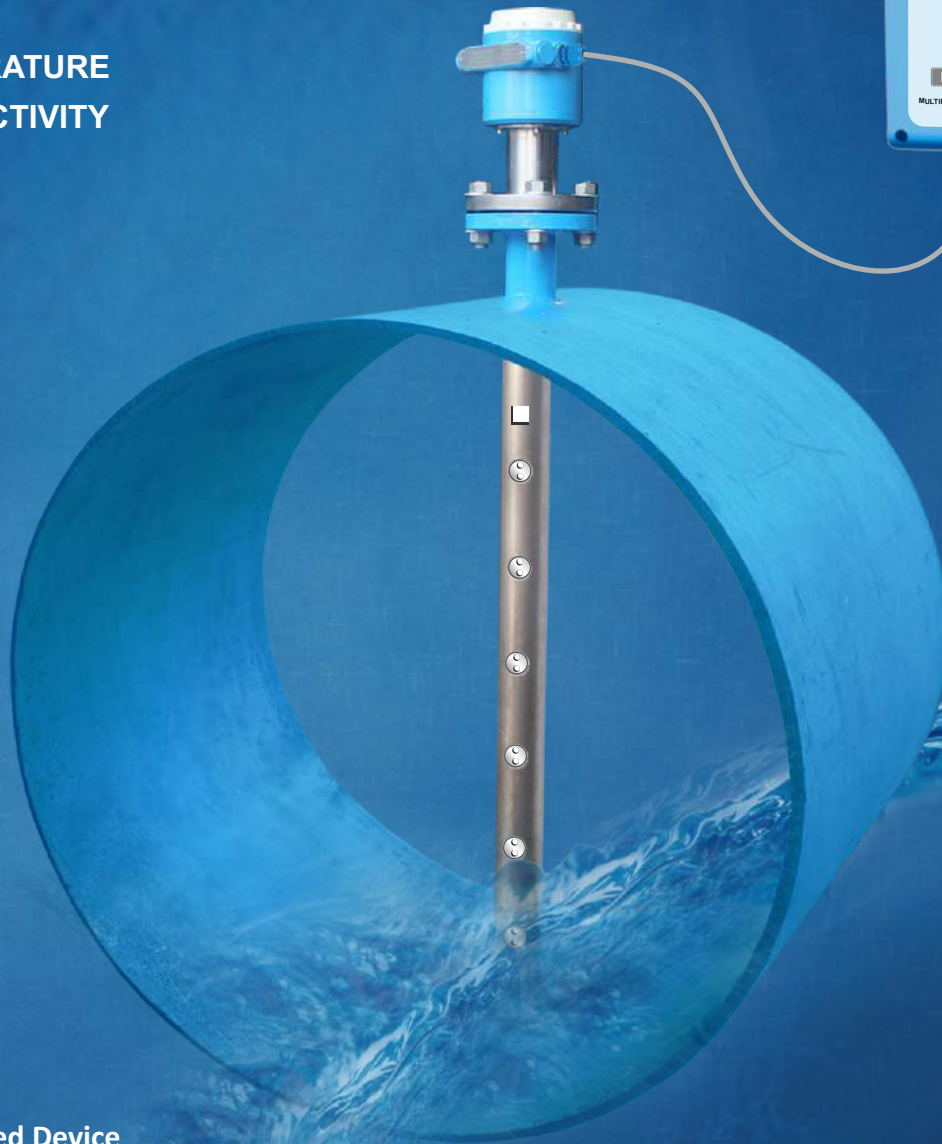


INDUSTRY'S FIRST INNOVATIVE PRODUCT

ELNBAR

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



ELNSENSORS

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ESS-S001A-010121 **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/cm² 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-

$$Q = A * V$$

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 ² Gauge
Velocity	0.3 m/s to 6 m/s
Flow	m ³ /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) Flanged 2" ASA 150 as per Pipe Diameter (150 NB to 600 NB) & 3" ASA 150 (700NB & Above) 2) * Hot Retractable Sensor Assembly –SS316 (150 to 600 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 +100°C or -20 to +250°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 ² Gauge
Electrical Conductivity	> 10 microsiemens/cm
Permissible solid content	< 20%
Density	< 1.15 kg / m ³

