EU-type examination certificate

Number **T10970** revision 4
Project number 3835412

Issued by	NMi Certin B.V., designated and notified by the Netherlands to perform tasks with respect to conformity asssessment procedures mentioned in article 17 of Directive 2014/32/EU, after having established that the measuring instrument meets the applicable requirements of Directive 2014/32/EU, to:
Manufacturer	Badger Meter Europa GmbH Nürtinger Straße 76 72639 Neuffen Germany
Measuring instrument	An electromagnetic **water meter** Type : M2000 Further properties are described in the annexes: Description T10970 revision 4; Documentation folder T10970-1.
Valid until	24 November 2026
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Remark	This revision replaces the previous versions, except for its documentation folder.

Issuing Authority **NMi Certin B.V., Notified Body number 0122**
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Certification Board

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PRODUCTS RvA C 681

1 General information on the water meter

All properties of the water meter, whether mentioned or not, shall not be in conflict with the legislation.

1.1 Essential parts

Description	Documents	Remarks
Measurement sensor	10970/0-04; 10970/0-05	The inside of the cylindrical measuring tube is covered with an insulating liner. