Fuji Electric

Innovating Energy Technology

Electromagnetic Flow meters

Simple and economical solution for conductive liquids

21D1-E-009b

About us

Founded in Japan in 1923, Fuji Electric Co., Ltd. is recognized as one of the world leaders in electrical power equipment, industrial controllers and instrumentation. With over than 8 billion dollars in turnover and more than 27,400 employees worldwide*, the Fuji Electric Group is one of the world's leading distributors and manufacturers of measurement and control equipment.

Fuji Electric France, a subsidiary of Fuji Electric Co., Ltd. produces and markets the instruments that have built the reputation of the Japanese group. The French company is responsible for international operations in Europe, Africa and the Middle East. Highly qualified staff and state-of-the-art production and testing facilities ensure the best service and sales support for our customers.

**As for March 2019*

Proximity and valuation

Our location in France has enabled us for 20 years to provide a quality local service to our customers on all our products.
Our large network of sales representatives, international distributors and after-sales technicians guarantee the best service. Our local partners provide local support in your language in order to offer the most efficient service.
Whatever the industrial sector, Fuji Electric team is here to help you throughout the lifecycle of your projects. We will deliver a tailored response that is best suited to your specific needs, whether they be diagnostic, technical, application, commissioning or ongoing support and maintenance.
Our team is continuously trained on products and the latest fluid measurement technologies to support you in optimising your solution, choosing the technology and location of the flowmeter best suited to your activity.

The Fuji Electric brand is a guarantee of excellence and ensures that products are manufactured with the utmost care and in compliance with all ISO 9001:2015 and ISO 14001:2015 certification standards.

Flow measuring

Fuji Electric electromagnetic flowmeters can be used wherever you want to measure the flow rate of a conductive liquid in any industrial sector, such as chemical, pharmaceutical, paper, food processing, or drinking and waste water treatment.

With excellent reliability over time (no moving parts), high accuracy (±0.2%) and total absence of pressure drop on the pipework, our flowmeters are perfectly adapted to your measurement requirements.

Contents

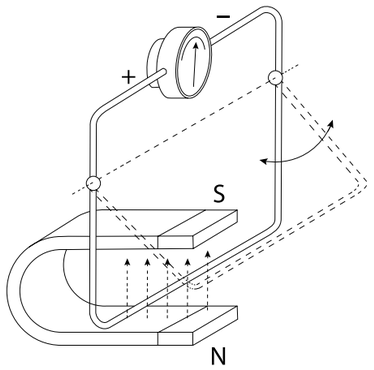
Electromagnetic Flow meters

Electromagnetic flow meters are ideally suited for flow measurement of all liquids with a minimum conductivity of 5 µS/cm (20 µS/cm for demineralized water). These meters are very accurate and the flow measurement is independent of density, temperature and pressure of the medium.

Measuring principle

The operating principle of the electromagnetic flow meter is based on Faraday's law of magnetic induction:

The voltage induced across any conductor, as it moves at right angles through a magnetic field, is proportional to the velocity of that conductor. The voltage induced within the fluid is measured by two diametrically opposed internally mounted electrodes.The induced signal voltage is proportional to the product of the magnetic flux density, the distance between the electrodes and the average flow velocity of the fluid.



Meters for conductive fluids
Detectors

Detector type II
For a great variety of applications

The electromagnetic detector type II is not only available in a number of different flange process connections (DIN, ANSI, JIS, AWWA, etc.) but also in a number of liners like hard rubber, soft rubber, PTFE, PFA or ETFE. The detector can be configured with up to four electrodes for measuring, empty pipe and grounding electrodes.

Available in sizes from DN 6 to DN 2000 and nominal pressures up to PN 100, the detector type II is best suited for a variety of the water and wastewater treatment industry.
Lined measuring pipes with materials that are approved for drinking water: KTW/DVGW, NSF-61, WRAS, ACS.

