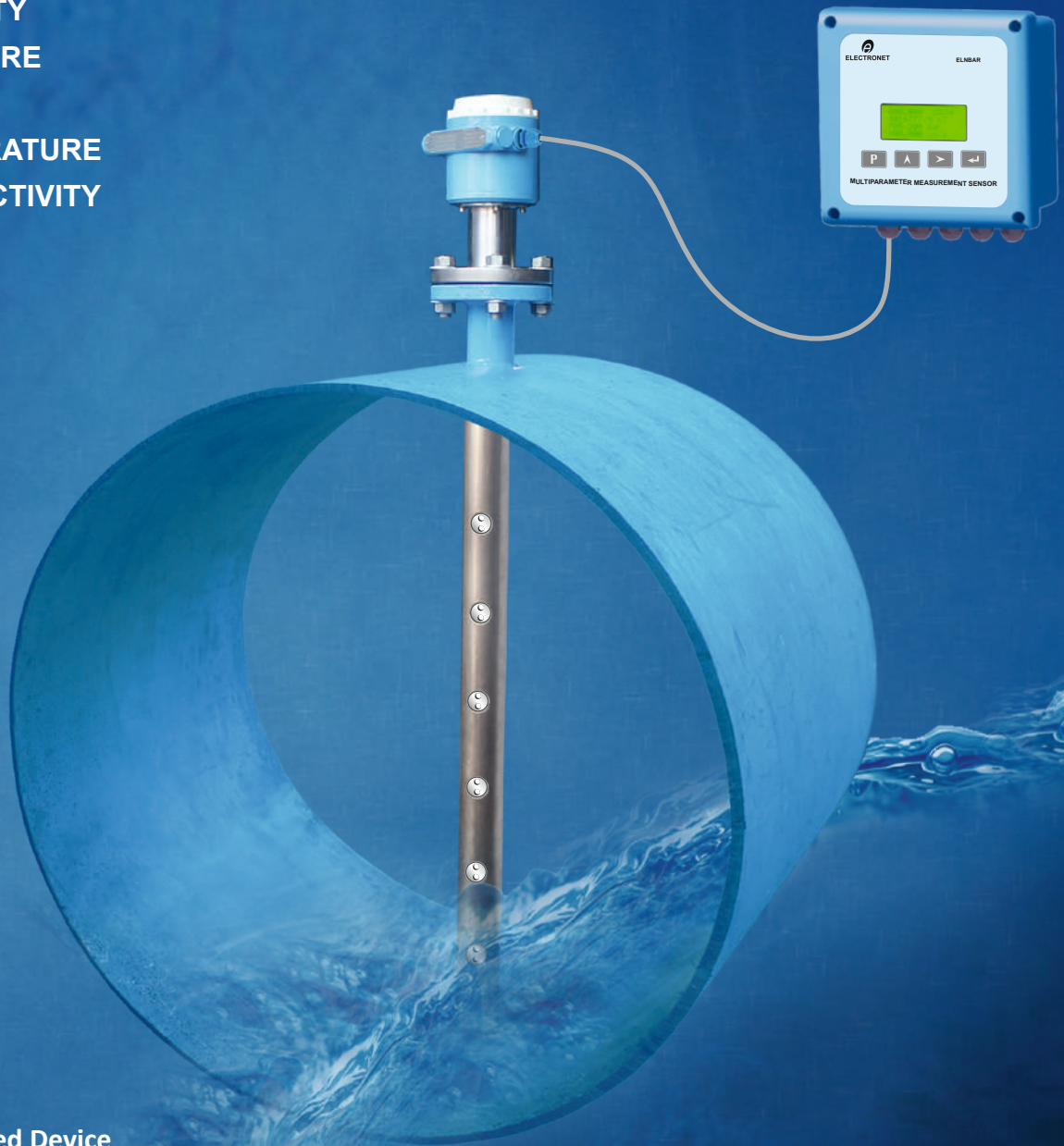


INDUSTRY'S FIRST INNOVATIVE PRODUCT

# ELN BAR

## MULTIPARAMETER MEASUREMENT SENSOR

- VELOCITY
- PRESSURE
- LEVEL
- TEMPERATURE
- CONDUCTIVITY
- TDS
- FLOW



- IoT Enabled Device
- Wired or Wireless Signal Transmission
- Single Instrument for Multiparameter
- Hot Retractable Insertion Sensor
- Simple and Time Saving Installation
- Wide Range of Applications



