

MAGNETIC FLOW METERS



MEASURING PRINCIPLE

Having no moving or mechanical parts in the flow profile electromagnetic flow meters cause no pressure drop, are virtually maintenance free and provide highly accurate and stable measurement of liquids with even solid particles inside.

Measuring principle is based on Faraday's law of Induction. Conductive liquid flowing through magnetic field induces voltage proportional to its flow speed. This voltage is picked up by electrodes and measured in converter. Fortunately, most liquids are conductive to some extent but oil products, distilled water, pure alcohol, etc. cannot be measured with this technology.

MADE TO LAST

M9xx flow meter series is made of quality materials designed to withstand harsh environments of mining sites, seafronts, sewer installations and other industrial applications.

Resilient electronic components provide protection against wear, temperature and electric abuse whereas thought-out software got you covered in case of power failure or partial data loss caused by severe electrostatic discharge.

All processes are certified to ISO 9001:2015 under UKAS certification rules.



ORDER EXAMPLE

Ex910E-V2121 DN40 PN25

Sensor:	Ex certified	Power supply:	24 V DC
Flow converter:	910E	Construction:	remote version
Liner:	PTFE	Flanges:	metric DIN2501, 40 mm
Electrodes:	hastelloy C276	Pressure rating:	25 bar

Sensor

M	Basic
Ex	Ex certified (remote version only)

Flow converter

910E	Economic version
910	Basic version
920	High accuracy version (legacy)
921	High accuracy version
930	Battery powered version

Liner

-V0	Hard rubber
-V2	PTFE

Electrodes

0	CrNi steel
1	Hastelloy C276
2	Tantalum

Power supply

0	115V/230V AC or 38 Ah battery
1	12V DC or 76 Ah battery
2	24V DC
3	48V DC

Construction

0	Compact version
1	Remote version
2	Remote version with pulse output (M930 only)

Flanges

DN	DIN2501 + diameter in mm
ANSI	ANSI B16.5 + inch diameter
JIS	JIS B2220 + diameter in mm
Sanitary	DIN11851 + diameter in mm

Pressure rating

PN	Metric:	16–40 bar @ DN<200 10–25 bar @ DN≥200
PSI	Imperial:	150 PSI
K	JIS:	5K or 10K

M910 CONVERTER



M910 comes with six isolated outputs – pulse, frequency, current loop, relay, RS232, RS485 – and one isolated input for exact dose measurement. All fully customizable. 2x16 LCD screen can display min., max. and actual flow rate, directional volumes, auxiliary volume counter, datalogger data and can be used to operate and calibrate the unit by hand. Additional functions include signal filtering (low flow cut-off, moving average), RTC and diagnostics.

M910E is economic version of M910 with the same accuracy but limited functionality and user control. Suitable for automated solutions and simple readout stations.

Application: water and wastewater treatment, food processing, paper industry.

M921 PRECISION CONVERTER



Top of the range converter has all the features of M910 plus 0.25% accuracy, wider flow range, Modbus protocol, empty pipe detection, temperature measurement, huge datalogger and many other functionality improvements.

New hardware design allows for easier operation and better stability whereas new user interface and dot matrix display provide great user experience.

Application: where precision is key – chemical, pharmaceutical or food industry.

M930 BATTERY POWERED CONVERTER



M930 was made specifically for applications in remote or hard-to-reach areas with lifetime up to 10 years on single battery pack.

Large datalogger and fast USB for long-time data acquisition applications, exposed capacitive buttons and dot matrix display help in convenient navigation through data at readout stations. Coil power draw limits maximum diameter to 300 mm or 12 inches.

Application: where main power supply is not available – dewatering, irrigation.

