AIRFLOW™ 9020023/G/797

SPECIALISTS IN AIR MOVEMENT TECHNOLOGY

TA-2 RANGE OF THERMAL ANEMOMETERS Operating instructions

1 Introduction

The TA-2 range of thermal anemometers comprises three models, scaled in both metric and imperial units. Each model may be used for velocity or temperature measurement. For full technical details of the range see section 8 'Specification'.

All the instruments in the range are fitted with telescopic probes with a maximum diameter of 8mm. The TA-2 is therefore very suitable for measurement in small ducts or where large access holes are not acceptable.

The velocity sensitive thermistor in the probe is compensated for changes in airstream temperature by a second thermistor which is also used to measure the airstream temperature. As part of the manufacturing process each instrument is checked and calibrated by wind tunnel in a temperature controlled calibration room.

All TA-2 models are fitted with 0-1 volt outputs. These give an output proportional to meter deflection, and are intended for use with a compatible data logger such as the Airflow AM-2.

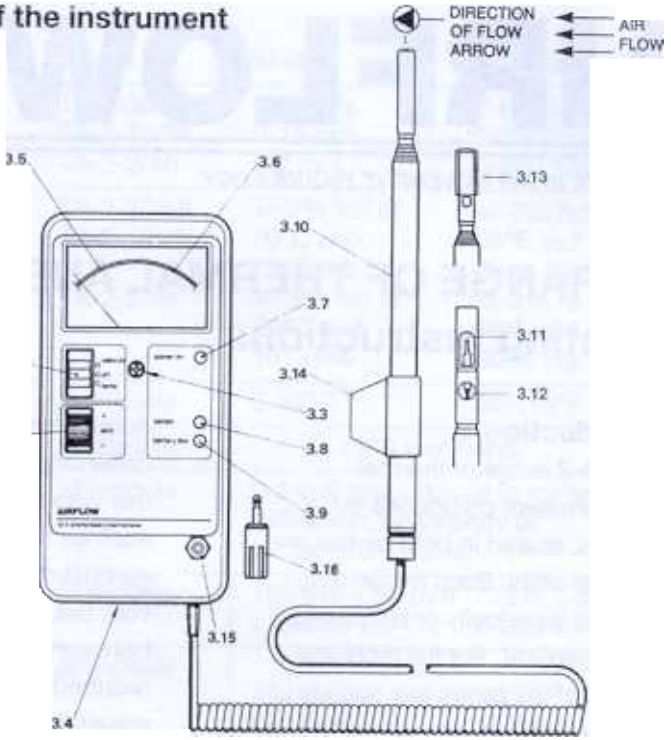
As built, the output is set to 0-1 volt, but may be factory set to between 0.5 and 2.0 volts if required. The output is not user adjustable.

2. To fit battery cells

Instruments in the TA-2 range are supplied without battery cells. Four 1.5 volt AA size cells are required, which may be standard, alkaline or rechargeable.

Battery cells are accessible through the slide and 'snap in' cover in the underside of the instrument. Remove the batteries by means of the tape, but the use of a small screwdriver or similar tool will assist the removal. Low battery condition is indicated by a red light on the front of the instrument. Replace the battery cells as soon as possible if this occurs or incorrect reading may result.

3. Description of the instrument



Instruments in the TA-2 range are very easy to operate. Before using the instrument, users should thoroughly familiarise themselves with its features.

3.1. Three position slide switch:
Up - velocity.
centre - off.
down - temperature.
Always switch off when not in use.

3.2. Electronic zero wheel.

3.3. Mechanical meter zero. With the instrument switched off, zero the meter by using the screw on the meter face to adjust the pointer. This should not normally require resetting.

3.4. Battery cover. This slides and 'snaps in' at the rear underside of the instrument case.

3.5. Velocity scale in metres per second and feet per minute.

3.6. Temperature scale in degrees C and F.

3.7 Green light. Flashes when unit is switched to either velocity or temperature.

3.8. Amber light. Comes on momentarily only at switch on to velocity mode whilst velocity thermistor is heating to operating temperature. If this l light comes on at any other time, this indicates incorrect use or a faulty instrument.

3.9. Red light. Comes on momentarily at switch on. If this light comes on at any other time, whilst the instrument is in use, a low battery condition is indicated (see section 2).

