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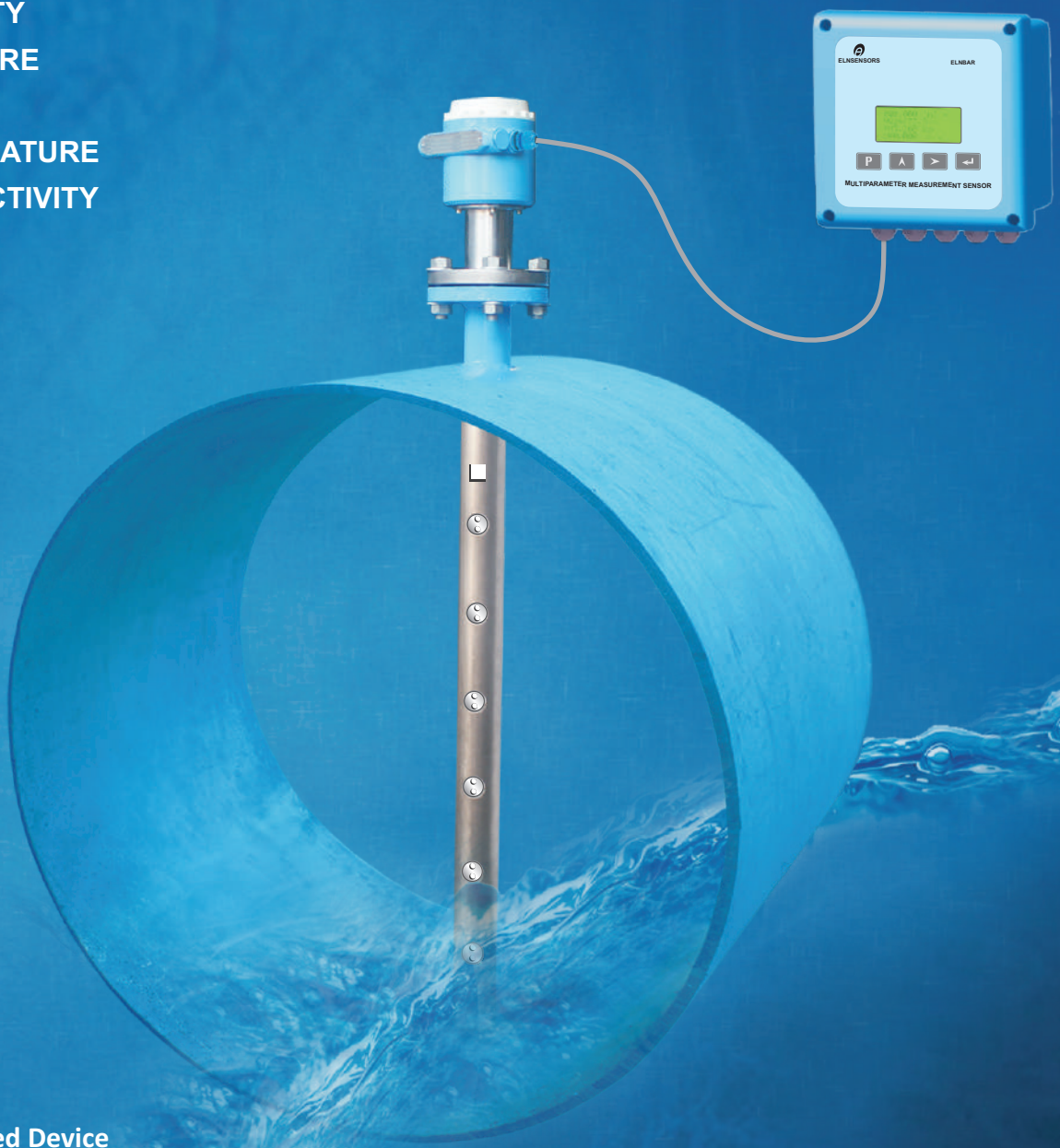
INDUSTRY'S FIRST INNOVATIVE PRODUCT

