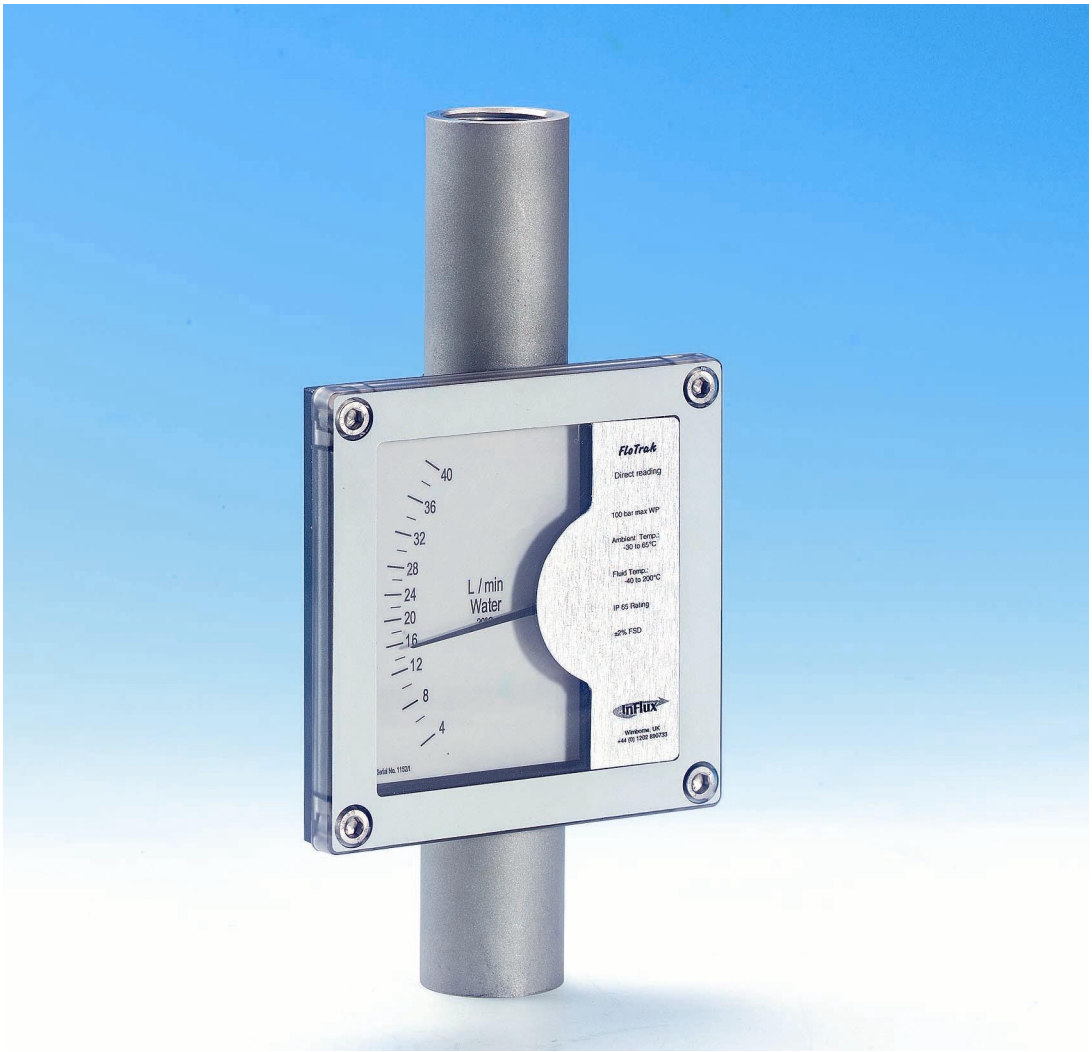
InFlux Measurements Ltd

INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS FOR

FloTrak

METAL TUBE VARIABLE AREA FLOWMETERS



InFlux Measurements Ltd, Forge Works, The Dean,
Alresford, Hampshire, SO24 9BH.
Tel: +44 (0) 1962 736736, Fax: +44 (0) 1962 736737
e-mail: sales@influxmeasurements.com Internet: www.influxmeasurements.com

CONTENTS:

1 Safety

This meter complies with the European Pressure Equipment Directive 97/23/EC by application of Sound Engineering Practice (PED Article 3 paragraph 3). Before commencing the installation check that the unit to be installed is suitable for the application fluid and the line pressure, and that the flanges or other connections are correct. Any electrical connections proposed must be suitable for the hazard classification of the location on the plant. All process lines must be drained and de-pressurized.

