	5"
2095202	187	7.125"	197	7.75"	127	5"

Accessories

Order no.	Product name	Product type
2248282	2-way manifold - low mag	AAD-82
2248283	3-way manifold - low mag	AAD-83
2248284	4-way manifold - low mag	AAD-84
2248285	5-way manifold - low mag	AAD-85
2086963	Magnification kit, for calibrating pneumatic display units, Magnification: 20000:1, 32000:1	AMR-15
2009183	Particle filter, filter size 5µm	AFL-10
2201994	Oil and Water Separator Trap	AFL-24
2201992	Replacement Filter Element for AFL-10 Filter	AFL-21
2201993	Replacement Filter Element for AFL-24 Filter	AFL-23
2086965	Magnification kit, for calibrating pneumatic display units, Magnification: 1250:1	AMR-SPEC-136
2009118	Magnification kit, for calibrating pneumatic display units, Magnification: 2500:1, 4000:1	AMR-12
2009119	Magnification kit, for calibrating pneumatic display units, Magnification: 5000:1, 8000:1	AMR-13
2086962	Magnification kit, for calibrating pneumatic display units, Magnification: 10000:1, 16000:1	AMR-14
2094182	Magnification kit, for calibrating pneumatic display units, Magnification: 1260:1	DP60



AMR-SPEC-136



AFL-24



AAD-83

Dimensionair® Air Gages (single or dual master system)



Application:

Use in basic dual master air gage applications.

- The center is operated with regular workshop compressed air (3–10 bar).
- Internal pressure regulators and differential pressure gages guarantee optimum stability over the entire operating range.
- Measuring span and zero point can be set to adjust the measuring range to the interchangeable dial plates.
- Interchangeable dial plates for easy, cost effective coverage of different measuring ranges.
- Clear display with fine dial graduation and needle thin pointer gives an accurate, reliable readout.
- An integrated air filter removes dust and dirt particles from the air supply.
- Equipment connection on the front of the device. Adapters are available for virtually any equipment configuration.
- **Scope of delivery:** Dial face (order no.: 2242662), Adapter for pneumatic plug gages, Mahr Federal compatible, Air filter, Supply hose AHO–2

Technical Data

Order no.	2098125	
Inputs for pneumatic measuring equipment	1	
Scale reading	Standard diameter 82.6 mm / 3.25"	
Range of analog display	inch	± .0015"
Graduation value	inch	.00005"
Display	Large analog scale with 2 tolerance markers	
Compatibility	Federal	
Features	1	
Air pressure	3 –10 bar / 40–125 psi	
Data interface	none	

Order no.	Depth		Height		Width	
	mm	inch	mm	inch	mm	inch
2098125	187	7.125"	197	7.75"	127	5"

Accessories

Order no.	Product name	Compati- bility	Magnifi- cation	Range of analog display		Gra- duation value	Gradu- ation value	Product type
				inch	µm	inch	µm	
2242760	Dial face		1260:1	± .003"		.0001"		
2242761	Dial face		1875:1	± .002"		.0001"		
2242662	Dial face		2500:1	± .0015"		.00005"		
2242763	Dial face		3750:1	± .001"		.00005"		
2242764	Dial face		5000:1	± .00076"		.00002"		
2242765	Dial face		7500:1	± .0005"		.00002"		
2242766	Dial face		10000:1	± .0003"		.00001"		
2242770	Dial face		1260:1		± 76		2	
2242771	Dial face		1875:1		± 50		2	
2242772	Dial face		2500:1		± 38		1	
2242773	Dial face		3750:1		± 25		1	
2242774	Dial face		5000:1		± 19		0,5	
2242776	Dial face		10000:1		± 7,6		0,2	

Dimensionair® Air Gages (single or dual master system)

Order no.	Product name	Compatibility	Magnification	Range of analog display	Range of analog display	Graduation value	Graduation value	Product type
2086610	Adaptor 3/8-32 to 10/32, for Ø .109" (2,77mm) up to .494" (12,55mm)	Sheffield		inch	µm	inch	µm	AAD-313
2201587	Adaptor 3/8-32 to 1/2-20 for Ø .940" (23,88mm) up to 5.500" (139,7mm)	Sheffield						AAD-314
2201586	Adaptor 3/8-32 to 1/4-28 for Ø .494" (12,55mm) up to .940" (23,88mm)	Sheffield						AAD-312
2201515	Adaptor 3/8-32 to 10/32 with bleed for Ø .109" (2,77mm) up to .494" (12,55mm)	Sheffield						AAD-194
2201514	Adaptor 3/8-32 to 1/4-28 with bleed for Ø .494" (12,55mm) up to .940" (23,88mm)	Sheffield						AAD-193
2201516	Adaptor 3/8-32 to 1/2-20 with bleed for Ø .940" (23,88mm) up to 5.500" (139,7mm)	Sheffield						AAD-195
2201496	Adaptor 3/8-32 to 9/32-40	Federal	10000:1					AAD-165
2240621	Adaptor 3/8-32 to M8	Mahr						
2253424	Adaptor 3/8-32 to M10	Mahr						
2240623	Adaptor 3/8-32 to M12	Mahr						
2242767	Adaptor 3/8-32 to 1/8 barb							
2242777	Adapter 3/8-32 to Setlock	Moore						
2254565	Adaptor 3/8-32 inside thread to M12x1 outside thread							
2009183	Particle filter, filter size 5µm							AFL-10
2201992	Replacement Filter Element for AFL-10 Filter							AFL-21
2201993	Replacement Filter Element for AFL-24 Filter							AFL-23
2201994	Oil and Water Separator Trap							AFL-24
2094182	Magnification kit, for calibrating pneumatic display units, Magnification: 1260:1		1260:1					DP60
2009118	Magnification kit, for calibrating pneumatic display units, Magnification: 2500:1, 4000:1	Federal	2500:1, 4000:1					AMR-12
2009119	Magnification kit, for calibrating pneumatic display units, Magnification: 5000:1, 8000:1	Federal	5000:1, 8000:1					AMR-13
2086962	Magnification kit, for calibrating pneumatic display units, Magnification: 10000:1, 16000:1	Federal	10000:1, 16000:1					AMR-14
2248282	2-way manifold - low mag							AAD-82
2248283	3-way manifold - low mag							AAD-83
2248284	4-way manifold - low mag							AAD-84
2248285	5-way manifold - low mag							AAD-85



2248283



AMR-SPEC-136



AFL-24

Compact length measuring instrument Millimar 832 PE/F1 / 832 PE/F2



- Digital and analog display in one unit.
- Large, high contrast digital display of the exact deviation from zero
- Analog display of measurement related information
- With its fixed ratio and controlled compressed air supply, the digital Dimensionair® is a sturdy, reliable system for manufacturing environments.
- Only one standard needed for zero offset; the instrument is precalibrated for the correct ratio
- Measuring ranges and resolutions for almost all measuring applications (including measuring equipment with 2, 3, 4 and 6 nozzles, air sensors and nozzle measuring probes, etc.)
- Suitable for dynamic measurement
- RS-232 output for communication with a data storage device, computer or printer, for statistical process control
- Master deviation – improved measurement with even more accurate automatic zero offset.
- **Scope of delivery:** Power source, Supply hose AHO-2, Adapter for pneumatic plug gages, Mahr Federal compatible

