

INTEGRATED MULTIVARIABLE FLOW AND WATER QUALITY MONITOR



ELMAG 400



FLOW
m³/hr



VELOCITY
mtr/s



PRESSURE
kg/cm²



CONDUCTIVITY
μS/cm



TDS
ppm



pH
pH



**DISSOLVED
OXYGEN**
ppm



CHLORINE
ppm



TURBIDITY
NTU



TEMPERATURE
°C

MEASUREMENT SOLUTION FOR **FLOW & WATER QUALITY**

FEATURES

- Full Bore Flow Measurement
- Zero Pressure Loss
- Touch Display With Easy Operation
- High Accuracy & Stable Performance
- Integrated Data Logger
- SCADA / GSM / GPS Ready
- Replaceable Analytical Sensor
- Low Maintenance

APPLICATIONS

- Water Treatment Plants
- Sewage Treatment Plants
- Drinking Water Systems
- Industrial Water Monitoring
- Smart City Projects
- Process Industries
- Power Plants
- Pulp & Paper Industries
- Chemical & Pharmaceutical Industries

Measuring Principle

The ELMAG 400 is a Multiparameter Measurement Sensor. This is a single integrated sensor used for the measurement of various parameters like Velocity, Flow, Pressure, Temperature, TDS, Chlorine, pH, DO, Turbidity and Conductivity of Conductive Liquid.

Pressure Measurement:

ELMAG 400 is embedded with piezo-resistive pressure sensor with built-in temperature compensation. Standard pressure range is 0 to 20 kg/cm² gauge.

Temperature Measurement:

ELMAG 400 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.

TDS / Conductivity Measurement:

ELMAG 400 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.

pH Measurement:

ELMAG 400 is embedded with pH Sensor. Standard pH measuring range is 0 to 14 pH.

DO Measurement:

ELMAG 400 is embedded with DO Sensor which measure dissolved oxygen contents upto 20 ppm.

Chlorine PPM:

ELMAG 400 is embedded with Chlorine Sensor which measure chlorine contents from 0 to 10 ppm (mg/L)

Turbidity:

ELMAG 400 is embedded with Turbidity Sensor which measure Turbidity from 0 to 40 NTU

Flow Measurement:

ELMAG 400 is conventional full bore type flow measurement sensor.

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

Calibration:

ELMAG 400 is manufactured and calibrated for flow and pressure measurements in NABL Accredited (ISO17025) calibration lab for line sizes starting from 50NB to 300NB.

Technical Specifications

Measuring Parameter	
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 5000 mg/litre
pH	0 to 14
DO	0 to 20 ppm

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 ² Gauge
Electrical Conductivity	> 10 microsiemens/cm
Permissible solid content	< 20% (Size maximum 100 micron)
Density	< 1.15 kg / m ³

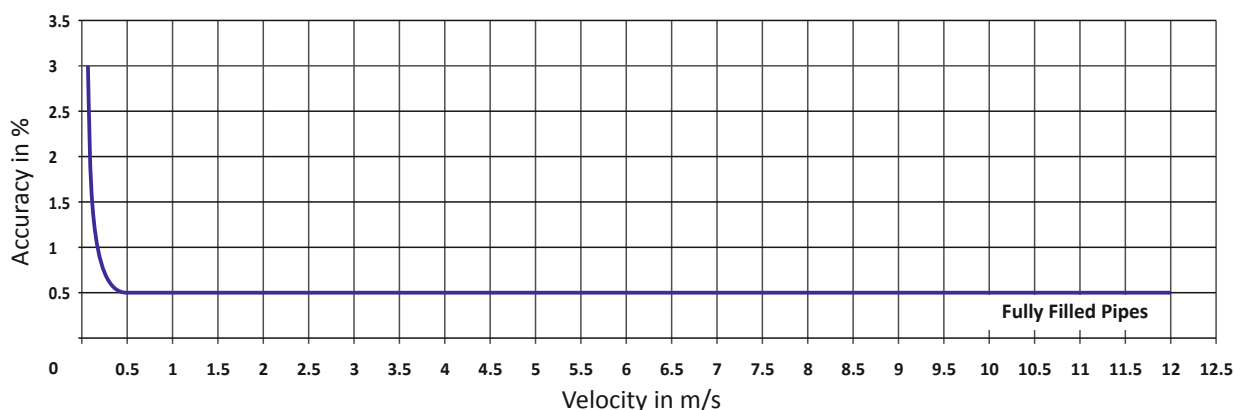
Measurement Accuracy	
Pressure	+/-0.25% of F.S.
Temperature	+/-0.25% of F.S.
Conductivity	+/-2% of F.S.

