EUREKA

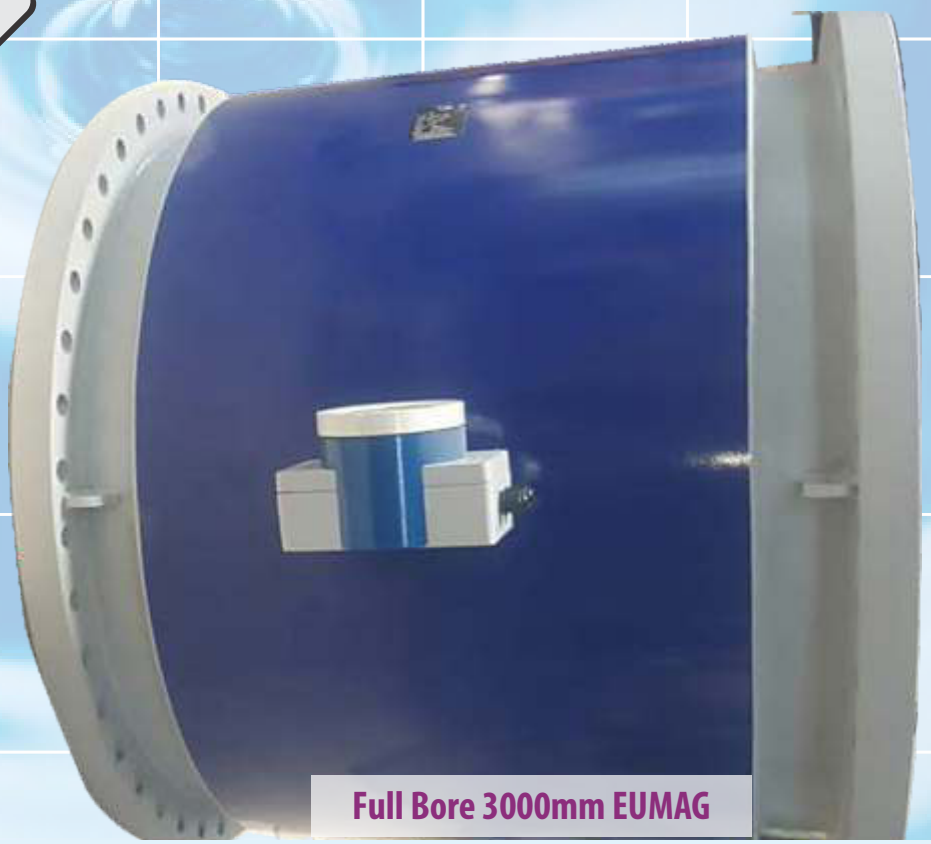
ISO 9001:2015,ISO 14001:2015, ISO 45001:2018 Certified Company

EUMAG FLOWMETERS

HART COMMUNICATION PROTOCOL

ISO/IEC 17025:2017(NABL Accredited)