Technical Data

Order no.1-3	2004100	2004112	2004106	2004118	2004103	2004115	2004109	2004121	
Order no.	4	2004101	2004113	2004107	2004119	2004104	2004116	2004110	2004122
Order no.	6	2004102	2004114	2004108	2004120	2004105	2004117	2004111	2004123
Product type		832 PE/F1		832 PE/F2		832 PE/F1		832 PE/F2	
Magnification		1260:1, 2500:1, 5000:1				10000:1, 20000:1			
Tooling ID		60, 50, 20				10, 5			
Inputs for pneumatic measuring equipment		1		2		1		2	
Number of Jets		1-3							
Range of digital display	µm	± 80, ± 40, ± 20				± 8, ± 4			
Range of digital display	inch	± .003", ± .0015", ± .00075"				± .0003", ± .00015"			
Resolution	µm	0,2				0,1			
Resolution	inch	.00001"				.000005"			
Graduation value	µm	4, 2, 1				0,4, 0,2			
Graduation value	inch	150 µ", 75 µ", 38 µ"				15 µ", 8 µ"			
Display		Display mode A (or A and B for 2 channel models only)							
Tolerance display		5 LEDs							
Compatibility		Federal							
Dynamic functions		Max, Min, Max-Min							
Statistical functions		Actual value, nominal value							
Response time digital display	s	0.43							
Response time (Air)		approx. 1 s (depending on the hose length of the measuring equipment)							
Error limit		+/-1 digit							
Repeatability [µm]		±1 digit or ±1% of the indication range (whichever is greater)							
Data interface		RS232C							
Control outputs		five TTL optocoupler outputs							
Analogue output		±5 VDC at maximum amplitude of the selected measuring range for signal ±A, ±B							
Energy supply		110 V / 60 Hz, Power source	230 V / 50 Hz, Power source	110 V / 60 Hz, Power source	230 V / 50 Hz, Power source	110 V / 60 Hz, Power source	230 V / 50 Hz, Power source	110 V / 60 Hz, Power source	230 V / 50 Hz, Power source

Compact length measuring instrument Millimar 832 PE/F1 / 832 PE/F2

Order no.	Depth	Depth	Height	Height	Width	Width
	mm	inch	mm	inch	mm	inch
2004100	254	10"	197	7.75"	216	10.25"
2004112	254	10"	197	7.75"	216	10.25"
2004106	254	10"	197	7.75"	216	10.25"
2004118	254	10"	197	7.75"	216	10.25"
2004103	254	10"	197	7.75"	216	10.25"
2004115	254	10"	197	7.75"	216	10.25"
2004109	254	10"	197	7.75"	216	10.25"
2004121	254	10"	197	7.75"	216	10.25"

Accessories

Order no.	Product name	Product type
7024634	Data Connection Cable RS232C (3 m)	
2212852	Oil splashguard storage cover non-transparent	ECV-1276
2212858	Oil splashguard cover transparent	ECV-1285
2211464	Foot switch for hold/measure 3 m / 10 ft cable	ECB-1857
2211465	Footswitch for Dynamic Reset (15 pin connector)	ECB-1858
2211466	Foot switch for data transmit, 3 m / 10 ft	ECB-1859
2211462	Push button for dynamic reset/zeroing, 1,5 m / 5 ft cable	ECB-1855
2211467	Push button for data transmit, 1,5 m / 5 ft cable	ECB-1860
2211481	Push button for measurement hold/measure/data transmit, 3 m / 10 ft	ECB-1868
2214163	Control box with 5 Relays (120 V)	EKT-1236-W3
2214165	Control box with 5 Relays (240V)	EKT-1236-W5
2010000	Plug in Power Supply (832 units with 3 pin connector), 120 Vac	
2010001	Power Supply Module (832 amp with 3 pin connector), 220/240 Vac	
2212340	15-Pin connector - male (Digital I/O)	ECN-1695-W2
2212336	Phone plug male connector for Reset / Data	ECN-1693
2212339	9-Pin RS232 connector - male (Digital output)	ECN-1695-W1
2009118	Magnification kit, for calibrating pneumatic display units, Magnification: 2500:1, 4000:1	AMR-12
2009119	Magnification kit, for calibrating pneumatic display units, Magnification: 5000:1, 8000:1	AMR-13
2086962	Magnification kit, for calibrating pneumatic display units, Magnification: 10000:1, 16000:1	AMR-14
2009183	Particle filter, filter size 5µm	AFL-10
2201994	Oil and Water Separator Trap	AFL-24
2201992	Replacement Filter Element for AFL-10 Filter	AFL-21
2201993	Replacement Filter Element for AFL-24 Filter	AFL-23
2248282	2-way manifold - low mag	AAD-82
2248283	3-way manifold - low mag	AAD-83
2248284	4-way manifold - low mag	AAD-84
2248285	5-way manifold - low mag	AAD-85



AMR-SPEC-136



AFL-24



AAD-84

Compact length measuring instrument Millimar C1208 PE/F



- When using pneumatic compact length measuring instruments we recommend using a supply filter (see accessories) at all times
- Favorites: the „SELECT“ button allows you to access frequently used settings directly
- Static measurements $\pm A$
- Dynamic measurements: Max, Min, Max-Min, Max+Min, Average
- 1-point or 2-point master measurement
- Programmable via the integrated keypad or the RS-232 interface with MS Windows D1000S configuration software

When using pneumatic compact length measuring instruments we recommend using a supply filter (see accessories)

Favorites: the "SELECT" button allows you to access frequently used settings

- Static measurements $\pm A$

- Dynamic measurements: Max, Min, Max-Min, Max+Min, Average

Auto-detect mode (automatic detection).

- A pneumatic measuring instrument can be connected (nozzle plug gage or nozzle ring gage) – the instrument in use is automatically switched to the display

- 1-point or 2-point master measurement

- Programmable via the integrated keypad or the RS-232 interface with MS Windows® D1000S configuration software

- Backlit LCD for scale display and two-line digital display

- 5 three-color status lamps for warning and tolerance limits

- 1 input for pneumatic measuring equipment (compatible with Mahr / Federal electrical spec.)

- RS-232 interface

- 3 digital inputs for measurement start, master measurement, measured value transfer, ...

- 3 digital outputs for good, reject, rework, measuring time, ...