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

ELNSENSORS

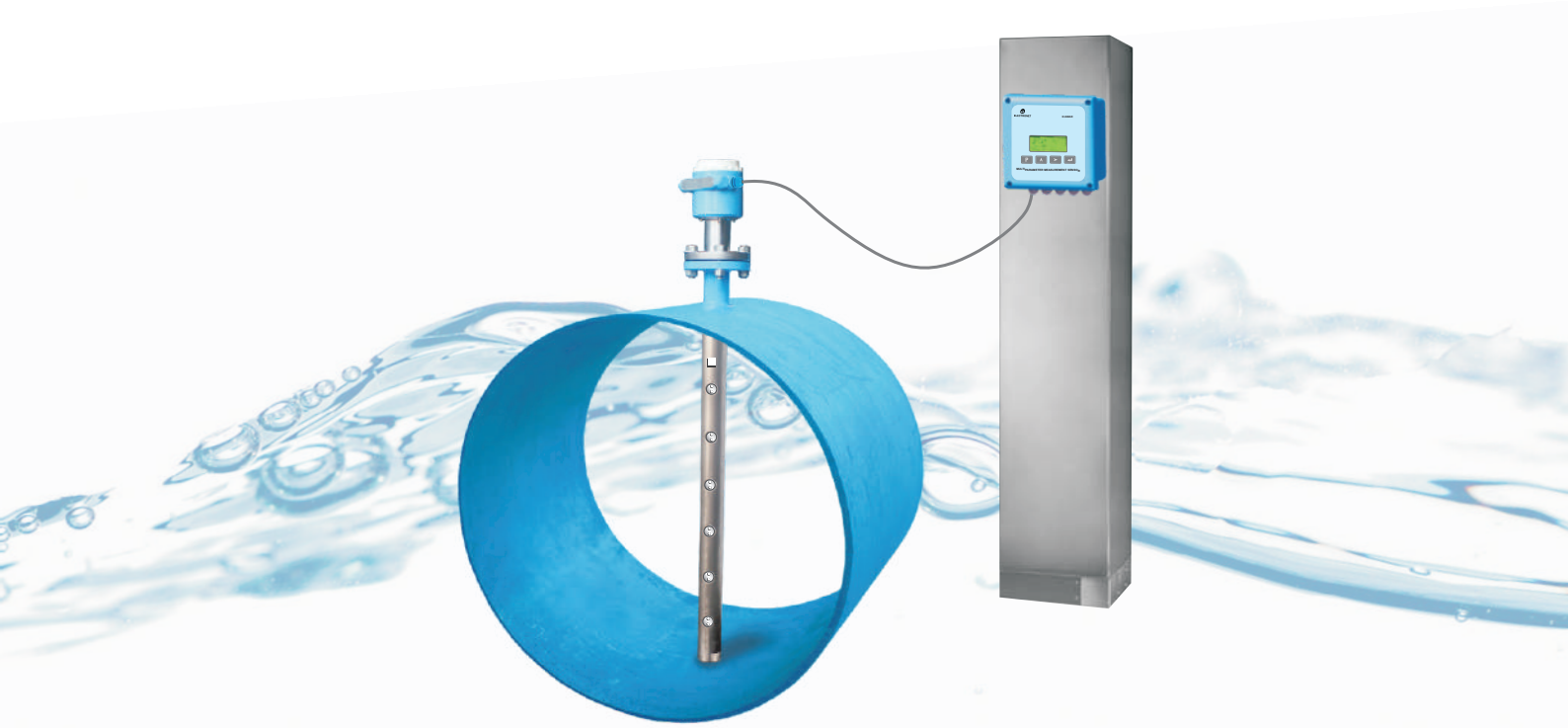
www.elnsensors.com

MAKE IN INDIA

ELN BAR

MULTIPARAMETER MEASUREMENT SENSOR

MAINS / 24V DC POWERED



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^2 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
k = factor correcting for geometry
B = magnetic field strength
D = distance between electrodes
V = Voltage Generated

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.

ELN BAR

MULTIPARAMETER MEASUREMENT SENSOR

SOLAR POWERED

WITH GPRS TRANSMISSION

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 or 12 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 (250 NB to 5000 NB)
	2) * Hot Retractable Sensor Assembly –SS316 (350 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 +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 or 12 m/s
Pressure Range	0 to 20 kg/cm^2 Gauge
Electrical Conductivity	> 10 microsiemens/cm
Permissible solid content	< 20%
Density	< 1.15 kg / m3

