IN-588B
Flow Totaliser.

Programmable Flow or Frequency Input Self Powered Totaliser.

Features.

- **Self Powered.**
- **LCD Display.**
- **User Calibrated.**
- **Cost Effective.**
- **Programmable.**
- **Enclosure IP67 Rated.**
- **Gland IP65 Rated.**
- **Divides Input Signal From 1 to 10,000,000.**
- **Display Reset Via DIP Switch.**
- **Logic Reset Via DIP Switch.**
- **Power ON / OFF Via DIP Switch.**

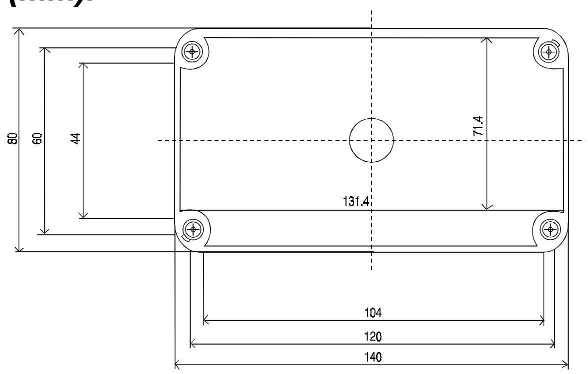
Description.

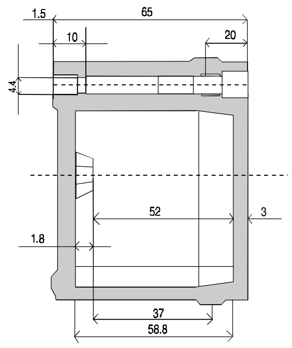
The model IN-588B is a self powered flow totalising counter intended for use in industrial applications. The flow totaliser is designed to accept low voltage input signals from flow transducers and display totalised quantities in engineering units. No external power connections are required as it is self powered by a long life lithium battery. This unit comes complete in a polycarbonate IP67 enclosure.

Typical Applications.

- Water distribution.
- Process liquids.
- Energy management systems.
- Boiler feed water.
- Effluent discharge.
- Diesel cooling water.
- Insecticides.
- Oils.
- High Pressure systems.
- Well monitoring.
- Irrigation.
- Fertilisers.

Dimensions (mm).





Specifications.

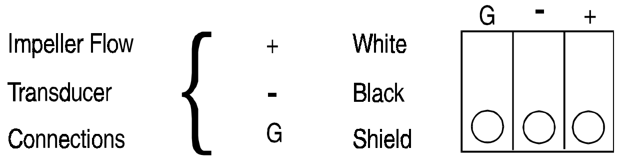
Minimum Input Level	10mVpp.
Maximum Frequency Input	2kHz.
Operating Temperature	0~70C.
Storage Temperature	-20~80C.
Power Supply	3.6V Lithium Battery.
Battery Life	Minimum Life 10 Years at 25^0C - Under Normal Conditions.

Note 1. Specifications based on Standard Calibration Unit, unless otherwise specified.
Note 2. Due to ongoing research and development designs, specifications, and documentation are subject to change without notification. No liability will be accepted for errors, omissions or amendments to this specification.
Note 3. Further ranging and installation information supplied with each unit, and is available upon request.

Quality Assurance Programme.

The modern technology and strict procedures of the ISO9001 Quality Assurance Programme applied during design, development, production and final inspection grant long term reliability of the instrument.

Connections.



DIP Switch Settings.

Notes:

(1) X = Multiply signal in by .....

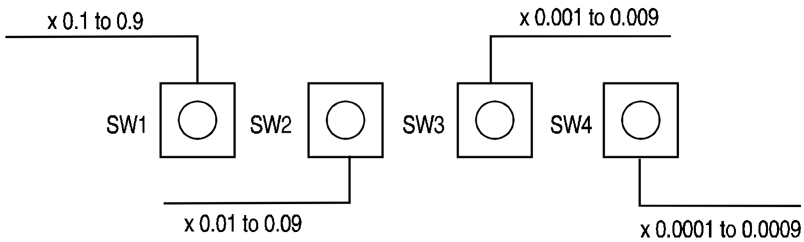
(2) DIP switch states active when DIP switch "ON".

(3) Only one of the DIP switches 1, 2, 3, 4 or 5 should be "ON" at any one time.

(4) Do not leave DIP switches 6 or 7 "ON". Momentary contact only.

		DIP Switches
Power "ON"		8
Logic Reset		7
Display Reset		6
x 0.0001	(10^{-4})	5
x 0.001	(10^{-3})	4
x 0.01	(10^{-2})	3
x 0.1	(10^{-1})	2
x 1	(10^{0})	1

BCD Switch Settings.



Example of Calibration Procedure.

We want the flow in a schedule 40, 4 inch pipe to be totalised in cubic metres.

(1) From the 'Flow Research Impellor Transducer Calibration Data' (next page) for schedule 40, 4" pipe there are 2.074 pulses per litre generated by the impellor flow transducer.

