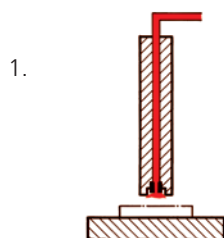


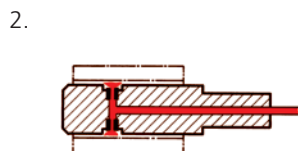
Millimar | Air Gages

Precision begins at the Start of the Measuring Process

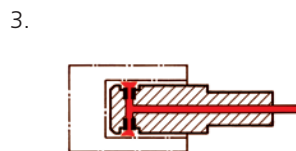
Air gages use the measuring effect of the change in pressure when a workpiece approaches a measuring jet. As the distance between jets and work surface decreases, the pressure increases while the velocity of flow and the respective volume flow decrease. The air measuring procedure has a relatively short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



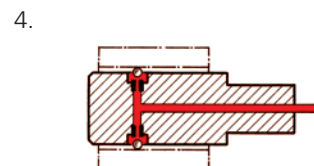
1. Thickness or wall thickness measurements with jet air gage.



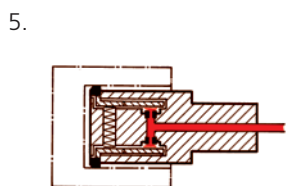
2. Diameter measurement of cylindrical through bores with jet air plug gage.



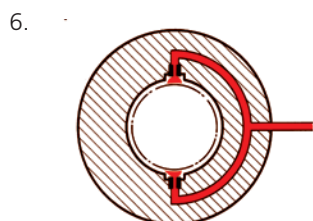
3. Diameter measurement of cylindrical blind bores with jet air plug gage.



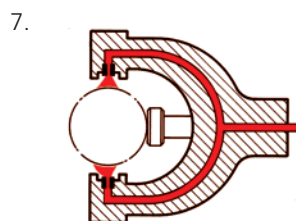
4. Diameter measurement of cylindrical through bores with ball contact plug gage.



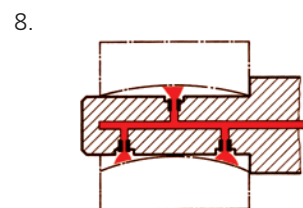
5. Diameter measurement of cylindrical blind bores with lever contact plug gage.



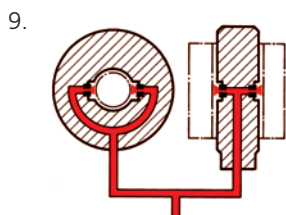
6. Diameter of thickness measurement with adjustable jet air caliper gage.



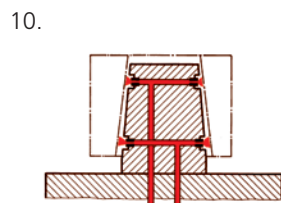
7. Diameter measurement of cylindrical shafts with jet air ring gage.



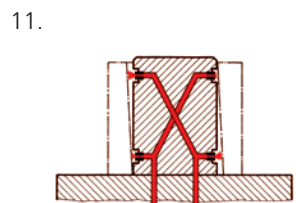
8. Straightness measurement of a cylindrical bore with special jet air plug gage.



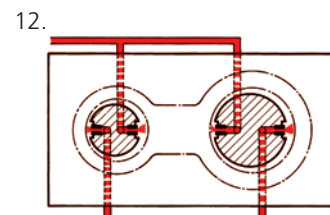
9. Mating measurement between bore and shaft with jet air plug gage and jet air ring gage.



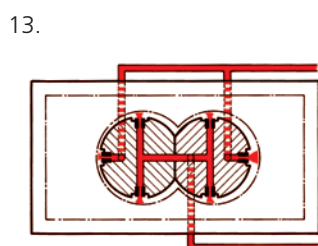
10. Taper pitch measurement of an inside taper with taper jet air plug gage measurement as per the differential measuring method.



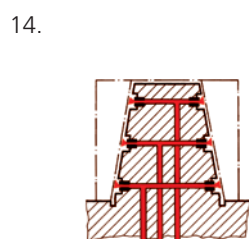
11. Measurement of a perpendicular position of a cylindrical bore to the front face with a special jet air plug gage measurement as per the differential measuring method.



