

## Air Gauging "a new approach"

Air Gauging is a fast, user friendly method of providing high precision results in even the most challenging of shop-floor environments. Using air flow volumes and pressures to measure parts, Air Gauging is a reliable, repeatable technology well suited for applications that demand sub-micron precision tolerancing. Air Gauging technology is flexible; enabling measurement of not only dimensions, but geometric and relational characteristics, such as squareness, parallelism, ovality, taper and straightness.

The working range of our standard air gauge tooling is 0.08mm. For optimum accuracy, Bowers produce the Setting Masters at the Upper and Lower product limits.

## Bowers Air1 (Single Channel) Air2 (Twin Channel)

The user friendly modern design of the Bowers Air1/2 Gauge has a touch screen for ease of use and readability.

For improved accuracy the Bowers Air1/2 benefits from two or three points of calibration, the minimum, the maximum and the mid: this offers greater linearity. Air gauging on the shop floor is a simple yet robust method of measurement that offers a myriad of measurement capability but with the smallest of footprint in a busy crowded factory floor. With no moving parts the toughened glass touch screen requires no special maintenance making this device really suitable for harsh working environments. It does have a number of connectivity options, all designed to make the measuring process more user friendly.

- Simplicity with USB connectors for laptops and keyboards
- Data output from this device is exceptionally straightforward
- Fast reaction time of measurement, reduces the cycle times on machines
- QR Code Configuration
- Foot pedal for preset-clear-part characteristic-hold-data transfer

### Bowers Air1/2 Features

- TFT colour touch screen display 4,3", resolution 480x272
- Static or dynamic measurements (Max, Min, Max-Min, Average, Median)
- Analogue or digital display
- 1 or 2 measurement configurations (2 characteristics)
- Possibility to select automatically the characteristic by using the air gauge or by touching the screen
- Relative or absolute display
- Display resolution (up to 0.1µm)
- Metric (mm or µm) or Imperial (Inches) measurement or DMS
- Classification/Grading: Up to 16 classes with colour representation
- RS232 port for communication with a PC
- USB port for communication and/or power supply
- USB Stick for data saving on a CSV file
- Optional connection of M-Bus modules
- Measurement transfer by pressing a key, footswitch input or retro-command on the RS232 port
- Operating temperature: +15°C to +30°C
- Power supply from 85 to 265 VAC by using the supplied main transformer (or by connecting it directly on your PC USB port, or through the 24 VDC screw terminal)
- Relative humidity: maximum 80%
- Dimensions: width 130mm, height 111mm, depth 105mm
- Mass: 600g (700g with the power supply)

### D400S – Multifunctional Multichannel Features

The D400S from Sylvac allows users to display readings simultaneously from multigauging applications. All of which offers readings for each dimension, the MIN, MAX and DELTA.

- 7" touchscreen display and customizable display interface
- Aluminium body
- 12VDC/30VDC Power supply
- RJ-45 Ethernet TCP4
- USB host (for usb key) and USB device (virtual keyboard)
- Footswitch
- M-BUS
- RS232
- Static and dynamic (Mini, Maxi, Maxi-mini, Average, Median)
- Trigonometrical measurements
- Analogical and digital display
- Manage up to 32 fixtures with automatic fixture detection by probe motion
- Up to 32 characteristic by fixture
- Up to 128 part references
- Calibration mode
- Individual probe display
- Displays resolution up to 5 decimal places E 7
- SPC functions
- Measurement transfer by USB or RS232
- PLC programming



Bowers Air1/2

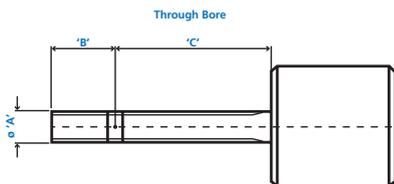


D4005

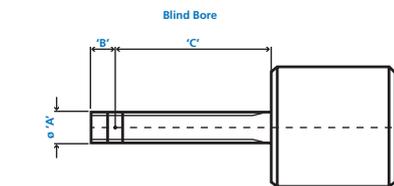
## Air Gauge Tooling

Standard: 3.00-14.10mm

ø'A' Range	'B'	'C'
ø3.00 - 4.70	4.76	20.65
ø4.70 - 6.30	12.70	22.30
ø6.30 - 14.10	12.70	25.40