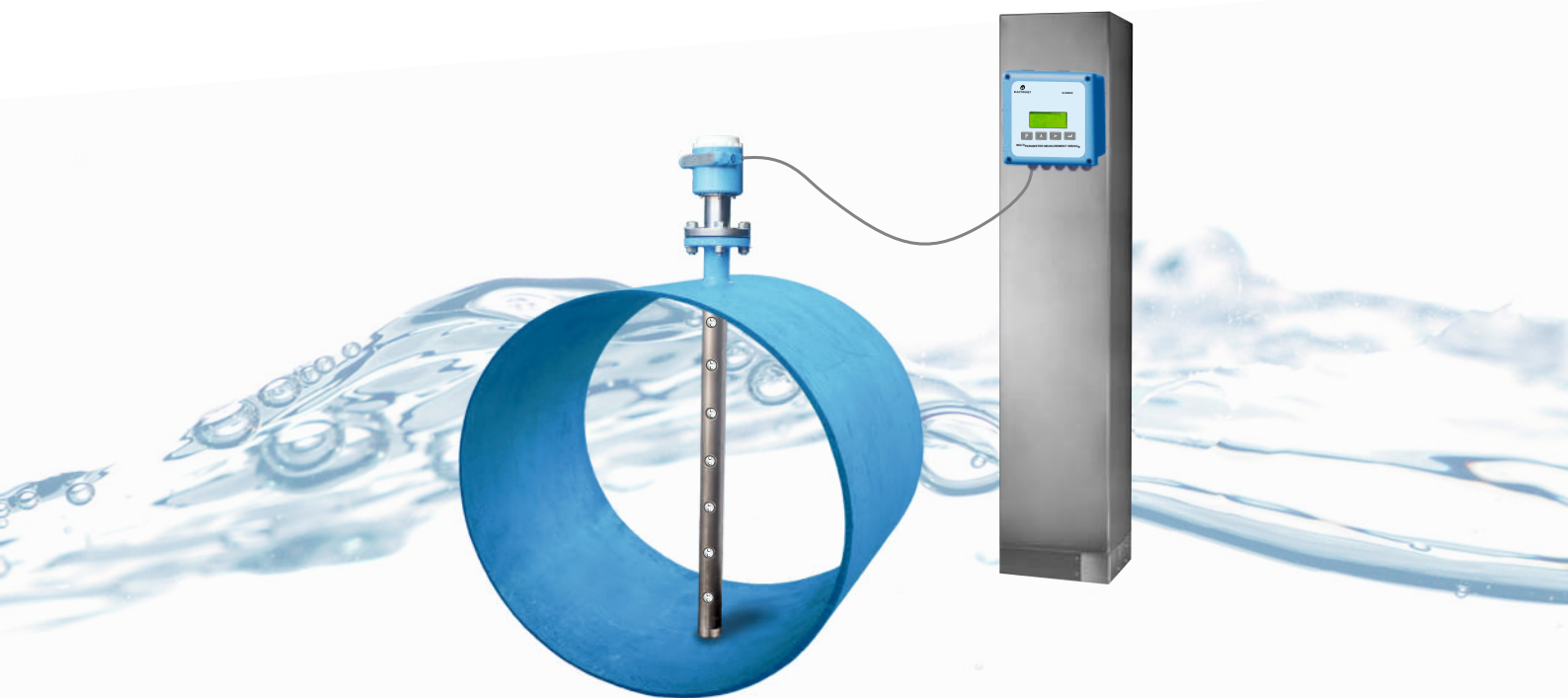
**ELECTRONET**

[www.eeplindia.com](http://www.eeplindia.com)



ESS-S001A-220424 **1**

### MULTIPARAMETER MEASUREMENT SENSOR



#### Measuring Principle

The ELNBAR is a Multiparameter Measurement Sensor. This is a single integrated sensor used for the measurement of various parameters like Velocity, Flow, Level, Pressure, Temperature and Conductivity of Conductive Liquid.

##### Pressure Measurement:

ELNBAR is embedded with piezo-resistive pressure sensor with built-in temperature compensation. Standard pressure range is 0 to 20 kg/cm<sup>2</sup> gauge.

##### Temperature Measurement:

ELNBAR is embedded with RTD PT100 Sensor which senses fluid temperature. The Measurable temperature range is -20 to +100 Deg C or -20 to +250 Deg C.

##### Level Measurement:

Level probe is guided with SS tubes arranged in insertion sensor to sense the level of fluid.

##### Flow Measurement:

ELNBAR has multiple bores along with the Axis of Probe. Electrodes & electromagnetic excitation coil pairs are placed along with the axis of sensor probe.

The flow measurement method is based on Faraday's Law of Electromagnetic Induction.

An electrically conductive fluid flows inside an electrically insulated pipe through a magnetic field. This magnetic field is generated by a current flowing through a pair of field coils.

Inside of the fluid a voltage V is generated:

$$V = v * k * B * D$$

in which:

v = mean flow velocity

B = magnetic field strength

V = Voltage Generated

k = factor correcting for geometry

D = distance between electrodes

The specific design of multi-bore sensor takes care of calculations with respect to variable flow profiles including laminar and turbulent conditions achieving accuracy as good as full-bore electromagnetic flow meters.