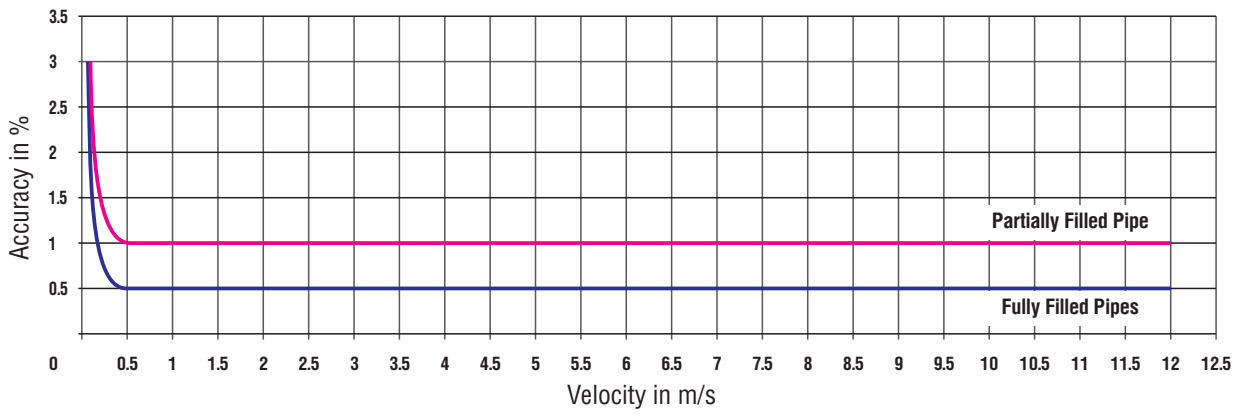
Measurement Accuracy	
Pressure	+/–0.25%
Temperature	+/–0.25%
Conductivity	+/–2%
Fluid Level	+/–2%

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 6 m/s or 12 m/s
Accuracy of Partially Filled Pipe Line	⩽+/– 1% +(+/–5mm per sec.) for Velocity 0.3 m/s to 6 m/s or 12 m/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 67
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 + PVC / PEEK + PTFE
Process Connection Flange	2" ASA 150
MOC of Electrode	SS316L / Hastelloy C
Installation	Flanged Fixed Inline

Note:

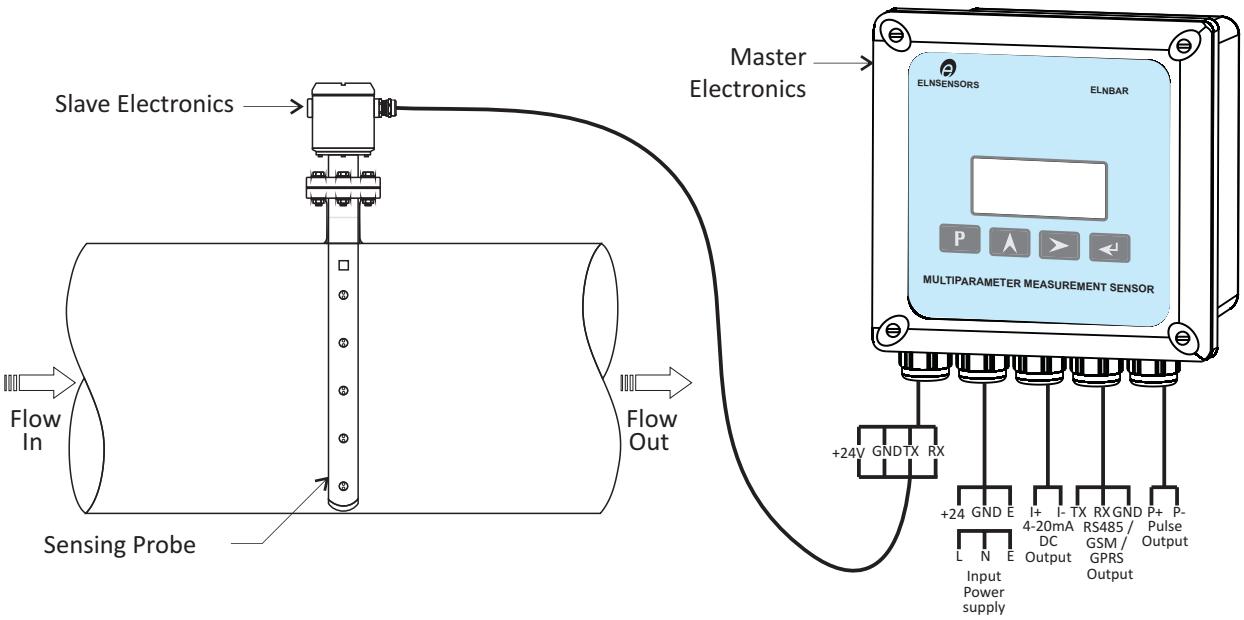
1) *Incase of hot tap sensor, maximum pressure is 6 kg/cm^2 & suitable for line size 350NB to 1000NB
2) Suitable for clean conductive liquid having solid particles not more than 100 microns in size.
3) For slurry & other chemical applications, please consult factory.
4) ELNBAR will be supplied come with 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