- **Flange process connection (DIN, AINSI, JIS, AWWA, etc.)**
- **Size : DN 6 – DN 2000 (1/4“-80“)**
- **Nominal pressure up to PN 100**

Detector type III
With short lay length

Thanks to its very short lay length, the detector type III is often the right alternative for many applications.
Delivered with a PTFE liner, the detector type III has a standard nominal pressure of PN 40.

- **Wafer connection (compact type sandwich)**
- **DN 25 – DN 100 (1“ - 4“)**
- **PN 40**

Sanitary detector
For liquid food flow measurement

The sanitary detector was developed for the flow measurement of liquid food. This model is available with Tri-Clamp® BS 4825/ISO 2852, DIN 11851 process connections and also with any special connections (customer specifications).
The sanitary detector is delivered in a stainless steel housing and with PTFE lining.

- **Process connections Tri-Clamp® BS 4825/ISO 2852, DIN 11851**
- **DN 10 – DN 100 (3/8“ - 4“)**
- **PN 10/16**

Technical data: Detectors

Type	Type II	Type III	Type food
			
Size	DN 6 – 2000 (1/4“...80“)	DN 25 – 100 (1“...4“)	DN 10 – 100 (3/8“...4“)
Process connections	Flange : DIN, ANSI, JIS, AWWA u.a.	Wafer connection, (in-between flange mounting)	Tri-Clamp® BS 4825/ISO 2852, DIN 11851 among others
Nominal pressure	Up to PN 100	PN 40	PN 10/16
Protection class	IP 67, optional IP 68	IP 65, optional IP 68	IP 65, optional IP 68
Min. conductivity	5 µS/cm (min. 20 µS/cm for demineralized water)	5 µS/cm (min. 20 µS/cm for demineralized water)	5 µS/cm (min. 20 µS/cm for demineralized water)
Liner materials	Hard / soft rubber | from DN 25 | 0 up to +80 °C PTFE | DN 6 – 600 | -40 up to +150 °C ETFE | from DN 300 | -40 up to +150 °C	PTFE | -40 up to +150 °C	PTFE | -40 up to +150 °C
Electrodes materials	Hastelloy C (standard) Tantal Platinum / Gold plated Platinum / Iridium	Hastelloy C (standard) Tantal Platinum / Gold plated Platinum / Iridium	Hastelloy C (standard) Tantal Platinum / Gold plated Platinum / Iridium
Housing	Carbon steel / optional stainless steel	Carbon steel / optional stainless steel	Stainless steel
Lay length	DN 6 – 10 | 170 mm DN 15 – 80 | 200 mm DN 100 – 125 | 250 mm DN 150 | 300 mm DN 200 | 350 mm DN 250 | 450 mm DN 300 | 500 mm DN 350 | 550 mm DN 400 – 700 | 600 mm DN 750 – 1000 | 800 mm DN 1200 – 1400 | 1000 mm DN 1600 | 1600 mm DN 1800 | 1800 mm DN 2000 | 2000 mm or according to ISO 13359 from DN15 to 400	DN 25 – 50 | 100 mm DN 65 – 100 | 150 mm	Tri-Clamp® connection: DN 10 – 50 | 145 mm DN 65 – 100 | 200 mm DIN 11851 connection: DN 10 – 20 | 170 mm DN 25 – 50 | 225 mm DN 65 – 100 | 280 mm

Amplifiers

Amplifier - M2000
For a great variety of applications

The amplifier type M2000 is best suited for bidirectional flow measurement of fluids with a conductivity >5 µS/cm (>20 µS/cm for demineralized water). M2000 shows a high accuracy, is easy to use and can be chosen for a large and flexible applications spectrum.The backlight, four-line display shows all actual flow measuring data, daily and complete information, including alarm messages.The standard amplifier has 4 programmable digital outputs, one digital input, analog output and different interfaces.