Number of bores in ELNBAR depends on the pipe's inside diameter. For bigger line sizes, the number of bores are increased to achieve required measurement accuracy.

##### Calculation of Partial / Filled Pipe Flow:

The flow rate

$$Q = A * V$$

Where

A - Area of the liquid section

V - Velocity of the Liquid

##### TDS / Conductivity Measurement:

ELNBAR is consisting of Built-in conductivity sensors of cell constant 1 with required flow path. The measuring cell measures the TDS / conductivity in the specified measurement ranges.

##### Calibration:

ELNBAR is manufactured and calibrated for flow and pressure measurements in NABL Accredited (ISO17025) calibration lab for line sizes starting from 250NB to 2000NB.





### Use of ELNBAR for Open Channel Flow Measurement

All Open Channel flow meters have inferential Flow measurement i.e. they measure the height or head of the liquid as it passes over an obstruction in the channel and from the height or head of the liquid Flow rate is inferred or calculated.

For this type of inferential measurement, a restriction is to be created in the liquid flow path to have height gradient respective to the liquid flow. This type of flow measurement has limited accuracy of +/-5 to 10% and is affected by the liquid surface conditions like whirl or turbulence of flowing liquid. Construction cost of the restriction also adds to the overall cost of flow measurement.

ELNBAR unique multipoint velocity and liquid level measurement technology offers most accurate and efficient solution for open channel flow measurement. ELNBAR measures the velocity at multiple points across the height of flowing liquid along with the actual liquid level in the open channel. Based on the multipoint velocity & Liquid height

measurement ELNBAR calculates the actual flow rate from the discharge formula as given below–

$$Q = A \times V$$

Where

A – Area of the liquid section in the open channel

V – Velocity of the Liquid in the open channel.

Programmable flow path selection is available in ELNBAR Display and controller unit for Rectangular, Trapezoidal, Triangular, Circular and parabolic channels.

On the basis of multipoint velocity measurement, ELNBAR measures far more accurate and realistic flow in open channel as compared to other open channel flow meters without any effects of whirls and flow turbulence in flow and requirement of construction of restriction in flow path.

## Technical Specifications

Measuring Parameter	Engineering Unit
Pressure	0 to 20kg/cm <sup>2</sup> Gauge
Velocity	0.3 m/s to 6 m/s
Flow	m <sup>3</sup> /hr, MLD as per Line Size
Temperature	0 to 100°C
Conductivity / TDS	10 to 10000 microsiemens / 0 to 2000 mg/litre
Fluid Level	0 to 5000mm (as per Probe Length)

## Construction

Sensor Probe	1) 2" BSP Threaded / Flanged 2" ASA 150 as per Pipe Diameter (150 NB to 1000 NB) & 3" ASA 150 (1100 NB & Above) 2) * Hot Retractable Sensor Assembly –SS316 (150 to 1000 NB)
Slave Electronics	Integrated with Sensor Probe transmitting digital signal to Master Electronics
Master Electronics	Remote Mounted measurement electronics accepts signal from Slave Electronics

## Process Conditions

Process temperature	-20 to +200°C
Ambient temperature	0 to 65°C
Storage temperature	0 to 65°C
Measurement Range	0.3 to 6 m/s
Pressure Range	0 to 20 kg/cm <sup>2</sup> Gauge
Electrical Conductivity	> 10 microsiemens/cm
Permissible solid content	< 20% (Size maximum 100 micron)
Density	< 1.15 kg / m <sup>3</sup>

## Measurement Accuracy

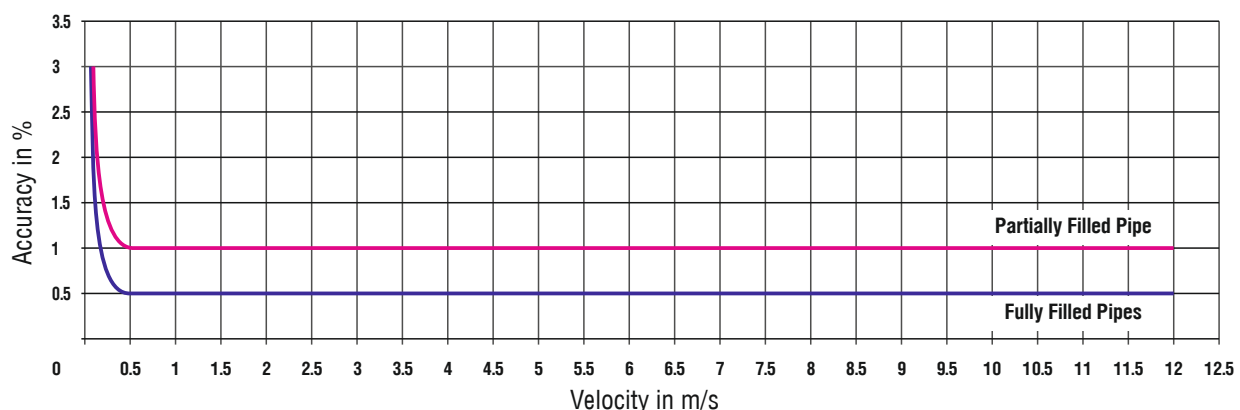
Pressure	+/-0.25% of F.S.
Temperature	+/-0.25% of F.S.
Conductivity	+/-2% of F.S.
Fluid Level	+/-2% of F.S.