12000 ELECTROMAGNECTIC FLOW METERS INSTALLED

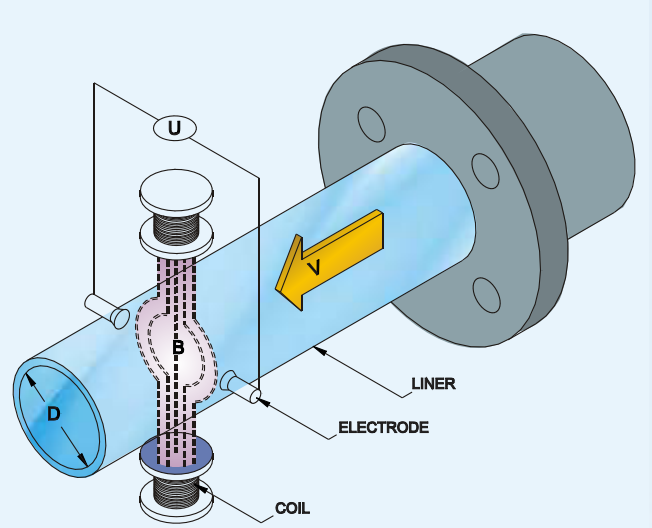


Full Bore 3000mm EUMAG

Principle of operation of Electromagnetic flow meter

Electromagnetic flow meters commonly known as Magmeters are a type of inferential flow metering devices used to measure the flow of electrically conductive liquids in a close pipe application where the magnetic flux parameters the entire cross sectional area of the liquid flow. Magmeters measure electromotive force to determine liquid velocity using the Faraday's law of electromagnetic induction & compute the flow rate using the equation of conductivity.

The EUREKA make EUMAG flowmeters operate with electrically conductive liquids & are relatively immune to the effects of pressure, temperature, density & viscosity of the liquid medium.
For Eumag flowmeters the electrically conductive liquid is defined as a liquid with a conductivity of atlaest 5 micro siemens/cm.



The Principle of operation

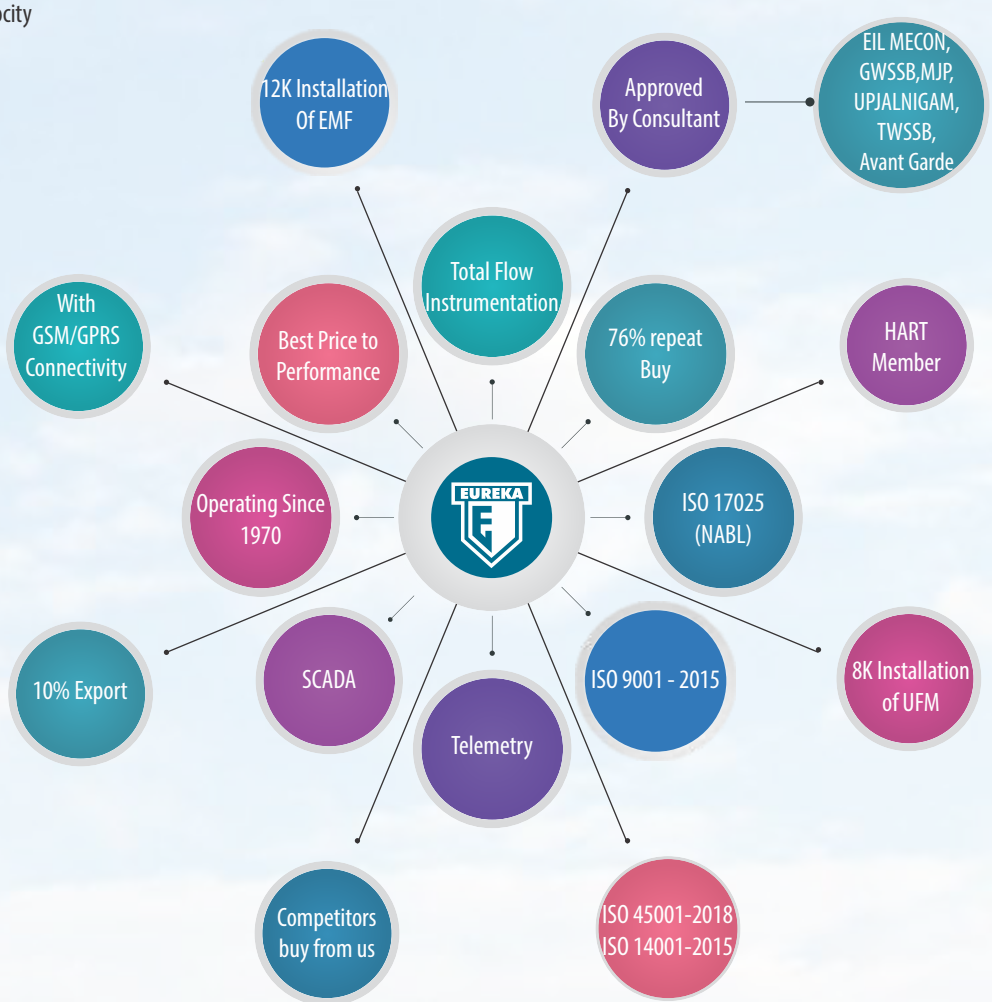
Faraday's law states that when a conductor moves through a magnetic field of given strength, a voltage is produced in the electrode dependent on and proportional to the relative velocity between the conductor and magnetic field.