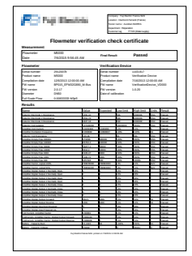
Integrated system self check-up makes putting into operation and servicing easier. The back-up function enables retrieval of parameters while servicing the meter, without the need for reprogramming the device or transferring to another device.

- **For all detectors**
- **Accuracy : ±0,2 % of actual flow**
- **Flow range : 0,03 – 12 m/s**
- **DN 6 – DN 2000 (1/4" - 80")**
- **Protection class IP 67**
- **Interfaces ModBus®, HART ™, M-Bus, Profibus DP**
- **ACS, OIML R49-1 and MID MI-001 approved**
- **Integrated data logger function**

Verification Device

All important parameters of the flow meter are measured, protocoled and evaluated. The accuracy of the amplifier and of the in-/outputs as well as the functionability of the detector are measured without process interruption more easily, more precisely and better secured.

The verification device enables to check the perfect and exact functionality of the electromagnetic flow meters types M1000, M2000 and M5000 on site in regular time intervals at a low cost and without interruption of the process. The device is verifying that the MAG meter´s calibration is still ranging between ±1% of the primary factory calibration.


Fuji Electric

Flowmeter verification check certificate

Passed

Amplifier M5000
Battery-powered for water supply

The M5000 is a battery-powered electromagnetic flow meter with a very high accuracy even at very low flows. The excellent repeatability as well as the above-average battery life makes this innovative water meter indispensable for the water market. Typical applications are leak detection in water networks, water consumption measurements and irrigation plants.

The meter is best suited for applications without a power supply where exact consumption or flow rates are required. The M5000 can also be used with an available power supply. The meter can be powered with mains voltage and in case of a mains failure, it is powered by an internal battery. Important data is therefore saved. The M5000 has been designed for very harsh environmental measurement conditions. The meter has no moving parts and can be used to measure water containing particles like sand or gravel.

The M5000 is encased in an IP67 housing (optional IP68), which makes it a reliable meter even when submerged. The standard meter is equipped with an internal datalogger which can be read via an IrDA or M-Bus with ModBus® RTU protocol. The collected data can also be retrieved via radio frequency or GSM/GPRS. The data can thus be centrally compiled and evaluated.

- **Flanged process connections**
- **Accuracy better than ±0,4 % of actual flow**
- **Flow range : 0,03 to 10 m/s**
- **DN 15 – DN 600**
- **Protection class IP67 / IP68**
- **ACS, OIML R49-1 and MID MI-001 approved**
- **Interfaces IrDA, ModBus®, RTU, M-Bus**
- **Up to 12 years battery life span**
- **Integrated data logger fonction**

up to **12 years** Lifespan

Low-cost amplifier M1000
For a great variety of applications

The M1000 amplifier is suited for bidirectional flow measurement of liquids 5 µS/cm (>20 µS/cm for demineralized water). It combines all the opportunities of price with high level performance.

Information such as flow rate, total flow rates, daily flow rate or even an alert can easily be read from the LCD display. Various inputs, outputs and interfaces allow a wide range of different applications with the M1000. Thanks to the IP67 aluminium housing the M1000 is ideal for outdoor applications in rugged environmental conditions. The M1000 with a robust stainless steel housing was specially developed to meet the highest requirements in the food industry.

- **For all detectors**
- **Accuracy : ±0,3 % of actual flow**
- **Flow range : 0,03 – 12 m/s**
- **DN 6 – DN 500 (1/4" - 20")**
- **Protection class IP67**
- **Modbus®, HART™, MBUS, Ethernet interfaces**

Amplifiers M3000/M4000
For hazardous areas

The amplifier with modular design allows flow measurements, in either the mounted or remote version in classified hazardous area (eg. zone 1 and 2). The amplifier housing, made of powder-coated aluminium, is available in protection class IP67 and with a separate connection space. Programming can be done either with closed housing thanks to a magnetic pen or with open housing via three buttons. The four-line display shows all necessary data like actual flow, totalizer and status messages. The programmable excitation frequency even enables the amplifier to be adjusted for difficult metering applications. The newly developed process for amplifier compensation enables a high accuracy, especially in the lower flow range. The M3000/M4000 is especially suited for flow measurements in chemical and pharmaceutical industries, as well as water and waste water plants with explosion-proof zones.