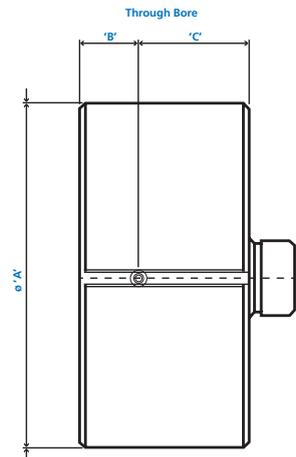


ø'A' Range	'B'	'C'
ø3.00 - 4.70	3.97	21.45
ø4.70 - 6.30	3.97	31.05
ø6.30 - 14.10	3.97	34.15



- Mercer System Bayonet Adapter (included)
- Federal System 3/8" - 32 NS Internal Thread, Air Box Unit Assembly NOT included
- Bowers PC2200 System Hexagonal Handle (included)

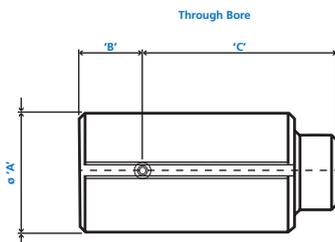
Standard: 76.45-203.20mm



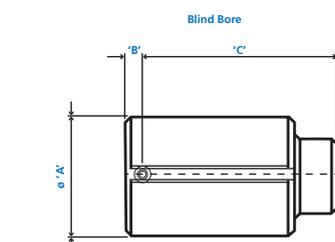
ø'A' Range	'B'	'C'
ø76.45 - 203.2	19.05	31.75

Standard: 14.10-76.45mm

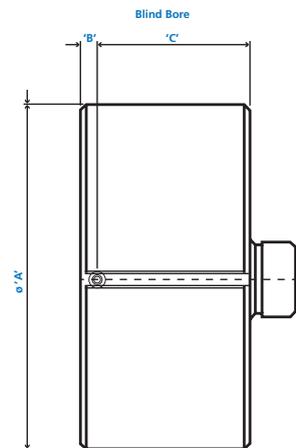
ø'A' Range	'B'	'C'
ø14.10 - 37.85	15.90	35.20
ø37.85 - 76.45	19.05	34.95



- Mercer System Bayonet Adapter (included)
- Federal System 3/8" - 32 NS Internal Thread, Air Box Unit Assembly NOT included
- Bowers PC2200 System Hexagonal Handle (included)



ø'A' Range	'B'	'C'
ø14.10 - 37.85	3.97	47.15
ø37.85 - 76.45	3.97	50.00



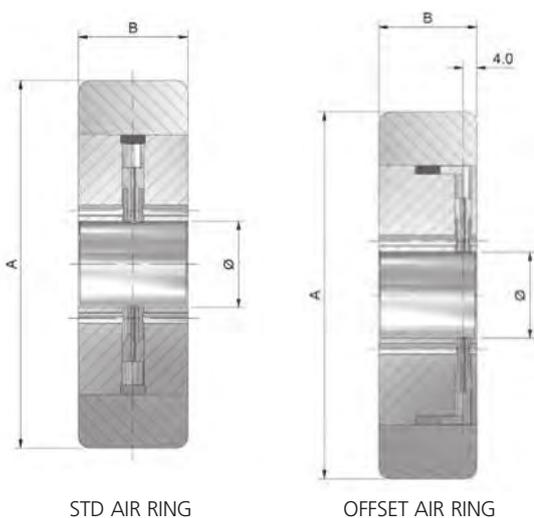
ø'A' Range	'B'	'C'
ø76.45 - 203.2	3.97	46.60

## D400S Multifunctional/Multichannel Display



Application example: Display several channels for each dimension (MIN, MAX and DELTA)