- **Software:** MarCom Professional free download:

www.mahr.com/marcom (only for Mahr data cables and wireless systems with USB and RS232 interface)

- **Scope of delivery:** Instruction manual, Power source

Technical Data

Order no.	5312095	5312094	5312093
Product type	C1208 PE/F		
Display	Background illuminated LCD, 115 mm x 70 mm		
Scale reading	Pointer, 61 scale graduations		
Digital display	7 digit LCD, 7 segments		
Range of analog display	μm	$\pm 3, \pm 10, \pm 30, \pm 100, \pm 300, \pm 1000, \pm 3000, \pm 10000$, tolerance related	
Range of analog display	inch	$\pm .0001", \pm .0003", \pm .001", \pm .003", \pm .01", \pm .03", \pm .1", \pm .3"$, tolerance related	
Tolerance display	5 LEDs, 3 color		
Measuring span	mm	76	32
Measuring span	μm	76	32
Inputs for pneumatic measuring equipment	1		
Compatibility	Federal		
Magnification	2500:1	5000:1	10000:1
Measuring combination	+A, -A, +B, -B, A+B, +A-B, -A+B, -A-B		
Features	1		
Programs	1		
Test steps	1		
Dynamic functions	Max, Min, Max-Min, (Max+Min)/2, Average		
Configuration	PC, keyboard		
zero setter	Can be set to zero at any point		
Error limit, digital display	0,05 %		
Error limit, analog display	2% (decimal scale display)		
Temperature coefficient	$\mu\text{m}/^{\circ}\text{C}$	0,005	
Air pressure	2,1 bar ± 5 %		
Air consumption in l/h	ca. 1–2 m ³		
Data interface	RS232C, Wireless		
Control inputs	3 optocoupler inputs, 24 V, 10 mA		
Control outputs	3 optocoupler outputs, 24 V, 100 mA		
Energy supply	Power source, 230 V/115 V; 50/60 Hz		
IP protection category	IP 43		

Order no.	Depth	Height	Width
	mm	mm	mm
5312095	165	205	160
5312094	165	205	160
5312093	165	205	160

Compact length measuring instrument Millimar C1208 PE/F

Accessories

Order no.	Product name	Product type
7024634	Data Connection Cable RS232C (3 m)	
4102331	Millimar - USB Adapter Cable RS232-USB (1 m)	Millimar - USB
5318430	Control Unit with 3 push buttons	
5330955	Foot Switch for Input 1	
5330956	Foot Switch for Input 2	
5330957	Foot Switch for Input 3	
2121236	Supply filter with adapter kit	
3025712	Keypad dust cover	
4102233	Transmitter for e-Stick	RS232 e
4102230	Receiver	e-Stick
2248282	2-way manifold - low mag	AAD-82
2248283	3-way manifold - low mag	AAD-83
2248284	4-way manifold - low mag	AAD-84
2248285	5-way manifold - low mag	AAD-85
2009118	Magnification kit, for calibrating pneumatic display units, Magnification: 2500:1, 4000:1	AMR-12
2009119	Magnification kit, for calibrating pneumatic display units, Magnification: 5000:1, 8000:1	AMR-13
2086962	Magnification kit, for calibrating pneumatic display units, Magnification: 10000:1, 16000:1	AMR-14
2201994	Oil and Water Separator Trap	AFL-24
2201992	Replacement Filter Element for AFL-10 Filter	AFL-21
2201993	Replacement Filter Element for AFL-24 Filter	AFL-23



e-Stick



AMR-SPEC-136



AFL-24



AAD-84

Compact length measuring instrument Millimar C1245 PE/F1



Technical Data

Order no.	5331271	5331272	5331273
Product type	C1245 PE/F1		
Display	analog pointer instrument, LCD 53 mm x 40 mm		
Scale reading	145 mm x 80 mm		
Digital display	7 digit LCD, 7 segments		
Range of analog display	μm	$\pm 10, \pm 30, \pm 100, \pm 300, \pm 1000, \pm 3000, \pm 10000$	
Range of analog display	inch	$\pm .0003", \pm .001", \pm .003", \pm .01", \pm .03", \pm .1", \pm .3"$	
Tolerance display	5 LEDs, 3 color		
Measuring span	mm	76	32
Measuring span	μm	76	32
Inputs for pneumatic measuring equipment	1		
Compatibility	Federal		
Magnification	2500:1	5000:1	10000:1
Measuring combination	Links entered via formula editor		
Features	16		
Programs	6		
Test steps	6		
Dynamic functions	Max, Min, Max-Min, (Max+Min)/2, Average		
Statistical functions	N, x-bar, S, Xmax, Xmin, Range		
Classification	max. 998, max. at I/O		
Configuration	PC, keyboard		
zero setter	electrical, can be set to zero at any point		
Error limit, digital display	0,05 %		
Error limit, analog display	2 %		
Error limit, analog output	0,1 %		
Temperature coefficient	$\mu\text{m}/^{\circ}\text{C}$	0,005	
Air pressure	2,1 bar \pm 5 %		
Air consumption in l/h	ca. 1-2 m ³		
Data interface	RS232C, Wireless		
Control inputs	3 optocoupler inputs, 24 V, 10 mA		
Control outputs	6 optocoupler outputs, 24 V, 100 mA		
Analogue output	max. \pm 4 V, adjustable sensitivity		
Energy supply	230 V/115 V; 50/60 Hz		
IP protection category	IP 43		

- When using pneumatic compact length measuring instruments, we recommend using a supply filter at all times (see accessories)
- Analog pointer device for displaying the measured value
- Two-line LCD for displaying measured values and help texts
- 5 three color status lamps for warning and tolerance limits
- Up to 3 features can be displayed simultaneously
- 16 characters can be defined
- Using a formula editor (80 characters), input channels C1 to C8 can be mathematically linked via the 4 basic arithmetic operations with factors and brackets
- Static measurements: Instantaneous value, square root, arc tangent
- Dynamic measurements: Max, Min, Max-Min, Max+Min, Average
- Statistical **Functions:** N, x-bar, S, Xmax, Xmin, R
- Measured value memory for 5000 measured values
- Measurement start/stop via buttons, digital input, RS-232
- 1 input for pneumatic measuring equipment (compatible with Mahr / Mahr Federal)
- RS-232 interface
- 1 analog output
- 3 digital inputs for measurement start, master measurement / zero offset, data transfer
- 6 digital outputs for good, reject, rework, grouped goods, measuring time, 4 classes, BCD interface
- **Software:** MarCom Professional free download: www.mahr.com/marcom (only for Mahr data cables and wireless systems with USB and RS232 interface)
- **Scope of delivery:** Instruction manual, Power source, Pressure regulator

Compact length measuring instrument Millimar C1245 PE/F1

Order no.	Depth	Height	Width
	mm	mm	mm
5331271	165	205	160
5331272	165	205	160
5331273	165	205	160

Accessories

Order no.	Product name	Product type
7024634	Data Connection Cable RS232C (3 m)	
4102331	Millimar - USB Adapter Cable RS232-USB (1 m)	Millimar - USB
5318430	Control Unit with 3 push buttons	
5330955	Foot Switch for Input 1	
5330956	Foot Switch for Input 2	
5330957	Foot Switch for Input 3	
2121236	Supply filter with adapter kit	
3025712	Keypad dust cover	
4102233	Transmitter for e-Stick	RS232 e
4102230	Receiver	e-Stick
2248282	2-way manifold - low mag	AAD-82
2248283	3-way manifold - low mag	AAD-83
2248284	4-way manifold - low mag	AAD-84
2248285	5-way manifold - low mag	AAD-85
2009118	Magnification kit, for calibrating pneumatic display units, Magnification: 2500:1, 4000:1	AMR-12
2009119	Magnification kit, for calibrating pneumatic display units, Magnification: 5000:1, 8000:1	AMR-13
2086962	Magnification kit, for calibrating pneumatic display units, Magnification: 10000:1, 16000:1	AMR-14
2201994	Oil and Water Separator Trap	AFL-24
2201992	Replacement Filter Element for AFL-10 Filter	AFL-21
2201993	Replacement Filter Element for AFL-24 Filter	AFL-23



e-Stick



AMR-SPEC-136



AFL-24



AAD-84

Compact column measuring instrument Millimar S1840 PE/F

Order no.	Depth	Height	Width
	mm	mm	mm
5318455	144	487	47
5318456	144	487	47
5318457	144	487	47

