

# manas



.....a name that spells trust  
AN ISO 9001: 2000 COMPANY

## We Measure Wide Aqua Flow



## INSERTION MAGMETER

 *Sroat* 1000i

## ELECMAGNETIC FLOW METER : SROAT -1000 i

### INTRODUCTION :

The Manas make Insertion Type Electromagnetic flow meter, called SROAT - 1000*i* is an ideal solution for water flow measurement in large diameter pipes. Fairly good accuracy of measurement (typically  $\pm 1\%$  of flow rate) can be achieved with little care in installation of probe and transmitter. The electrical conductivity of liquid under measurement can be as low as  $20 \mu\text{S}/\text{cm}$ . Being insertion type, there is virtually no pressure loss. Most economical as compared to its counterpart in full bore measurement or ultrasonic measurement.

The technique called as " Pulsed DC " is used which offers very high zero stability and accuracy of measurement. The standard current output of 4-20 mA DC is provided which is linearly proportional to volumetric flow rate.

### PRINCIPLE OF OPERATION :

The method of flow measurement is based on Faraday's law of electromagnetic induction. When a conductor moves within a magnetic field, voltage is induced in it, which is proportional to the velocity of conductor.

In this case the conductor is flowing media. The equation is as below.

$$E = B \cdot v \cdot d$$

where,

E = Induced voltage [ proportional to velocity ]

B = Magnetic flux density.

v = Mean velocity of the media

d = Distance between the sensing electrodes

For a given probe and compatible amplifier the flux density 'B' is constant, the distance between the electrodes is constant. Hence, the induced voltage is proportional to the velocity of the flowing media. Thus, the unit can be calibrated in terms of volumetric flow rate by knowing the cross-sectional area of the pipe on which the probe is installed.

### PRINCIPAL ADVANTAGES :

Excellent long term zero stability using pulsed dc magnetisation and auto zero technique.

Measurement results are independent of density, viscosity, pressure, temperature, solid-impurities and conductivity variations (above  $20 \mu\text{S}/\text{cm}$  )

No additional pressure drop across the meter.

Compatible with virtually all corrosive / non-corrosive liquids.

IP-65 class of protection offered.