## Flow Accuracy

ELNBAR is calibrated by direct volume comparison. The wet calibration at our ISO 17025 NABL Accredited Calibration Laboratory validates the performance of flow meter under laboratory condition against accuracy limits.

Laboratory Reference Conditions	Media : Water
	Temperature : 15 to 40 °C
	Operating Pressure : 0.1 to 3.6 Bar Gauge
	Up Stream Length : 10D (upto 1000 NB line size)
	Down Stream Length : 5D (upto 1000 NB line size)
Accuracy of Fully Filled Pipe	≤+/- 0.5% of F.S. +(+/-5mm per sec.) for Velocity 0.3 m/s to 6m/s
Accuracy of Partially Filled Pipe Line	≤+/- 1% of F.S. +(+/-5mm per sec.) for Velocity 0.3 m/s to 6m/s

## Graph



Master Electronics	
Ingress Protection	Weatherproofs IP 65
Power Supply	24V DC / 100 to 230V AC (50/60Hz) Solar Powered (20Watt, 24V DC)
Power Consumption	Less than 20W
MOC of Enclosure	Aluminum Dia Cast PU Painted / SS316
Electrical Connection	M 20 x 1.5 (other on request) / Circular Metal Connector
Output 1	4 to 20mA Selectable for Flow, Pressure, Temperature, Conductivity, Level
Output 2	Pulse Output Open Collector for Flow Measurement
Communication Output	RS485 (MODBUS RTU) / GSM / GPRS for Flow, Pressure, Temperature, TDS/Conductivity, Level

Slave Electronics	
Ingress Protection	Weatherproofs IP 68
Power Supply	+12V DC from Master Electronics
MOC of Enclosure	Aluminum Dia Cast PU Painted / SS316
Electrical Connection	M 20 x 1.5 (other on request)
Communication between Master Electronics & Slave Electronics	RS485 (MODBUS RTU)
Slave Electronics to Master Electronics Cable	Multicore Sheathed & PVC Insulated having size of 4C X 0.5 Sq.mm.

Sensor Probe	
Line Size	150 NB to 5000 NB
Master Electronics Location	Remote
Protection Class	IP 68
MOC	SS316 + PTFE / RUBBER
Process Connection Flange	2" ASA 150 Flange / 2" BSP Threaded / 3" ASA 150 Flange
MOC of Electrode	SS316L / Hastelloy C
Installation	Flanged Fixed Inline or Hot Retractable upto 1000 NB / Flanged Fixed Inline above 1000 NB

