

KDG

Rotameter Anaesthetic Variable Area Flowmeters

Data sheet
1700



Features

- Conform to ISO 5358, BS 5724, ISO 32 (BS 1319) or CASA Z305, ANS Z79
- Anti-static conductive glass tube coating is indestructible and has earthing bands
- Permanent ceramic flow scale fused to glass
- Float colour spotted for observation of rotation
- Special design float for rapid recovery after flow change

This bulletin details standard Glass Tube Variable Area Flowmeters 'Rotameters' fitted with a skirted (bobbin) type float, developed by experience with users requirements specifically for use with anaesthetic gases.

Standard Range

Dual Taper Glass Tubes with Extended Flow Ranges

Calibrated 20°C / 1013 mbar abs

	Scale	A \varnothing ±0,4	B \varnothing ±0,05	Code
Air	0.2 - 15L/M	15mm	11,54mm	A010
Oxygen	0.1 - 8L/M	15mm	11,54mm	A020
	0.1 - 10 L/M	15mm	11,54mm	A021
	0.2 - 15 L/M	15mm	11,54mm	A022
Nitrous oxide	0.2 - 12 L/M	15mm	11,54mm	A030
Carbon dioxide	0.1 - 2L/M	15mm	11,54mm	A040

Notes

Table 1

See also page 4.

Scales are calibrated as photograph fig. 2.

Aluminium alloy bobbin float is anodised red and body has a 2 silver spot to observe rotation i.e. correct behaviour in use.

Position for equipment company's logo if requested

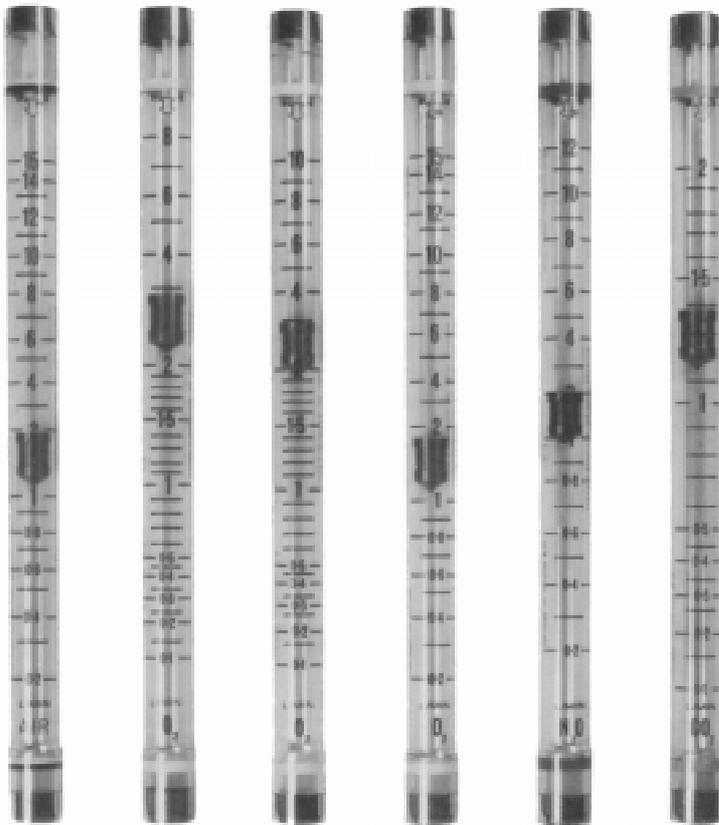
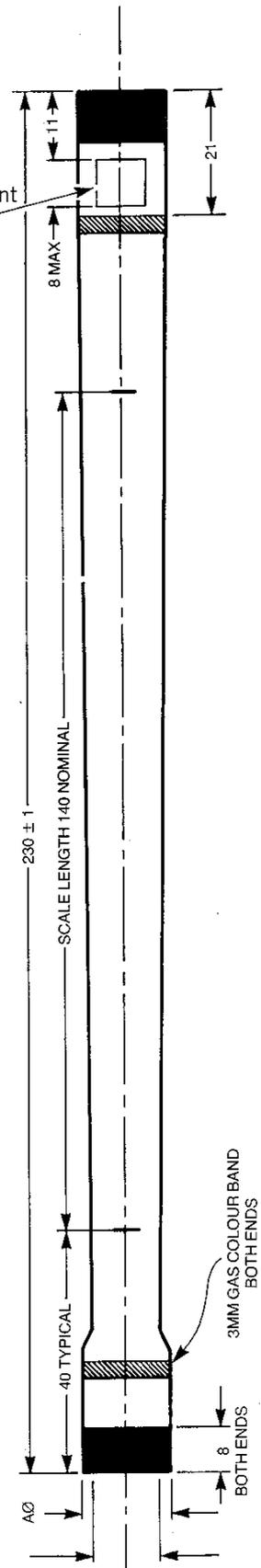
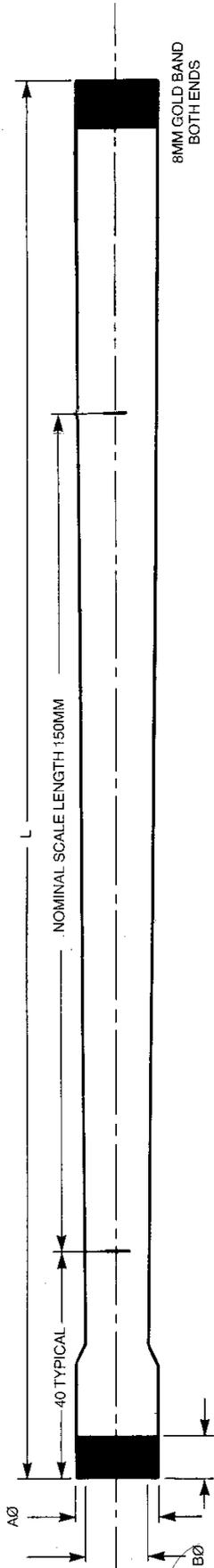