(2) One cubic metre = 1000 litres. So 2.047 x 1000 = 2074 pulses/m^3.

(3) So for every 2074 pulses into the prescaler from the impellor flow transducer, we want one unit totalised on the display.

=> $1 \div 2074 = 0.0004822$ or 0.4822×10^{-3}.

=> 0.4822×10^{-3} is the scaling factor that we must program into the IN-588B.

(4) Set the DIP switches 1, 2, 3, 5, "OFF" and DIP switch 4 (i.e. 10^{-3}) "ON".

Set SW4 = 2 (i.e. 0.0002)
SW3 = 2 (i.e. 0.002)
SW2 = 8 (i.e. 0.08)
SW1 = 4 (i.e. 0.4)

0.4822×10^{-3}

Flow Research Corporation Impellor Transducer Calibration Data.

Model	Pipe Size			Minimum Flow Rate (l/min)	Maximum Flow Rate (l/min)	Output (pulses/l)
	Schedule*	Nominal (")	I.D. (mm)			
TR475		½	12.7	3.6	107.6	65.722
TR475		¾	19.05	6.3	188.8	42.346
TR475		1	25.4	10.2	305.8	23.194
TR475		1¼	31.75	17.6	529.4	12.724
TR475		1½	38.1	24.0	720.5	9.52
TR400/500	80ST,80S	2	49.3	34.8	1045.2	8.542
TR400/500	40ST,40S	2	52.5	39.6	1187.8	7.08546
TR400/500	40ST,40S	2½	62.713	56.5	1694.7	5.01338
TR400/500	80XS,80S	3	73.7	77.9	2338.0	3.2265622
TR400/500	40ST,40S	3	77.92	87.2	2616.7	2.74791
TR400/500	40ST,40S	4	102.26	150.2	4506.0	2.07418
TR400/500	40ST,40S	5	128.19	235.9	7078.5	1.2112
TR400/500	40ST,40S	6	154.05	340.9	10226.0	0.813775
TR400/500	40ST,40S	8	202.7	590.3	17707.6	0.4275536
TR400/500	40ST,40S	10	254.5	930.4	27911.3	0.2712331
TR400/500	80S	10	247.7	880.9	26427.4	0.2864488
TR400/500	ST,40S	12	304.8	1334.4	40032.0	0.1890966
TR400/500	40	12	303.2	1320.6	39619.4	0.1910668
TR400/500	XS,80S	12	298.5	1279.4	38381.4	0.1972742
TR400/500	30,ST	14	336.6	1626.9	48806.4	0.1551093
TR400/500	40	14	333.3	1596.1	47882.5	0.1581373
TR400/500	30,ST	16	387.4	2155.1	64652.4	0.1171079
TR400/500	40,XS	16	381	2085.0	62550.0	0.1210443
TR400/500	40	18	428.7	2639.1	79174.2	0.0956091

'Perry's Chemical Engineers' Handbook, Pages 6-42, Table 6-6.
Calibration figures for in between pipe sizes are available on request.

Installation of TR400 Series Transducer.

Never attempt this procedure without proper safety equipment.
Make sure necessary pumps are off or valves closed.

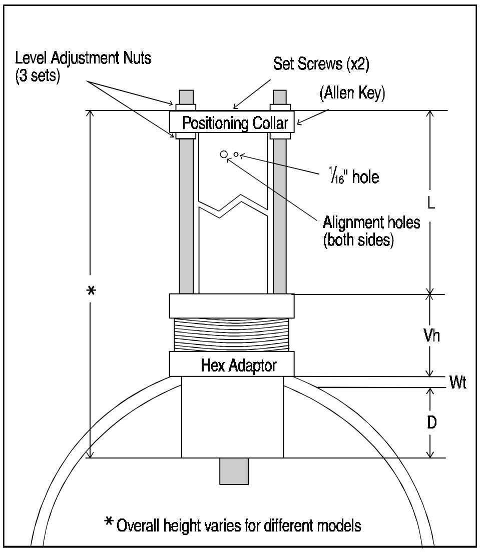
(1) Install a 2" weld on threaded fitting or service saddle according to the manufacturer's instructions.

(2) Calculate 'L' as follows:

L = 161.93 mm - (D + Vh + Wt) TR400 model.
L = 390.53 mm - (D + Vh + Wt) TR500 model.

Abbreviations:

D = 0.125 X pipe I.D. (insertion depth)
Vh = Distance between the top of the pipe and the top of hex adaptor. (When the TR400 is seated in the pipe.)
Wt = Pipe wall thickness.



(3) Wrap threads of the TR400 with Teflon tape and install the TR400 transducer into the pipe.

(4) Turn the level adjustment nuts as required so that the distance between the top of the hex adaptor and the top of the positioning collar equals 'L'.

