

## TECHMAG RLM - ELECTROMAGNETIC FLOW METER

### APPLICATION

Electromagnetic Flow meters for bidirectional measurement of liquids with a minimum conductivity of  $>5\mu\text{s/cm}$ .

- Water, Waste Water
- Chemical
- Food
- Textile



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## SPECIAL FEATURES

- Flow Measurement up to 40000 m<sup>3</sup>/hr.
- Fluid Temperature up to +130° C.
- Process Pressure up to 40 bar
- Application-specific lining material: PTFE, PFA, Hard Rubber, Soft Rubber (optional).
- Sizes available from DN 10 mm to 3000 mm.
- Protection Class: IP65, IP67, IP 68(optional).
- Electrode for earthing and empty pipe alarm.
- Bi-directional measurement
- Universal power supply unit 85-440VAC and 12 – 30 VDC are also available.
- Protocol: RS 485/232 (or) HART Compatible.
- Measuring range: 0.01 m/s to 10m/s velocity
- Password Protection available.
- Housing: Flow Tube is Completely welded and Integrated
- All communication based on MODBUS RTU (only one communication module can be installed at a time)
- BLUETOOTH as a communication option and mobile network is not required.
- TCP/IP module – Intranet use is extremely straightforward with the Flow meter having its own IP- address. With the correct setup, the same module can be used via the internet. All over the world using MAG software is possible to connect to the Flow meter via internet.
- GPRS Wireless communication system which is performed by the GPRS protocol.
- RS232, RS485 and USB communications are also available
- Data downloading and communication does not require disassembly of the housing. No removal of large covers or lids is necessary. When using RS485, Bluetooth, GPRS or TCP/IP communication, data-downloading and communication is provided with IP67 protection.
- Three ways to remote mount the transmitter:
  - Wall mount
  - Panel mount



- o Field mount

## INTRODUCTION

A magnetic flow meter is a volumetric flow meter which does not have any moving parts and is ideal for wastewater applications or any dirty liquid which is conductive or water based. Magnetic flow meters will generally not work with hydrocarbons, distilled water and many non-aqueous solutions. Magnetic flow meters are also ideal for applications where low pressure drop and low maintenance are required.

Electromagnetic flow meters can measure difficult and corrosive liquids and slurries, and they can measure flow in both directions with equal accuracy.

Electromagnetic flow meters have relatively high power consumption and can only be used for electrical conductive fluids such as water.

## PRINCIPLE OF OPERATION

The operation of a magnetic flow meter is based upon Faraday's Law, which states that the voltage induced across any conductor as it moves at right angles through a

magnetic field is proportional to the velocity of that conductor.

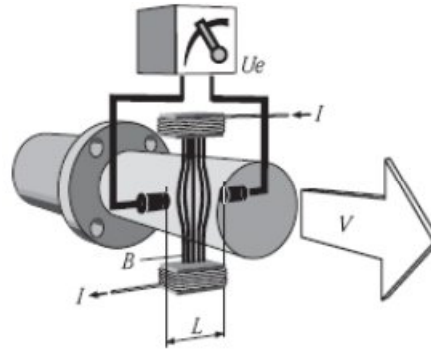


Fig 1.1: Measuring principle

To use the magnetic flow meter which works based on Faraday's law, it is necessary first to state that the fluid being measured must be electrically conductive.

Faraday's law of electromagnetic induction states that electric charges will be induced when a conductive metal rod of length (D) moves at a velocity (v) through a magnetic field (B). As a result, voltage (E) is induced between the ends of the rod. The liquid which flows through the flow meter serves as the conductor and the magnetic field is created by energizing the coils outside the flow tube.



Faraday's Law also indicates that signal voltage (E) is dependent on the average liquid velocity (V), the magnetic field strength (B) and the length of the conductor (D) (which in this instance is the distance between the electrodes).  $V \times B \times D$

#### Faraday's Formula

The voltage produced is directly proportional to the flow rate. (i.e) E is proportional to  $V \times B \times D$ .

$$(i.e) E = V \times B \times D.$$

Where,

E is the voltage generated in a conductor

V is the velocity of the conductor

B is the magnetic field strength

D is the length of the conductor

The volume flow is also proportional to the velocity of the conductor and the cross sectional area of the pipe.

$$(i.e.) Q = V \times A$$

Where,

Q is the flow Volume

V is the velocity of the conductor

A is the Cross sectional area of the pipe.

Measuring system:

The measuring system consists of a transmitter and a sensor. There are two versions in Magnetic Flow Meter.

Compact version:

Transmitter and sensor form a mechanical unit.

Remote version:

Sensor is mounted separately from the transmitter.

### PERFORMANCE SPECIFICATIONS

Accuracy:

System accuracy is  $\pm 0.5\%$  of rate 0.01 to 10 m/s.

Analog output has the same accuracy as frequency output plus an additional 0.1% of span.