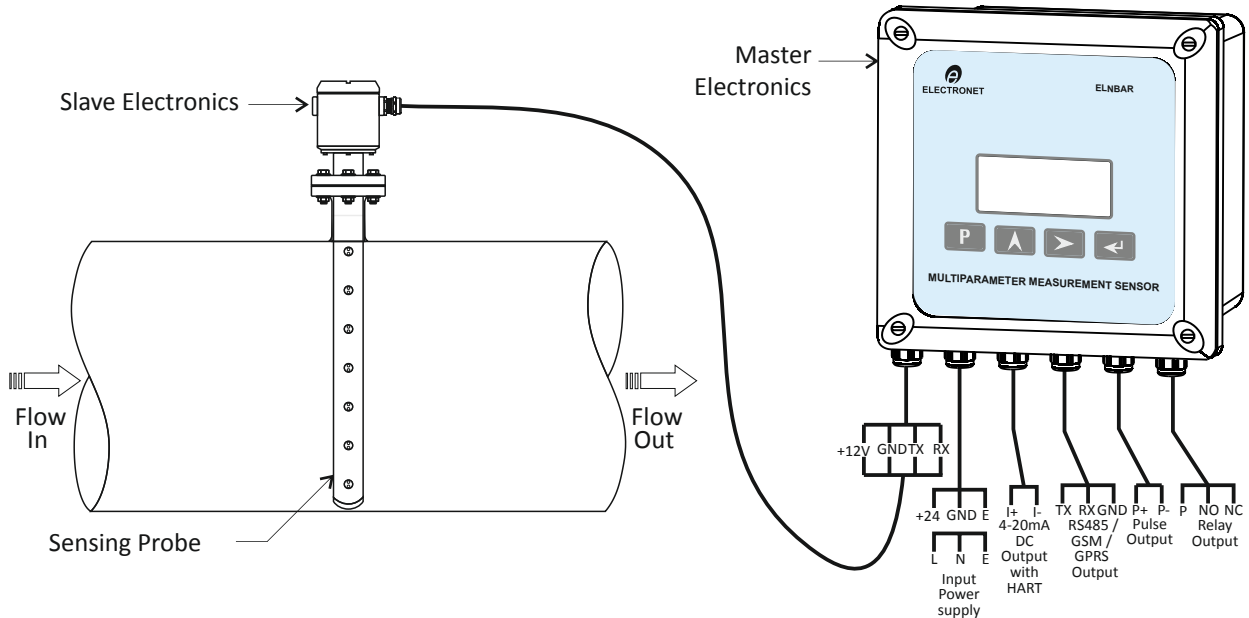
**Note:**

- 1) \*Incase of hot tap sensor, maximum pressure is 6 kg/cm<sup>2</sup> & suitable for line size 150NB to 1000NB
- 2) Suitable for clean conductive liquid having solid particles not more than 100 microns in size.
- 3) For slurry & other chemical applications, please consult factory.
- 4) ELNBAR will be supplied with following components.
  - a) Master Electronics
  - b) Slave Electronics with required cable & connector [Maximum cable Length 20 meters ( additional optional)]
  - c) Sensor Probe
  - d) Sensor Mounting Socket (To be welded to pipe, refer instruction manual)
  - e) Hot retractable assembly with ball valve (Optional)