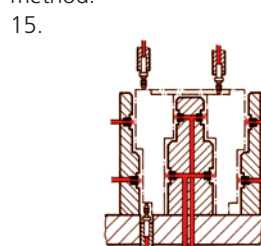
12. Measurement of hole distances of separated cylindrical bores with jet air plug gage measurement as per the differential measuring method.



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.



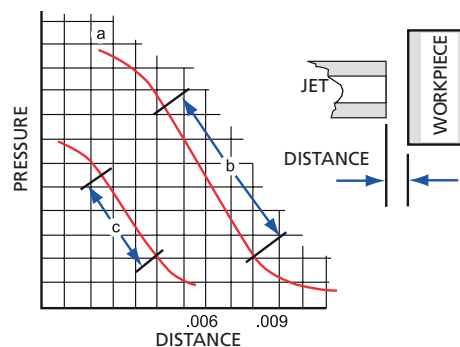
Metrological

- 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.



Millimar D-1250 / D-2500 / D-5000 / D-10000 / D-20000 / D-4000 / D-8000 / D-16000 / D-32000

Dimensionair Air Gages (Single Master System)

FEATURES

- 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
- **Package contains:** adapter for pneumatic plug gages, Federal compatible, air filter, supply hose AHO-2



TECHNICAL DATA

	Order no.	2095183	2095184	2095185	2095186	2095189	2095195	2095196	2095197	2095198
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 inches	inch	± .003"	± .0015"	± .00075"	± .0003"	± .00015"	± .0015"	± .00075"	± .0003"	± .00015"
Scale graduation value	inch	.0001"	.00005"	.00002"	.00001"	.000005"	.000025"	.00001"	.000005"	
Display		Large analog scale with 2 tolerance markers								
Compatibility		Federal								
Features		1								
Air pressure		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"

Millimar D-1250 / D-2500 / D-5000 / D-10000 / D-20000 / D-4000 / D-8000 / D-16000 / D-32000

Dimensionair Air Gages (Single Master System)

ACCESSORIES

Order no.	Product name	Product type
2086965	Magnification kit, for calibrating pneumatic display units, Magnification: 1250:1	AMR-SPEC-136
2094182	Magnification kit, for calibrating pneumatic display units, Magnification: 1260:1	DP60
2201991	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
2086960	Magnification kit, for calibrating pneumatic display units, Magnification: 2500:1, 4000:1	AMR-12
2086961	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;
D60;
AMR-12;
AMR-13;
AMR-14;
AMR-15



AFL-24

Millimar D-1250M / D-2500M / D-5000M / D-10000M / D-20000M / D-4000M / D-8000M / D-16000M / D-32000M

Dimensionair Air Gages (Single Master System)

FEATURES

- 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
- **Package contains:** adapter for pneumatic plug gages, 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	D-4000M	D-8000M	D-16000M	D-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								
Features	1								
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	Depth	Height	Height	Width	Width
	mm	inch	mm	inch	mm	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"

Millimar D-1250M / D-2500M / D-5000M / D-10000M / D-20000M / D-4000M / D-8000M / D-16000M / D-32000M

Dimensionair Air Gages (Single Master System)

ACCESSORIES

Order no.	Product name	Product type
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;
D60;
AMR-12;
AMR-13;
AMR-14;
AMR-15



AFL-24

Millimar

Dimensionair Air Gages (Single or Dual Master System)

FEATURES

- 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
- **Package contains:** dial face (order no.: 2242662), adapter for pneumatic plug gages, Federal compatible, air filter, supply hose AHO-2



Application:

- Use in basic dual master air gage applications

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	Depth	Height	Height	Width	Width
	mm	inch	mm	inch	mm	inch
2098125	187	7.125"	197	7.75"	127	5"

Millimar

Dimensionair Air Gages (Single or Dual Master System)

ACCESSORIES

Order no.	Product name	Compat- ibility	Magnifi- cation	Range of	Range of	Gradua- tion value	Gradua- tion value	Product type
				analog display	analog display	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	
2086610	Adaptor 3/8-32 to 10/32, for Ø .109" (2,77mm) up to .494" (12,55mm)	Sheffield						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
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



AFL-24



AMR-SPEC-136;
D60;
AMR-12;
AMR-13;
AMR-14;
AMR-15