Repeatability:

$\pm 0.1\%$  of reading

Response Time:

0.2 seconds maximum response to step change in input

Stability:

$\pm 0.1\%$  of rate over six months

Ambient Temperature Effect:

$\pm 1\%$  per 100 °F (37.8 °C)

Supply Voltage Effect:



## RLT Instrumentation (Unit of RLT Group)

Transmitter meets supply voltage effect requirements of SAMA

PMC 31.1, Section 5.10.1 through 5.10.5. Transmitter withstands surges in supply voltage as specified in IEEE 472, 1974

Vibration Effect:

±0.1% of span per SAMA PMC 31.1, Level 2

RFI Effect:

Class 1, A, B, C: ±0.5% of span at 3 V/m per SAMA PMC 33.1, wires and conduit EN61326 1 1997 + A1/A2 (Industrial) electromagnetic compatibility (EMC) for process and laboratory apparatus.

### FUNCTIONAL SPECIFICATIONS

DN (mm)	Lining Material			Flow Range (m <sup>3</sup> /h)		
	H R P	F E P	P F E	Min	Nom	Max
10	*	*		0.03	0.7	2.8
15	*	*		0.03	1.5	6.4
20	*	*	*	0.11	2.5	11
25	*	*	*	0.18	3.5	18
32	*	*	*	0.29	6	29
40	*	*	*	0.45	10	45

50	*	*	*	0.71	15	71
65	*	*	*	1.19	25	119
80	*	*	*	1.81	40	181
100	*	*	*	2.83	60	283
125	*	*	*	4.42	100	442
150	*	*	*	6.36	150	636
200	*	*	*	11.3	250	1130
250	*	*	*	17.66	400	1766
300	*	*	*	25.43	600	2543
350	*	*	*	34.62	750	3462
400	*	*	*	45.22	900	4522
450	*		*	57.23	1200	5723
500	*		*	70.65	1500	7065
600	*		*	101.74	2500	10174
700	*		*	138.47	4000	13847
800	*		*	180.86	5000	18086
900	*		*	228.91	6000	22891
1000	*		*	282.6	8000	28260
1200	*			406.94	10000	40694
1400	*			538.51	15386	55460.16
1600	*			703.36	20096	72437.76
1800	*			890.19	25434	91679.04

Note: Sizes available up to 3000 mm available. Specifications for size above 1800mm will be given when requested.

Conductivity Limits:

Process liquid must have conductivity greater than 5 micro Siemens / cm (Optional)

Flow Rate Range:



## RLT Instrumentation (Unit of RLT Group)

Capable of processing signals from fluids that are traveling between 0.01 m/s to 10 m/s for both forward and reverse flow in all flow tube sizes.

### Power Supply:

85-250VAC

12-24VDC

Battery Operated (Lithium Battery)

### Output:

4 to 20mA, pulse

4 to 20mA, HART

4 to 20mA, RS232/RS485

4 to 20mA, Bluetooth

4 to 20mA, GPRS

4 to 20mA, GSM

TCP/IP Module

### Load Limitation:

Max. 700  $\Omega$

### Damping:

0.1s-99.9s adjust (for display or output)

### Ambient Temperature Limit:

5~55°C

### Process Temperature Limits:

0 to +60 °C

### Storage Temperature Limit:

-20 to +60 °C

### Humidity Limits:

<85 % r.h (no condensation)

### Display:

2-Line Display

3-Line Display with Back-Lit Option

6-Line Display with Back-Lit Option

## PHYSICAL SPECIFICATIONS

### Non-Wetted Materials:

#### Flow tube:

AISI Type 304 SST

#### Flanges:

Carbon steel, AISI Type 304/304L SST or Type 316/316L SST

#### Housing:

Low-copper aluminum, NEMA 4X and IEC 60529 IP65, IP67, IP68 (optional)

#### Paint:

Polyurethane

#### Cover Gasket:

Rubber

#### Electrical Connections:

Two 1/2"-14 NPT connections with number 8 screw terminals are provided in the terminal enclosure for electrical wiring. Power wiring connected to the transmitter only.

Remote mounted transmitters require only a single conduit connection to the flow tube.

Integrally mounted transmitters are factory wired to the flow tube.



**CERTIFICATION:**

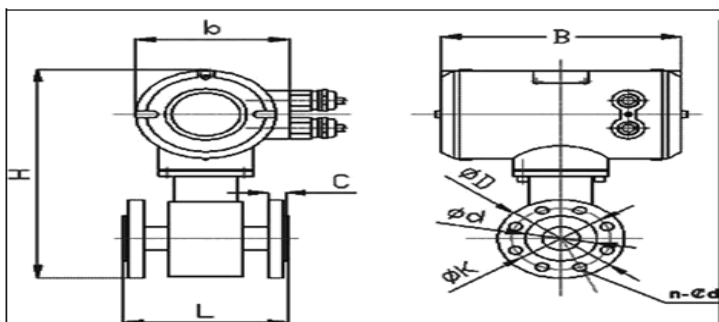
**CE mark:** The measuring system is in conformity with the statutory Requirements of the EC Directives. We confirm successful testing of the device by affixing it to the CE mark.