## GENERAL ARRANGEMENT (GA) DRAWING

### General Arrangement (GA) Drawing

#### ELNBAR : MAINS / 24V DC POWERED



### General Arrangement (GA) Drawing

#### ELNBAR : SOLAR POWERED

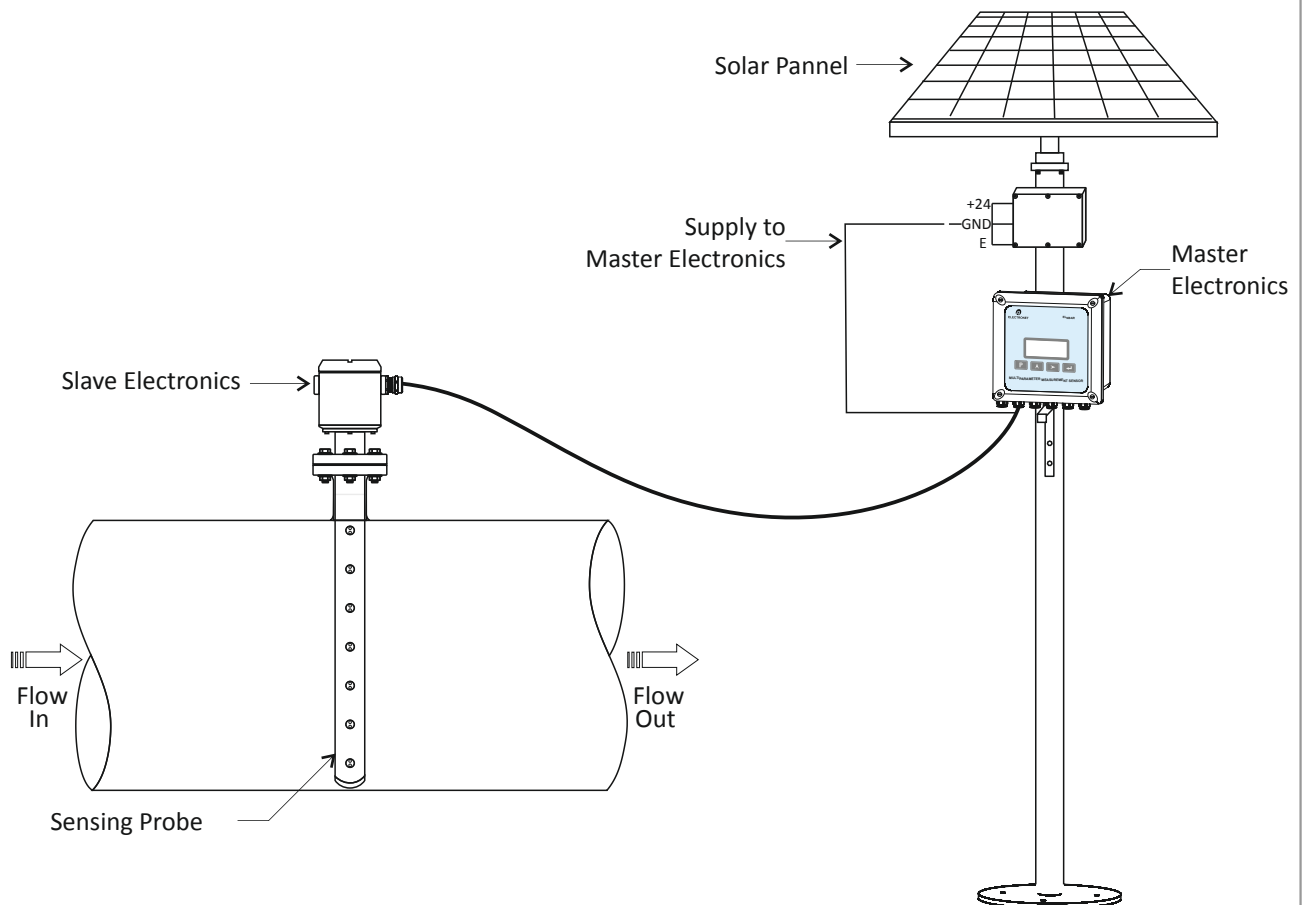


TABLE : Dimensional Details (Flow Meter with ANSI 150 Flange)

Line Size		Pipe OD (mm)	Effective Probe Length (mm)	Approx.Weight KG	Flow Range (m <sup>3</sup> /hr) for Velocity 0.3m/s	Flow Range (m <sup>3</sup> /hr) for Velocity 6.0m/s
Inch	NB					
6"	150	108	148	5.5	19	381
10"	250	273	253	6.0	53	1060
12"	300	324	305	6.5	76	1527
14"	350	356	337	7.0	104	2078
16"	400	406	387	7.5	136	2714
18"	450	457	438	8.0	172	3435
20"	500	508	489	8.5	212	4241
24"	600	610	591	9.0	305	6107
28"	700	711	671	9.5	416	8313
32"	800	813	773	10.0	543	10857
36"	900	914	874	10.5	687	13741
40"	1000	1016	976	11.0	848	16965
44"	1100	1118	1068	11.5	1026	20527
48"	1200	1219	1169	12.0	1221	24429
52"	1300	1321	1271	12.5	1434	28670
56"	1400	1422	1372	13.0	1663	33251
60"	1500	1524	1474	13.5	1909	38170
64"	1600	1626	1576	14.0	2171	43429
68"	1700	1727	1677	14.5	2451	49028
72"	1800	1829	1779	15.0	2748	54965
76"	1900	1930	1880	15.5	3062	61242
80"	2000	2032	1982	16.0	3393	67858
84"	2100	2135	2085	16.5	3741	74814
88"	2200	2238	2188	17.0	4105	82109
92"	2300	2342	2292	17.5	4487	89743
96"	2400	2445	2395	18.0	4886	97716
100"	2500	2545	2495	18.5	5301	106029
104"	2600	2645	2595	19.0	5734	114681
108"	2700	2745	2695	19.5	6184	123672
112"	2800	2845	2795	20.0	6650	133002
116"	2900	2948	2898	20.5	7134	142672
120"	3000	3048	2998	21.0	7634	152681

Note : ▪ All dimensions are in 'mm' ▪ For higher line size please consult factory.  
▪ Typical mounting dimensions are for reference only. ▪ Wet Calibrated at IEC/ISO/EN17025 Accredited Calibration Laboratory.

## Applications

### Industrial Water

- Cooling/chilled Water
- Power Plants

### Other Applications

- Raw river
- Non-ragging effluent
- Large diameter pipework
- Replacement of unsatisfactory flow meters such as pitot tube, propeller, single point velocity meter, differential pressure meter, full bore mag meters...

### Municipal Water

- Raw water intake
- Plant process
  - Chemical Pacing
  - Filter Balancing
  - Plant Balancing
  - Backwashing
- Plant process
  - Billing
  - Storage Management
  - Pump Station Management
- Water Loss Management
  - District Metering
  - Minimum Night Flow Monitoring
  - PRV flow based modulation



Product Ordering Information :													Order Code for Flow Transmitter				
Sample Order Code :		TX3	A1	B2	C1	D1	E1	F2	G1	H1	I2	J1					
Parameter		Code	Description					Parameter		Code	Description						
TX	Electronics Transmitter	TX 1	Master+Slave(150NB)					G	Communication Output (Any One)	G1	RS485 (MODBUS RTU)						
		TX 2	Master+Slave(200 to 250NB)							G2	GSM						
		TX 3	Master+Slave(300, 350 to 400NB)							G3	GPRS						
		TX 5	Master+Slave(450 to 1000NB)							GX	NA						
		TX 7	Master+Slave(1100 to 5000NB)					H	Process Pressure Calibration Range	H1	10 Kg						
A	Power Supply	A1	90 to 250 VAC							H2	20 Kg						
		A2	24V DC							HX	NA						
		A3	Solar Powered					I	Conductivity Measurement Sensor Type	I1	Cell Constant 0.1						
B	MOC Electronics Enclosure	B1	Aluminium Die Cast							I2	Cell Constant 1.0						
		B2	SS316							IX	NA						
C	Electrical Connection	C1	M20 *1.5 F					J	Temperature Measurement Sensor	J1	PT-100 RTD						
		CY	Other							JX	NA						
D	Output 1	D1	4 to 20 mA					<div>Note :</div> <div><div>▪ Accuracy defined at Lab Conditions.</div><div>▪ Relay &amp; Alarms are programmable.</div><div>Relay 1 is programmable for High / Low.</div><div>Relay 2 is programmable for High / Low.</div></div>									
		DX	NA														
E	Output 2	E1	Pulse (Open Collector Type)														
		EX	NA														
F	Alarm Relay Output	F1	1 Relay Output														
		F2	2 Relay Outputs														
		FX	NA														