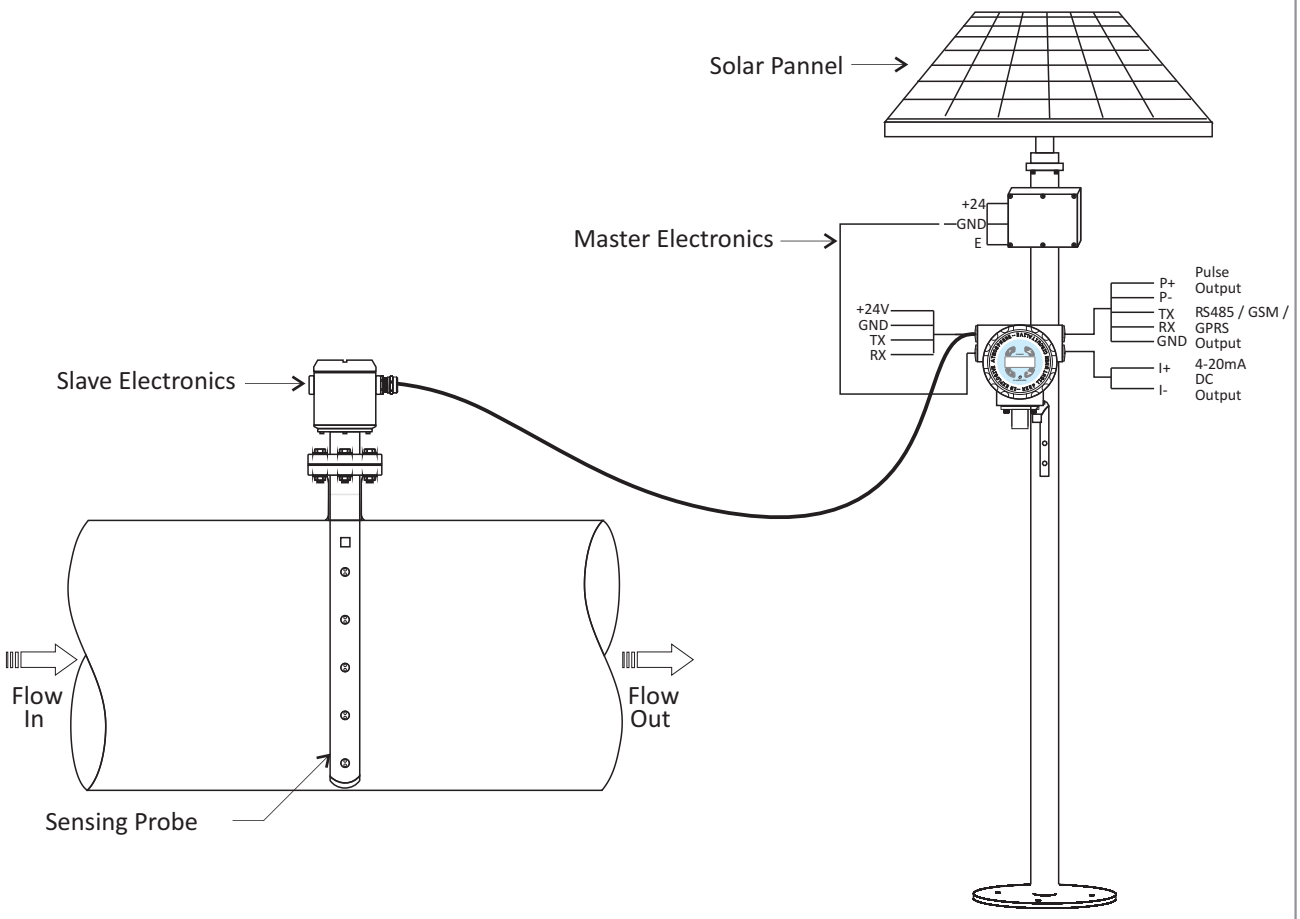


TABLE : Dimensional Details Of Flange (as Per ANSI 150 # B-16.5) & Finished Product