- **Flanged process connections**
- **Accuracy : ±0,2 % of actual flow**
- **Flow range : 0,03 – 12 m/s**
- **Protection class IP67**
- **Ex-proof**
- **DN 6 – 600 (1/4“- 56“)**

Technical data: Amplifiers

Type	M1000	M2000	M3000/M4000	M5000
				
Size	DN 6 – DN 500	DN 6 – DN 2000	DN 6 – DN 600 (M3000) DN 6 – DN 300 (M4000)	DN 15 – DN 600
Accuracy	±0,3 % of actual flow, ±2 mm/s of actual flow	±0,2 % of actual flow, ±1 mm/s of actual flow	±0,2 % of actual flow, ±1 mm/s of actual flow	±0,4 % of actual flow, ±2 mm/s of actual flow
Repeatability	0,1 %	0,1 %	0,1 %	0,1 %
Flow range	0,03 – 12 m/s	0,03 – 12 m/s	0,03 – 12 m/s	0,03 – 10 m/s
Conductivity	Min. 5 µS/cm (min. 20 µS/cm for demineralized water)	Min. 5 µS/cm (min. 20 µS/cm for demineralized water)	Min. 5 µS/cm (min. 20 µS/cm for demineralized water)	Min. 20 µS/cm
Power supply	92 – 275 VAC (50/60 Hz) consumption < 14 VA, optional 9 – 36 VDC, 4 W	85 – 265 VAC (50/60 Hz) consumption < 20 VA, optional 9 – 36 VDC	85 – 265 VAC (50/60 Hz) consumption < 20 VA, optional 24 VDC	Internal Lithium batteries 3,6 V Optional battery back-up model (100 – 240 VAC or 9 – 36 VDC)
Display	LCD graphic display 64x128 dot	LCD 4 lines / 20 characters	LCD 4 lines / 16 characters	LCD, 2 lines
Digital outputs	2 x open collector 1 x relay	4 x open collector 2 x relays	2 x open collector 2 x relays (M3000)	4 x open collector
Digital input	Yes (x1)	Yes (x1)	Yes (x1)	Yes (x1)
Analog output	0/4 – 20 mA, 0 – 10 mA	0/4 – 20 mA, 0/2 – 10 mA	0/4 – 20 mA, 0 – 10 mA	–
Interface	Modbus® RTU RS232/RS485 In option, Modbus® TCP/IP M-Bus, HART™	Modbus® RTU RS232 In option, Modbus® RTU R485 HART™,M-BUS, PROFIBUS-DP	–	Modbus® RTU RS232 (Optional, RS485) M-Bus, IrDA
Empty pipe detection	Separate electrode	Separate electrode	Separate electrode	Separate electrode
Datalogger	30.000 measuring values	10.000 measuring values (optional)	–	7.224 measuring values
Housing	Aluminium, IP 67	Aluminium, IP 67	Aluminium, IP 67 (NEMA 4x)	Aluminium, IP 67 (Optional IP 68)
Remote version	Max. 50 m	Max. 100 m	Max. 30 m	Max. 30 m
Ambient temperature	-20 °C up to +60 °C	-20 °C up to +60 °C	-20 °C up to +50 °C	-20 °C up to +60 °C
Approvals	ACS (Hard rubber only)	OIML R49-1, MID MI-001 ACS (Hard rubber only)	M3000 ATEX Zone 2, FM/ CSA Classe I, Div. 2 M4000 ATEX Zone 1, FM/ CSA Classe I, Div. 1	OIML R49-1, MID MI-001 ACS (Hard rubber only)