Measurement Accuracy

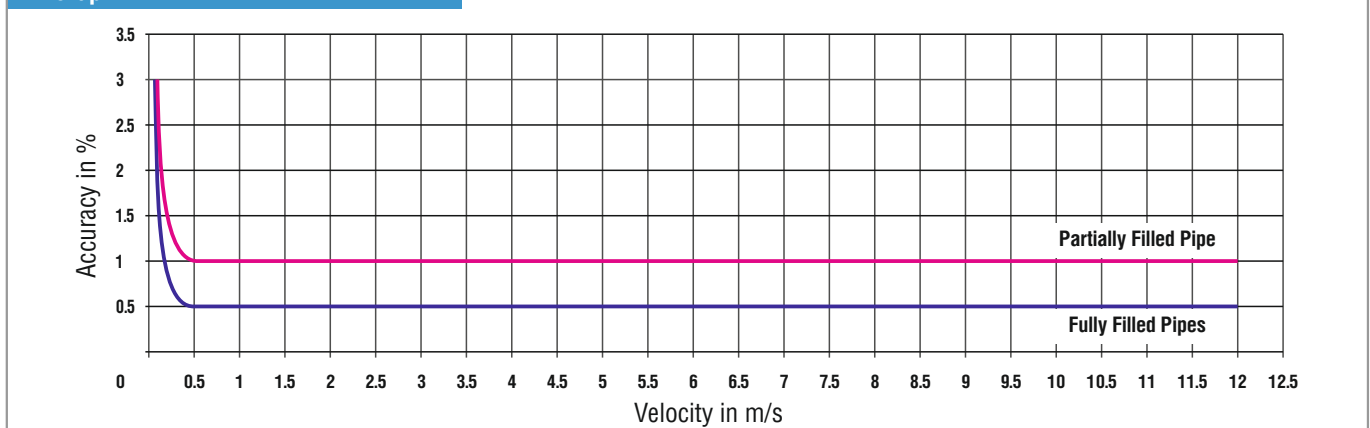
Pressure	+/-0.25%
Temperature	+/-0.25%
Conductivity	+/-2%
Fluid Level	+/-2%

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
	Down Stream Length : 5D
Accuracy of Fully Filled Pipe	≤ +/- 0.5% +(+/-5mm per sec.) for Velocity 0.3 m/s to 6m/s
Accuracy of Partially Filled Pipe Line	≤ +/- 1% +(+/-5mm per sec.) for Velocity 0.3 m/s to 6m/s

Graph



Electrical Parameters	
Power Supply	24V DC / 100 to 230V AC (50/60Hz) Solar Powered (20Watt, 24V DC)
Power Consumption	20W

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
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	24V DC from Master Electronics
MOC of Enclosure	Aluminum Dia Cast PU Painted / SS316
Electrical Connection	M 20 x 1.5 (other on request)
Communication Output	RS485 (MODBUS RTU) for Flow, Pressure, Temperature, TDS/Conductivity, Level (Communicate with Master Electronics of ELNBAR)
Slave Electronics to Master Electronics Cable	5 Core Shielded Armoured Cable maximum 400 mtrs.

Sensor Probe	
Line Size	250 NB to 5000 NB
Master Electronics Location	Remote
Remote Cable Length	Max. 400 mtrs.
Protection Class	IP 68
MOC	SS316 + PTFE / RUBBER
Process Connection Flange	2" ASA 150 Flange / 3" ASA 150 Flange
MOC of Electrode	SS316L / Hastelloy C
Installation	Flanged Fixed Inline

Note:

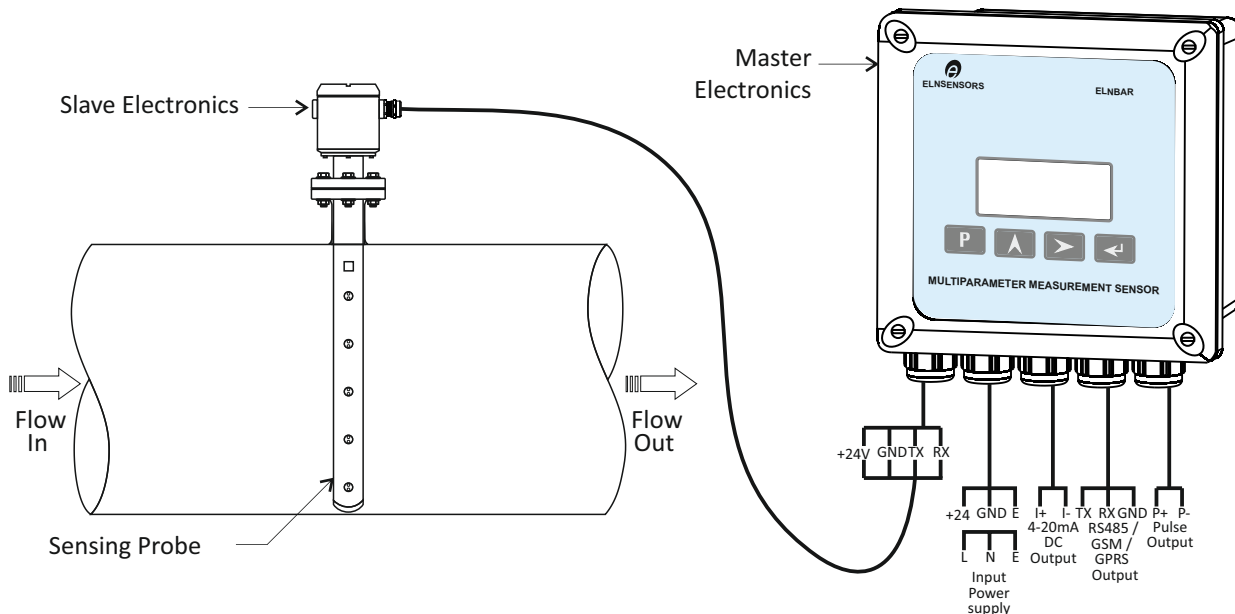
- 1) *Incase of hot tap sensor, maximum pressure is 6 kg/cm² & suitable for line size 150NB to 600NB
- 2) Suitable for clean conductive liquid having solid particles not more than 100 microns in size.
- 3) For slurry & other chemical applications, please consult factory.
- 4) ELNBAR will be supplied come with following components.
 - a) Master Electronics
 - b) Slave Electronics with required cable & connector
 - c) Sensor Probe
 - d) Sensor Mounting Socket (To be welded to pipe, refer instruction manual)
 - e) Hot retractable assembly with ball valve (Optional)