Figure 2. Scale Detail

Standard Range

Length / Diameter Indexed Tubes High & Low Flow Ranges



Calibrated 20°C / 1013 mbar abs

	Scale	AØ±0,4	BØ±0,2	L±1,0	Code
Air	1 - 15L/M	15	11,54	240	A100
Oxygen	1 - 8L/M	15	11,54	260	A200
	0.1 - 1 L/M	10	6,3	260	A250
Nitrous Oxide	1 - 10 L/M	15	11,54	250	A300
	0.1 - 1 L/M	10	6,3	250	A350
Carbon dioxide	0.1 - 2 L/M	15	11,54	240	A400

Notes

Table 2

See also page 4.

Gas colour bands are not supplied unless requested.

Scales are calibrated as photograph Fig. 4.

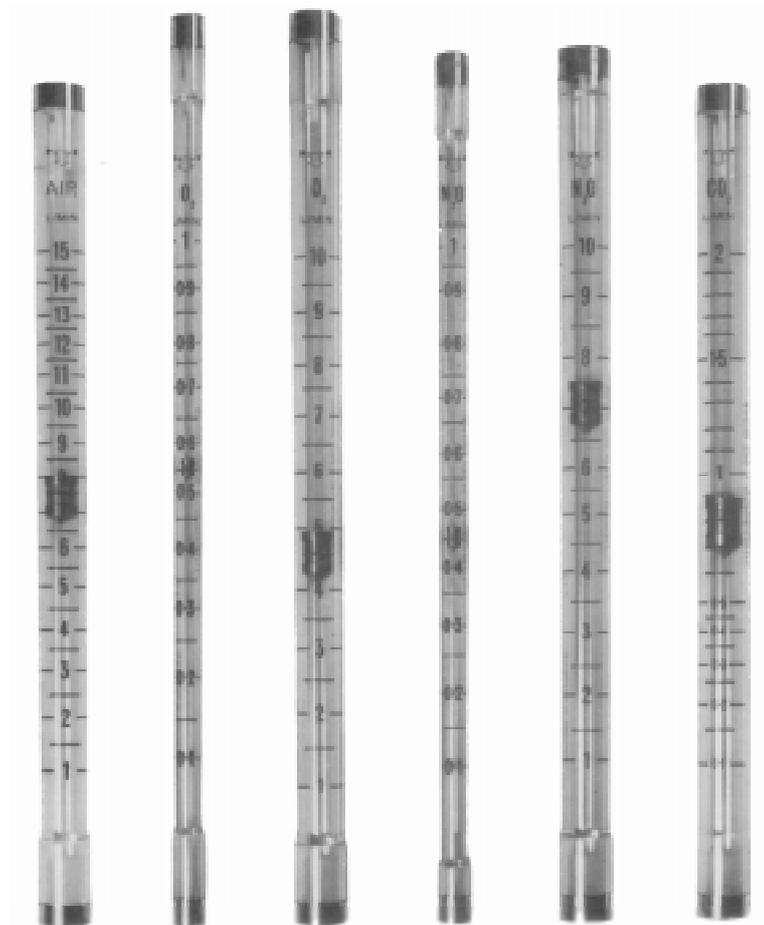


Figure 4. Scale Detail

Rotameter Flowmeters for Anaesthetic Gas flow Measurement

The normal standard ranges available are manufactured to conform to recommendations of BS 5724 ISO 5358 and Z 79.8-1979. The following notes cover the relevant clause specifications. Refer to factory for variations of scale and mechanical dimensions which can also be offered.

