LCA 30VT, LCA 30RVT and LCA 30VA

Operating Instructions

1. INTRODUCTION

Models from the LCA range which are described in these instructions are all rotating vane anemometers featuring digital display of Velocity (and Volume Flow rate on the LCA30VA) in metric or imperial units.

The LCA range has been designed for ease of operation with one operational control on the side of the handle. A slide switch is provided below the display to switch the unit On and Off, Metric and Imperial readout can be selected by means of a switch in the battery compartment.

The VA model also has an additional button on the front of the unit to scroll through the menu.

1.1 LCA30VT displays air velocity in Metric or Imperial units ranging from 0.25 to 30 m/s or 50 to 6000 ft/min. The instrument utilises a Microprocessor which enables the user to obtain a continually updated average of air velocity over extended periods.

1.2 The LCA30RVT is specially calibrated in reverse so that the display faces the operator when taking extract velocity measurements such as at the sash windows of fume cupboards or laminar flow safety cabinets. Calibration results are plotted for flows up to 5m/s to ensure accuracy for low extract velocity situations.

1.3 The LCA30VA displays air velocity or volume flow rate in Metric or Imperial units. Air velocity ranges from 0.25 to 30m/s, 50 to 6000ft/min whilst volume flow rate can be displayed from 0.01 to 3000m^3/s, 1 to 999999 l/s, 1 – 999999 m3/hr and 1.0 to 999.9E^3 cfm (Note; 999.9 x 10^3 displays as 999.9E3) with duct cross sectional areas programmable within the range of 0.00399 to 90.00m^2, 0.043 to 900.0 ft^2.

2. BATTERY INFORMATION

2.1 Instruments in the LCA range are supplied with a battery but this is not fitted into the instrument.

Due to the limited shelf life the battery is not covered by the Airflow standard warranty.

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

Carefully pull out the battery connector and flying lead and fit the battery to it. Place the battery and lead into the compartment and refit the cover and the screw if applicable. The instrument is now ready for use.

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

2.2 **Type of Battery**

9V batteries type PP3 (IEC 6F22) or equivalent, standard, alkaline or rechargeable.

2.2.1 **To Remove a Battery.**

Remove the battery from the connector using a small screwdriver or similar tool. Do not disconnect it by pulling on the flying lead.

2.2.2 **Low Battery Indication**

If the battery voltage falls below a pre-determined level, the display will show "bat" in the top left hand corner. The instrument will still operate correctly but only for a limited time so the battery should be replaced as soon as possible.

3. Metric/Imperial Switch

All instruments in the range can display Metric or Imperial units. The metric/imperial switch is in the

battery compartment, See Fig 1.

Note: Unit must be off when changing from imperial to metric or vice versa.

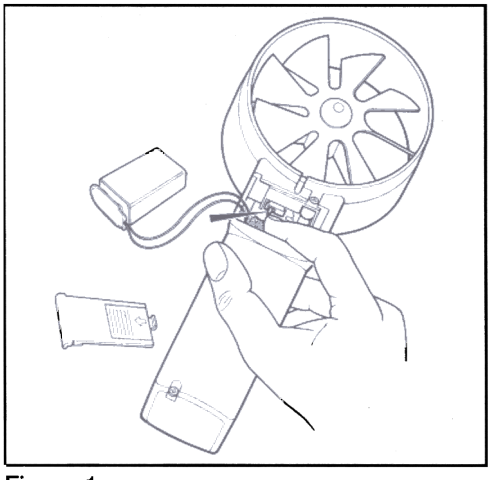

Figure 1

4. To Use the Instrument

4.1 LCA 30VT and LCA 30RVT:

Switch on the instrument using the on-off switch marked 0, 1 below the display. Hold the rotating vane in the airstream according to the direction of flow arrow on the side of the instrument. Allow the vane a few seconds in the airstream to enable it to reach a steady speed. The instrument may then be used in two modes:

4.1.1 A momentary push on the switchplate will display the average velocity over about a two second period.

4.1.2 Pushing and holding down the switchplate will display the average velocity over the period that it is depressed. During this time the instrument is programmed to display the current average reading about every two seconds. If the instrument is used in this mode for long periods, the memory will become full after about 12 minutes and the display will indicate 'FULL. The last valid reading will be displayed when the switchplate is released. This reading will continue to be displayed until the instrument is switched off. This erases the memory, extinguishes the display and makes the instrument ready for use again.

4.2 **Note:**

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

4.3 LCA 30VA (See Figure 2 for Mode cycles)

4.3.1 Velocity Mode

Switch on instrument to 'VEL' using the Mode Button below the display. The instrument may then be used exactly as described for the LCA 30VT above (see sections 4.1 and 4.2).

