



**THE AE6 AIR/  
ELECTRONIC TRANSDUCER**

**USER'S MANUAL**

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**A&E GAUGES LTD.**

Unit 7

Redbourn Industrial Estate

Redbourn

Hertfordshire

AL3 7LG

Tel: +44 (0)1582 794136

Fax: +44 (0)1582 794463

E-mail : [sales@a-egauges.co.uk](mailto:sales@a-egauges.co.uk)

Web: [www.a-egauges.co.uk](http://www.a-egauges.co.uk)

# THE A & E GAUGES A/E.6/ELECTRONIC TRANSDUCER

## SECTION 1 : INTRODUCTION

### 1. GENERAL DESCRIPTION

The A & E Gauges A/E.6 Air/Electronic Transducer permits the use of air gauge measuring heads, such as air plug or air ring gauges, with a variety of A & E Gauges Electronic Units. In addition to providing very high magnification, the simplicity of air gauge measuring heads is combined with electronics to provide benefits such as high accuracy tolerance indication, differential and match gauging, and SPC (Statistical Process Control). Precision at high magnification is ensured by restricting the standard measuring range to a maximum of  $\pm 0.015\text{mm}$  ( $\pm 0.0005$  in). There is a special measuring range of up to  $\pm 0.050\text{mm}$  ( $\pm 0.002$  in). For very special applications, longer measuring ranges are possible: A & E Gauges Technical Dept. will be pleased to advise on receipt of a detailed requirement.

Two versions are available with a differing connection for the measuring head, and are designated as follows:

- A/E.6 (Part No 96100.005) - Standard version with bayonet connection.
- A/E.6F (Part No 96100.007) - Fixture version with G1/4 (BSP Parallel) connection.

Two M5 clearance holes are provided on the body of the transducer for securing it to a bench or fixture; multiple transducers can be secured to each other.

### 1.1 OPERATING PRINCIPLE (Fig.1)

Compressed air at a minimum gauge pressure of 4.8 bar (70 psi) is filtered and regulated externally to a gauge pressure of 2.96 bar (43.0 psi) before entering the transducer, through the magnification control, to one side of a diaphragm sensitive to minute changes in pressure. Air flows to atmosphere through one or more jets in the gauge measuring head, and variations in pressure against the diaphragm result from variations in the clearance between the measuring head and the work piece.