	M921	M910	M910E	M930
Accuracy	0.25 % 0.003 m/s under 0.5 m/s	0.5 % 1 % under 0.5 m/s		
Flow range	0.03 to 12 m/s	0.1 to 10 m/s		
Displayed values	Flowrate, volume (positive, total, negative, auxiliary)			
Empty pipe detect.	✓	–	–	✓
Temp. indication	✓	–	–	–
Diagnostic	✓	✓	Optional	✓
Datalogger size	900 000 values	15 000 values	N/A	100 000 values

Mechanical

Diameter range	15...800 mm / ½" ...32"			15...300 mm / ½" ...12"
Pressure range	10, 16, 25, 40 bar / 150 psi			
Liner	Hard rubber PTFE			
Electrodes	Stainless steel 1.4571 (316Ti) Hastelloy C276 Tantalum			
Measuring tube	Stainless steel 1.4201, dimensions according to DIN 17457			
Flanges	Carbon steel 1.0402 or higher Dimensions DIN2501 (=EN1092=BS 4504), ANSI B16.5, Sanitary (DIN11851), flangeless wafer style			
IP protection	Compact version: IP67 Remote version: sensor IP68, converter IP65 (optionally IP67)			

Interface

Control	RS232 (USB), RS485 Keypad	RS232, RS485 Keypad & pointer	RS232 Magnetic pointer	RS232 (USB) Keypad
Modbus protocol	✓	–	–	✓
Pulse output	✓	✓	✓	Optional
Frequency output	✓	✓	✓	–
4-20 mA loop	✓	✓	✓	–
Relay contact	✓	✓	–	–
Digital input	✓	✓	–	–

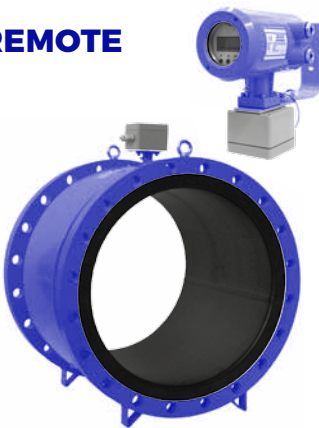
General

Ambient temp.	-20 to 60 °C (-4 to 140 °F)		-20 to 50 °C (-4 to 122 °F)
Liquid temp.	up to 150 °C (302 °F)	up to 130 °C (266 °F)	up to 150 °C (302 °F)
Power supply	85...264 V, 50/60 Hz	115/230 V, 50/60 Hz	Internal battery 38 Ah
	DC options: 12 V, 24 V, 48 V		76 Ah as option
Consumption	10 VA		~ 3.2 mW (up to 10 years)
Conformity requirements	LVD (safety) according to EN 61010-1, EN61010-1/A2 PED according to directive 97/23/EC EMC according to EN 61326-1, EN 61000 parts 3-2, 3-3, 4-2, 4-3, 4-4, 4-5, 4-6, 4-11, 6-2		

COMPACT

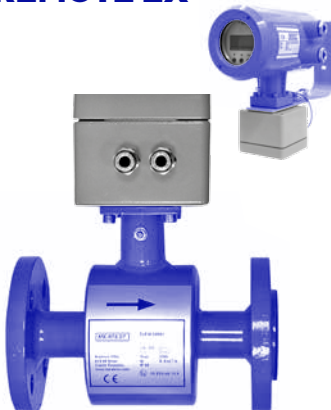
Space and cost saving solution with converter mounted directly on top of sensor.

- Protection IP67
- PN10-PN40
- PTFE or hard rubber liner
- CrNi steel, hastelloy or tantalum electrodes

REMOTE

Separate flow converter can be placed outside installation site for better accesibility.

- Sensor and convertor connected by cable
- Maximum cable length 60m
- Sensor protection IP68
- Convertor protection IP67
- PN10-PN 40
- Same selection of liners and electrodes

REMOTE EX

Ex certified remote sensor can be installed in workplaces with potentially explosive atmosphere.

- Same layout as remote version
- Zone II, 3G Ex nA IIC T5/T6 Gc
- PN10-PN25
- Same selection of liners and electrodes



Liners and electrodes

Liner, electrodes and grounding rings come in direct contact with measured liquid so they have to be resistant to its abrasive and corrosive effects. Generally speaking, more expensive materials like PTFE, Hastelloy C276 or tantalum are resistant to more solutions than basic materials but one should always consider compatibility of selected materials with the specific liquid in question. For more details on chemical compatibility see M910's manual on our website.