3.10. Telescopic probe and cable. The probe comprises seven telescopic tubes giving an extended length of over 900 mm. With the coiled cable fully extended, the maximum reach from the instrument case is approximately 2 metres.

3.11. Velocity measuring thermistor.

3.12 Compensating and temperature measuring thermistor.

3.13. Zeroing cap.

3.14. Direction indicator.

3.15. Voltage output 3.5mm dia. jack socket.

3.16. Jack plug. Connection is + to centre pin. Output impedance should not be less than 10k ohms.

Item not shown.

3.17. Carrying case for instrument, probe and cable.

4. Using the instrument

4.1 Before using the instrument, check the battery state (see section 2 and 3.9).

4.2. To measure velocity.
Before using the instrument, zero electronically. Ensure that the zeroing cap is on the probe head covering the velocity thermistor to isolate it from any air movement. Select 'velocity' mode on the slide switch, allow a minimum of 10 seconds for the thermistor to warm up and then slowly turn the zero wheel to adjust the pointer on the scale. For greater accuracy, the meter should be zeroed in still air at the same temperature as that to be measured. Extend the telescopic probe by pulling gently on the end cap. Ensure that the cable can slide freely into the handle end of the probe. It is only necessary to extend the probe to a sufficient length for the readings to be taken. After zeroing, remove the zeroing cap. If the probe head is to be out of sight when a reading is taken (e.g. inside ducting), align the direction indicator on the end of the probe with the probe head slot. The direction of air flow must be as shown by the arrowhead on the end of the probe. Offer the probe head into the airstream, pointing the slot in the direction of flow, and read the velocity indicated. Check zero and re-zero if necessary before each set of readings.

4.3.To measure temperature.
Select temperature mode on the slide switch. Place probe head in the airstream and read the temperature indicated.

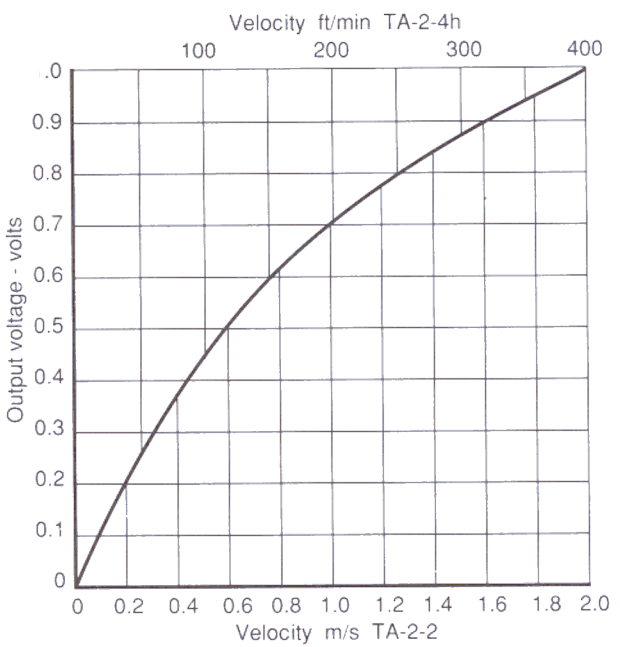
Note 1. To use a probe inside ducting, a 14mm. (0.55 in.) minimum hole is required in the duct wall.

Note 2. If a duct traverse is required it may help to use the joints between the telescopic tubes as markers so that the probe head position can be easily determined.

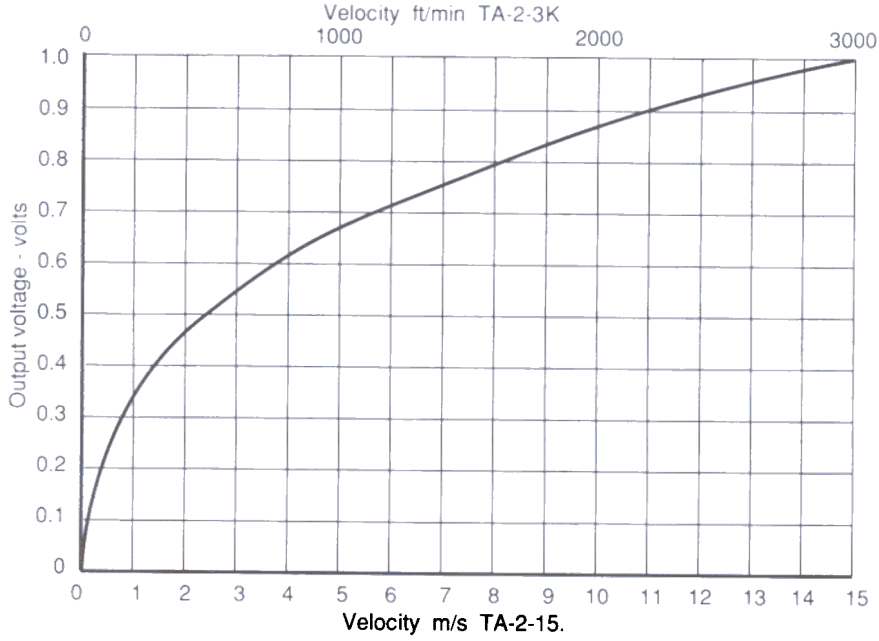
Note 3. When closing down the telescopic probe, allow the cable to slide freely through the probe.