(5) After distance 'L' has been set, loosen the set screws in the positioning collar to allow for alignment of the impeller. Insert a rod through the alignment holes to reposition the transducer tube. Position the transducer tube so that the $^{1}/_{16}$" hole next to the alignment hole faces the upstream side of the pipe. Tighten the set screws.

Installation of Flow Research Corporation Flow Sensors

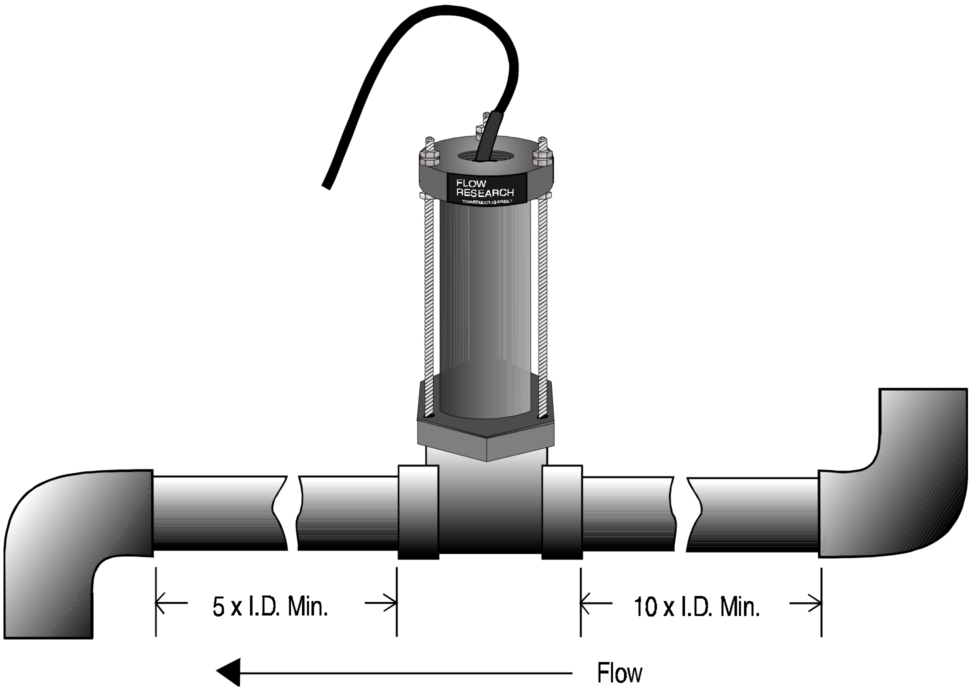


Figure 1

- Elbow joints, valves, and other bends in your pipe run cause disturbances in the flow.
- To get a proper flow reading, your sensor should be placed in a straight run section of the pipe in order to avoid those areas.
- A basic rule is to allow at least 10 diameters of straight pipe run before the sensor and 5 diameters after the sensor.
- These are minimum recommended distances, some obstructions, such as butterfly valves, may require longer straight runs.

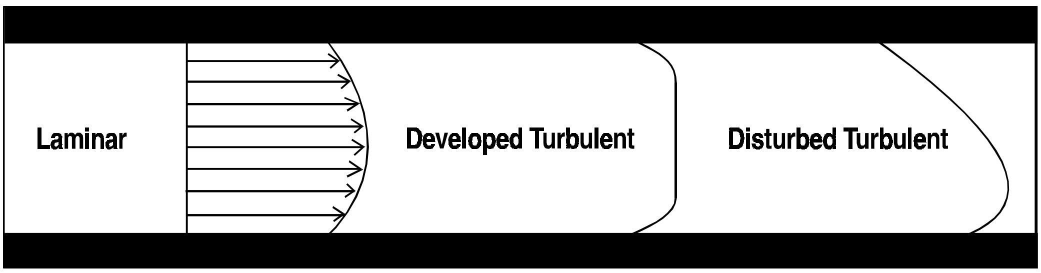


Figure 2

- Knowledge of the flow profiles shown in Figure 2 is important for proper calibration and placement of a flow sensor in a pipe.
- The most common flow profile found in industrial applications is developed turbulent flow, which is what flow sensors are calibrated for.
- The second type of profile "known as disturbed turbulent flow" is less stable and occurs when the flow is interrupted by a valve, elbow or other internal obstruction.
- By running 10 diameters of straight pipe ahead of the sensor, disturbed turbulent flow can achieve a well developed turbulent profile which can then be accurately measured.
- Finally, laminar flow occurs only with highly viscous fluids which travel at extremely low velocities (contact the factory for details).

To determine which type of flow exists in your particular application, you need to know the fluids velocity (u), gravity (p), viscosity (µ) and the pipe diameter (D). This information is expressed in the form of a REYNOLDS NUMBER.

$$\text{REYNOLDS NUMBER} = \frac{D \times u \times p}{\mu}$$

- Typically, a fluid with a REYNOLDS NUMBER greater than 5,000 is developed turbulent, and less than 2,000 is laminar.

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