Diameter selection

There are two parameters to consider when choosing diameter of the sensor. First of all, both expected minimum and maximum flowrate should fall into guaranteed accuracy range to be able to measure both extremities reliably. If you're left with more than one option, choose diameter with nominal flowrate Q_N closest to expected working flow rate.

DN	Flowrates [l/s]							Flowrates [m ³ /h]						
	Q _{0.3%}	Q _{1%}	Q _{5%}	Q _N	Q _{50%}	Q _{100%}	Q _{MAX}	Q _{0.3%}	Q _{1%}	Q _{5%}	Q _N	Q _{50%}	Q _{100%}	Q _{MAX}
15	0,005	0,02	0,09	0,50	0,88	1,77	2,21	0,01	0,06	0,32	2,00	3,18	6,36	7,95
20	0,009	0,03	0,16	0,90	1,57	3,14	3,93	0,03	0,11	0,57	3,20	5,65	11,3	14,1
25	0,015	0,05	0,25	1,40	2,45	4,91	6,14	0,05	0,18	0,88	5,00	8,84	17,6	22,0
32	0,024	0,08	0,40	2,20	4,02	8,04	10,0	0,08	0,3	1,5	8,00	14,5	29,0	36,2
40	0,04	0,1	0,6	4,0	6,3	12,6	15,7	0,14	0,5	2,3	13,0	22,6	45,2	56,6
50	0,06	0,2	1,0	6,0	9,8	19,6	24,5	0,21	0,7	3,5	20,0	35,3	70,7	88,4
65	0,10	0,3	1,7	9,0	16,6	33,2	41,5	0,36	1,2	6,0	35,0	59,7	119,5	149,3
80	0,15	0,5	2,5	14,0	25,1	50,3	62,8	0,54	1,8	9,0	50,0	90,5	181,0	226,2
100	0,24	0,8	3,9	20,0	39,3	78,5	98,2	0,85	3	14	80	141	283	353
125	0,4	1	6	30,0	61	123	153	1,3	4	22	150	221	442	552
150	0,5	2	9	50,0	88	177	221	1,9	6	32	200	318	636	795
200	0,9	3	16	100	157	314	393	3,4	11	57	300	565	1131	1414
250	1,5	5	25	150	245	491	614	5,3	18	88	500	884	1767	2209
300	2,1	7	35	200	353	707	884	7,6	25	127	800	1272	2545	3181
350	2,9	10	48	300	481	962	1203	10	35	173	1000	1732	3464	4330
400	3,8	13	63	400	628	1257	1571	14	45	226	1300	2262	4524	5655
500	5,9	20	98	600	982	1963	2454	21	71	353	2000	3534	7069	8836
600	8,5	28	141	800	1414	2827	3534	31	102	509	3000	5089	1017	1272
700	12	38	192	1000	1924	3848	4811	42	139	693	4000	6927	1385	1731
800	15	50	251	1200	2513	5027	6283	54	181	905	5000	9048	1809	2262

Q_{0.3%}...Q_{100%} – guaranteed accuracy range (M920, M921)

Q_{1%}...Q_{100%} – guaranteed accuracy range (other types)

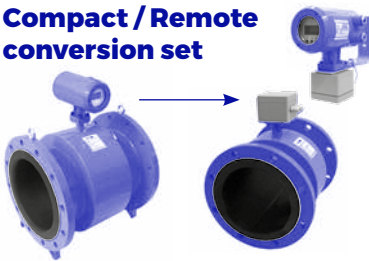
Q_{5%}...Q_{50%} – best accuracy range

Q_N – recommended working flow rate

Q_{MAX} – maximum applicable overload (Q_{125%}; flowmeter can't measure above this point)

Grounding rings

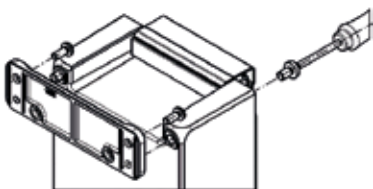
Electromagnetic flow meters measure very low voltages so any electromagnetic noise in measured liquid can lead to wrong readouts. Grounding rings can help you avoid this, particularly in systems with plastic or concrete pipes. The rings go between sensor flange and pipe flange like shown.