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	Flow Range (m^3/hr) for Velocity 12.0m/s
Inch	NB						
10”	250	273	253	6.0	53	1060	2121
12”	300	324	305	6.5	76	1527	3054
14”	350	356	337	7.0	104	2078	4156
16”	400	406	387	7.5	136	2714	5429
18”	450	457	438	8.0	172	3435	6871
20”	500	508	489	8.5	212	4241	8482
24”	600	610	591	9.0	305	6107	12215
28”	700	711	671	9.5	416	8313	16625
32”	800	813	773	10.0	543	10857	21715
36”	900	914	874	10.5	687	13741	27483
40”	1000	1016	976	11.0	848	16965	33929
44”	1100	1118	1068	11.5	1026	20527	41054
48”	1200	1219	1169	12.0	1221	24429	48858
52”	1300	1321	1271	12.5	1434	28670	57340
56”	1400	1422	1372	13.0	1663	33251	66501
60”	1500	1524	1474	13.5	1909	38170	76341
64”	1600	1626	1576	14.0	2171	43429	86859
68”	1700	1727	1677	14.5	2451	49028	98055
72”	1800	1829	1779	15.0	2748	54965	109931
76”	1900	1930	1880	15.5	3062	61242	122484
80”	2000	2032	1982	16.0	3393	67858	135717
84”	2100	2135	2085	16.5	3741	74814	149628
88”	2200	2238	2188	17.0	4105	82109	164217
92”	2300	2342	2292	17.5	4487	89743	179485
96”	2400	2445	2395	18.0	4886	97716	195432
100”	2500	2545	2495	18.5	5301	106029	212058
104”	2600	2645	2595	19.0	5734	114681	229361
108”	2700	2745	2695	19.5	6184	123672	247344
112”	2800	2845	2795	20.0	6650	133002	266005
116”	2900	2948	2898	20.5	7134	142672	285345
120”	3000	3048	2998	21.0	7634	152681	305363

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
TX	Electronics Transmitter	TX 3	Master+Slave(250 to 350NB)
		TX 5	Master+Slave(400 to 1000NB)
		TX 7	Master+Slave(1100 to 1400NB)
		TX 9	Master+Slave(1500 to 3000NB)
A	Power Supply	A1	90 to 250 VAC
		A2	24V DC
		A3	Solar Powered
B	MOC Electronics Enclosure	B1	Aluminium Die Cast
		B2	SS316
C	Electrical Connection	C1	M20 *1.5 F
		CY	Other
D	Output 1	D1	4 to 20 mA
		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

Parameter		Code	Description
G	Communication Output (Any One)	G1	RS485 (MODBUS RTU)
		G2	GSM
		G3	GPRS
		GX	NA
H	Process Pressure Calibration Range	H1	10 Kg
		H2	20 Kg
		HX	NA
I	Conductivity Measurement Sensor Type	I1	Cell Constant 0.1
		I2	Cell Constant 1.0
		I3	Toroidal Sensor
		IX	NA
J	Temperature Measurement Sensor	J1	PT–100 RTD
		JX	NA

Note :
- Accuracy defined at Lab Conditions.
- Relay & Alarms are programable.
  Relay 1 is programmable for High / Low.
  Relay 2 is programmable for High / Low.

Order Code for Flow Tube

Sample Order Code : FT 250 | K2 | L1 | M1 | N2 | O1 | P1 | Q1 | R1 | S1

Parameter		Code	Description	Code	Description
FT	Sensor Tube	FT 250	250 NB	FT 1200	1200 NB
		FT 300	300 NB	FT 1400	1400 NB
		FT 350	350 NB	FT 1500	1500 NB
		FT 400	400 NB	FT 1600	1600 NB
		FT 450	450 NB	FT 1800	1800 NB
		FT 500	500 NB	FT 2000	2000 NB
		FT 600	600 NB	FT 2200	2200 NB
		FT 700	700 NB	FT 2400	2400 NB
		FT 800	800 NB	FT 2600	2600 NB
		FT 900	900 NB	FT 2800	2800 NB
		FT 1000	1000 NB	FT 3000	3000 NB
		FT 1100	1100 NB		
K	Remote Cable Length	K1	5 Meter		
		K2	10 Meter		
		K3	15 Meter		
		K4	25 Meter		
		KY	Other		
L	MOC of Flow Sensor Assembly	L1	ABS Plastic		
		L2	PEEK		
M	Sensor Mounting Flange Ratings	M1	ANSI 150 B16.5		
		M2	ANSI 300 B16.5		