2 Specification and Principle of Operation

2.1 Introduction

The Influx FloTrak Variable Area metal tube flowmeter is suitable for monitoring the flowrate of liquids or gases in Industrial process lines. All wetted parts are stainless steel, and a magnetic coupling drives the flow indicator needle external to the flowtube, to follow the internal flow element. Direction of flow must be vertically upwards through the flowmeter body.

2.2 Principle of Operation

The flow measurement element in this meter is a carefully tapered plug, described normally as a float. Under no flow conditions the weight of the float causes it to drop into an orifice, restricting the annular space available to fluid flow up the tube. When flow commences, the flow force causes the float to rise up the meter tube. The small pressure drop produced is sufficient to balance with the float weight, causing the float to stop at an equilibrium position. This position is signalled to a pointer external to the flow tube, by a magnet in the float body, which drives a follower magnet on the pointer shaft.

The flow scale behind the pointer is calibrated in the factory on air or water flow rigs, with the data then being extrapolated to relate to the conditions of the fluid and process as stated to exist on the site. This allows the scale to be expressed in units that are meaningful for the operator. It is also possible to provide another flow scale for revised process conditions, should the plant conditions change.

Units designed for gas flow measurement have a built-in flow pulsation damper, in the form of a piston attached to the end of the float rod moving in a fixed cylinder.

2.3 Construction & Specification

Wetted materials	Stainless steel
Connections	DIN PN16 or ANSI 150 Flanges Option of screwed BSP connections
Indicator Housing	Stainless Steel, Polycarbonate, IP65
Max Fluid Pressure	Typically 100 bar or flange rating if lower*
Temperature Ranges	- 30°C to + 65°C Ambient - 40°C to + 200°C Fluid
Meter Scale	Typically 100mm scale
Flow Turndown	Operating range 10:1
Meter Indication Accuracy	± 2% of Full Scale Reading

*Max. Fluid Pressure dependent upon fluid type and pipe size, in accordance with the European Pressure Equipment Directive 97/23/EC.

3 Installation – Standard Unit

3.1 Unpacking

All transit packing and tape should first be removed prior to installation of the meter. In the case of gas damped units care should be taken to avoid disengaging the top damping cylinder assembly from the meter. Note that on flanged units this top assembly will be held in position, being sandwiched between flange connection.