**Compact / Remote conversion set**

Remote set is used for conversion of M9xx flow meters from compact to remote version, compact set does the opposite. Sets contain all parts and description how to convert the flow meter from one type to another.

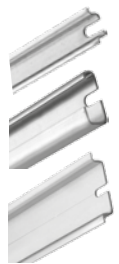
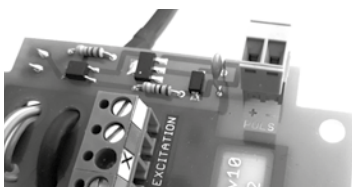
Spare sealing compound

Re-enterable insulating and sealing compound is used for remote version to reach the protection IP67 in converter and IP68 in sensor. One bag is included in every M9xx remote version delivery. Fill both sensor and converter terminal boxes with connected wires for the best results.

M921 wall mounting options

M921's cubic shape allows for easier external surface mounting of remote version flow converters. There are 5 mounting options:

- None (default)
- Mounting brackets (left) - option 921-10
- DIN60715 TH 15 rail (right) - option 921-11
- DIN60715 G 32 rail (right) - option 921-12
- DIN60715 TH 35 rail (right) - option 921-13

**M930 pulse output option**

With large datalogger and battery, the M930 is meant for long measurement periods. If you, however, need to evaluate readouts constantly through GPRS transmitters or other evaluation units, pulse output option is the way to go.

FLOWASSISTANT SOFTWARE



HIGHLIGHTS

- Remote control of M9xx series
- Password protection
- Easy calibration
- Service functions
- Save and recall instrument setting
- Connection via RS232 or RS485
- Windows 2000/XP/Vista/7/8/10

MAIN WINDOW

Data logger - Charts printing

General - nominal diameter, nominal flowrate, serial number, power supply, save/restore settings

Flowmeter

units, resolution, low flow, cut-off, real time clock, temperature alarm

Main - flow rate, volume, batch, min./max. values

Input/Output - current loop 20mA, frequency output, pulse output, status output, digital input

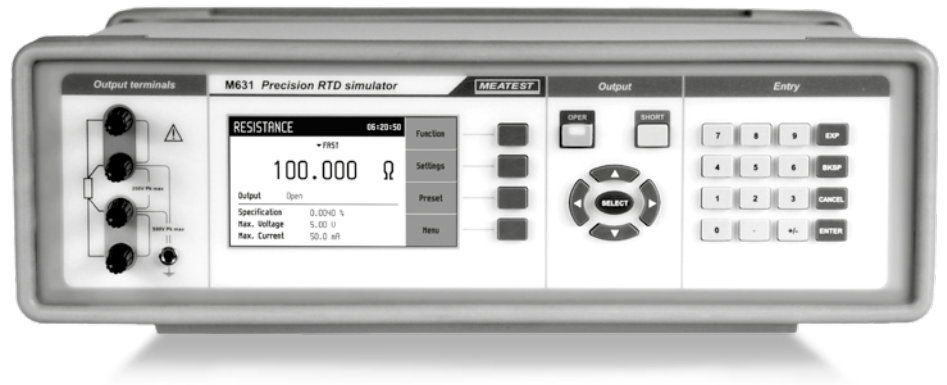
Calibration - 2...4 calibration points, calib. curve, calib. constants

Service - internal voltages, internal temperature, last errors

The screenshot shows the 'Flow920 - demonstration version' software window. It features a menu bar with 'Main', 'Input/Output', 'Flowmeter', 'General', 'Calibration', 'Service', and 'Datalogger'. The 'Flowmeter' menu is active, displaying settings for flow and volume units, resolution, flow direction, low-flow cutoff, and time constant. A separate window shows a line graph of flow data over time. Blue arrows point from the text descriptions on the left to the corresponding fields in the software interface.