The mathematical representation is as follows

U=B×V×D×C
Where U=induced voltage,
D=internal dia of flow tube
B=Magnetic strength
C=Instrument constant
V=Average velocity

Hence the flow rate equation is

Q=VA,
V =Average velocity,
a=Area occupied by flow



EUMAG Sizing

Minimum -Maximum flow table

Velocity range 0.2 M/sec minimum to 12 meter/sec maximum

	M3 per hour		LPM		LPS		USGPM	
DN in mm	Min.	Max	Min.	Max	Min.	Max.	Min.	Max.
10	0.06	3.98	0.94	56.53	0.02	0.94	0.25	14.94
15	0.13	7.63	2.12	127.21	0.04	2.11	0.56	33.61
20	0.23	13.56	3.77	226.15	0.06	3.77	1	59.75
25	0.35	21.19	5.89	353.36	0.1	5.88	1.56	93.35
32	0.58	34.91	9.65	578.96	0.16	9.65	2.55	152.95
40	0.9	54.28	15.08	904.63	0.25	15.07	3.98	238.98
50	1.41	84.82	23.56	1413.49	0.39	23.56	6.22	373.4
65	2.39	143.28	39.82	2389.2	0.66	39.8	10.52	631.06
80	3.62	217.08	60.31	3618.55	1.01	60.3	15.93	955.92
100	5.65	339.24	94.23	5653.99	1.57	94.22	24.89	1493.63
125	8.84	530.16	147.24	8834.38	2.45	147.24	38.9	2333.8
150	12.72	763.32	212.03	12721.5	3.53	212.02	56.01	3360.66
200	22.6	1356	376.93	22616	6.28	376.93	99.58	5974.51
250	35.2	2112	588.96	35337.5	9.82	588.96	155.59	9335.18
300	50.89	3053.16	848.1	50886	14.14	848.1	224.04	13442.65
350	69.26	4155.72	1154.36	69261.5	19.24	1154.36	304.95	18297
400	90.46	5427.84	1507.73	90464.02	25.13	1507.74	398.3	23898.12
450	114.49	6869.64	1908.4	114503.76	31.81	1908.43	504.1	30246
500	141.35	8481	2355.83	141350.03	39.26	2355.85	622.35	37340.76
600	203.54	12212.52	3392.4	203544.04	56.24	3392.42	896.18	53770.68
700	277.04	16622.4	4608.08	277084.68	76.96	4617.46	1219.9	73193.88
800	365.44	21926.4	6090.65	365439	101.51	6090.48	1593.2	95592.24
900	457.98	27478.8	7633.87	458032.32	127.23	7634.04	2016.79	121007.52
1000	568.16	34089.6	9469.5	568169.76	157.82	9469.44	2489.38	149362.92
1200	814.18	48850.8	13569.6	814176.12	227.27	13636.4	3584.74	215084.16
1400	1108.18	66490.8	18471.9	1108316.3	307.88	18472.7	4880.3	292818.24
1600	1447.47	86845.2	24125.4	1447522.4	402.08	24124.7	6372.82	382369.2
1800	1831.9	109914	30809.5	1848566.8	515.5	30810.1	8139.39	488363.16
2000	2261.6	135696	37880.6	2272833.6	631.34	37880.5	9957.53	597451.8
2700	4121.76	247305.96	68696.1	4121766.8	114.93	68696.6	181476	1088856

EUMAG LPM CONSTANT

Line size	20	25	40	50	65	80	100	125	150	200	250	300	350	400	450	500
LPM factor	88.34	33.46	78.8	129.9	185	286	493	774	1118	1937	3052	4378	5237	6841	8659	10761