Accessories

Order no.	Product description	Product type
5330914	Base foot with 1 pressure regulator	
5330915	Base foot with 2 pressure regulators	
5330916	Base foot with 3 pressure regulators	
2121236	Supply filter with adapter kit	
5318430	Control Unit with 3 push buttons	
5330955	Foot Switch for Input 1	
5330956	Foot Switch for Input 2	
5330957	Foot Switch for Input 3	
7024634	Data Connection Cable RS232C (3 m)	
4102331	Adapter Cable RS232-USB (1 m)	
4102233	Transmitter for e-Stick	RS232 e
4102230	Receiver	e-Stick



e-Stick

Mobile pneumatic length measuring instrument Millimar μ Dimensionair® II



Application:

Air Gaging Applications where a portable measurement and readout are needed

Technical Data

Order no.		2103200
Product type		μ Dimensionair® II
Magnification		5000:1, 2500:1, 1260:1
Inputs for pneumatic measuring equipment		1
Digital display		rotates through 270°
Storage temperature MAX	°C	60
Graduation value	μm	0,5, 1, 2
Graduation value	inch	.00002", .00005", .0001"
Display		Analog display with one-line digital display
Tolerance display		Two - over / under (3 class)
Compatibility		Federal
Features		1
Programs		1
Test steps		1
Dynamic functions		MAX, MIN, MAX-MIN
Statistical functions		Difference, Nominal Average
Response time (Air)		approx. 1 s
Error limit		$\pm 1\%$ of the total range
Air pressure		2.10 \pm .01 bar
Repeatability [μm]		± 1 numerical increment
Data interface		Digimatic, Opto RS232C, USB, Wireless
Energy supply		Battery operation, approx. 3000 h
IP protection category		IP 54

- Affordable
- Versatile
- Innovative
- Robust
- No other pneumatic measuring system is as versatile as the μ Dimensionair®, which can be used as a hand-held device, as a stationary table-top device or even directly on the machine tool. With its IP54 protection rating it is suitable for use in harsh workshop environments. The compressed air flowing out of the measuring equipment removes any contamination from the testpiece to ensure reliable measuring results.
- Direct and clear measuring results.
- Ideal for use in manufacturing environments
- The μ Dimensionair® II offers:
- Choice of setup with one standard or with Min/Max standards
- All other functions of the μ Max μ m® II digital dial comparator:
- Dynamic measurement: Min, Max, measuring span
- Multiplication factor and hold function („freeze“)
- Choice of data transfer with serial number
- MarConnect data output: USB, Opto RS-232C and Digimatic
- **Scope of delivery:** Instruction manual, Supply hose AHO-2

Order no.	Depth	Height	Length	Length (inch)	Width
	mm	mm	mm	inch	mm
2103200	60	3	100	4	70

Mobile pneumatic length measuring instrument Millimar μ Dimensionair® II

Accessories

Order no.	Product name	Product type
2238020	Pressure regulator with filter	
2095924	Pressure meter	
2239307	Universal bench mount	
2237666	Standard plastic handle	
2240993	Shut off slide valve	
2241109	Table stand for μ Dimensionair®	
2240594	Swivel coupling adapter for rotating tooling	
2201994	Oil and Water Separator Trap	AFL-24
2237713	Connecting hose, 6 m	
2202076	Supply hose, 1.5 m	AHO-2
4102520	Battery 3 V, CR 2032	
4346023	2000 usb Data connection cable USB (2 m)	2000 usb
4346021	Digimatic data cable (2 m)	2000 d
4346020	Data Connection Cable RS232C (2 m)	2000 r



AFL-24



2240594



2241109



2240993



2239307

Dimensionair® Air Gages — Air Plugs

- Calibrated ID tooling for the Dimensionair® Air Gaging Systems
- 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 a greater measuring range.

- Long life - wide clearance and

hard chrome (optional) body extends life of the Air Plug.

- Deep, recessed jets - Air jets are recessed into the plug body, protecting 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.

Identification	Nominal Size from		To & include		Clearance from Nominal Size	
	mm	inch	mm	inch	mm	inch
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"	76.3	3.004"	0.023	.0009"
	76.3	3.004"	127	5.000"	0.071	.0028"
	Above 127	5.000"			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	5.000"	0.071	.0028"
	Above 127	5.000"			0.081	.0032"
DP60	3	.123"	3.5	.140"	0.030	.0012"
	3.5	.140"	4.7	.185"	0.045	.0018"
	4.7	.185"	6.3	.248"	0.061	.0024"
	6.3	.248"	76.3	3.004"	0.081	.0032"
	76.3	3.004"	127	5.000"	0.089	.0035"
	above 127	5.000"			0.107	.0042"

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 25 mm/1.000" 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.

Ordering Information

When ordering Air Plugs please specify:

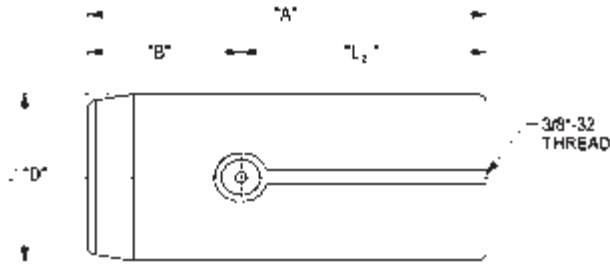
1. Nominal ID Size and Tolerance.
2. Dimensionair® Model to be used.
3. Air Plug style (Through Hole, Blind Hole, or Counterbore).
4. Air Plug finish (Chrome-plated or Hardened Steel).
5. Please order Master Setting Ring at same time. Unless otherwise specified, Mahr will furnish a 2-jet, Through Hole, High Chrome Air Plug for a 2500:1 Dimensionair®.



Through Hole and Blind Hole Air Plugs

Through and Blind Holes

For air gages, an appropriate setting master according to accuracy grade XX, can be ordered separately.