Order Code for Flow Tube		Sample Order Code :									
		FT 250	K2	L1	M1	N2	O1	P1	Q1	R1	S1
Parameter		Code	Description	Code	Description	Parameter		Code	Description		
FT	Sensor Tube (2" :150NB to 1000NB) (3" :1100NB to 3000NB)	FT 250	250 NB	FT 1200	1200 NB	M	Sensor Mounting Flange Ratings	M1	ANSI 150 B16.5		
		FT 300	300 NB	FT 1400	1400 NB			M2	ANSI 300 B16.5		
		FT 350	350 NB	FT 1500	1500 NB	N	Sensor Probe MOC	N1	SS316		
		FT 400	400 NB	FT 1600	1600 NB			N2	Hastelloy C		
		FT 450	450 NB	FT 1800	1800 NB	O	Sensor Electrode MOC	O1	SS316L		
		FT 500	500 NB	FT 2000	2000 NB			O2	Hastelloy C		
		FT 600	600 NB	FT 2200	2200 NB			O3	Platinum		
		FT 700	700 NB	FT 2400	2400 NB			O4	Tantalum		
		FT 800	800 NB	FT 2600	2600 NB			O5	Titanium		
		FT 900	900 NB	FT 2800	2800 NB	P	ELNBAR Sensor Installation	P1	Fixed Inline		
		FT 1000	1000 NB	FT 3000	3000 NB			P2	Hot Retractable Assembly		
		FT 1100	1100 NB			Q	Inline Pressure Sensor	Q1	10 Kg		
				Q2	20 Kg						
				QX	NA						
K	Remote Cable Length	K1	5 Meter			R	Inline Conductivity Sensor	R1	Cell Constant 0.1		
		K2	10 Meter					R2	Cell Constant 1.0		
		K3	15 Meter					RX	NA		
		K4	20 Meter								
		KY	Other								
L	MOC of Flow Sensor Assembly	L1	ABS Plastic			S	Inline Temperature Sensor	S1	RTD PT-100		
		L2	PEEK					SX	NA		
<div>Note :<ul style="list-style-type: none"><li>Due to our continuous product revisions, design specification and model numbers are subject to change without notice.</li><li>For other requirement please consult factory.</li><li>For line sizes more than 3000 mm, please consult factory.</li></ul></div>											

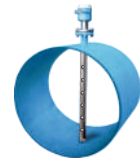


# Why ELNBAR ?

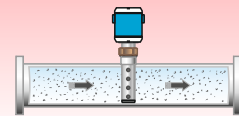
Flow measurement of  
**Partially Filled & Completely Filled Pipes**



**Multiparameter Measurement** of Flow, Pressure,  
Temperature, TDS/Conductivity, Level  
Data transmission of all parameter via RS485/ GPRS Communication



**Suitable** for Dirty Conductive Liquids



**Half the Price** of Full Bore Type Flow Meters

**50%**  
Cost Reduced

**Same Accuracy** as of Full Bore Type Flow Meters

$\leq \pm 0.5\% + (\pm 5\text{mm/sec.})$   
for Velocity 0.3 m/s to  
6 m/s or 12 m/s



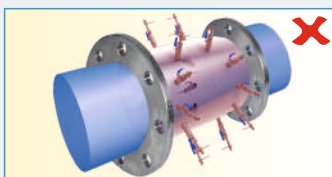
**Only Single Flange Joint** Avoiding Leakages  
as in case due to Multiple Joints



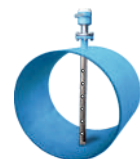
**No need of Sensor Alignments** as in case of  
Clamp on Ultrasonic Flow Meters