Flow Accuracy

ELMAG 4000 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

Graph



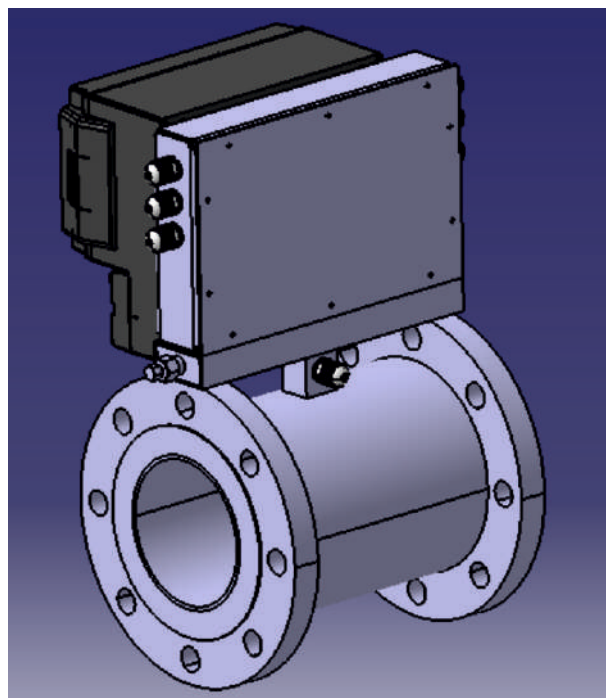
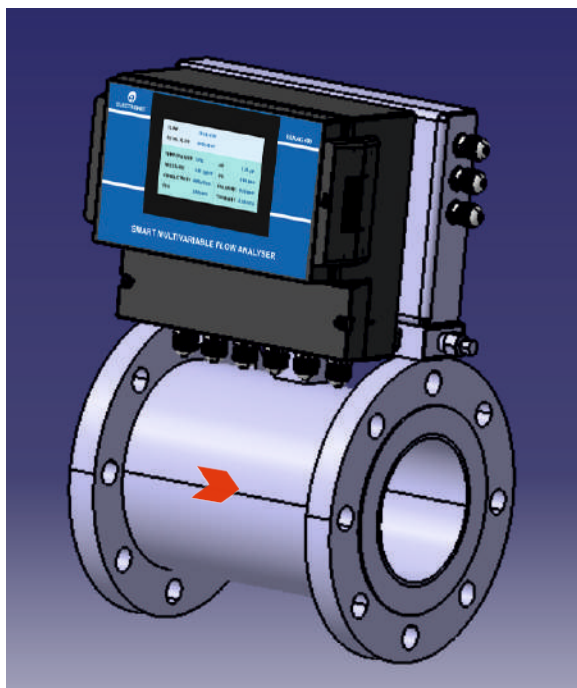
Technical Specifications

Cell Constant	1 / 0.1 / 0.01
Engineering Unit	User Programmable (m3/hr by default)
Calibration	Wet Calibrated at IEC/ISO/EN17025 Accredited Calibration Laboratory.
Accuracy	< ± 0.5% of M.V. +(± 5mm /sec) for Velocity Range 0.3 m/s to 6 or 12 m/s
Linearity	+/- 0.5% of M.V.
Repeatability	+/- 0.2% of M.V.
Temperature Coefficient	+/- 0.05% per °C
Process Temperature	-20 to 85°C max for Rubber Lining & -20 to 220°C for PTFE & PFA Lining
Process Pressure	16 kg/cm2 max (Higher on request)
Material of construction	1) Lining - Neoprene / Ebonite Rubber, PFA, PTFE, PU, CERAMIC
	2) Flange - MS, CS, SS316, SS304
	3) Electrode - SS316L, Hastelloy C, Platinum, Tantalum, Titanium
	4) Coil Housing - SS304
Power Supply	24V DC / Rechargeable Battery Operated
	Solar Powered (20Watt, 24V DC)
Power Consumption	< 10 VA
Inline Pressure Sensor	Pressure Sensor 16 Kg/cm ²
Isolation	1.4 KV between Input, Output & Power Supply
Response Time	Less than 1 Sec.
Electronics	Integral (Local) / Remote
Electronic Protection Class	Field Mount Weather Proof IP-67 (NEMA 6),
Sensor / Flow Tube Protection class	Weather Proof IP-67, IP-68
Process Connections	ANSI 150 flanged, as per table B 16.5 (Other On Request)
Mounting	In-Line Horizontal / Vertical
Output 1	4 to 20mA Selectable for Flow, Velocity, Pressure, Temperature, Conductivity, TDS, pH, DO, Chlorine & Turbidity
Output 2	Pulse Output Open Collector for Flow Measurement
Communication Output	RS-485 (MODBUS RTU) / GSM / GPRS/LORAWAN for Flow, Pressure, Temperature, TDS/Conductivity,
Ambient Conditions	Temperature -20 to 70°C / Humidity 5 to 95% non condensing
Certification	CE

ELMAG 400

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Assembly Overview - Integral



Line Size		Flange To Flange Distance	Flow Range (m ³ /Hr)			
Inch	NB		Velocity 0.3m/s	Velocity 2.5m/s	Velocity 6m/s	Velocity 10m/s
2"	50	200	2.12	17.67	42.4115	70.69
2½"	65	200	3.58	29.86	71.675	119.46
3"	80	200	5.43	45.24	108.573	180.96
4"	100	250	8.48	70.69	169.646	282.74
5"	125	250	13.25	110.45	265.071	441.79
6"	150	300	19.09	159.04	381.703	636.17
8"	200	350	33.93	282.74	678.584	1130.97
10"	250	450	53.01	441.79	1060.28	1767.15
12"	300	500	76.34	636.17	1526.81	2544.69

Note : Flange to flange distance (FD) Tolerance : 1) 2"(50NB) to 6"(150NB) : +/-3mm 2) 8"(200NB) to 12"(300NB) : +/-5mm

- All dimensions are in 'mm'
- For dimensions of line size above 300NB, please consult factory.
- Typical mounting dimensions are for reference only.