Through Holes

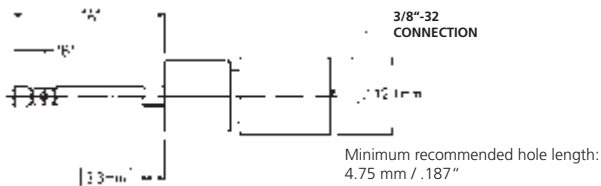
Nominal deviations from - to ø D		A		B		L2		Minimum length of bore		Measuring Range	Order no.	Measuring Range	Order no.	Measuring Range	Order no.
mm	(inch)	mm	(inch)	mm	(inch)	mm	(inch)	mm	(inch)	µm (inch)		µm (inch)		µm (inch)	
3.124 - 3.553	(0.1230 - 0.1399)	23.80	(.937)	4.75	(.187)	19.05	(.750)	4.75	(.187)	13 (.0005)	2092975	25 (.0010)	2092945	51 (.0020)	2108672
3.556 - 4.696	(0.1400 - 0.1849)	23.80	(.937)	4.75	(.187)	19.05	(.750)	4.75	(.187)	19 (.00075)	2092976	38 (.0015)	2092946	76 (.0030)	2108673
4.699 - 6.312	(0.1850 - 0.2485)	38.10	(1.500)	12.70	(.500)	25.40	(1.000)	4.75	(.187)	25 (.0010)	2092977	51 (.0020)	2092947	102 (.0040)	2108674
6.314 - 9.484	(0.2486 - 0.3734)	38.10	(1.500)	12.70	(.500)	25.40	(1.000)	6.35	(.250)	38 (.0015)	2092978	76 (.0030)	2092948	152 (.0060)	2108675
9.487 - 12.494	(0.3735 - 0.4919)	38.10	(1.500)	12.70	(.500)	25.40	(1.000)	6.35	(.250)	38 (.0015)	2092979	76 (.0030)	2092949	152 (.0060)	2108676
12.497 - 13.688	(0.4920 - 0.5389)	38.10	(1.500)	12.70	(.500)	25.40	(1.000)	6.35	(.250)	38 (.0015)	2092980	76 (.0030)	2092950	152 (.0060)	2108677
13.691 - 14.933	(0.5390 - 0.5879)	38.10	(1.500)	12.70	(.500)	25.40	(1.000)	6.35	(.250)	38 (.0015)	2092981	76 (.0030)	2092951	152 (.0060)	2108678
14.935 - 20.978	(0.5880 - 0.8259)	41.28	(1.625)	15.88	(.625)	25.40	(1.000)	6.35	(.250)	38 (.0015)	2092982	76 (.0030)	2092952	152 (.0060)	2108679
20.980 - 28.699	(0.8260 - 1.1299)	41.28	(1.625)	15.88	(.625)	25.40	(1.000)	6.35	(.250)	38 (.0015)	2092983	76 (.0030)	2092953	152 (.0060)	2108680
28.702 - 37.691	(1.1300 - 1.4839)	41.28	(1.625)	15.88	(.625)	25.40	(1.000)	6.35	(.250)	38 (.0015)	2092984	76 (.0030)	2092954	152 (.0060)	2108681
37.694 - 44.193	(1.4840 - 1.7399)	50.80	(2.000)	19.05	(.750)	31.75	(1.250)	6.35	(.250)	38 (.0015)	2092985	76 (.0030)	2092955	152 (.0060)	2108682
44.196 - 63.751	(1.7400 - 2.5099)	50.80	(2.000)	19.05	(.750)	31.75	(1.250)	6.35	(.250)	38 (.0015)	2092986	76 (.0030)	2092956	152 (.0060)	2108683
63.754 - 76.299	(2.5100 - 3.0039)	50.80	(2.000)	19.05	(.750)	31.75	(1.250)	6.35	(.250)	38 (.0015)	2092987	76 (.0030)	2092957	152 (.0060)	2108684
76.302 - 89.151	(3.0040 - 3.5099)	50.80	(2.000)	19.05	(.750)	31.75	(1.250)	6.35	(.250)	38 (.0015)	2092988	76 (.0030)	2092958	152 (.0060)	2108685
89.154 - 104.115	(3.5100 - 4.0990)	50.80	(2.000)	19.05	(.750)	31.75	(1.250)	6.35	(.250)	38 (.0015)	2092989	76 (.0030)	2092959	152 (.0060)	2108686
104.117 - 114.300	(4.0991 - 4.5000)	50.80	(2.000)	19.05	(.750)	31.75	(1.250)	6.35	(.250)	38 (.0015)	2092990	76 (.0030)	2092960	152 (.0060)	2108687

Blind Holes

Nominal deviations from - to ø D		A		B		L2		Minimum length of bore		DP20 (5000:1)		DP50 (2500:1)		DP60 (1250:1)	
mm	(inch)	mm	(inch)	mm	(inch)	mm	(inch)	mm	(inch)	µm (inch)		µm (inch)		µm (inch)	
3.937 - 4.696	(0.1550 - 0.1849)	19.05	(.750)	3.96	(.156)	15.09	(.594)	6.35	(.250)	19 (.00075)	2092991	38 (.0015)	2092961	76 (.0030)	2108688
4.699 - 6.312	(0.1850 - 0.2485)	29.36	(1.156)	3.96	(.156)	25.40	(1.000)	6.35	(.250)	25 (.0010)	2092992	51 (.0020)	2092962	102 (.0040)	2108689
6.314 - 9.484	(0.2486 - 0.3734)	29.36	(1.156)	3.96	(.156)	25.40	(1.000)	6.35	(.250)	38 (.0015)	2092993	76 (.0030)	2092963	152 (.0060)	2108690
9.487 - 11.859	(0.3735 - 0.4669)	29.36	(1.156)	3.96	(.156)	25.40	(1.000)	6.35	(.250)	38 (.0015)	2092994	76 (.0030)	2092964	152 (.0060)	2108691
11.862 - 14.933	(0.4670 - 0.5879)	29.36	(1.156)	3.96	(.156)	25.40	(1.000)	6.35	(.250)	38 (.0015)	2092995	76 (.0030)	2092965	152 (.0060)	2108692
14.935 - 20.978	(0.5880 - 0.8259)	29.36	(1.156)	3.96	(.156)	25.40	(1.000)	6.35	(.250)	38 (.0015)	2092996	76 (.0030)	2092966	152 (.0060)	2108693
20.980 - 28.699	(0.8260 - 1.1299)	29.36	(1.156)	3.96	(.156)	25.40	(1.000)	6.35	(.250)	38 (.0015)	2092997	76 (.0030)	2092967	152 (.0060)	2108694
28.702 - 37.691	(1.1300 - 1.4839)	29.36	(1.156)	3.96	(.156)	25.40	(1.000)	6.35	(.250)	38 (.0015)	2092998	76 (.0030)	2092968	152 (.0060)	2108695
37.694 - 44.193	(1.4840 - 1.7399)	35.71	(1.406)	3.96	(.156)	31.75	(1.250)	6.35	(.250)	38 (.0015)	2092999	76 (.0030)	2092969	152 (.0060)	2108696
44.196 - 63.751	(1.7400 - 2.5099)	35.71	(1.406)	3.96	(.156)	31.75	(1.250)	6.35	(.250)	38 (.0015)	2093000	76 (.0030)	2092970	152 (.0060)	2108697
63.754 - 76.299	(2.5100 - 3.0039)	35.71	(1.406)	3.96	(.156)	31.75	(1.250)	6.35	(.250)	38 (.0015)	2093001	76 (.0030)	2092971	152 (.0060)	2108698
76.302 - 89.151	(3.0040 - 3.5099)	38.10	(1.500)	3.96	(.156)	34.14	(1.344)	6.35	(.250)	38 (.0015)	2093002	76 (.0030)	2092972	152 (.0060)	2108699
89.154 - 101.851	(3.5100 - 4.0099)	38.10	(1.500)	3.96	(.156)	34.14	(1.344)	6.35	(.250)	38 (.0015)	2093003	76 (.0030)	2092973	152 (.0060)	2108700
101.854 - 114.300	(4.0100 - 4.5000)	38.10	(1.500)	3.96	(.156)	34.14	(1.344)	6.35	(.250)	38 (.0015)	2093004	76 (.0030)	2092974	152 (.0060)	2108701