## Air Rings



STD AIR RING

OFFSET AIR RING

### AIR RINGS - SPECIFICATION

Size Range (mm)	Size Range (inch)	Dia A (mm)	Dia A (inch)	Dia B (mm)	Dia B (inch)
3.17-6.35	1/8-1/4	63.50	2.5	19.05	3/4
6.35-25.40	1/4-1	82.55	3 1/4	25.40	1
25.40-38.10	1-1.5	107.95	4 1/4	28.58	1 1/8
38.10-50.80	1.5-2	120.65	4 3/4	28.58	1 1/8
50.80-63.5	2-2.5	133.35	5 1/4	28.58	1 1/8

## Master Setting Rings

### RING CODES

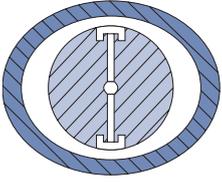
		From mm	To mm	From inch	To inch
R1X	RING GAUGE (CLASS X)	1.5	3	0.059	0.118
R3X	RING GAUGE (CLASS X)	3	6.1	0.118	0.24
R6X	RING GAUGE (CLASS X)	6.1	9.27	0.24	0.365
R9X	RING GAUGE (CLASS X)	9.27	12.95	0.365	0.51
R12X	RING GAUGE (CLASS X)	12.95	20.96	0.51	0.825
R20X	RING GAUGE (CLASS X)	20.96	28.83	0.825	1.135
R28X	RING GAUGE (CLASS X)	28.83	38.35	1.135	1.51
R38X	RING GAUGE (CLASS X)	38.35	51.05	1.51	2.01
R51X	RING GAUGE (CLASS X)	51.05	63.75	2.01	2.51
R63X	RING GAUGE (CLASS X)	63.75	76.45	2.51	3.01
R76X	RING GAUGE (CLASS X)	76.45	89.15	3.01	3.51
R89X	RING GAUGE (CLASS X)	89.15	101.85	3.51	4.01
R101X	RING GAUGE (CLASS X)	101.85	120.9	4.01	4.76
R120X	RING GAUGE (CLASS X)	120.9	139.95	4.76	5.51
R139X	RING GAUGE (CLASS X)	139.95	159	5.51	6.26
R159X	RING GAUGE (CLASS X)	159	178.05	6.26	7.01
R178X	RING GAUGE (CLASS X)	178.05	197.1	7.01	7.76
R197X	RING GAUGE (CLASS X)	197.1	203.2	7.76	8
R1XX	RING GAUGE (CLASS XX)	1.5	3	0.059	0.118
R3XX	RING GAUGE (CLASS XX)	3	6.1	0.118	0.24
R6XX	RING GAUGE (CLASS XX)	6.1	9.27	0.24	0.365
R9XX	RING GAUGE (CLASS XX)	9.27	12.95	0.365	0.51
R12XX	RING GAUGE (CLASS XX)	12.95	20.96	0.51	0.825
R20XX	RING GAUGE (CLASS XX)	20.96	28.83	0.825	1.135
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R38XX	RING GAUGE (CLASS XX)	38.35	51.05	1.51	2.01
R51XX	RING GAUGE (CLASS XX)	51.05	63.75	2.01	2.51
R63XX	RING GAUGE (CLASS XX)	63.75	76.45	2.51	3.01
R76XX	RING GAUGE (CLASS XX)	76.45	89.15	3.01	3.51
R89XX	RING GAUGE (CLASS XX)	89.15	101.85	3.51	4.01
R101XX	RING GAUGE (CLASS XX)	101.85	120.9	4.01	4.76
R120XX	RING GAUGE (CLASS XX)	120.9	139.95	4.76	5.51
R139XX	RING GAUGE (CLASS XX)	139.95	159	5.51	6.26
R159XX	RING GAUGE (CLASS XX)	159	178.05	6.26	7.01
R178XX	RING GAUGE (CLASS XX)	178.05	197.1	7.01	7.76
R197XX	RING GAUGE (CLASS XX)	197.1	203.2	7.76	8

CLASS X OR XX TO ANSI/ASME B89.1.6M. All Setting Rings are supplied with UKAS Certificates



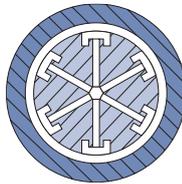
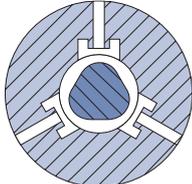
## Air Gauge Tooling Applications

The following are some examples of how Air Gauge tooling can be configured.