4.3.2 Volume Flow Rate Mode

Before switching on the instrument determine the cross-sectional area of the duct, grille etc for which the volume flow rate is required. If working in Metric units, calculations must be in m^2. If working in Imperial units, calculations must be in ft^2. Switch the instrument to 'Area +' mode observe the area figure displayed from the memory. If the new area required is larger than the one displayed press the switchplate to increase the displayed area to the calculated figure. If the area is to be less than the figure displayed push the Mode Button to move to 'Area -' mode and press the switchplate to reduce the displayed area to the

calculated figure. When the correct area has been displayed use the Mode key to select the required 'Vol' mode.

Note: The last area value will be retained in the memory even when the instrument is switched off.

The instrument may then be used in two modes:

4.3.2.1 A momentary push on the switch plate will display the average volume flow rate over about a two second period.

4.3.2.2 Pushing and holding down the switchplate will display the average volume flow rate over the period that it is depressed. During this time the instrument is programmed to display the current average reading about every two seconds. If the instrument is used in this mode for long periods, the memory will become full after about 12 minutes and the display will indicate 'FULL'. The last valid reading will be displayed when the switchplate is released.

4.4 Notes:

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

4.4.2 If a flow reading is above the displayable range: 'rAnGE' will be displayed and the mode button should be used to select a larger measurement unit if available.

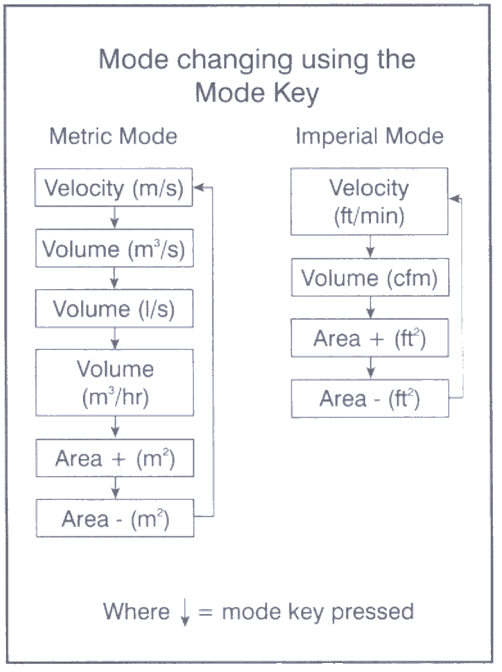

Figure 2:

5. Where to use the instrument.

5.1 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 LCA range is calibrated for use in free air conditions. For smaller airstreams the Airflow TA type anemometers are recommended.

5.2 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 as described in 4.1.1 or 4.3.2.1, to give coverage over the whole area.

Alternatively, the instrument will provide the mathematical average automatically, when steadily scanned across the whole area, if used as described in 4.1.2 or 4.3.22.

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.

6. Use on Grilles

Note: See Comments under section 8 '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.

7. 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 $0.019m^2$ ($0.204ft^2$). The effect can be ignored completely if the duct exceeds about 500mm diameter (1' 9").

8. 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 BS 1042 Part 2.1 (ISO 3966) 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 LCA instrument as described in section 4.1.2 or 4.3.2.2 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.

9. 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 LCA range of instruments, means of compensation for this error is provided in the software enabling accuracy to be maintained to within: ±1% of reading: ±1 digit.

WARNING; ALTERING THE CALIBRATION WILL INVALIDATE AIRFLOW'S 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.

10. SERVICE AND RECALIBRATION

If a fault or the instrument's calibration is suspected, it should be returned to Airflow Developments 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 agent or UK. Service Department on High Wycombe (01494) 525252 (International +44 1494 525252).

Airflow Developments 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.

11. CONTACTING AIRFLOW

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12. SPECIFICATION

Parameter	Metric	Imperial
Velocity Range * Accuracy	0.25-30 m/sec Calibrated to better than +/- 1% of reading +/- 1 digit.	50-6000 ft/min Calibrated to better than +/- 1% of reading +/- 1 digit.
Volume Flow Ranges * Accuracy (VA only)	0.01 - 3000m^3/sec 1 - 999999 l/sec 1 - 999999 m^3/hr Calibrated to better than +/- 1% of reading +/- 1 digit.	1 - 999.9 x 10^3 ft^3/min Calibrated to better than +/- 1% of reading +/- 1 digit.
Air Flow Area - Ranges (VA only)	0.00399 - 90.00m^2	0.043 - 900ft^2
Maximum Averaging time.	12 Minutes	12 Minutes
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 - +50°C	14 to +122°F
Dimensions of Instrument	268 x 113 x 43mm	10.55 x 4.44 x 1.69 in
Weight of Instrument (less battery)	280gms	0.62lbs
Battery Cells	One 9V battery type PP3 or equivalent (IEC ref 6F22) 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.

AIRFLOW™

QUALITY ASSURED TO ISO 9001

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