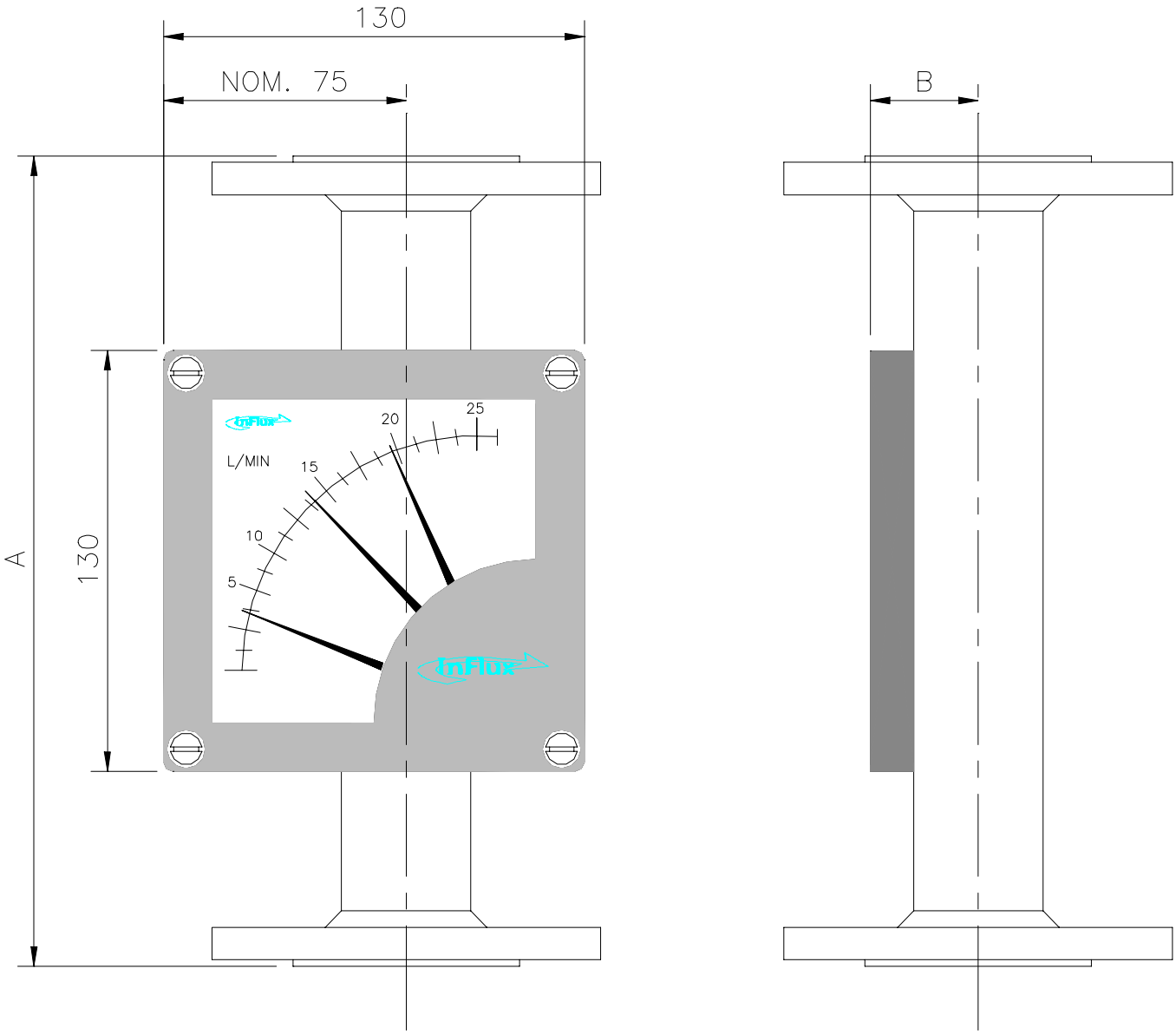
3.2 Mounting

All VA Flowmeters must be mounted in a vertical section of flow line, with the flow direction upwards. It is not necessary to have any particular length of straight pipe up- or down-stream of the meter, but any bends near the meter should preferably be swept rather than abrupt (ie avoid 90 degree elbows or T-junctions). The plant pipework around the meter should ideally have the same bore as the nominal bore of the meter, to avoid the disturbance produced by abrupt diameter changes. Equally all gasket materials should be sized correctly, within the flange faces, so as not to intrude into the flow.

It is not desirable to use solenoid operated or other fast acting shut off valves near a VA meter, since the flow surges resulting can cause the float to be damaged by impacts on the stops. All flow control valves should be designed to operate gradually, to avoid hammer effect.

The meter display is local to the measurement tube, so the meter should be positioned where this display is visible to the operator. The meter does not require any separate support; this is normally supplied by the surrounding pipework. Because the needle drive coupling is magnetic, the meter should not be installed in areas of high magnetic field or close to magnetic materials. The process pipes connected to the meter will not affect the meter.

3.3 Dimensions



DIMS (mm)	A			B	
	Screwed	Flanged		Without Alarms	With Alarm/s
		Liquid	Gas		
Size 15	250	250	253	32	51
Size 25	250	250	253	37	56
Size 50	250	250	253	53	72

Note:
Pipe work for Flanged units must be designed allowing clearance for appropriate gaskets at each end of the flowmeter.

3.4 Optional Alarm/s

This section applies to the Alarm unit options available on the flowmeter: The Alarm unit is based on the standard FloTrak Indicator unit with the addition of one or two NAMUR DIN 19324 slot type sensors inside the indicator housing. These sensors are used to monitor the position of the indicator needle, and trigger the change of state of an external electronic sensing unit when the needle passes a preset flow level.
The position of these flow alarms is adjusted on the meter scale, using the red pointer(s) which is set at the required flow value for alarm, by loosening the locking screw approximately ½ turn only, and moving the pointer across the scale to the flow rate required, and tightening the screw back. The alarms are either for Low flow, or High flow, or a two sensor unit for both Low and High flow alarm.
The standard sensor fitted to the alarm indicator housing is a Pepperl & Fuchs type SJ3.5N slot sensor, which is approved CENELEC intrinsically safe EEx ia IIC T6 as standard. It has to be monitored by an appropriate P&F Transformer Isolated barrier, which could be a WE77/Ex* unit or a KFA*-SR2-Ex*.W mains AC powered unit, or the DC powered KFD2-SR2-Ex*.W.