4.4. Use of the output.
The voltage output is proportional to the meter deflection when the instrument is being used in either velocity or temperature mode. The output IS NOT directly proportional to measured velocity or temperature. The velocity/ voltage and temperature/voltage relationship is best shown graphically. See 4.4.1 to 4.4.4 below. These graphs show typical velocity/output relationships at 20 degrees C (68 degrees F).
If the TA-2 instrument is used in velocity mode with the output feeding into a logging or recording device over longer periods, during which time the temperature may vary significantly at the probe tip, accuracy may be impaired.

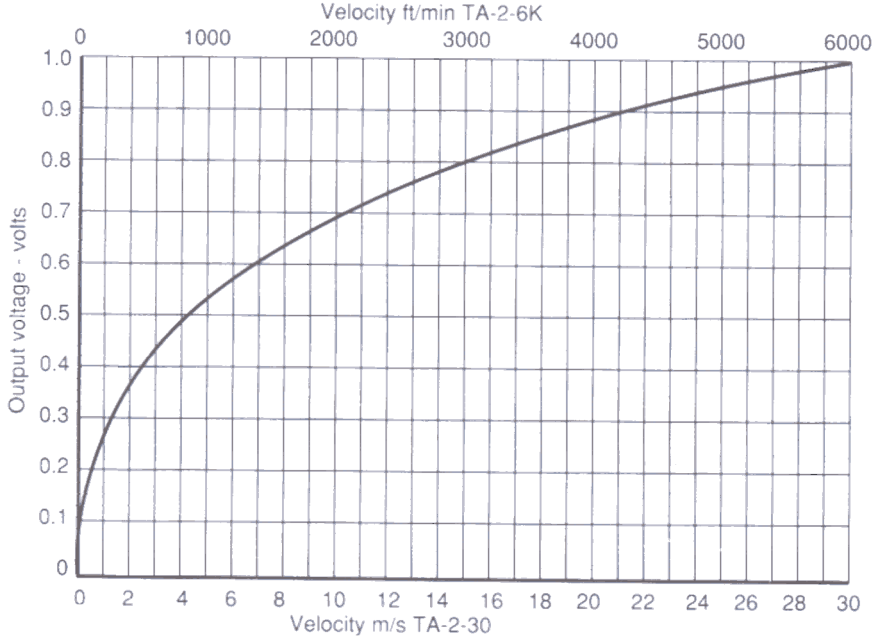
4.4.1.Velocity/voltage relationship - TA2-2 and TA2-4h.



