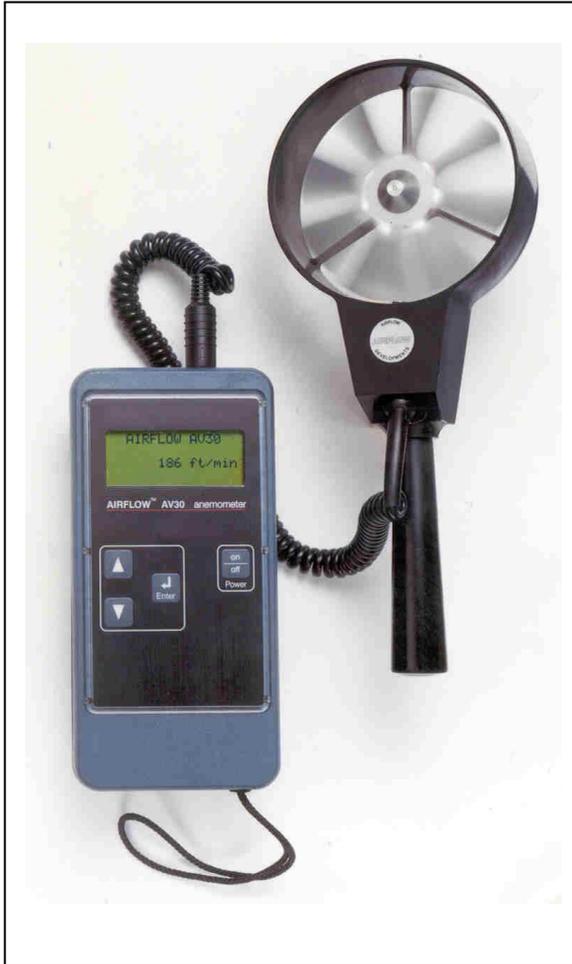


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## AV30 OPERATING INSTRUCTIONS



Please read these instructions carefully before using the instrument. Shortform instructions appear on the back of the instrument.

## 1. INTRODUCTION

The AV30 is a rotating vane anemometer featuring digital display of Velocity and Volume Flow rate in metric or imperial units.

1.1 The AV30 has been designed for ease of operation and has a menu driven interface, it supports the following units of measurement:

- m/s (metres per second)
- m<sup>3</sup>/s (metres cubed per second)
- l/s (litres per second)
- m<sup>3</sup>/h (metres cubed per hour)
- ft/min (feet per minute)
- cfm (cubic feet per minute)
- knots
- mph (miles per hour)
- km/h (kilometres per hour)

1.2 The AV30 has a 0-1 volt output proportional to velocity (0 to 30m/s) or volume flow. This signal is created using a 12 bit DAC and so has a small DC offset which should be taken into account when taking readings. The cable connected to the 0-1 volt output should not be more than 3 metres long.

## 2. BATTERY INFORMATION

2.1 The AV30 is supplied with batteries but these are not fitted into the instrument.

Due to the limited shelf life the batteries are not covered by the TSI Instruments Ltd. standard warranty.

To fit the batteries press firmly on the battery compartment cover and slide it in the direction of the arrow.

Carefully insert the batteries into the holder checking the polarity of each cell as marked on the holder and ensuring that the ribbon is underneath all batteries. Refit the cover. The instrument is now ready for use.

Do not leave discharged batteries in the instrument or the batteries in place if the instrument is out of use for a long period of time.

## 2.2 Type of Batteries

4 x 1.5V AA batteries, standard, alkaline or rechargeable.

### 2.2.1 To Remove Batteries.

Remove the batteries from the holder by pulling on the ribbon or using a thin screwdriver to ease them out.

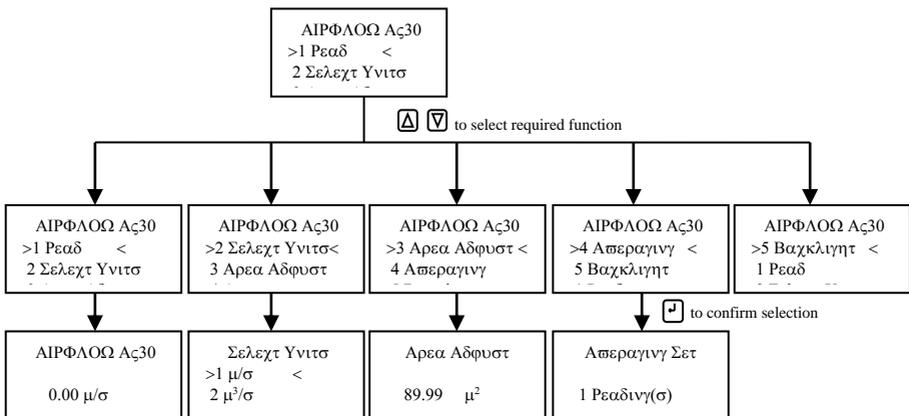
### 2.2.4 Low Battery Indication

If the battery voltage falls below a pre-determined level, the display will show battery symbols at both ends of the top line of the display. The instrument will still operate correctly but only for a limited time so the batteries should be replaced as soon as possible (Also use of the backlight should be avoided to maximise remaining operating life of the batteries).