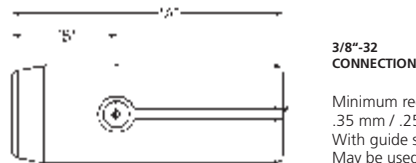
Through Hole Plugs (DP50 – DP20)

3.94-4.70 mm / .155-.185"



Minimum recommended hole length:
4.75 mm / .187"

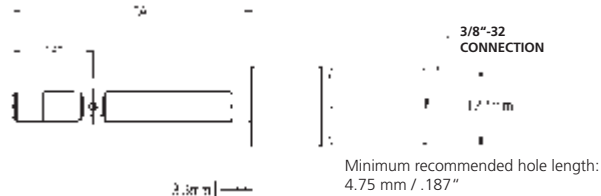
11.86-14.94 mm / .467-.588"



3/8"-32
CONNECTION

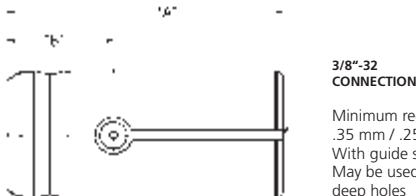
Minimum recommended hole length:
.35 mm / .250"
With guide sleeve or stop collar 1.8 mm / .07"
May be used with AHA-4 or -5 Extensions for deep holes

4.70-6.30 mm / .185-.248"



Minimum recommended hole length:
4.75 mm / .187"

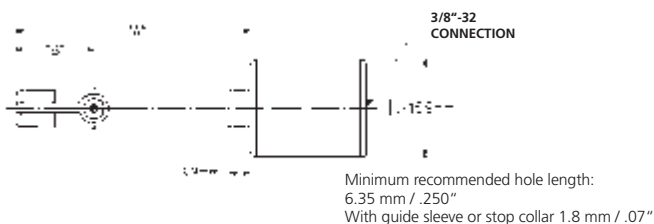
14.94-37.69 mm / .588-1.484"



3/8"-32
CONNECTION

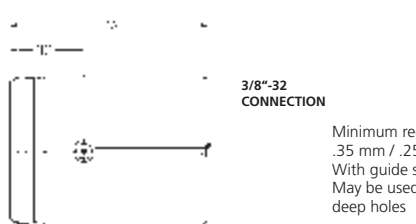
Minimum recommended hole length:
.35 mm / .250"
With guide sleeve or stop collar 1.8 mm / .07"
May be used with AHA-4 or -5 Extensions for deep holes

6.30-9.49 mm / .248-.3735"



Minimum recommended hole length:
6.35 mm / .250"
With guide sleeve or stop collar 1.8 mm / .07"

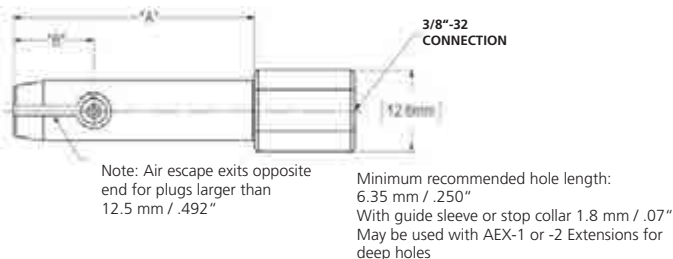
37.69-76.30 mm / 1.484-3.004"



3/8"-32
CONNECTION

Minimum recommended hole length:
.35 mm / .250"
With guide sleeve or stop collar 1.8 mm / .07"
May be used with AHA-4 or -5 Extensions for deep holes

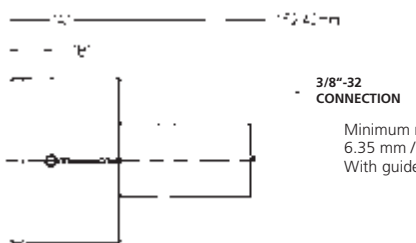
9.49-11.86 mm / .3735-.467"



Note: Air escape exits opposite end for plugs larger than 12.5 mm / .492"

Minimum recommended hole length:
6.35 mm / .250"
With guide sleeve or stop collar 1.8 mm / .07"
May be used with AEX-1 or -2 Extensions for deep holes

76.30-114.30 mm / 3.004-4.500"



3/8"-32
CONNECTION

Minimum recommended hole length:
6.35 mm / .250"
With guide sleeve or stop collar 1.8 mm / .07"

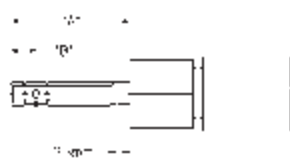
Nominal Dimension mm / inch						Minimum Hole Length*		Measuring range			
Including & Above	To	"A"	"B"	mm	inch	DP20	DP50	DP60			
3.12 / .123"	3.56 / .140"	23.81 / .938"	4.76 / .188"	4.75 / .187"	.013 / .0005"	.025 / .0010"	.051 / .0020"				
3.56 / .140"	4.70 / .185"	23.81 / .938"	4.76 / .188"	4.75 / .187"	.0200 / .00075"	.038 / .0015"	.076 / .0030"				
4.70 / .185"	6.30 / .248"	38.10 / 1.500"	12.70 / .500"	4.75 / .187"	.025 / .0010"	.051 / .0020"	.102 / .0040"				
6.30 / .248"	9.49 / .3735"	38.10 / 1.500"	12.70 / .500"	6.35 / .250"	.038 / .0015"	.076 / .0030"	.152 / .0060"				
9.49 / .3735"	14.94 / .588"	38.10 / 1.500"	12.70 / .500"	6.35 / .250"	.038 / .0015"	.076 / .0030"	.152 / .0060"				
14.94 / .588"	19.05 / .750"	41.28 / 1.625"	15.88 / .625"	6.35 / .250"	.038 / .0015"	.076 / .0030"	.152 / .0060"				
19.05 / .750"	37.69 / 1.484"	41.28 / 1.625"	15.88 / .625"	6.35 / .250"	.038 / .0015"	.076 / .0030"	.152 / .0060"				
37.69 / 1.484"	76.30 / 3.004"	50.80 / 2.000"	19.10 / .750"	6.35 / .250"	.038 / .0015"	.076 / .0030"	.152 / .0060"				
76.30 / 3.004"	114.30 / 4.500"	50.80 / 2.000"	19.10 / .750"	6.35 / .250"	.038 / .0015"	.076 / .0030"	.152 / .0060"				

* If a guide sleeve or stop collar is used, minimum hole length can be as small as 1.78 mm / .070" for holes larger than 6.30 mm / .248".