M 631

PRECISION RTD SIMULATOR



HIGHLIGHTS

- Real resistors switched by relays
- Custom temperature scales
- No residual resistance
- 0.01°C accuracy
- Six different languages
- GPIB, USB, RS-232 and ethernet interface

DESCRIPTION

M631 is programmable real-resistance decade with parameters designed specifically for RTD sensor's simulation and testing of RTD evaluation units like temperature regulators, transducers, etc. The core function is still resistance so you can as well calibrate ohmmeters and other resistance based meters easily. With its 0.01°C accuracy and 0.001°C resolution the M631 is rather a laboratory reference but thanks to extensive connectivity it can be used in industry as well. Containing some of the most stable (and expensive) foil resistors available, the M631 has temperature coefficient as good as 1 ppm/°C. RTD simulators can be used even for AC applications.

M631 is sophisticated instrument with its own recalibration procedure. The procedure enables to correct any deviation without mechanical adjustment.

MAIN DISPLAY

Temperature

PLATINUM	10:18:59	Function
PT385 (90)	FAST	
100.000 °C		
Output	138.505 Ω	RO 100.000 Ω
Specification	0.015 °C	
Max. Voltage	5.88 V	
Max. Current	42.5 mA	
		Menu

Recalibration

CALIBRATION		Previous
Resistance	1 / 37	
Nominal resistance	1.95 Ω	Next
Requested accuracy	1 mΩ	
Last calibrated	07/02/2012	Save
1.9443810 Ω		
		Close

SPECIFICATION

Pt simulation accuracy

Temp./Resolution	Accuracy Pt100–Pt500	Accuracy Pt501–Pt1000
-200.000–0.000 °C	0.01 °C	0.01 °C
0.001–200.000 °C	0.015 °C	0.02 °C
200.001–500.000 °C	0.03 °C	0.04 °C
500.001–850.000 °C	0.04 °C	0.1 °C

AC/DC difference

R	100 Hz	1 kHz	10 kHz
16 Ω	0.01 %	0.01 %	0.04 %
100 Ω	0.01 %	0.03 %	0.30 %
1 kΩ	0.03 %	0.30 %	3.00 %
10 kΩ	0.30 %	3.00 %	
100 kΩ	3.00 %		

Ni simulation accuracy

Temp./Resolution	Accuracy Ni100–Ni500	Accuracy Ni501–Ni1000
-60.000–0.000 °C	0.01 °C	0.01 °C
0.001–300.000 °C	0.01 °C	0.02 °C

Resistance accuracy

Range/Resolution	Accuracy
10.0000–20.0000 Ω	20 ppm + 2 mΩ
20.001–200.000 Ω	20 ppm + 2 mΩ
200.01–1000.00 Ω	30 ppm
1000.1–3000.0 Ω	50 ppm
3001–10000 Ω	150 ppm
10.01–30.00 kΩ	300 ppm
30.1–100.0 kΩ	1000 ppm
101–400 kΩ	4000 ppm

GENERAL DATA

Maximum voltage:	200 V pk
Maximum current:	500 mA
Maximum input power:	0.25 W
Temperature coefficient:	<1 ppm/°C (16 Ω...2 kΩ) <5 ppm/°C (2 kΩ...10 kΩ) <50 ppm/°C (10 kΩ...400 kΩ)
Reaction time:	6 ms
Switching method:	Fast, Smooth, Via short, Via open
Terminals:	4 mm, gold plated
Reference temperatures:	+20 °C ... +26 °C
Working temperatures:	+5 °C ... +40 °C
Storage temperatures:	-10 °C ... +50 °C
Remote control:	RS232 interface (optionally USB, LAN, IEEE488)
Power supply:	115/230 VAC, 50/60 Hz
Dimensions:	W 390 mm, H 128 mm, D 310 mm
Weight:	5.2 kg
Languages:	English, German, French, Spanish, Russian, Czech

Ordering codes

Bus	M631-V1xxx – RS232 M631-V2xxx – RS232, USB, LAN, GPIB
Housing	M631-Vxx0x – table version M631-Vxx1x – module 19", 3HE

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