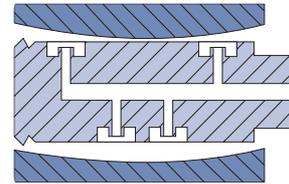
### OUT-OF-ROUNDNESS

Air tools can gauge a part for roundness. For two-point out-of-round conditions, a standard two-nozzle air tool can be used. If lobing exists in the part, an odd number of nozzles must be used, depending on the number of lobes.



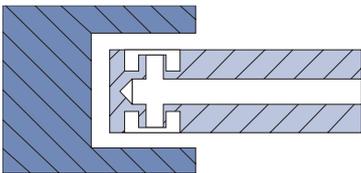
### AVERAGING

Multiple nozzles are equally located about the circumference of the air tool to allow for average size measurement. Commonly used for thin-walled or out-of-round parts — four, six, or more nozzles are utilised, depending on the tool size.



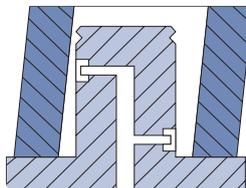
### STRAIGHTNESS

A common application of Air Gauging is to dynamically measure the straightness or “bow” of an inside or outside diameter. In this case, a custom designed air plug makes verifying a part’s straightness simple and fast. (A straightness air plug cannot measure diameter).



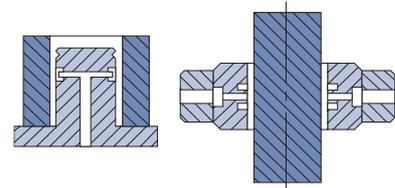
### GROOVE WIDTH

The measurement of grooves is conveniently achieved with flat, blade-type air tools. Air Gauging not only determines groove size, but with exploration around the workpiece, parallelism of the groove faces can also be determined.



### SQUARENESS

To determine squareness of a part, for example a bore to a face, air nozzles configured as a “z” are used with dynamic measurement to change the back-pressure from square to out of square conditions.



### INSIDE & OUTSIDE DIAMETERS

Air Gauges are most commonly used for measuring the size and form of inside diameters and outside diameters. Two-nozzle air plugs, with nozzles diametrically opposed, are used for internal measuring, and two-nozzle air rings are used for external dimensions.

## Air / Electronics Columns

For the more traditional methods of Air Gauging Bowers offers a variety of display options e.g. air/electronic, which is capable of measuring functions including static and dynamic gauging, classification grading, probe mixing, ie (A+B) , (A-B).

### FEATURES OF AIR/ELECTRONIC COLUMNS

	AEP 2045	PC2200
Display Type	Tri-colour bar / Digital numeric	Tri-colour bar / Digital numeric
User Interface	Keypad	Keypad or remote program (1)
Channels	1	1 or 2 depending on model
Memory Capability	16 Tooling Characteristics	4 Tooling Characteristics
Resolution	Up to 0.0001mm	Up to 0.0001mm
Relative/Absolute	REL/ABS	REL/ABS
Measuring Mode	Static/Dynamic/TIR	Static/Dynamic/TIR
Units	mm or inch	mm or inch
Direct RS232	Yes	Yes
Data Collection	On board (2)	External
Connectivity	USB	RS232
Display Options	Tri-colour bar / Digital Numeric Tolerance + Approach	Tri-colour bar / Digital Numeric Tolerance + Approach
Auto Channel Recognition	No	No
Grading	Yes	Yes
Dimension (mm) (HxWxD)	500x60x200	450x57x215
Weight Approx (kg)	4.7	5
Power Requirements	230 VAC 50Hz	110/220 VAC 50Hz

(1) Additional parts / software required. (2) 1000 measurements. Download to Flash Drive via USB.



55-2045-AEP

PC2200