## 3. TO USE THE INSTRUMENT

### 3.1 Instrument Menu

The Menu is set up with the following structure.



The  and  and the  key are used to navigate between different parts of the menu.

### 3.1.1 Read:

ΑΙΡΦΛΟΩ Α<sub>30</sub>

0.00 μ/σ

Select this mode to take measurements, to hold a reading press  or  and to release and continue with new readings press  or . To leave this mode hold down the  key for approx 2 seconds.

### 3.1.2 Select Units:

Σελεχτ Υνιτσ

>1 μ/σ <

2 μ<sup>2</sup>/σ

This mode allows you to switch between the different units supported by the instrument, use the  and  keys to select the required unit then the  key to confirm selection.

### 3.1.3 Area Adjust:

Αρεα Αδφυστ

89.99 μ<sup>2</sup>

Use the  and  keys to change the area to that required then press the  key to confirm selection.

### 3.1.4 Averaging:

Απεραγινγ Σετ

1 Ρεαδινγ(σ)

Sets the amount of readings to be averaged, 1 to 10 in steps of one, then 10 to 100 in steps of ten. Use the  and  keys to select the level of averaging desired then press the  key to confirm selection.

### 3.1.5 Backlight:

ΑΙΡΦΛΟΩ Α<sub>30</sub>

>5 Βαγκλιγητ <

1 Ρεαδ

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Turns on and off the screen backlight press the  key to toggle between these two modes.

## 3.2 Notes:

3.2.1 Incorrect readings may be displayed if the metal plate within the anemometer ring is touched whilst using the instrument.

3.2.2 To display the instruments serial number and software version hold down  and turn the instrument on.

3.2.3 In averaging mode readings will be averaged at the desired level only when this many readings have been taken, until this point the instrument will average all available readings.

## 4. Where to use the instrument.

4.1 Checking air velocity or volume flow rate in small areas.

The instrument will function satisfactorily in an angular position but should not be used in airstreams which are smaller than the entire face area of the measuring head (113mm diameter). The AV30 is calibrated for use in free air conditions. For smaller airstreams TSI Instruments Ltd. thermal type anemometers are recommended.

- 4.2 Checking air velocity or volume flow rate over larger areas.  
When checking air velocity or volume flow rate over larger areas, a number of 'spot' readings should be taken and recorded to give coverage over the whole area.

When taking 'spot' readings, it should be noted that quite large variations might be observed between individual readings. In general, the more readings taken, the more accurate the result will be. It does not matter if the positions of the readings overlap somewhat, so long as they are equally spread to cover the entire area.

## 5. Use on Grilles

**Note:** See Comments under section 7 'Possible sources of error'. Avoid intrusion of the hand, arm or handle of the instrument into the face area of the grille. The blockage effect created by this would cause artificially high velocity over the remainder of the grille, leading to additional errors. Better measuring conditions can be obtained on grilles with adjustable direction vanes if the vanes on the grilles are temporarily straightened before making measurements. This should not significantly affect the flow rate so long as any built in dampers are not accidentally disturbed. It is advisable to use the aperture, not the surface area of the grille in any flow calculations.

The instrument is suitable for both supply and extract grilles, and the procedure for both is the same except that the measuring head must be rotated through 180° to align the direction arrow correctly.

Whilst it is acceptable to hold the anemometer head against the grille in extract it is usually recommended to hold it slightly away from the grille face on supply to avoid excessive turbulence and any vena-contracta effects.

## 6. Use in Airways

In large airways the presence of the instrument will have a negligible effect, but in small airways the blockage caused by the instrument, hand and arm will cause the airstream to accelerate slightly as it passes the rotating vane. This effect is somewhat variable depending on the size of the airway and the distance from the duct walls. The error can be virtually eliminated by mathematical correction to allow for the reduction of free area caused by the obstruction. For this purpose the effective front area of the instrument (not including hand or arm) can be taken as  $0.019\text{m}^2$  ( $0.204\text{ft}^2$ ). The effect can be ignored completely if the duct exceeds about 500mm diameter (1' 9").

## 7. Possible sources of error

The above method ignores the effects of the reduced velocity at the duct walls. A more precise method is shown in BS1042 Part 2.1 Log Tchebycheff method.

This procedure is satisfactory for use in ducts, and at unobstructed apertures.

Significant errors may occur if the aperture is covered by a grille, particularly if this is of the type having adjustable direction vanes and/or dampers. The airstream issuing from such a grille is invariably very disturbed, consisting of many small areas of high velocity interspersed with areas of low velocity.

The transitions between these areas are highly turbulent, and there may even be some reversed flow. If maximum accuracy is required, it is advisable to make up a short length of test ducting which is just larger than the overall dimensions of the grille. This duct can be of any convenient rigid material (eg stiff cardboard) and should have a length about twice the diagonal measurement of the grille. The duct should be placed over the grille, and sealed to the wall with adhesive tape. Measurements of flow can now be conducted, as already described, at the unobstructed end of the test duct. Use the cross sectional area of the duct (not the grille) for the calculations.