Line size	600	700	900	1000	1100	1200
LPM factor	15564	24913	36451	45357	51107	67159

Sizing Guidelines

Particulars	Velocity range
Normal service	0-12 M/Sec
Preferred service	1-10 M/sec
Abrasive slurries	0.9-3.1 M/sec
Nonabrasive slurries	1.5-4.6 M/Sec

Because of its effect on flow velocity sensor size is an important consideration.
It may be necessary to select a magnetic flow meter that is larger or smaller than adjacent piping to ensure fluid velocity is in specified measuring range of the sensor. Suggested guidelines& examples for sizing normal velocities are listed in above tables.

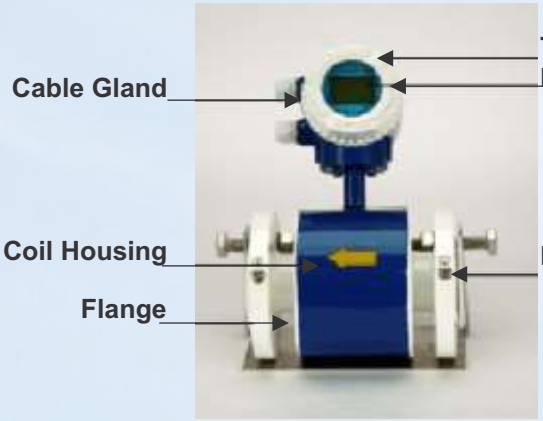
Please note operation outside these guidelines may also give acceptable performance.

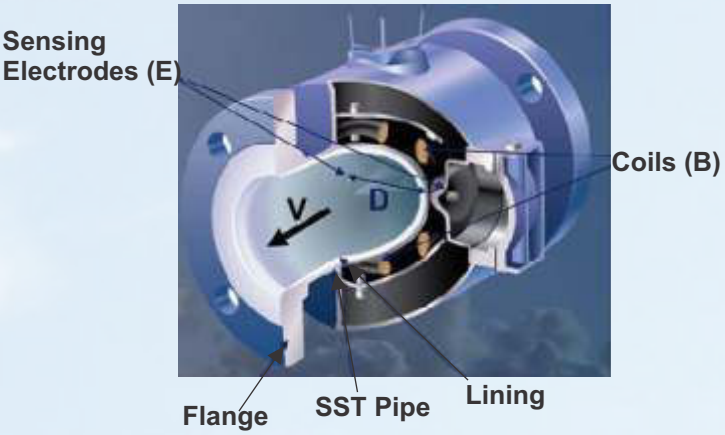
To convert flow rate to velocity
Velocity=Flow rate/Eumag factor

For E.G.
Velocity=Normal flow rate 800 LPM/Eumag factor 492.78
=1.62 m/Sec

This is acceptable
Please note Max/min flow rate are for following conditions
1) Please Ensure the Installation location flow head is always field with a liquid under no flow condition.
2) Ensure straight length required of 5D Upstream and 3D downstream
3) The flow meter installation location should be free of bends, Elbows, Tee & valves.

EUMAG COMPONENT





Electrode Material selection

Electrode Material	General characteristics
SS316 L	Good corrosion resistance Good abrasion resistance Not recommended for acids
Nickel alloy	Better corrosion resistance High strength Good in slurry applications Effective in oxidising fluids
Tantalum	Excellent corrosion resistance Not recommended for hydraulic acid,Flurosilic acid or sodium hydroxide
Platinum+ iridium	Best chemical resistance Expensive material Not recommended for aquaregain
Titanium	Better chemical resistance Better abrasion resistance Good for sea water applications Not recommended for hydrochloric or sulphuric acid
Tungsten carbide	Limited chemical resistance Best abrasion resistance High concentration slurries preferred electrode for oil & gas fracturing Applications
Hastelloy C	Better corrosion resistance High strength Good for acid alkaline applications