■ PATENT PENDING

GENERAL ARRANGEMENT (GA) DRAWING

General Arrangement (GA) Drawing

ELNBAR : MAINS / 24V DC POWERED



General Arrangement (GA) Drawing

ELNBAR : SOLAR POWERED

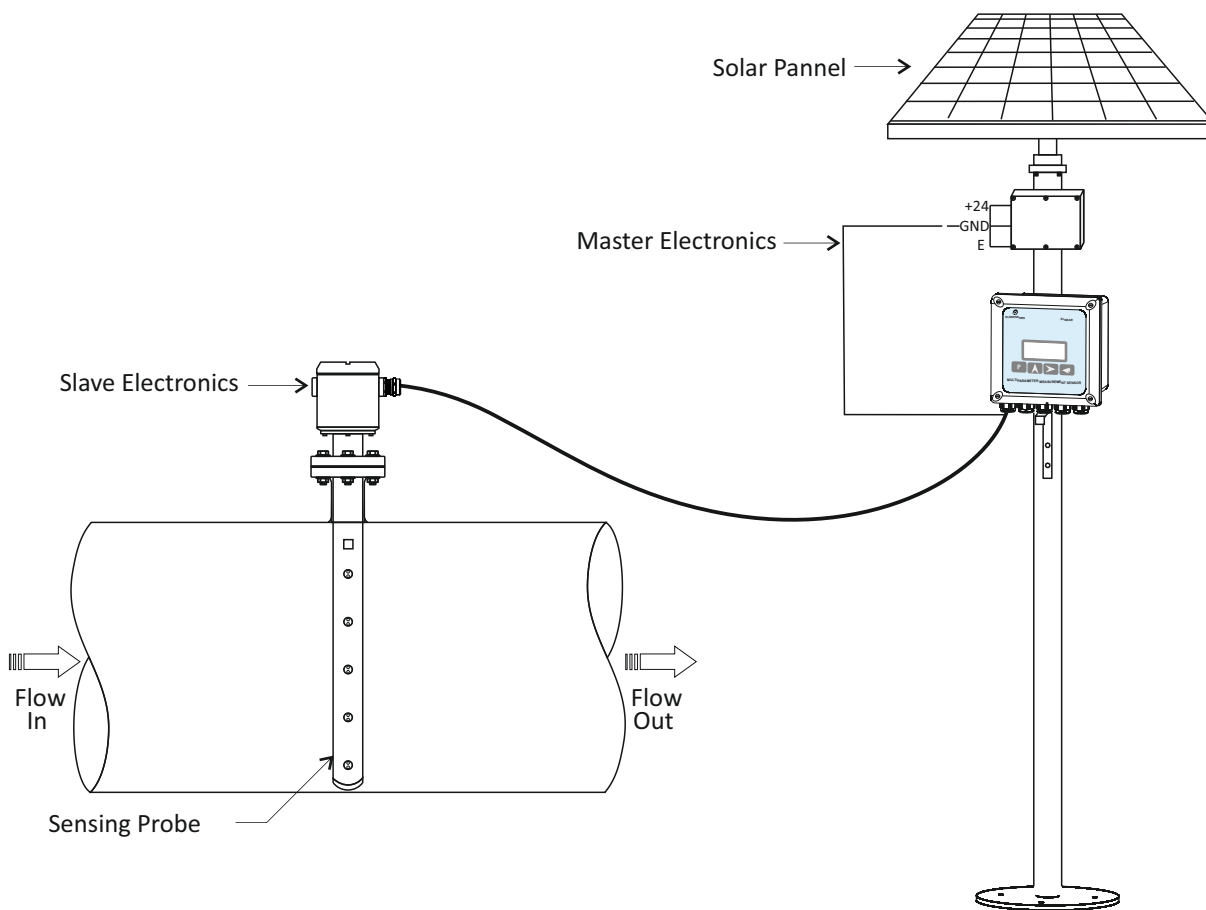


TABLE : Dimensional Details (Flow Meter with ANSI 150 Flange)

Line Size		Pipe OD (mm)	Effective Probe Length (mm)	Approx.Weight KG	Flow Range (m ³ /hr) for Velocity 0.3m/s	Flow Range (m ³ /hr) for Velocity 6.0m/s
Inch	NB					
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)			H1	10 Kg					
A	Power Supply	A1	90 to 250 VAC	H	Process Pressure Calibration Range	H2	20 Kg					
		A2	24V DC			HX	NA					
		A3	Solar Powered			I1	Cell Constant 0.1					
B	MOC Electronics Enclosure	B1	Aluminium Die Cast	I	Conductivity Measurement Sensor Type	I2	Cell Constant 1.0					
		B2	SS316			I3	Toroidal Sensor					
C	Electrical Connection	C1	M20 *1.5 F			IX	NA					
		CY	Other									
D	Output 1	D1	4 to 20 mA	J	Temperature Measurement Sensor	J1	PT-100 RTD					
		DX	NA			JX	NA					
E	Output 2	E1	Pulse (Open Collector Type)	Note :								
		EX	NA	<ul style="list-style-type: none"> Accuracy defined at Lab Conditions. Relay & Alarms are programmable. Relay 1 is programmable for High / Low. Relay 2 is programmable for High / Low. 								
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 600NB) (3" :700NB 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		N	Sensor Probe MOC	N1	SS316	
		FT 350	350 NB	FT 1500	1500 NB	O			Sensor Electrode MOC	N2	Hastelloy C
		FT 400	400 NB	FT 1600	1600 NB		O1	SS316L			
		FT 450	450 NB	FT 1800	1800 NB		O2	Hastelloy C			
		FT 500	500 NB	FT 2000	2000 NB		O3	Platinum			
		FT 600	600 NB	FT 2200	2200 NB		O4	Tantalum			
		FT 700	700 NB	FT 2400	2400 NB	O5	Titanium				
		FT 800	800 NB	FT 2600	2600 NB	P	ELNBAR Sensor Installation	P1	Fixed Inline		
		FT 900	900 NB	FT 2800	2800 NB			P2	Hot Retractable Assembly		
		FT 1000	1000 NB	FT 3000	3000 NB	Q	Inline Pressure Sensor	Q1	10 Kg		
		FT 1100	1100 NB					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			R3	Toroidal Sensor				
		K4	25 Meter			RX	NA				
		KY	Other								
L	MOC of Flow Sensor Assembly	L1	ABS Plastic	S	Inline Temperature Sensor	S1	RTD PT-100				
		L2	PEEK			SX	NA				
				Note : <ul style="list-style-type: none"> Due to our continuous product revisions, design specification and model numbers are subject to change without notice. For other requirement please consult factory. For line sizes more than 3000 mm, please consult factory. 							

Why ELNBAR ?