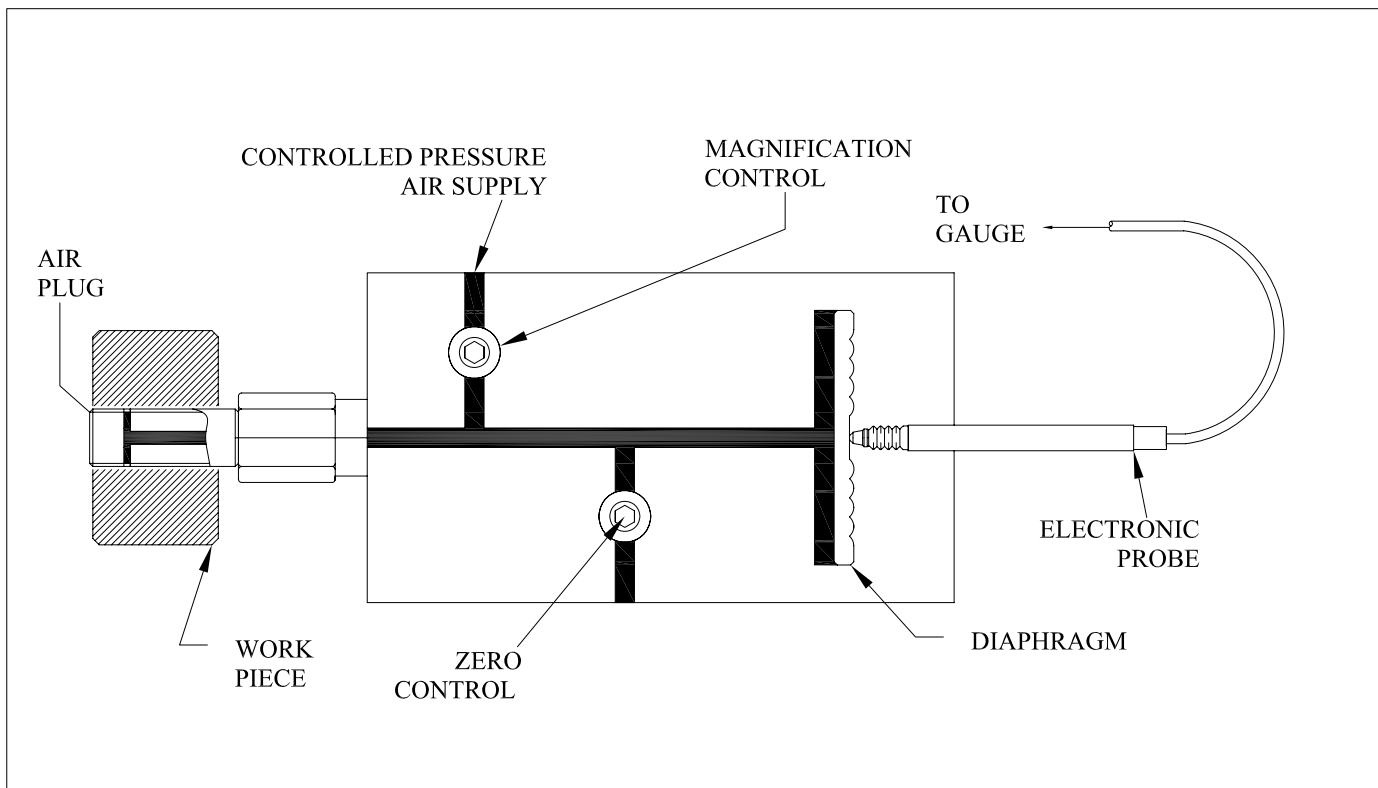
The movement of the diaphragm is detected by an electronic probe and indicated by the gauge unit.

Probes of differing sensitivity are used for differing applications; full details of Probe/Gauge Unit are given in section 1.4.

The zero control on the gauge unit and the magnification control on the transducer are used to calibrate the system using suitable masters. The zero control on the transducer is only used in special applications and can be blanked off to prevent tampering.

### IMPORTANT

The transducer must be used with a suitable air filter and pressure regulator and we recommend our Air/filter/regulator/monogauge unit (Ref No 95050.641).



**Fig.1 : Operating principle of the AE6 air/electronic transducer**

## 1.2 PHYSICAL DATA

Dimensions	see Fig.3
Weight	1.4 kg nett
Air supply	4.8 bar(70psi) gauge min.
Air consumption	1.3 litres/min (0.5 scfm)

### **Electronic probe:**

Standard version	Type 493
Special version	Type 495
* Accuracy	$\pm 0.5 \mu\text{m}/0.00002''$

### **Measuring range:**

Standard	$\pm 0.015 \text{ mm}/0.0005''$
Special	$\pm 0.050 \text{ mm}/0.0020''$

\*This figure is based on the use of a measuring head with two 1.5mm jets.

### 1.3 TRANSDUCER/GAUGE UNIT COMPATIBILITY

The A/E.6 Transducer can be used with any of the current range of A & E approved electronic gauge units; in addition, some of the older obsolete '155' Series may also be used. The Gauge Units comprising these systems are as follows:

IBR

Mercer 122 series, EL80/83/87/90, EL300  
EL400, EL500,etc.

Tesa.

### 1.4 PROBE/GAUGE UNIT COMBINATION

The following table summarises the type of probe which must be fitted to the Transducer when used with a particular Gauge Unit. For details see Section II.