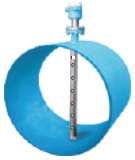
Parameter		Code	Description
N	Sensor Probe MOC	N1	SS316
		N2	Hastelloy C
O	Sensor Electrode MOC	O1	SS316L
		O2	Hastelloy C
		O3	Platinum
		O4	Tantalum
		O5	Titanium
P	ELNBAR Sensor Installation	P1	Fixed Inline
		P2	Hot Retractable Assembly
Q	Inline Pressure Sensor	Q1	10 Kg
		Q2	20 Kg
		QX	NA
R	Inline Conductivity Sensor	R1	Cell Constant 0.1
		R2	Cell Constant 1.0
		R3	Toroidal Sensor
		RX	NA
S	Inline Temperature Sensor	S1	RTD PT–100
		SX	NA

Note :
- 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.

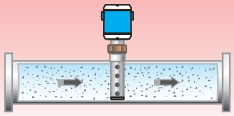
Why ELNBAR ?

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

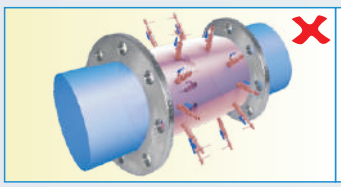
Same Accuracy as of **Full Bore Type Flow Meters**

⩽+/- 0.5% +(+/-5mm/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

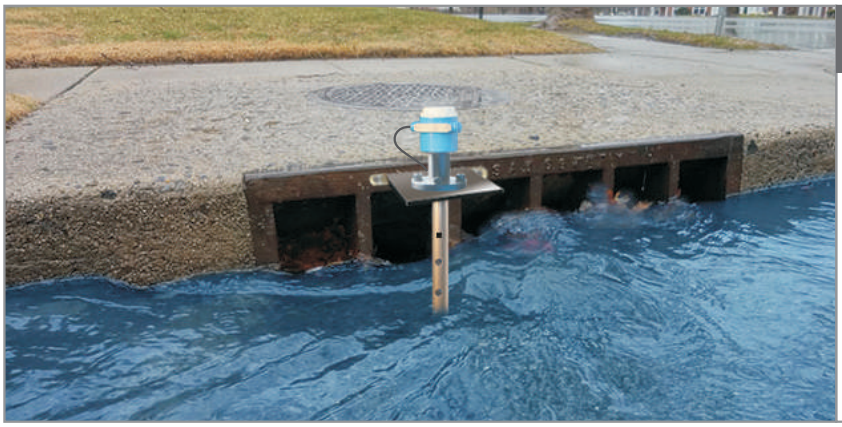
Typical Applications

Use of ELN BAR

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

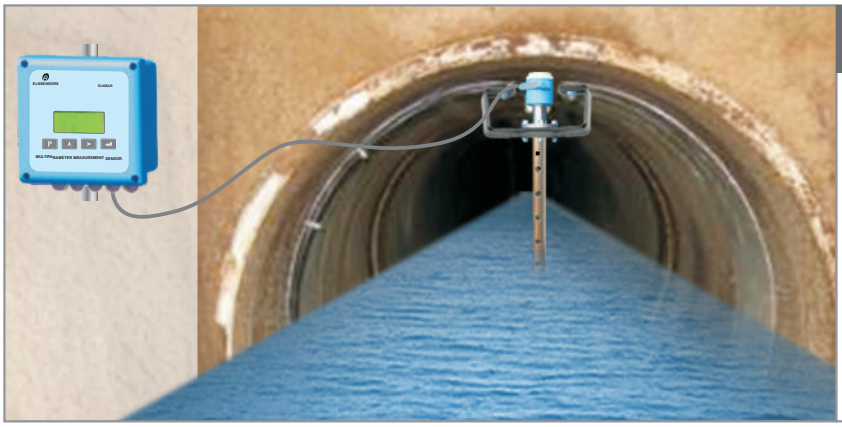
Use of ELN BAR

In Pumping Station Flow, Pressure and other parameter measurements.