Lining Material Selection

Liner material	General characteristic
PFA	Best chemical resistance Better abrasive resistance than PTFE Best High temperature capabilities Temp -29 to 177 ° C
PTFE	Highly chemical resistant Excellent high temp.capabilities Temp -29 to 177 ° C
ETFE Ethylene tetrafluoroethylene Plastic material	Excellent chemical resistance Better abrasion resistance than PTFE Temp -29 to 149 ° C
Polyurethane	Excellent abrasion resistance for slurries with small & medium particles Limited chemical resistance Temp -18 to 60 ° C Typically applied in clean water
Neoprene	Very good abrasion resistance for small & medium particles Better chemical resistance than polyurethane Temp -18 to 80 ° C Typically applied in water with chemicals & sea water
Linateax Rubber	Very good abrasion resistance for large particles Limited chemical resistance especially in acids Softer material than Polyurethane& neoprene Temp -18 to 70 ° C Typically applied in mining slurries
Extreme service Polyurethane	Ideal for applications in high salinity &/or hydrocarbon carryover Excellent abrasion resistance Temp -18 to 93 ° C Typical used for water injection, recovered water & coal gasification slurries
Hard Rubber Ebonite	Inexpensive Mainly water & waste water Industries Fair corrosion & abrasion resistance Temperature up to 95 ° C
Fused Aluminium Oxide	Recommended for high corrosive& abrasive applications Excellent corrosive & abrasive strength Temp. up to 180 ° C
Modified Phenolic	Developed for harsh environment containing H2S,CO2 concentrations & acids Temperature up to 200 ° C
Ceramic	Recommended for high corrosive& abrasive applications Temp up to 200 ° C Popularly used in Paper & pulp industry

FLANGE comparison of ANSI, DIN, PN, AWWA

ANSI. American National Standards Institute. Founded in 1918

ANSI standard flange dimensions are designated as 150, 300, 400, 600, 900, 1500, and 2500, in sizes NPS 1/2 through NPS 24. Regardless of size or specification, flanges are fundamentally designed to close, cover, connect, or support pipe systems. Threaded, to fit pipes with external threads without the need for welding. Pressure rating is defined as maximum allowed pressure a flange can with stand at defined temperature. The pressure possible with 150,300,400,600,900,1500 & 2500 are 20,50,70,100,150250,425 bar resp. ANSI is the primary entity representing the U.S. standards and conformity assessment system. It works to strengthen the position of the U.S. marketplace in the global economy. The organization is also interested in green initiatives -- the protection of the environment -- while working to ensure the safety and health of customers.

ASME flanges-acronym for the American Society of mechanical engineers

ASME works on the global level in the mechanical engineering community to enable the collaboration, career education and development of skills across the multi-disciplinary network of engineering disciplines. Its primary educational interest is in testing and evaluating mechanical engineers for the professional engineer license, PE.

PN flanges

PN' stands for Pressure Nominal and prefixes the pressure rating, e.g. a PN16 flange is designed to operate up to 16 bar. Typical ratings include PN6, PN10, PN16, PN25, PN40, PN64, Pn100

DeutschesIndustriesNorman (DIN)

It stands for Deutsches Industries Norman, whether relating to flanges or anything else. It means German Industrial Standards. For pipe flanges, it's DIN 2526

AWWA Flanges

AWWA acronym for the American Water Works Association. These flanges are designed for generally lower pressure applications typically 300 PSI or less. These are normally used for potable water applications

BS flanges

These are British standard flanges.The British Standard BS10, 1962 is a standard Specification for Flanges and Bolting for Pipes, Valves, and Fittings. The BS 10 flange dimensions in mm covers boss, plain, integrally cast or forged, and welding neck type flanges, in flanges as per BS 10 table