- Wet Calibrated at IEC/ISO/EN17025 Accredited Calibration Rig.
- Flow meter should be selected with the help of Nomograph (recommended full scale velocity).

Ordering Information of Transmitter

Sample Order Code: ELMAG 4000-TX-A1-B1-C1-D1-E1-F1-G1-H1-I1-J1-K1-L1-M1-N1-O1-P1-Q1

Parameter		Code	Value
A	Transmitter Mounting	A1	Integral (Local)
		A2	Remote
B	Power Supply	B1	24V DC / Rechargeable Battery Operated
		B2	Solar Powered (20Watt, 24V DC)
C	Enclosure MOC	C1	Aluminium Die Cast
		C2	SS316
		CY	Other
D	Electrical Connection	D1	M20
		D2	1/2" NPT
		DY	Other
E	Electrical Output 1 (Current)	E1	4 to 20 mA
		E2	4 to 20 mA with HART
		EX	NA
F	Electrical Output 2 (pulse)	F1	Pulse (OC)
		FX	NA
G	Electrical Output 3 (Alarm /Relay)	G1	One Alarm
		G2	Two Alarm
		GX	NA
H	Alarm Type	H1	Open Collector (Passive)
		H2	Potential Free
		H3	PNP Output (Active)
		HX	NA

Parameter		Code	Value
I	Communication Output 1	I1	RS-485 (MODBUS RTU)
		IX	NA
J	Communication Output 2	J1	GPRS
		J2	GSM
		J3	LORAWAN
		J4	MBUS
		JX	NA
K	Pressure Sensor	K1	16 Kg /cm ²
		KX	NA
L	Conductivity Measuring Sensor	L1	Cell Constant 0.01
		L2	Cell Constant 0.1
		L3	Cell Constant 1
M	pH Measuring Sensor	M1	0 to 14
		MX	NA
N	DO Measuring Sensor	N1	0 to 20 ppm
		NX	NA
O	Chlorine Measuring Sensor	O1	Required
		OX	NA
P	Turbidity Measuring Sensor	P1	Required
		PX	NA
Q	Temperature Measuring Sensor	Q1	PT-100 RTD
		QX	NA

Note :

▪ In case of flameproof version only electronics enclosure is flameproof certified.

▪ Accuracy defined at Lab Conditions.

▪ Relay & Alarms are programmable. Relay 1 is programmable for High / Low / for flow parameter.

Ordering Information of Flow Tube

Sample Order Code: ELMAG 4000- FT 15-R1-S1-T1-U1-V1-W1-X1

Parameter		Code	Value	Code	Value
FT	Flow Tube	FT 50	50NB	FT 150	150NB
		FT 65	65NB	FT 200	200NB
		FT 80	80NB	FT 250	250NB
		FT 100	100NB	FT 300	300NB
		FT 125	125NB		
R	Electronics Location	R1	Integral (Local)		
		R2	Remote		
S	Remote Signal Cable Length	S1	5 Meter		
		S2	10 Meter		
		S3	15 Meter		
		S4	25 Meter		
		SX	NA		
T	Flange MOC	T1	MS		
		T2	CS		
		T3	SS304		
		T4	SS316		
		TX	NA		
Note: ▪ Due to our continuous product revisions, design specification and model numbers are subject to change without notice. ▪ Accuracy defined at Lab Conditions. ▪ For other requirement please consult factory. ▪ This product is meant for laboratory/Process application only & not for custody transfer application.					

Parameter		Code	Value
U	Flange Standard	U1	ASA150 B 16.5
		U2	ASA 300 B 16.5
		U3	ASA 600 B 16.5
		U4	DIN PN 10 EN 1092-1
		U5	DIN PN 16 EN 1092-1
		U6	DIN PN 25 EN 1092-1
		U7	DIN PN 40 EN 1092-1
		U8	IS1538
		UY	Other
UX	NA		
V	Lining Material	V1	Hard /Ebonite Rubber
		V2	Neoprene Rubber
		V3	PFA
		V4	PTFE
		V5	Ceramic
		V6	PEEK (Up To 50 NB)
W	Electrode Material	W1	SS316L
		W2	Hastelloy C
		W3	Platinum
		W4	Tentalum
X	Conductivity Measuring Sensor	X1	Cell Constant 0.01
		X2	Cell Constant 0.1
		X3	Cell Constant 1