### APPLICATIONS :

Following industries find application of this flow measurement technique

Water Supply

Public Services & Utilities

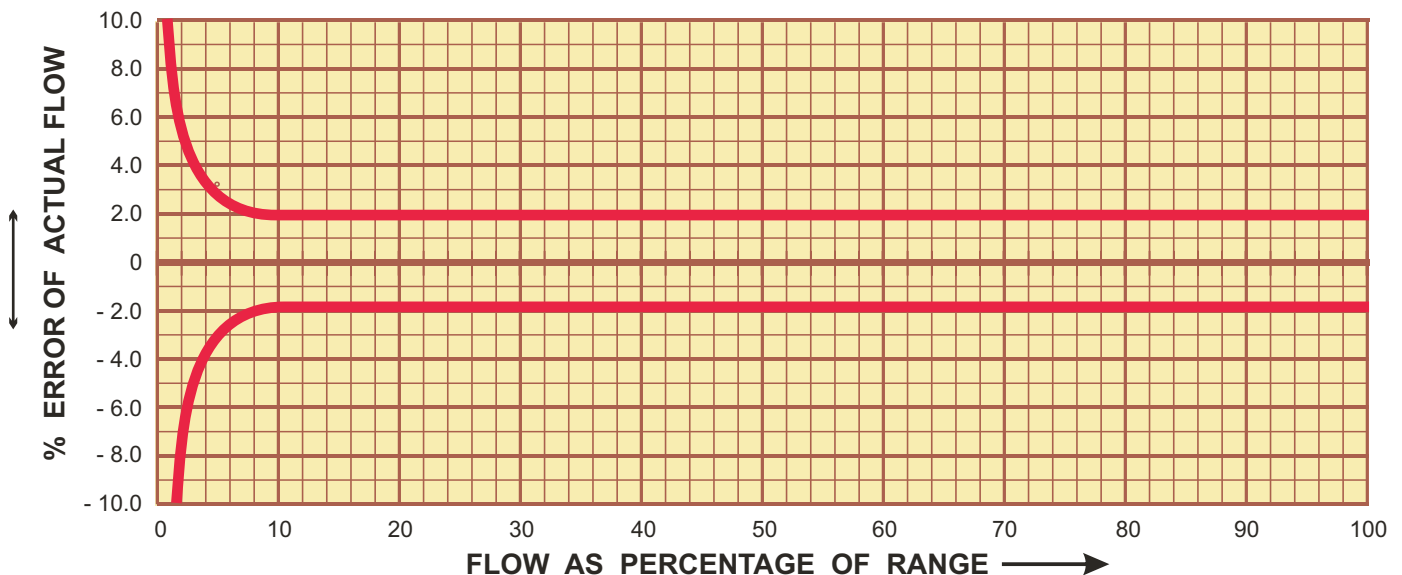
Effluent Treatment Plants

Pharmaceutical Industries

Sugar Industries & Distilleries

Food & Drugs

## ERROR DIAGRAM



## ELECTROMAGNETIC FLOW METER (INSERTION)

### INSERTION PROBE : SROAT 1000 i

|                             |                              |
|-----------------------------|------------------------------|
| Applicable line Sizes       | : 200 mm to 2000 mm          |
| Media Pressure              | : 15 kg/cm <sup>2</sup> max. |
| Media Temperature           | : 0 - 80 °C                  |
| Ambient Temperature Range   | : 0 - 50 °C                  |
| Materials :Insertion Probe  | : SS 304                     |
| Electrodes                  | : SS 316                     |
| Wetted Parts                | : SS 304, SS 316, Epoxy      |
| Weld in socket              | : SS 304                     |
| Flange Mounting Assembly    | : SS 304                     |
|                             | [Refer Sketch on rear page]  |
| Power Supply To Field Coils | : Pulsed DC                  |
| Terminal box                | : IP-65                      |
| Cable Entries               | : IP-68                      |

### TRANSMITTER : SROAT 1000 A i

|                              |  |
|------------------------------|--|
| 1. Type                      | : Integral Mounted (standard)<br>Remote Mounted (on request)                       |
| 2. Min. Media Conductivity   | : 20 µS/cm   |
| 3. Signal Output             | : 4-20 mA dc Isolated in<br>max. 600 ohms  |
| 4. Coil Excitation Frequency | : 3 Hz   |
| 5. Display                   | : a) 3½ Digit LCD Calibrated<br>in % or Engg. units for<br>instantaneous flow rate |

|                         |  |
|-------------------------|--|
| 5. Display ( cont.)     | b) 8 Digit LCD non- resettable type<br>for totalised quantity<br>[2½ years back-up for retaining<br>the value] |
| 6. Flow Velocity Range  | : 0.1 m/s to 10 m/s  |
| 7. Accuracy             | : ± 2 % of Reading<br>[ for range between 100 % to<br>10 % of flow rate at Ref.. Condition]                    |
| 8. Reference conditions | : Power supply nominal,<br>Ambient Temp. 27 °C±2C°   |
| 9. Repeatability :      | : ± 0.2% of reading  |
| 10.Ambient Temperature  | : 0 - 50°C   |
| 11.Temperature Drift    | : ± 0.015% Per °C max.   |
| 12.Humidity             | : 90% R. H. max. non condensing.   |
| 13 .Material of Housing | : Al. Die cast   |
| 14.Power Supply*        | : 230 V AC / 110 V AC, 50 Hz 24V DC  |
| 15.Damping              | : Adjustable from 5 to 30sec.  |
| 16.Cable Entries        | : 4 No. for Remote Amplifier<br>2 No. for Integral Amplifier<br>½" NPT / ½"BSP / PG 11[Female]                 |
| 17.Ingress Protection   | : IP-65 Equivalent   |

\* Battery back-up can optionally be provided for measurement & totalisation of flow in case of power failure by providing a separate powering unit.