Features available with EUMAG

1) Version: Integral/Remote
2) Meter size: 3 mm to 3000 MM
3) Maximum range: 12 meter/sec velocity, Bidirectional
4) Process connection: Flanged ANSI150, ANSI 300, ANSI600, DIN 10,16,25,40, ISb1538, Flange BS 10 table D, table E, H, /AWWA &wafer, SMS, Triclamp, BSP thread end,
5) Process connection material: MS/CS, SS304, SS316, SS316L
6) Electrode Material: SS316, SS316L, Hast alloy C, Titanium, Tantalum, tungsten carbide, Platinum, Nickel Alloy
7) Lining Material: Soft rubber, Hard Rubber(Ebonite), Neoprene, PFA, PTFE, Polyurethane, ceramic, Fused AL. Oxide.
8) Measuring tube material: SS304, SS316
9) Coil housing material: CS/MS, SS304, SS316
10) Power supply: 85-265 V AC,24 V DC, Solar powered, Battery powered
11 Output: 4-20mA,4-20 mA+ open collector pulse,4-20 mA DC+active pulse,4-20 mA DC + Relay 1 no,4-20 mA DC + relay 2 nos,4-20 mA DC + open collector pulse Relay 1no,4-20mA DC digital input + batch relay, open collector pulse,4-20 mA +open collector pulse+24 V Active pulse,4-20 mA DC +Digital input,4-20 MA + HART,
12) Communication interface: RS232, RS485 Modbus protocol, GSM, GPRS.HART, RF
13) The GSM/GPRS connectivity for communicating field data through SMS on mobile phones &/or control & monitoring through SCADA system.
14) Self diagnostic built in
15) Empty pipe indication built in
16) Data logger optional
17) Bidirectional flow measurement
18) Protection class: IP 67 for transmitter & IP 68 for sensor (Remote)
19) NO earthing rings required because of built in ear thing electrode
20) SS304/SS316 ear thing rings available as option
21) Flame proof & weather proof version available
22) Password protection available
23) Interchangeable converter
24) Selectable response time
25) Accuracy standard 0.5% optional 0.2%
26) Accessories: Mating flanges, gasket, nut bolt, panel, UPS, surge arrestor, printer, view software,

TECHNICAL SPECIFICATIONS OF EUMAG SERIES

Parameters	EUMAG L	EUMAG B	EUMAG I
Nominal Dia in mm	10 mm to 3000 mm	10 mm to 1000mm	> 100 mm
Working pressure Kg/CM2	10,16,25,40	10,16,25,40	20
Workingtemp. Deg.C	Integral PTFE 120 deg C Remote PTFE 180 deg C Others 70 deg C	Up to 55 deg C	Up to 120 deg C
Electrode material	SS 316 L *	SS 316 L *	SS 316 L std *
Sensor lining	Standard rubber *	Standard rubber *	NA
Display version	Integral/Remote	Integral/Remote	Integral/Remote
Measuring tube material	SS 304 standard *	SS 304 standard *	SS 316 L std *
Sensor housing material	Standard CS *	Standard CS *	NA
End connection	Flange/wafer/Triclamp/SMS	Flange/wafer/Triclamp/SMS	NA
Flange standard	ANSI 150 *	ANSI 150 *	NA
Measuring range	0.2 to 12 m/sec Bidirectional	0.2 to 12 m/sec Bidirectional	0.2 to 12 m/sec Bidirectional
Accuracy % of measured value	(+/-) o.5 % std (Optional +/- 0.2%	(+/-) o.5 % std	(+/-) 1%
Repeatability	(+/-) 0.5% of span	(+/-) 0.5% of span	(+/-) 0.5% of span
Display	2 line LCD	LCD	2 line LCD
Display units	All standard engineering unit m3,litre,gallon,ft3,imp.galon	All standard engineering unit m3,litre,gallon,ft3,imp.galon	All standard engineering unit m3,litre,gallon,ft3,imp.galon
Out put	4-20 mA standard *	Pulse *	Std 4-20 mA *
Power supply	12-60 V DC 80-300 V AC/DC Solar powered	Battery powered 5 years battery life extendable to 10 years	12-60 V DC 80-300 V AC/DC Solar powered
Protection class for sensor	IP 65 Std,IP 67 or IP 68 for flow tube in remote type	IP 65 Std,IP 67 or IP 68 for flow tube in remote type	Std IP 68
Protection class for transmitter	IP 67	IP 67	IP 67
Cable length for remote	10 meter *	10 meter *	10 meter *
Installation	Inline flanged type	Inline flanged type	Insertion type with use of isolating ball valve assembly on pipe line