<u>GAUGE TYPE</u>	<u>PROBE TYPE</u>	
	Standard Application	Special Application
122 Series, EL80/83/87/90,EL300, EL400, EL500	493	495
Microline.	490	490

**(Used with divisors programmed into Microline).**

## SECTION II : SETTING INSTRUCTIONS

### 2.0 INSTALLATION

Connect the Filter/Regulator Bracket and the Transducer to the main air supply as illustrated in Fig.2. Make sure that all connections are air-tight. Purge filters by opening drain taps [Fig.2 (2)] and turning on the air supply. Close drain taps and check that the pointer of the pressure gauge [Fig.2 (3)] is between the two scale marks.

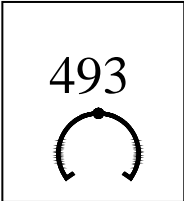
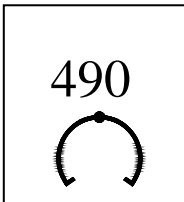
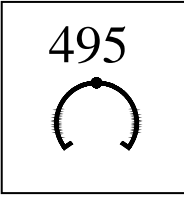
#### IMPORTANT

The filters must be drained **daily** and the bowls washed occasionally with soap and water. **NEVER USE SOLVENTS.** See Air Filter Regulator Bracket(AFRB) instruction sheet.

### 2.1 PROBE/GAUGE UNIT/GAUGE HEAD COMBINATION

It is absolutely essential that the correct probe appropriate to the gauge unit is used. Details are given in the following Table, columns 2 to 4.

It is essential that the correct measuring head (air plug or air ring) is used; the markings detailed in column 2 of table 1 are marked on the gauge plug adaptor.

1	2	3	4	
			mm	inch
Application	Probe Type	Sensitivity		
Standard		1\3	0.095 mm	0.0037"
Long Range		1\1	0.285 mm	0.0112"
Deep Jet		1\2	0.142 mm	0.0056"

**Table 1: Transducer Probe data**

## 2.2 CONNECTING THE PROBE

The Transducer is normally supplied with the probe assembled; if it is not fitted proceed as follows:

- i Shut off the air supply using tap Fig.2 (1) : Section 2.7
- ii Wait until the air is completely emptied from the system.
- iii Insert the probe into the Transducer and lightly clamp the screws.
- iv Insert the probe connector into the gauge unit as follow:

For air plugs insert into the A – (minus) socket.

For air rings insert into the A + (plus) socket.

**Note:** On '122' series gauge units, the 'B' Channel may be used if preferred.

The polarity on the Microline is included as part of the gauge program.

## 2.3 SETTING THE GAUGE UNIT

- i Check that the Gauge Unit is correctly calibrated in accordance with the instructions appropriate to the Unit.

**Note:** If the Transducer probe is used for this purpose, note the different sensitivity ratios:

490 is 1/1	i.e.1,0 mm reads 1,0 mm
493 is 1/3	i.e.0,9 mm reads 0,3mm
495 is 1/2	i.e.1,0 mm reads 0,5mm

- ii Set the zero control to mid-travel.
- iii Select the range given in column 4 of Table 1 (Section 2.1), note the following:
  - a. Electroline 80/87 series range is selected by means of an interchangeable plug. Ensure that the appropriate Range Plugs are available for both Setting and Gauging.
  - b. 'Microline': it may be necessary to temporarily reprogram sensitivity for 'L' Low Sensitivity for the purpose of setting the Transducer; in some cases a separate transducer Channel is provided. Check with the instructions supplied with the equipment.
  - c. '155' Units only: check that the slider switch at the rear of the Unit is set at the 'NORMAL' (up) position.

## 2.4 SETTING THE TRANSDUCER

- i Lightly clamp the probe in the Transducer until the gauge meter reads the approximate value of dimension 'A' in Table 1. Column 4.  
**Note:** The reading should be plus (+) for Air Plugs and minus (-) for Air rings when match gauging: see Section III.
- ii Securely clamp the probe with both screws but do not over tighten.
- iii Set the gauge meter reading to the exact value for dimension 'A' using the zero control of the gauge unit.  
(Microline has a special auto zero procedure: refer to the appropriate manual).