** A handle 152 mm / 6" long and 33.3 mm / 1.31" diameter is supplied with plugs over 76.30 mm / 3.004".

Blind Hole / Counterbore Plugs (DP50 – DP20)

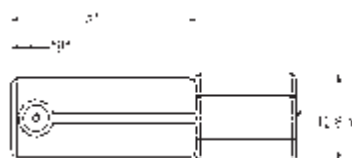
3.94-4.70 mm / .155-.185"



3/8"-32 CONNECTION

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

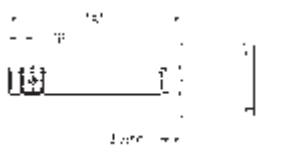
11.86-14.94 mm / .467-.588"



3/8"-32 CONNECTION

Minimum recommended hole length: 6.35 mm / .250"
May be used with Extensions 2201963 and 2201954

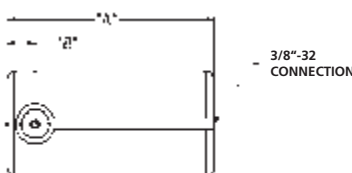
4.70-6.30 mm / .185-.248"



3/8"-32 CONNECTION

Minimum recommended hole length: 6.35 mm / .250"

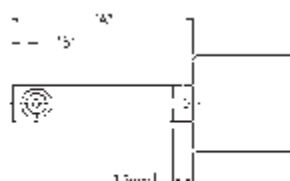
14.94-37.69 mm / .588-1.484"



3/8"-32 CONNECTION

Minimum recommended hole length: 6.35 mm / .250"
May be used with Extensions 2202010 and 2202011

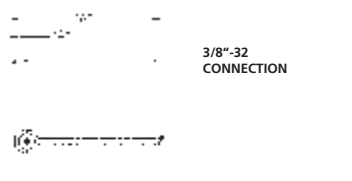
6.30-9.49 mm / .248-.3735"



3/8"-32 CONNECTION

Minimum recommended hole length: 6.35 mm / .250"

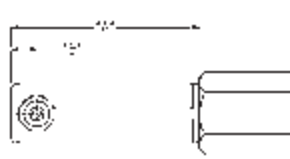
37.69-76.30 mm / 1.484-3.004"



3/8"-32 CONNECTION

Minimum recommended hole length: 6.35 mm / .250"
May be used with Extensions 2202010 and 2202011

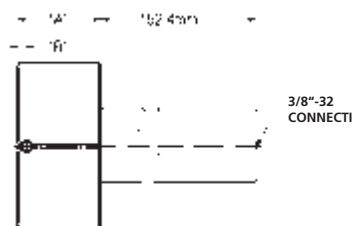
9.49-11.86 mm / .3735-.467"



3/8"-32 CONNECTION

Minimum recommended hole length: 6.35 mm / .250"
May be used with Extension 2202009

76.30-114.30 mm / 3.004-4.500"



3/8"-32 CONNECTION

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 2.79 mm/.110" long, and the

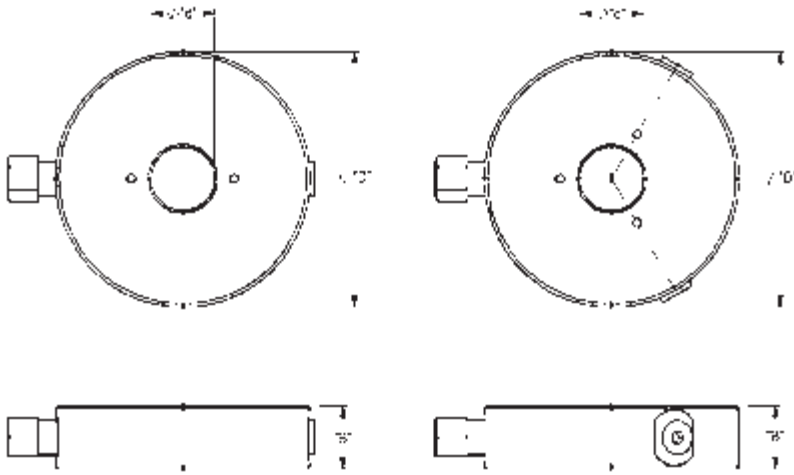
distance from the end of the plug to the center-line of the jets can be as short as 2.16 mm/.075" for plugs below 6.34 mm/.250" or 2.16 mm/.095" for plugs above 6.34 mm/.250".

Nominal Dimension mm / inch						Minimum Hole Length*		Measuring range		
Including & Above	To	"A"	"B"	mm	inch	mm	inch	DP20	DP50	DP60
3.94 / .155"	4.70 / .185"	19.10 / .750"	3.96 / .156"	6.35 / .250"	.0200 / .00075"	.038 / .0015"	.076 / .0030"	.038 / .0015"	.076 / .0030"	.152 / .0060"
4.70 / .185"	6.30 / .248"	29.36 / 1.156"	3.96 / .156"	6.35 / .250"	.025 / .0010"	.051 / .0020"	.102 / .0040"	.038 / .0015"	.076 / .0030"	.152 / .0060"
6.30 / .248"	9.49 / .3735"	29.36 / 1.156"	3.96 / .156"	6.35 / .250"	.038 / .0015"	.076 / .0030"	.152 / .0060"	.038 / .0015"	.076 / .0030"	.152 / .0060"
9.49 / .3735"	11.86 / .467"	29.36 / 1.156"	3.96 / .156"	6.35 / .250"	.038 / .0015"	.076 / .0030"	.152 / .0060"	.038 / .0015"	.076 / .0030"	.152 / .0060"
11.86 / .467"	14.94 / .588"	29.36 / 1.156"	3.96 / .156"	6.35 / .250"	.038 / .0015"	.076 / .0030"	.152 / .0060"	.038 / .0015"	.076 / .0030"	.152 / .0060"
14.94 / .588"	37.69 / 1.484"	29.36 / 1.156"	3.96 / .156"	6.35 / .250"	.038 / .0015"	.076 / .0030"	.152 / .0060"	.038 / .0015"	.076 / .0030"	.152 / .0060"
37.69 / 1.484"	76.30 / 3.004"	35.71 / 1.406"	3.96 / .156"	6.35 / .250"	.038 / .0015"	.076 / .0030"	.152 / .0060"	.038 / .0015"	.076 / .0030"	.152 / .0060"
76.30 / 3.004"	114.30 / 4.500"	38.10 / 1.500"	3.96 / .156"	6.35 / .250"	.038 / .0015"	.076 / .0030"	.152 / .0060"	.038 / .0015"	.076 / .0030"	.152 / .0060"

* If a guide sleeve or stop collar is used, minimum hole length can be as small as 1.78 mm / .070" for holes larger than 6.30 mm / .248".

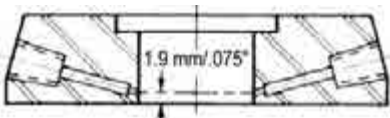
** A handle 152 mm / 6" long and 33.3 mm / 1.31" diameter is supplied with plugs over 76.30 mm / 3.004".

Dimensionair® Air Rings

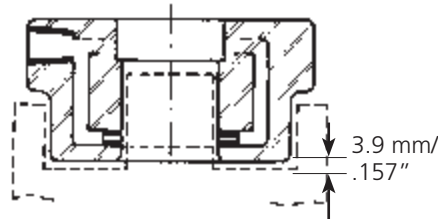


For applications where OD's need to be checked near a shoulder, or where part length is restricted, contact Mahr Federal for technical assistance about shoulder and Snout Type Air Rings.

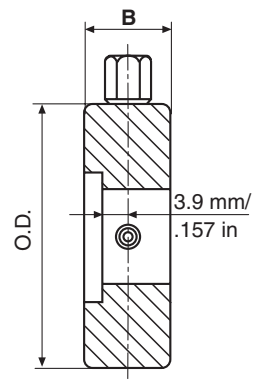
For every air gage, an appropriate setting master can be ordered.