<p>Flow measurement of Partially Filled & Completely Filled Pipes</p>		
<p>Multiparameter Measurement of Flow, Pressure, Temperature, TDS/Conductivity, Level Data transmission of all parameter via RS485/ GPRS Communication</p>		
<p>Suitable for Dirty Conductive Liquids</p>		
<p>Half the Price of Full Bore Type Flow Meters</p>		
<p>Same Accuracy as of Full Bore Type Flow Meters</p>	<p>≤ +/- 0.5% +/- 5mm/sec.) for Velocity 0.3 m/s to 6 m/s or 12 m/s</p>	
	<p>Only Single Flange Joint Avoiding Leakages as in case due to Multiple Joints</p>	
	<p>No need of Sensor Alignments as in case of Clamp on Ultrasonic Flow Meters</p>	
	<p>Low initial Installation Cost as compared with Full Bore Flow Meters</p>	
	<p>Single Intrusion on top of the pipe Avoiding Multiple Intrusions</p>	
	<p>Less Transportation Cost as compared with other Large Size Flow Meters</p>	

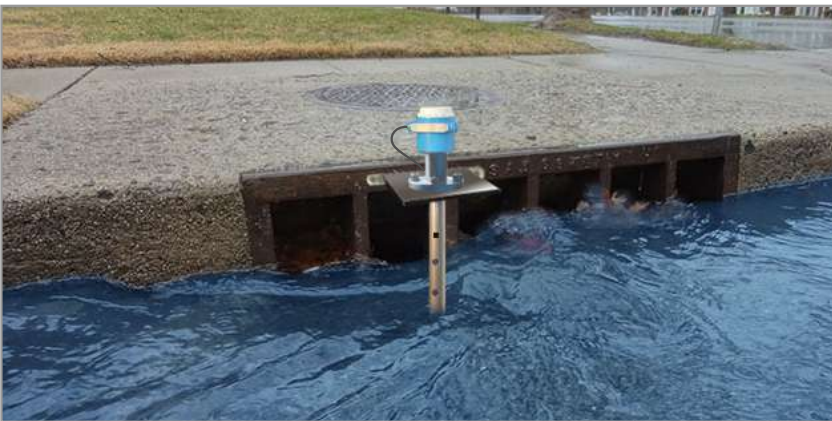
Typical Applications



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

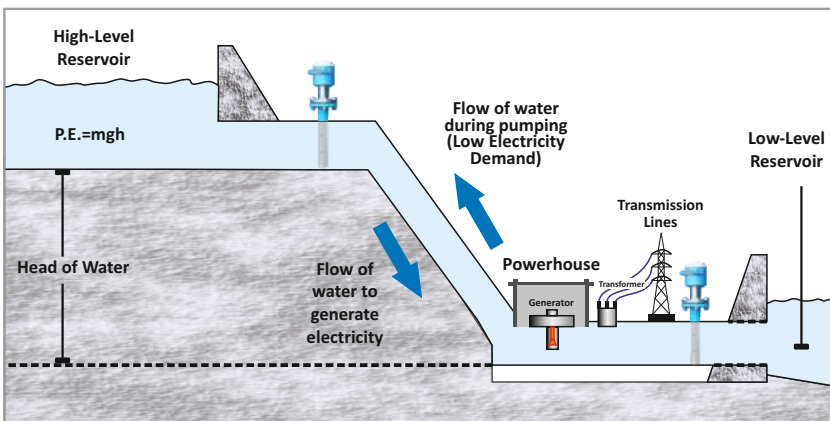
Typical Applications



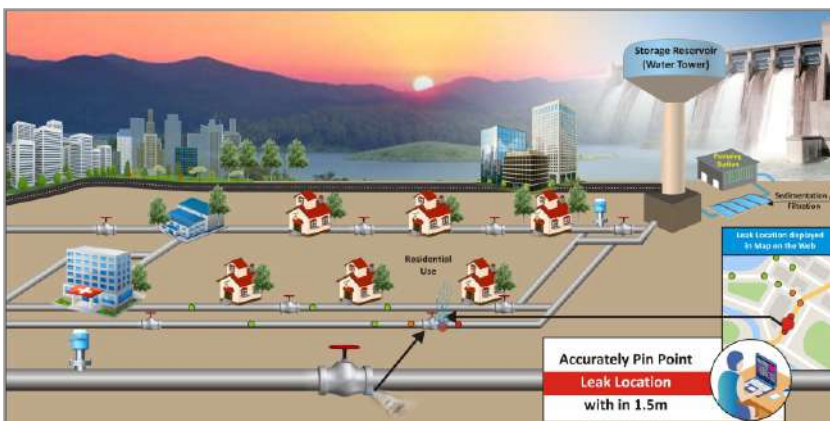
Use of ELN BAR
**In Water Intake
Flow & Pressure Measurements
in Nuclear Power Plant**



Use of ELN BAR
**In Irrigation Canal
Open Chanel 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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ELNSENSORS AND SYSTEMS

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