## 2.5 MASTER SETTING GAUGES

When using air gauge measuring heads (air plugs and air rings etc), it is necessary to range the indicating equipment to suit the measuring head. This is done using two Setting gauges; master rings for air plugs and master plugs for air rings.

For some applications a third 'zero' gauge may be required.

Standard setting gauges are made PLUS and MINUS from the nominal size to be measured; they are calibrated in temperature-controlled conditions and are marked with the mean (zero) size and a 'SET +' or 'SET -' value.

**EXAMPLE:** a PLUS setting ring may be marked:- 12,700 mm +0,0117mm  
or (0,5000 in +0.00046in).

## 2.6 FINAL SETTING: PRELIMINARY

- i. Turn the air supply ON [Fig.2 (1)]
- ii. Check that the monogauge [Fig.2 (3)] registers between or within 1,5 mm of the red lines.
- iii. Screw both transducer control(s) [Fig.2 (5)] right in (clockwise).

### **IMPORTANT NOTE:**

The zero control (unmarked) is only required when 'long range' measuring heads are used.

- iv. Set the range of the gauge unit to suit the range of the gauge head to be used.

## 2.7 FINAL SETTING: AIR PLUG GAUGES

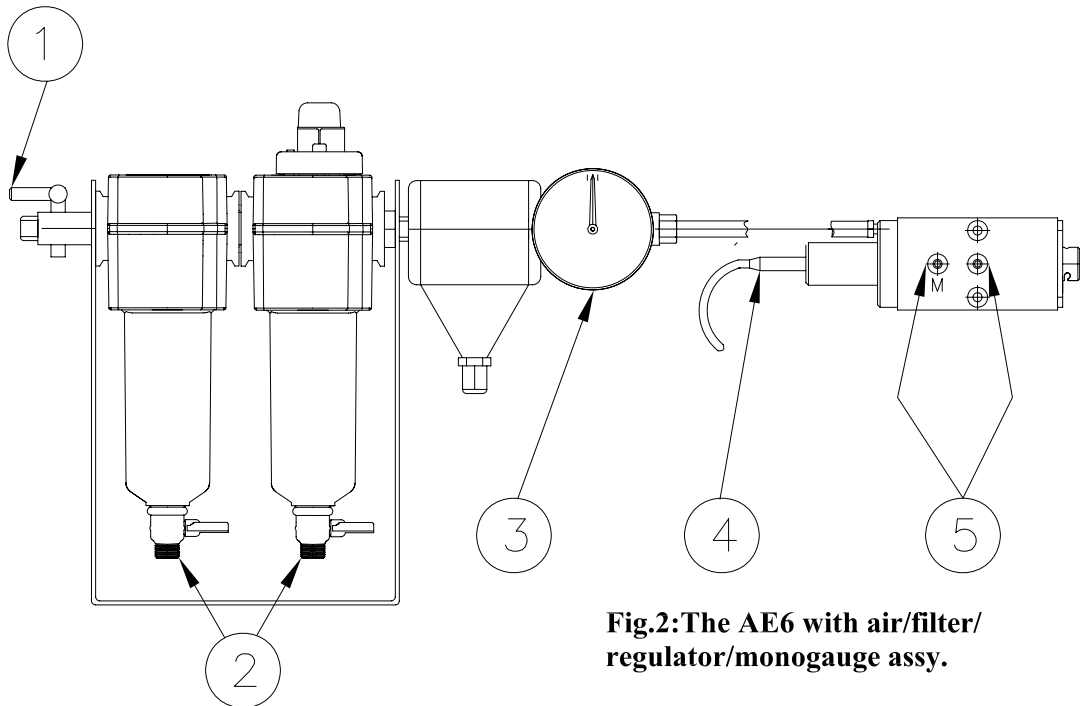
- i. Connect the probe to the 'A' minus (-) socket or check that, where appropriate, the correct polarity has been programmed.
- ii. Place the 'PLUS' setting ring on to the air plug.
- iii. Unscrew the control [Fig.2 (5)] marked 'M' until the display reads the SET + value marked on the setting ring.  
**Always remove the hexagon key from the control between adjustments otherwise spurious measurements may be encountered.**
- iv. Replace the 'PLUS' setting ring with the 'MINUS' setting ring.  
**NOTE:** it is unlikely that the reading will correspond exactly with the calibrated 'SET -' value; to adjust proceed as follows:
  - v. Air plugs for STANDARD measuring range: adjust to the 'SET -' (minus) value using the gauge unit 'ZERO' control.  
Air plugs for LONG measuring range: adjust to the 'SET -' (minus) value using the transducer (unmarked) zero control [Fig.2 (5)].
  - vi. Replace the 'PLUS' ring and, using the transducer control marked 'M', over-correct by 3 to 4 times the amount of error.
  - vii. Repeat this procedure until the correct setting is achieved, ensuring that adjustments are made as follows:

With the 'PLUS' Ring on the plug use the transducer control marked 'M'.

With the 'MINUS' Ring on the plug:

For 'standard range' plugs use the gauge unit 'ZERO' control.

For 'long range (495/490)' plugs use the transducer (unmarked) zero control.



**Fig.2: The AE6 with air/filter/  
regulator/monogauge assy.**



## **FINAL SETTING: AIR RING & OPEN JET CALIPER GAUGES**

- i. Connect the probe to the 'A' plus (+) socket or check that, where appropriate, the correct polarity has been programmed.
- ii. Insert the 'MINUS' setting plug into the air ring.
- iii. Unscrew the control [Fig.2 (5)] marked 'M' until the display reads the 'SET -' (minus) value marked on the setting plug.
- iv. Replace the 'minus' plug with the 'PLUS' setting plug.  
**NOTE:** it is unlikely that the reading will correspond exactly with the calibrated 'SET -' (minus) value; to adjust proceed as follows:
- v. AIR RINGS for STANDARD measuring range: adjust to the 'SET +' (plus) value using the gauge unit 'ZERO' control.  
AIR RINGS for LONG measuring range: adjust to the 'SET +' (plus) value using the transducer (unmarked) zero control [Fig. 2(5)].
- vi. Replace the 'MINUS' plug and using the transducer control marked 'M', overcorrect by 3 to 4 times the amount of error.
- vii. Repeat this procedure until the correct setting is achieved, ensuring that adjustments are made as follows:

With the 'MINUS' plug in the Air Ring use the transducer 'MAG' control marked 'M'

With the 'PLUS' plug in the Air Ring:

For 'Standard Range' plugs use the gauge unit 'ZERO' control.

For 'Long Range' Plugs use the Transducer (unmarked) zero control

**NOTE:** When used with 'MICROLINE', zero is adjusted using the special auto zero procedure.

### **SPECIAL NOTE WHEN USING ANALOGUE UNITS**

It may be convenient when setting to switch to a longer range (lower magnification), final adjustment for the zero setting must be made at the correct range to be used when gauging. For this reason a 'zero' Setting Gauge may be necessary in addition to the 'Plus' and 'Minus' Gauges.

## SECTION III : MATCH GAUGING

### 3.0 INTRODUCTION

Match gauging is the term used to describe equipment designed to measure the difference in size, or fit, between matching components (shafts and bores).

The fit may be classified as clearance, interference or transition.

### 3.1 EQUIPMENT USED

- i Any Gauge Unit in the '122' or two-column Electroline series may be used.
- ii The bore is measured with an air plug gauge and the A/E6 transducer; the shaft may be measured with a comparator and probe or an electronic calliper.
- iii Two calibrated setting rings are required to 'range' the air plug, a third ring made to the mean size of the component matches a mean-size plug, used to set the comparator or caliper.

### 3.2 MATCH GAUGING WITH '122' SERIES GAUGE UNITS

The method consists of measuring the bore with the 'A' channel, the shaft with the 'B' channel and, by combining the two readings; the 'A,B' setting will give their difference.