*Please refer order code for more options

Technical specification for EUMAG Mini, EUMAG Sandwich type, Wafer type

PARAMETERS	EUMAG MINI	EUMAG WAFER (SANDWICH)
Minimum conductivity	>5 µs/cm	>5 µs/cm
Line size	DN3, DN6, DN10, DN15	DN50,DN80, DN100, DN150, DN200
Velocity	0.1 M/S - 15 M/S	0.5 M/S-10 M/S
Accuracy	±0.5% of reading	±0.5% of reading
Lining types	F46 polymer	STD: Hard Rubber /OPTIONS: PFA
Electrode types	SS316L	STD: SS316 /OPTIONS: SS316L, Hastalloy C
Grounding Electrode		STD: SS316 /OPTIONS: SS316L, Hastelloy C
pressure	16 Bar	10 Bar
temperature	10-55°C	Upto 60° C
IP RATING	IP 65	IP 65
Power supply	85-250VAC , 20V-36V DC	230 VAC
Power Supply of field Coils		Pulsed DC
Flanges	CS	
Power consumption	< 10W	
output	4-20 mA, pulse	4-20 mA, pulse
Display	LCDisplay,128X128mm Three lines 4 internal push button	back-lit LCD, OLED, Flow 6 digits, Tantalizer 8 digits
Communication	RS 485 MODBUS	
Alarm	High/Low alarm	
Connection	1/2 NPT,BSP	

Order Code of EUMAG
EUMAG

Model Code
EUMAG

Line Size
DN10-DN3000

Lining Material
T-PTFE
N-Neoprene
P-PFA
HR-Hard Rubber

Electrodes
S-SS316L
H-Hastelloy C
Ta-Tantallum
Ti-Titanium

Common Interface
1I-Without Hard, 4-20 mA
1HART - With Hart
1 Modbus - With Modbus
1G - With GSM / GPRS

Coil Housing
M - MS
CS - CS
S4 - SS304
S16 - SS316

Power Supply
230 - 230 VAC
24 - 24 VDC
B - Battery

Flange Connections
AXX - A15 ANSI150
AXX - A30 ANSI300
DXX - D16 - DIN PN 16
DXX - D25 - DIN PN 25
W - wafer for DN50, 80

Converter
I - Integral
RXX - Remote with interconnecting cable distance

Flange Material
CS - Carbon Steel
S4 - SS 304
S16 - SS 316

Example: EUMAG-DN50-N-S-1I-CS-I-A15-230-CS

Order Code of EUMAG INSERT

Model Code
EUMAG

Line Size
DN100-DN2000

Electrode
S - SS316
SL - SS316L
H - Hastelloy C
O - Other

Measuring Pipe Material
CS - Carbon Steel
S4 - SS304
S16 - SS36

Example: EUMAG-INSERT-DN20-S-CS-P-I-F-0

O/p Communication
0 - 4-20 mA
1 - No Communication
2 - HART
3 - Modbus RS485
4 - GSM / GPRS

Flange Connections
F - Flange
T - Thread

Converter
I - Integral
RXX - Remote

Probe Material
A - ABS
P - Polypropylene

Order Code of EUMAG MINI

Model Code
EUMAG - MINI

Line Size
DN3 - DN 15

Lining Material
F46 Polymer

Example: EUMAG-MINI-10- HR-S16-I-1

Indicator
0 - Without
1 - With

Output
P - Pulse
I - 4-20 mA

Electrode
SS316L
SS316
H - Hastelloy C
O - Other