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



Snout Types



Counterbore Type

Nominal deviations from - to dia. D mm (inch)				2 Measuring Jets Measuring Range/type				3 Measuring Jets Measuring Range/type			
				38 µm (.0015") DR 20 5000:1		76 µm (.003") DR 50 2500:1		38 µm (.0015") DR 20-3 5000:1		76 µm (.003") DR 50-3 2500:1	
				ø D mm (inch)	B mm (inch)						
6.299	- 7.592	(0.2480	- 0.2989)	76.20	(3.000)	25.40	(1.000)	2093025	2093005	2093035	2093015
7.595	- 9.294	(0.2990	- 0.3659)	76.20	(3.000)	25.40	(1.000)	2093026	2093006	2093036	2093016
9.296	- 13.002	(0.3660	- 0.5119)	76.20	(3.000)	25.40	(1.000)	2093027	2093007	2093037	2093017
13.005	- 21.003	(0.5120	- 0.8269)	76.20	(3.000)	25.40	(1.000)	2093028	2093008	2093038	2093018
21.006	- 25.400	(0.8270	- 1.0000)	76.20	(3.000)	25.40	(1.000)	2093029	2093009	2093039	2093019
25.403	- 38.351	(1.0001	- 1.5099)	101.60	(4.000)	25.40	(1.000)	2093030	2093010	2093040	2093020
38.354	- 44.450	(1.5100	- 1.7500)	101.60	(4.000)	25.40	(1.000)	2093031	2093011	2093041	2093021
44.453	- 50.797	(1.7501	- 1.9999)	127.00	(5.000)	25.40	(1.000)	2093032	2093012	2093042	2093022
50.800	- 63.500	(2.0000	- 2.5000)	127.00	(5.000)	25.40	(1.000)	2093033	2093013	2093043	2093023

Setting Standards for indicating measuring instruments

AGD Masters



Master Rings

- Traceable certification and calibration available on request.
- Polished and lapped to size
- 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 Discs AGD Style 3

- Traceable certification and calibration available on request.
- Polished and lapped to size
- Non-gaging areas black oxidized — ring faces ground.
- Meet all requirements of ANSI Specification B47.1-1988

Master Plugs

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

- Manufactured in accordance with ANSI Specification B89.1.5.
- Furnished with clear insulators.
- All dimensions are AGD style 3.

Accessories Air Gaging Instruments

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.

2202010 and 2202011 Extensions — accepts Hose 2202074 on one end and the following plug sizes on the opposite end: all 8000:1 plugs up to 76.3 mm / 3.004”.

2202012 Handle — accepts Hose 2202074 on one end and the following plug sizes on the opposite end: all 8000:1 plugs up to 76.3 mm / 3.004”.
Has Bakelite insulating cover. Recommended for 37.7 mm / 1.484” up to 76.3 mm / 3.004” diameters.

2237666 — High impact and coolant resistant, lightweight composite handle — normally furnished with μ Dimensionair® and air snaps

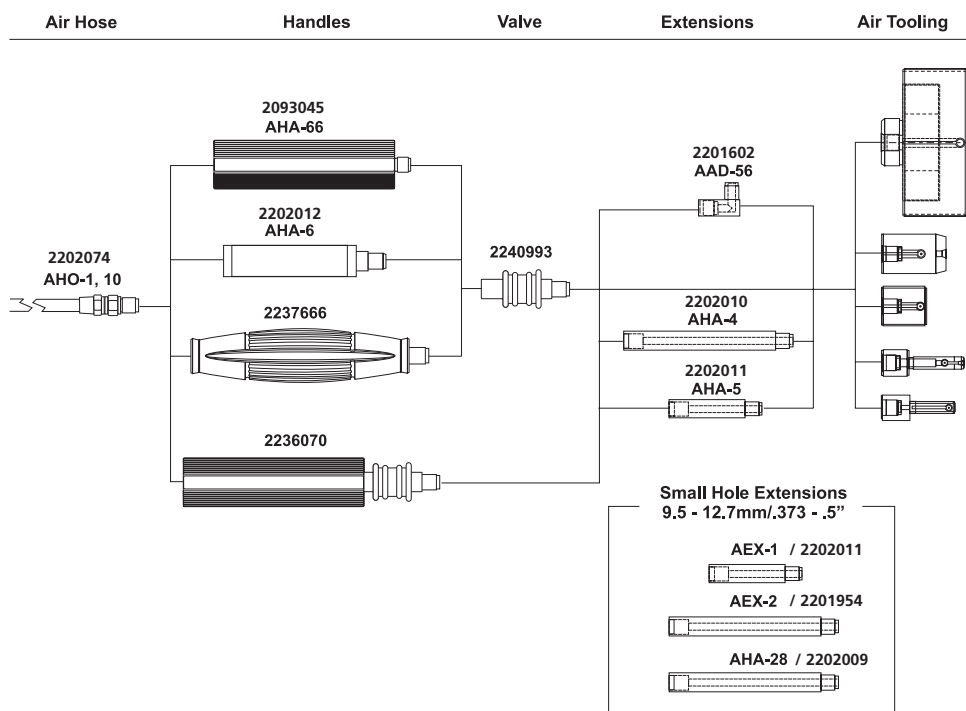
2093045 — lightweight aluminum handles with or without air shutoff valve.

2202003 Handle — used and furnished with 1250:1 thru 8000:1 through or blind hole plugs over 76.3 mm / 3.004”.

2202009 Handle — Used with 2500:1 thru 8000:1 blind hole plugs in the 9.47 mm / .3735” to 11.8 mm / .467” range, using an Adaptor 2201588.

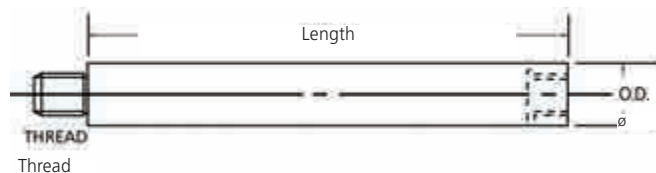
2201954 and 2201963 Extensions — used with 2500:1 thru 8000:1 through hole air plugs in the 9.47 mm / .3735” to 14.93 mm / .588” range and with 11.8 mm / .467” to 14.93 mm / .588” range blind hole plugs, using an Adaptor 2201601.

2201975 — extension used with an Adjustable Base 2204599. Provides easily configured base for bench mounted air tooling fixturing



Thread	ø		Length		Order no.
	mm	/ inch	mm	/ inch	
3/8-32	12.07	/ .475"	102	/ 4"	2202010
3/8-32	12.07	/ .475"	51	/ 2"	2202011
3/8-32	19	/ .750"	102	/ 4"	2202012
1-1/8-18	33.4	/ 1.315"	152	/ 6"	2202003
3/8-32	12.7	/ .500"	133.3	/ 5.25"	2202006
10-32	9.14	/ .360"	102	/ 4"	2202009
5/16-32	9.02	/ .355"	51	/ 2"	2201954
5/16-32	9.02	/ .355"	102	/ 4"	2201963
3/8-32	9.5	/ .374"	61.7	/ 2.43"	2201975*

* Use on 2204599



Single Jet Probe Millimar AAT-19 / AAT-20

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



Technical Data

Order no.	2086612	2086613
Product type	AAT-19	AAT-20
Magnification	2500:1	
Design	Single jet probe	Matched jet probe pair

Willrich Precision Instrument Company
 Ph 866-945-5742
sales@willrich.com