It should be noted that using an AV30 instrument to take spot readings across a duct as described earlier can result in an exaggerated velocity indication in applications where there is a significant variation in velocities across the test area. This is caused by the inability of the rotating vane to

slow down quickly when being moved from a higher velocity area to a lower velocity area. It is quite common to experience situations where a factor of 0.9 would have to be applied although this varies considerably. For proportional balancing this does not matter but on quantitative measurement it should be taken into consideration.

## **8. Uncertainty of Measurement**

Due to characteristics common to all rotating vane anemometers, the minute amount of bearing friction causes the head signal to depart from a linear signal/velocity relationship by an insignificant amount at high velocities but with progressively more effect below 2m/s (400 ft/mm). In the AV30 range of instruments, means of compensation for this error is provided in the software enabling accuracy to be maintained to within:  $\pm 1$  % of reading:  $\pm 1$  digit (with 100mm head).

**WARNING; ALTERING THE CALIBRATION WILL INVALIDATE TSI INSTRUMENTS LTD. RESPONSIBILITY FOR CALIBRATION UNDER WARRANTY.**

**The unit will monitor each time the calibration is effected.**

**If the calibration routine is inadvertently entered then ABORT immediately by switching the instrument OFF and then retry.**

## **9. SERVICE AND RECALIBRATION**

If a fault or the instrument's calibration is suspected, it should be returned to TSI Instruments Ltd. for repair or recalibration to original standards. In any event, it is good practice to have the instrument checked at least once a year. If an instrument is not working correctly or requires recalibration, contact your nearest AIRFLOW INSTRUMENTS agent or UK. Service Department on High Wycombe (01494) 459200 (International +44 1494 459200).

TSI Instruments Ltd. operates an Instrument Hire Service for the convenience of customers having equipment repaired or recalibrated. If you intend to take advantage of this facility please contact the Service Department to make arrangements prior to returning your instrument.

## **10. CONTACTING TSI INSTRUMENTS LTD.**

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## 11. SPECIFICATION

PARAMETER	METRIC	IMPERIAL
Velocity – Ranges *Accuracy (100mm Head)	0.25 – 30 m/sec 1 – 110 km/h 0.5 – 60 knots Calibrated to better than +/-1% of reading +/- 1 digit.	50 – 6'000 ft/min 1 – 70 mph Calibrated to better than +/-1% of reading +/- 1 digit.
Volume Flow- Ranges * Accuracy (100mm Head)	0.01 – 2'700 m <sup>3</sup> /sec 1 – 2'700'000 l/sec 1– 9'720'000 m <sup>3</sup> /hr Calibrated to better than +/-1% of reading +/- 1 digit.	1 – 5'500'000 ft <sup>3</sup> /min Calibrated to better than +/- 1% of reading +/- 1 digit.
Velocity – Ranges *Accuracy (35mm Head)	0.5 – 20 m/sec 2 – 70 km/h 1 – 40 knots Calibrated to better than +/-2% of reading +/- 1 digit.	100 – 4'000 ft/min 2- 45 mph Calibrated to better than +/-2% of reading +/- 1 digit.
Volume Flow- Ranges * Accuracy (35mm Head)	0.02 – 1800 m <sup>3</sup> /sec 2 – 1'800'000 l/sec 2 – 6'480'000 m <sup>3</sup> /hr Calibrated to better than +/-2% of reading +/- 1 digit.	2 – 3'700'000 ft <sup>3</sup> /min Calibrated to better than +/- 2% of reading +/- 1 digit.
Air Flow Area –Range	0.00399 – 90.00 m <sup>2</sup>	0.04295 – 900 ft <sup>2</sup>
Analogue Output	0 to 1V as standard proportional to 0 - 30m/s (0 to 0.5V and 0 to 2V available on request)	
Ambient Operating Environment.	Barometric Pressure 500mb to 2 bar Temp -10 to +50°C	Barometric Pressure 15 in Hg to 60 in Hg Temp 14 to 122°F
Storage Temperature	-10 to +50°C	14 to 122°F
Dimensions of Instrument	92 x 32 x 188mm	3.6 x 1.2 x 7.4inches
Weight of Instrument (less batteries)	310 gms.	0.68lbs
Battery Cells	4 x 1.5V batteries type AA or equivalent standard Alkaline or rechargeable.	
Battery Life	Approximately 40 Hours using Alkaline battery cells	

\*Accuracy is at ambient conditions of 20°C and 1013mb (68°F and 30in Hg.)  
CE Marking: This unit complies with the EEC Directive on Electromagnetic Compatibility (EMC) 89/336/EEC.  
Applied Harmonised Standards; EN50081-1 Radiated Emissions and EN50082-1 Radiated and ESD Immunities.



*QUALITY ASSURED TO ISO 9001*

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August 2005  
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