Flow range					
DN		0,03 m/s	2,5 m/s	10 m/s	12 m/s
(mm)	(Inches)				
6	1/4“	0,05 l/min	4,2 l/min	17 l/min	20 l/min
8	3/10“	0,09 l/min	7,5 l/min	30,2 l/min	36 l/min
10	3/8“	0,14 l/min	12 l/min	47,1 l/min	57 l/min
15	1/2“	0,32 l/min	27 l/min	106 l/min	127 l/min
20	3/4“	0,57 l/min	47 l/min	188,5 l/min	226 l/min
25	1“	0,88 l/min	74 l/min	294,5 l/min	353 l/min
32	1 1/4“	1,45 l/min	121 l/min	483 l/min	579 l/min
40	1 1/2“	2,3 l/min	188 l/min	754 l/min	905 l/min
50	2“	3,5 l/min	295 l/min	1178 l/min	1414 l/min
65	2 1/2“	6,0 l/min	498 l/min	1991 l/min	2389 l/min
80	3“	9,0 l/min	754 l/min	3016 l/min	3619 l/min
100	4“	14 l/min	1178 l/min	4712 l/min	5655 l/min
125	5“	1,33 m³/h	110 m³/h	442 m³/h	530 m³/h
150	6“	1,9 m³/h	159 m³/h	636 m³/h	763 m³/h
200	8“	3,4 m³/h	283 m³/h	1131 m³/h	1357 m³/h

Flow range					
DN		0,03 m/s	2,5 m/s	10 m/s	12 m/s
(mm)	(Inches)				
250	10“	5,3 m³/h	442 m³/h	1767 m³/h	2121 m³/h
300	12“	7,6 m³/h	636 m³/h	2545 m³/h	3054 m³/h
350	14“	10,4 m³/h	866 m³/h	3464 m³/h	4156 m³/h
400	16“	14 m³/h	1131 m³/h	4524 m³/h	5429 m³/h
450	18“	17 m³/h	1431 m³/h	5725 m³/h	6870 m³/h
500	20“	21 m³/h	1767 m³/h	7068 m³/h	8482 m³/h
550	22“	26 m³/h	2138 m³/h	8553 m³/h	10263 m³/h
600	24“	31 m³/h	2545 m³/h	10178 m³/h	12214 m³/h
700	28“	42 m³/h	3464 m³/h	13854 m³/h	16625 m³/h
750	30“	48 m³/h	3976 m³/h	15904 m³/h	19085 m³/h
800	32“	54 m³/h	4523 m³/h	18096 m³/h	21714 m³/h
900	36“	69 m³/h	5725 m³/h	22902 m³/h	27482 m³/h
1000	40“	85 m³/h	7068 m³/h	28274 m³/h	33929 m³/h
1200	48“	122 m³/h	10178 m³/h	40714 m³/h	48857 m³/h
1400	55“	166 m³/h	13854 m³/h	55416 m³/h	66499 m³/h

ø Larger diameters upon request

Calibration facility

We are able to calibrate electromagnetic flow meters in a range of nominal sizes from DN 6 up to DN 2000 mm. One calibration rig is up to DN 600 with a capacity of 1500 m³/h and a second rig up to DN 2000 with a capacity of 4500 m³/h.

The calibration is done by static weighing in accordance to ISO 4185 “Measurement of fluid flow in closed circuits”. The volume measured by the meter is recorded by the integration of the delivered pulses during the measurement time between two tank. The weights of the 2 tanks are weighed at the start and at the end of the test and then compared to the volume of water measured by the flow meter in the time interval. The calibration process is fully automated and controlled by an approved software.

The quality of the water which is used for the calibration is permanently controlled and running through a filter and disinfection system. This ensures that our products are not strained with dust, allergens, bacteria and smells.

Our calibration facility is certified according to ISO 9001 and ISO EN 17025; all calibration results are NIST traceable.

Electronic scale 150 kg

Electronic scale of the smallest bench

Middle test bench with scale covering low flows

Fuji Electric

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