- i Before connecting any probes to the gauge unit, use the 'A' and 'B' controls to set both channels to read zero.
- ii Set the '122' Unit as described in its own manual and set the air plug and transducer as described in Section II of this manual. Following the procedure described, the transducer probe will be fitted to the 'A' minus (A-) socket.
- iii Connect the probe from the comparator or caliper to the 'B' minus (B-) socket.
- iv Set the comparator/caliper closely to 'zero' but note that, because the probe is connected to give minus polarity, all deviations must be reversed.

**EXAMPLE:** A setting plug calibrated -0,002mm must be set to give a reading of +0,002mm, i.e. to the right of zero. This is necessary to achieve the correct polarity at the 'A,B' matching setting.

- v With the mean size setting ring on the Air Plug and the setting plug in position in the comparator/caliper, turn to the 'A,B' setting and check that the meter reads the difference between the two masters. Any small error should be corrected by re-checking the setting of Air Plug and comparator/caliper.

CLEARANCE will be indicated as plus (+), to the right of zero;

INTERFERENCE will be indicated as minus (-), to the left of zero.

**NOTE:** If it is required only to check the actual size of the shaft, it is important to remember that polarity is reversed; where a batch of shafts is to be measured prior to matching. It may be more convenient to transfer the probe connector to 'B'+ and reset.

Title: AEG TRANSDUCER: DIMENSIONAL DETAILS

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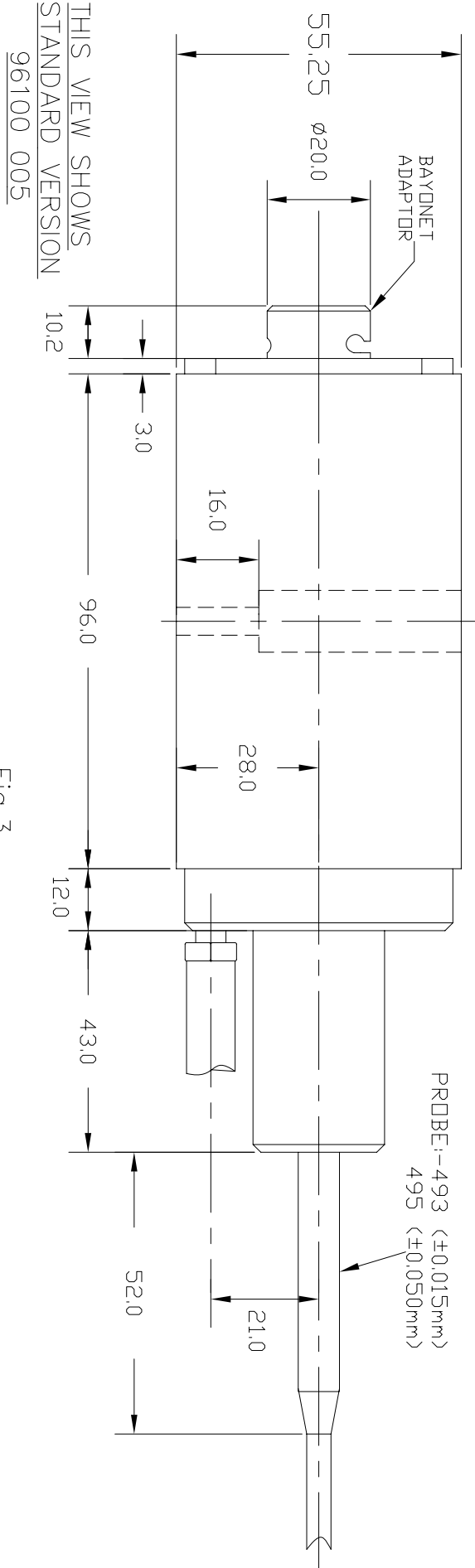
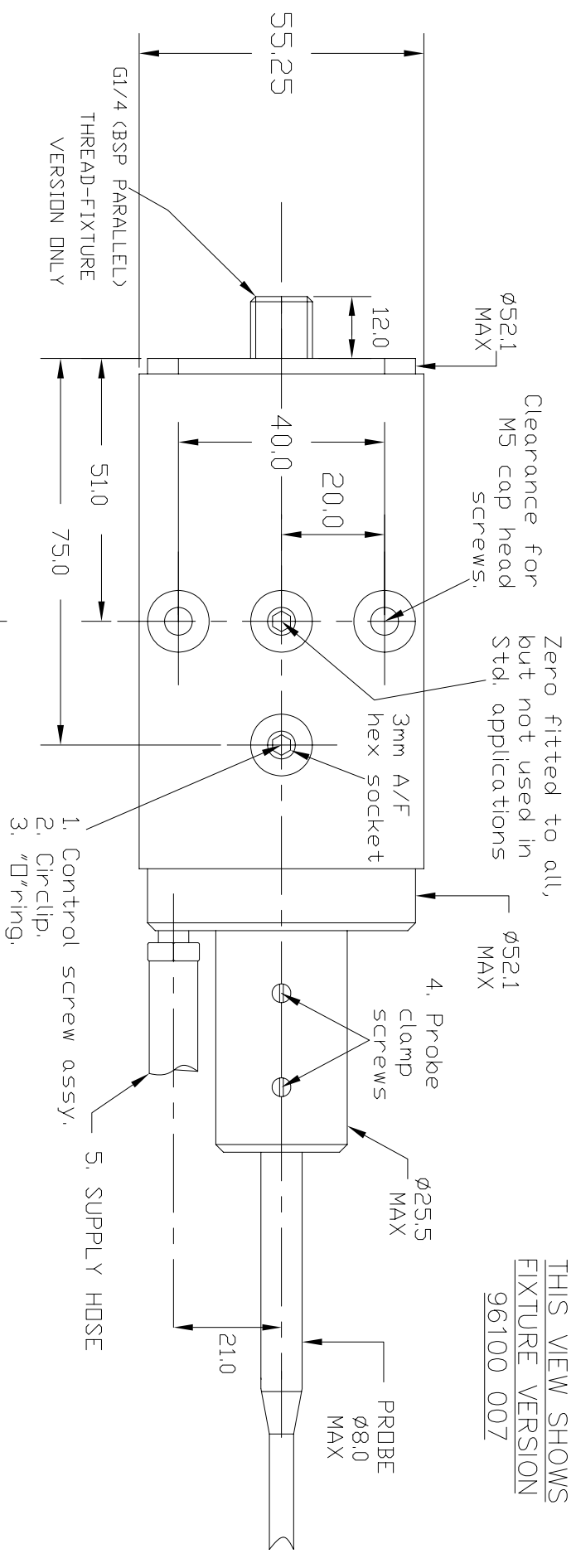