**C-tick mark:** The measuring system meets the EMC requirements of the

Australian Communications Authority (ACA).

**Ex approval:** Information about currently available Ex versions (ATEX, FM, CSA, etc.) can be supplied on request. All explosion protection data are given in a separate documentation which is available upon request.

**Dimension:**



DN(mm)	Size (mm)				Connection Size (mm)			Approx. Wt.
	L	H	B	b	øK	n-ød	øD	
10	160	254	152	102	65	4-ø14	95	
15	160	254			65	4-ø14	95	
20	160	254			75	4-ø14	105	
25	160	254			85	4-ø14	115	
32	160	270			100	4-ø18	140	
40	200	280			110	4-ø18	150	
50	200	294			125	4-ø18	165	
65	200	313			145	8-ø18	185	
80	200	326			160	8-ø18	200	
100	250	344			180	8-ø18	220	
125	250	372			210	8-ø18	245	
150	300	403			240	8-ø22	285	
200	350	460			295	12-ø22	340	
250	400	511			350	12-ø22	390	



**RLT Instrumentation  
(Unit of RLT Group)**

300	500	565		400	12-ø22	440	
350	500	620		460	16-ø22	500	
400	600	675		515	16-ø22	565	
450	600	727		565	20-ø26	615	
500	600	782		620	20-ø26	670	
600	600	782		725	20-ø30	780	
700	700	1068		840	24-ø30	895	
800	800	1157		950	24-ø34	1010	
900	900	1230		1050	28-ø34	1110	
1000	1000	1332		1160	28-ø36	1230	
1200	1200	1592		1340	32-ø33	1405	
1400	1400	1870		1560	36-ø36	1630	
1600	1600	2080		1760	40-ø36	1830	
1800	1800	2300		1970	44-ø39	2045	

**ORDERING INFORMATION**

**RLMXX -**

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
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Code	Features
A	Line Size
DN 10	3/8 inch
DN 15	1/2 inch
DN 20	3/4 inch
DN 25	1 inch
DN 32	1-1/4 inch
DN 40	1-1/2 inch
DN 50	2 inch
DN 65	2-1/2 inch
DN 80	3 inch
DN 100	4 inch
DN 125	5 inch





RLT Instrumentation  
(Unit of RLT Group)

DN 150	6 inch
DN 200	8 inch
DN 250	10 inch
DN 300	12 inch
DN 350	14 inch
DN 400	16 inch
DN 450	18 inch
DN 500	20 inch
DN 600	24 inch
DN 700	28 inch
B	Conductivity
A	>5 $\mu\text{s/cm}$
B	>20 $\mu\text{s/cm}$
C	Liner
H	Hard Rubber (60° C)
P	PTFE(130° C)
F	PFA(150° C)
D	Electrode
2	2-Electrodes
3	3-Electrodes
4	4-Electrodes
E	Electrode Material
S	SS316L
A	Alloy
T	Titanium
D	Tantalum
P	Platinum/Iridium
F	Process Connection
W	Wafer Connection



**RLT Instrumentation  
(Unit of RLT Group)**

A	ANSI Flange Connection
D	DIN Flange Connection
T	Tri-clamp - Dairy Fitting
G	Flange Material
C	CS Flange
S	SS Flange
H	Approval
N	Non-Hazardous
F	Flame Proof
E	Ex-proof
A	ATEX II
I	Version
C	Compact
R1	Remote Panel Mount
R2	Remote Field Mount: Cable length- 5 to 100 m in steps of 5 m.(Cable length more than 100m can be provided upon request)
J	Accuracy
0	0.5%
2	0.2%
K	Power Supply
A	85-440 V, AC
D	12-24 V DC
B	Battery Operated(Lithium Battery)
L	Output
1	4 to 20mA, pulse
2	4 to 20mA, HART
3	4 to 20mA, RS232/RS485
4	4 to 20mA, Bluetooth
5	4 to 20mA, GPRS



**RLT Instrumentation  
(Unit of RLT Group)**

6	4 to 20mA, GSM
7	TCP/IP Module
<b>M</b>	<b>Display</b>
2	2- Line Display
3	3-Line Display with Back-Lit Option
6	6-Line Display with Back-Lit Option
<b>N</b>	<b>Transmitter Protection Class</b>
7	IP 67
8	IP 68
<b>O</b>	<b>Sensor Protection Class</b>
5	IP 65
7	IP 67
8	IP 68
<b>P</b>	<b>Additional Option</b>
0	Basic Version
1	Battery Operated
2	GSM Connection
3	GPRS Connection
4	Temp Compensation & Auto Cleaning system
5	Temperature Indication



RLT Instrumentation  
(Unit of RLT Group)

Head Office



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