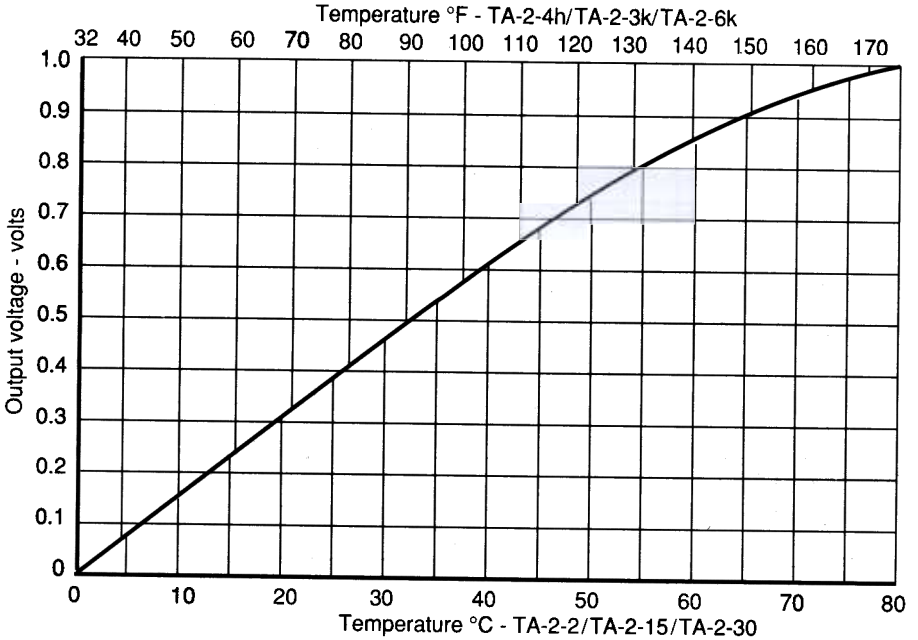
4.4.2. Velocity/voltage relationship - TA2-15 and TA2-3k.



4.4.3. Velocity/voltage relationship - TA2-30 and TA2-6k.



4.4.4. Temperature/voltage relationship - all TA2 models.



4.4. (cont) To maintain optimum accuracy it is best to re zero the instrument (see section 4.2), at regular intervals.
This procedure is NOT necessary when logging or recording temperature only.

5. Where to use the instrument

5.1 Checking the air velocity over large areas.
When checking air velocity over large areas, a number of readings must be taken, spaced to give an even coverage of the whole area.
The average of these readings gives the average velocity.
It should be noted that quite large variations may be observed between individual readings. In general, the larger the number of readings taken, the more accurate the result will be.

5.2. Use of grilles.
Avoid intrusion of the arm and hand into the face area of the grille. The blockage effect created would cause artificially high velocity over the remainder of the grille, leading to incorrect readings.
The telescopic probe is useful in avoiding this problem.

5.3. Volume flow rate calculations.

Volume flow rate through airways may be calculated if the cross-sectional area of the airstream and its average velocity are known.
To calculate volume flow rate, the cross-sectional area of the airway is multiplied by the average airstream velocity, using the same units of linear measurement throughout the calculation.

6. Possible sources of error

Taking a series of readings of velocity and averaging them may ignore the effect of reduced velocity at duct walls. A more precise method is shown in B.S. 1042 Section 2.1 - Log Tchebycheff method. This method is recommended for use in ducts and at unobstructed apertures. Significant errors may occur if the aperture is covered by a grille. The airstream issuing from a grille may be very disturbed with many small areas of high velocity interspersed with areas of low velocity. For maximum accuracy, 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 made from any convenient rigid material and should have a length about twice the diagonal measurement of the grille. The duct should be positioned over the grille and sealed to the wall with adhesive tape. Measurements of flow can now be conducted at the unobstructed end of the test duct. Use of the cross-sectional area of the duct, not the grille, for the calculations.

7. Recalibration

If an instruments calibration becomes suspect, it should be returned to Airflow for recalibration to original standards. It is, in any case, good practice to have the instrument checked at least once a year.
In the U.K., Airflow Ventilation Supplies (AVS) operates an instrument hire service for the convenience of customers having their instruments repaired or racalibrated. To use this facility, contact AVS, telephone (0494) 463490, facsimile (0494) 471507, to make arrangements prior to returning your instrument.

8. Specification

Parameter	Model	Metric	Imperial
Velocity range			
Velocity accuracy			
	TA-2-2/4h		
Working temperature range	all models		
Indicating meter		1 mA taut band	
output		0-1 volt proportional to meter deflection, on velocity or temperature scale	
Dimensions of instrument	all models	185 mm x 92 mm x 30 mm	7.25 in. x 3.62 in. x 1.25 in.
Probe dimensions compressed extended max. diameter	all models	 194 mm. 930 mm. 13 mm.	 7.6 in. 36.6 in. 0.52 in.
Weight of instrument only (less batteries)	all models	450 gms.	
	all models	4 type AA cells, alkaline, standard or re-chargeable	
Battery life	all models	Approx. 30 hours using alkaline batteries. Approx. 15 hours using standard batteries.	

AIRFLOW™ *QUALITY ASSURED TO ISO 9001*

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