Calibration

Flowmeter tubes are series calibrated at all marked scale flow points for discharge into a standard atmosphere at an operating condition 20°C 1013 m bar, flow is expressed as litres/minute. Tubes and floats are not interchangeable, a unique identifying serial number appears on the tube and float.

All tube and float combinations are flow checked at all figured graduations before despatch.

Scale

The flow scale is ceramic permanently fused on the tube, characters and lines are dense black. It is not practical to produce a true linear scale, special production controls ensures the visual scale shape is to an acceptable standard. Scale type face condensed Sans Serif.

Accuracy

Normal standard ranges are manufactured to class 2.5 VDI/VDE 3513, a European classification system for variable area flowmeters.

The class number is converted into a numerical value to give an allotted range of maximum error (Class X = $\frac{3}{4}X$ of the measured value and $\frac{1}{4}X$ of the full scale reading). Thus class 2.5 = 1.875% of measured value plus .625% of the scale reading.

The range of permitted error is the sum of the two partial errors, however, a maximum tolerance of $\pm 10\%$ of measured value is applied should class 2.5 exceed this.

Electro Static Discharge

An anti-static permanent conductive coating is applied on both the inside and outside wall of the glass tube and to facilitate earthing an 8mm wide gold band is standard at tube ends.

Value of resistance 11 MW max. Patent No. 1329903.

General

Scale graduation on the tube includes information covering units, gas symbol, reference reading position of float to scale, and a colour band coding of the duty gas in accordance with local standard is optional.

Equipment manufacturers company logos can be affixed to the tubes at an agreed position, colour to be as ceramic available.

Polyamide (Nylon 12). Float stops and retainers are

fitted as standard at bottom and top of tube.

Tubes are manufactured from borosilicate glass and ends are flame polished to strengthen and reduce risk of chipping.

Installation & Maintenance

The practical installation of flowmeters is in the hands of the anaesthetic machine manufacturer and user. As a guide the following recommendations are made : -

- 1) All tubes fitted with rotating bobbin floats must be truly vertical. The effect of imperfection is to cause erratic misbehaviour of the float and incorrect reading, in particular at the low flow values.
- 2) Glass tubes are sensitive to surface damage (scratching) which lowers the bursting pressure. Abrasives should never be used to clean them. as, not only is there a risk of scratching, but also the conductive coating may be damaged. This latter reduces the conductivity and may affect the calibration.
- 3) The flow of gas into the bottom of the flowmeter should be steady, symmetrical and without swirl. Imperfection shows itself in float behaviour. The common practice of placing a sintered metal disc filter at the bottom of the tube generally produces the desired effect.
- 4) Anaesthetic gases are normally dry and consequently not significantly corrosive. Moisture should never be allowed to diffuse into the tubes. This may, in conjunction with the mixed vapours, cause corrosion, particularly of the float.
- 5) In designing the piping, particularly from the outlet of the flowmeters, it must be remembered that pressure loss is a function of pipe bore and flow rate. A small bore pipe may give insignificant loss at low flow, but at high flow the loss may be of a magnitude such that the calibration is affected. (The flowmeter is operating at atmospheric pressure plus downstream piping pressure loss.)

The effect on calibration of the discharge conditions being different from the design 20°C and 1013 mbar is variable according to the meter, the gas, and the flow rate. (As a crude approximation 30° working temperature may cause an error or 1 to 2%. A pressure of 1040 mbar may cause a similar error.)

6) The European Standard for glass tube flowmeters gives maximum design pressure for the weakest tube as 9.6 bar gauge. It is therefore recommended that the apparatus using these flowmeters should ensure that the pressure in the tubes never exceeds $\frac{1}{4}$ of the recommended limit i.e. never greater than 2.5 bar gauge.

7) Gold band tube ends are intended to be in contact with an earthing conductor or conductive sealing material.

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