**Low initial Installation Cost**  
as compared with  
Full Bore Flow Meters



**Single Intrusion on  
top of the pipe**  
Avoiding Multiple Intrusions



**Less Transportation Cost**  
as compared with other  
Large Size Flow Meters



## Typical Applications



### Use of ELN BAR

**In Flow & Pressure Measurements in Pipe without Shutting down the flow**



### Use of ELN BAR

**In Pumping Station Flow, Pressure and other parameter measurements.**



### Use of ELN BAR

**For Storm Water Discharge Control flow measurement with GPRS Transmission**



### Use of ELN BAR

**For Intake Flow Measurements Open Channel / Closed Pipes**

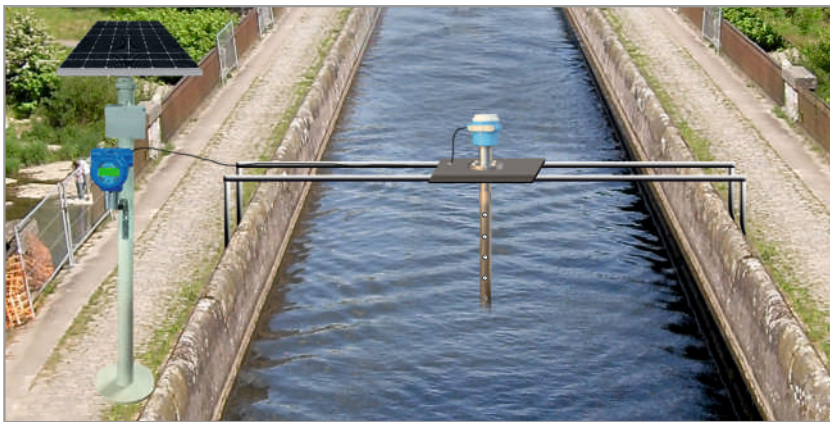


## Typical Applications



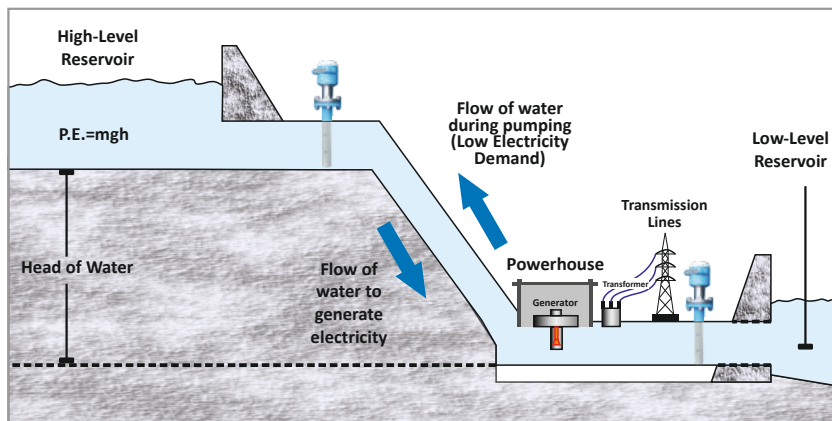
### Use of ELN BAR

**In Water Intake  
Flow & Pressure Measurements  
in Nuclear Power Plant**



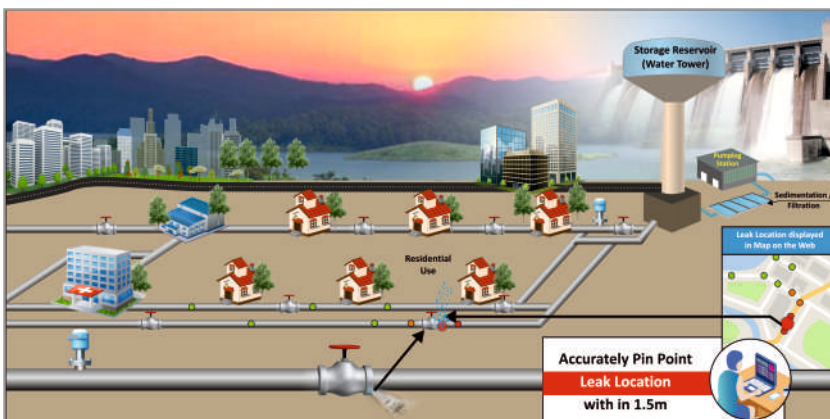
### Use of ELN BAR

**In Irrigation Canal  
Open Channel Flow  
Measurements**



### Use of ELN BAR

**In Flow Measurements in  
Turbine / Dam Intake**



### Use of ELN BAR

**In Water Leak Detection &  
Water Distribution Control  
in Water Distribution Lines**

#### Quick Questions to suggest you suitable Product Code

- Power Supply : \_\_\_\_\_
- Line Size : \_\_\_\_\_
- Geometry of Flow Channel : \_\_\_\_\_
- Flowing Media : \_\_\_\_\_
- Flow Range
  - 1. Minimum : \_\_\_\_\_
  - 2. Operating : \_\_\_\_\_
  - 3. Maximum : \_\_\_\_\_
- Process Temperature : \_\_\_\_\_
- Process Pressure : \_\_\_\_\_
- Required Outputs : \_\_\_\_\_  
: \_\_\_\_\_  
: \_\_\_\_\_
- Installation
  - 1. Fixed : \_\_\_\_\_
  - 2. Hot Retractable : \_\_\_\_\_
- Required Quantity : \_\_\_\_\_



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