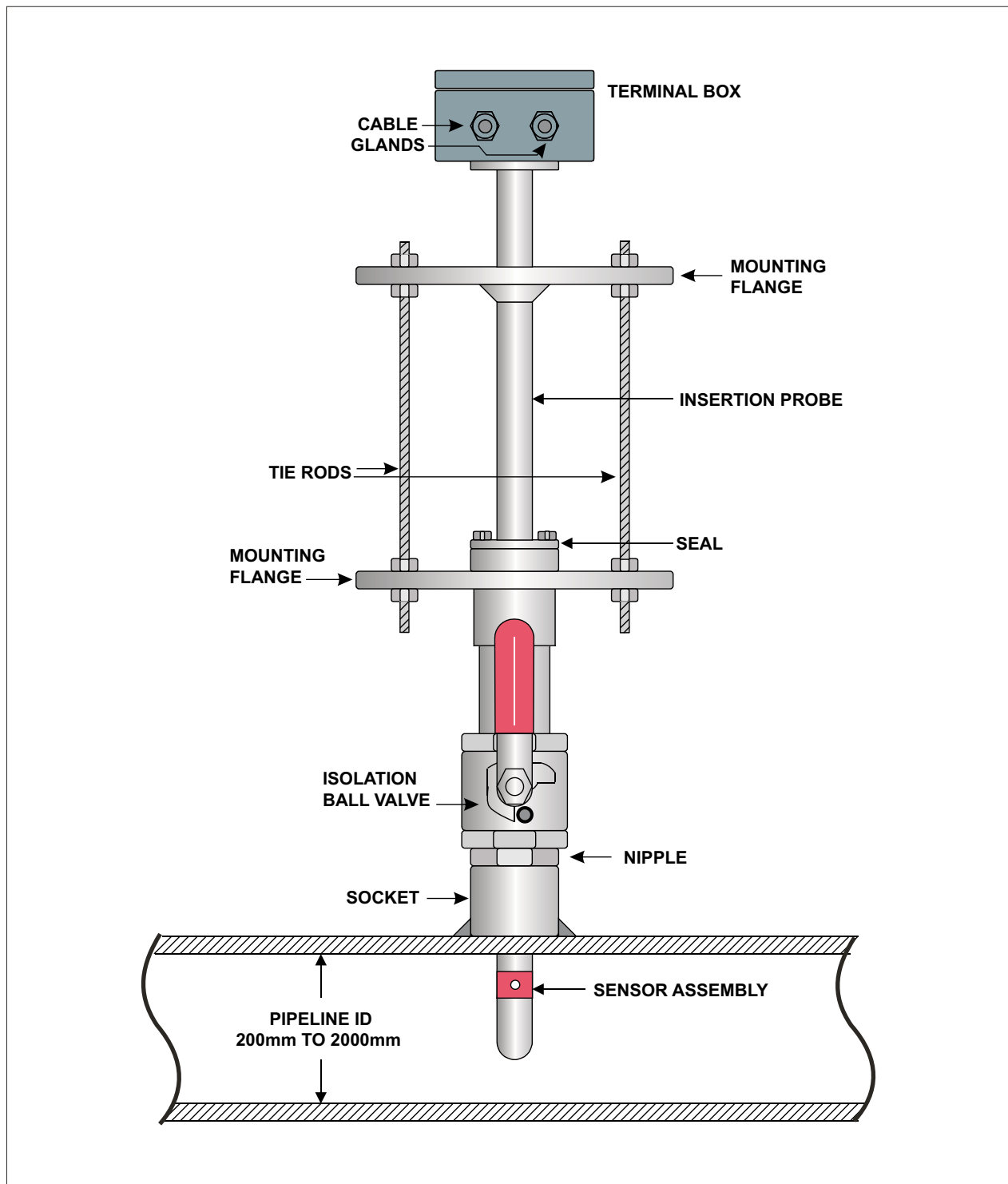
### FLOW RATE TABLE : Flow Rate at v = 1 m / s

| Dia.(mm) | M <sup>3</sup> /hr. | MLD     | Cu. ft./Sec. | Dia.(mm) | M <sup>3</sup> /hr. | MLD      | Cu. ft./Sec. |
|----------|---------------------|---------|--------------|----------|---------------------|----------|--------------|
| 200      | 113.097             | 2.7143  | 1.1094       | 800      | 1809.556            | 43.4293  | 17.7511      |
| 250      | 176.714             | 4.2411  | 1.7335       | 900      | 2290.219            | 54.9652  | 22.4662      |
| 300      | 254.469             | 6.1072  | 2.4962       | 1000     | 2827.431            | 67.8583  | 27.7360      |
| 350      | 346.360             | 8.3126  | 3.3977       | 1200     | 4071.500            | 97.7160  | 39.9400      |
| 400      | 452.389             | 10.8573 | 4.4378       | 1400     | 5541.765            | 133.0024 | 54.3626      |
| 500      | 706.858             | 16.9646 | 6.9340       | 1600     | 7238.223            | 173.7174 | 71.0043      |
| 600      | 1017.875            | 24.4290 | 9.9850       | 1800     | 9160.876            | 219.8610 | 89.8648      |
| 700      | 1385.441            | 33.2506 | 13.5907      | 2000     | 11309.724           | 271.4333 | 110.9442     |

### COMPARISON OF VARIOUS TYPES OF FLOW METERS

| Parameters                               | Insertion<br>SROAT 1000i | Vortex<br>Insertion | Turbine          | Orifice                             |
|--|--------------------------|---------------------|------------------|-------------------------------------|
| Accuracy                                 | ±2 %                     | ±2 %                | ±3 %             | ±5 %                                |
| Minimum Velocity                         | 0.1 m/s                  | 0.6 m/s             | 0.6 m/s          | --                                  |
| Pressure Drop                            | NIL                      | NIL                 | Considerable     | Considerable                        |
| Effect of Viscosity & Density variations | No Effect                | Very Much           | Very Much        | Very Much                           |
| Solid Particle Impurities                | No Effect                | Wears Out           | Wears Out        | Wears Out<br>Errors in Measurements |
| Vibration of Pipe                        | Immune                   | Affects Reading     | Affects Reading  | Not Recommended                     |
| Orientation                              | No Effect                | No Effect           | Affects Accuracy | Horizontal Mounting only            |

# SCHEMATIC DIAGRAM FOR INSERTION PROBE ASSEMBLY



Manufactured By



Manas Microsystems Pvt. Ltd.  
Pune.

Authorised Distributor



Managing Technology & Services

MTS ENGINEERS PVT. LTD.

B/408, Wall Street-II, Opp. Orient Club, Near Gujarat College,  
Ellisbridge, Ahmedabad-380 006, Gujarat, INDIA.  
T : +91 79 2640 0063 / 3016 0063 • F : +91 79 4004 7430  
www.mtsengrs.com