A cable from the sensors exits the housing via the cable gland at the bottom of the indicator. Each sensor requires two wires and are connected as follows:

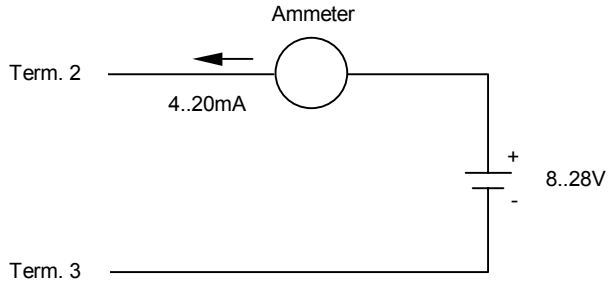
Low Alarm -	Red positive terminal Black negative terminal
High Alarm -	White positive terminal Green negative terminal

3.5 Optional Transmitter

If a flow transmitter is fitted, connections are made via a 3-way terminal block (or in some applications by an integral DIN type connector). The unit is powered by a 2-wire 4-20mA loop, requiring the connections shown below:

Terminal Block:

Terminal 1 :	Used for communication and factory calibration. (Not used in normal operation)
Terminal 2 :	positive power supply voltage
Terminal 3 :	negative power supply voltage
Supply voltage :	8V to 28VDC



For units fitted with an integral DIN connector, the connections are as follows:

Pin 1 :	Used for communication and factory calibration. (Not used in normal operation)
Pin 2 :	positive power supply voltage
Earth Pin :	negative power supply voltage (Not an Earth connection, i.e. isolated from flowmeter chassis)

The maximum allowable loop resistance is a function of the supply voltage. Use the equation below to determine the maximum resistance for your application:

$$R_{max} = \frac{\text{Supply Voltage} - 8V}{0.02A}$$

Unless otherwise requested, the transmitter is factory set to reflect the flowmeter scale, with 4mA at the rest position and 5.6mA at 10% up to 20mA at 100%. This can be adjusted / calibrated with the help of a PC-program and a small interface plugged in any RS232 serial PC-port. The calibration data is stored into non-volatile memory in the transmitter. After calibration the unit is a standalone functioning device.

3.6 Transmitters in Hazardous Areas

For intrinsically safe operation (Tia units only), barrier selection, cable parameters and power supply limits must be in accordance with the entity parameters shown on the label.
If an intrinsically safe unit is used without a barrier, this apparatus may no longer be considered as intrinsically safe. It is the customer's responsibility to clearly mark the apparatus when intrinsic safety is no longer valid.

Tia approval code: EEx ia IIC T6

Do not connect the green wire (keep it floating) when the transmitter is in normal operation. The green wire should not be extended.

For TnA type units, a barrier is not required, although installation is limited to zone 2 applications for gases and vapours, and non-hazardous areas.

Note: The power supply voltage determines the maximum allowable resistance of the loop.
Always be sure that the voltage on the transmitter is within specifications.

4 Operation & Maintenance

4.1 Commissioning

All Influx Flowmeters are fully calibrated for the specified plant conditions before dispatch, and no further adjustment should be necessary.

4.2 Cleaning & Maintenance

These Metal Tube flowmeters do not normally require any cleaning or regular maintenance. However it is possible that magnetic particles in a liquid flow, or moisture and dirt in a gas flow, may deposit on the float/orifice combination, or in the damping cylinder on a gas unit, and cause the meter to "stick", or fail to return to zero. In this case it is desirable to clean the meter flow tube, either by purging, or removal to allow internal inspection and cleaning.

STATIC RISK
When installed in hazardous areas, only clean plastic parts with a damp cloth.

4.3 Fault Finding

Should flow indication be incorrect, the first action is to check that the needle is free to move across the scale in the housing. By removing the housing cover and physically rotating the needle, any resistance to movement other than the magnetic interaction with the float, can be identified.
If the needle moves freely and problem is still suspected, then the meter should be removed and the float, orifice and piston damper (if fitted) should be cleaned and checked for free movement (see 4.2 above).

4.4 Operational Changes

The flow scale provided with the meter is marked with the process conditions expected at the measurement point, in terms of fluid to be monitored, and the pressure and temperature of the fluid to be measured. It shows the full scale reading applicable to the float fitted in the meter.
Should the process liquid or physical conditions change compared to these that were expected, it is possible to provide a new scale for the new conditions. In many cases a slight temperature change, or a pressure change for a liquid flow, will not have a significant effect on the scale. If however it is required to re-range the meter to cover a different flow range, this may be possible by replacement of the float unit inside the meter, and fitting a new scale plate: please contact your distributor, with information about the existing and new conditions to be applied.