Use of ELN BAR

For Storm Water Discharge Control flow measurement with GPRS Transmission



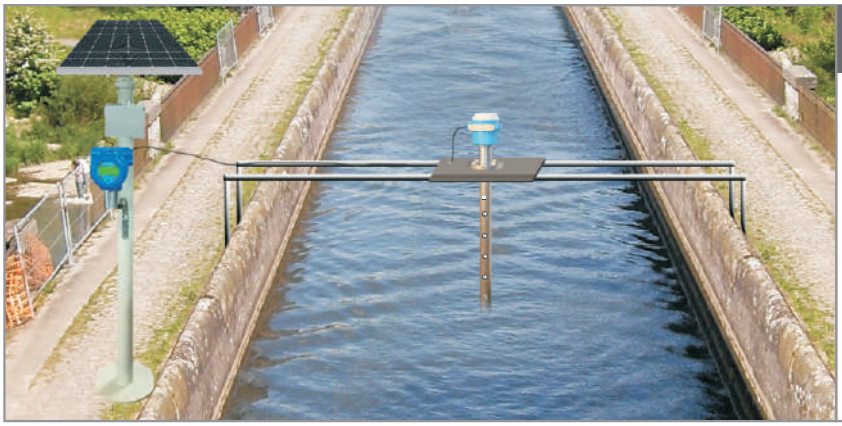
Use of ELN BAR

For Intake Flow Measurements Open Channel / Closed Pipes

Typical Applications

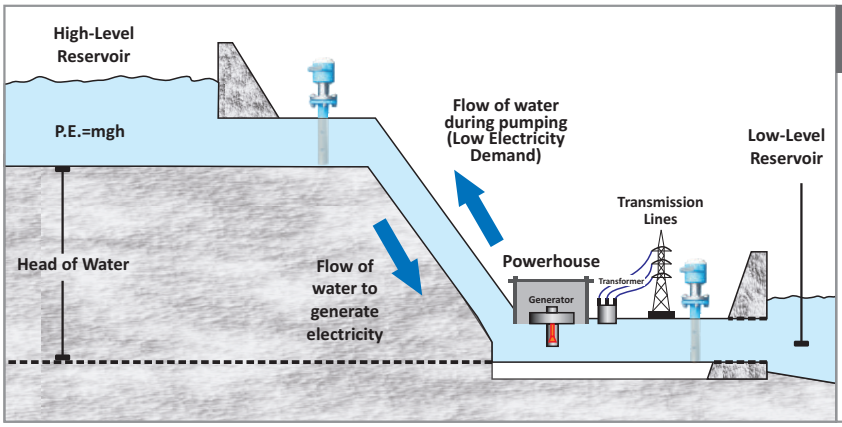
Use of ELN BAR

In Water Intake
Flow & Pressure Measurements
in Nuclear Power Plant



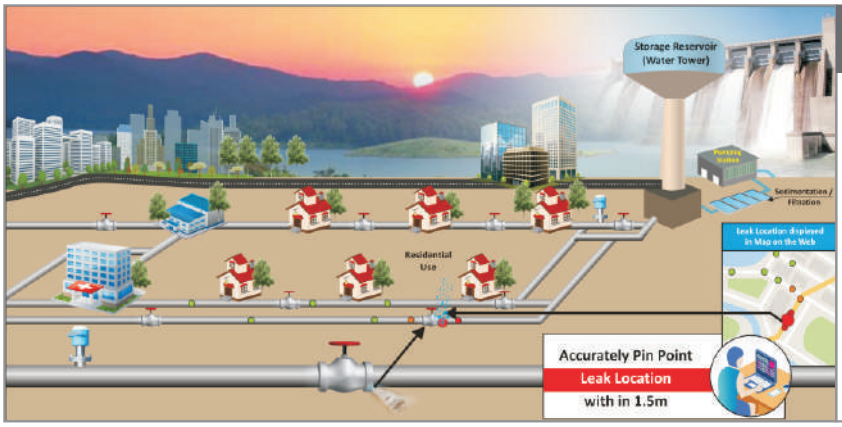
Use of ELN BAR

In Irrigation Canal
Open 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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