Fig. 3

## SERVICE

Your gauging and inspection procedures are a critical part of your production process, and their integrity is vital to your business.

Regular maintenance and calibration of this air gauge will ensure continuity of its usefulness, assure accuracy of measurement and prolong its service life. Time and production losses through unplanned repairs will be minimised.

Current BS/ISO approval requires regular maintenance and traceable calibration of all gauges and test equipment used in a manufacturing process.

A & E Gauges Ltd offers comprehensive service and calibration facilities for all its products. In line with current British Standard and ISO requirements we recommend that any gauge is serviced at least once a year. Some quality procedures require more frequent equipment servicing and re-calibration.

A & E Gauges gauging references are fully traceable to National Standards. Conformity and calibration certificates are available if required.

Full service support is provided for all air gauging products, and on-site service contracts for larger users are strongly recommended. The Service Department will be pleased to provide full details of service rates and contract terms.

Contact :       The Service Department

**A & E GAUGES LTD.**

Unit 7  
Redbourn Industrial Estate  
Redbourn  
Herts  
AL3 7LG

Tel:             +44 (0) 1582 793528

Fax:             +44 (0) 1582 794463

E-mail:         [sales@a-egauges.co.uk](mailto:sales@a-egauges.co.uk)

Web:            [www.a-egauges.co.uk](http://www.a-egauges.co.uk)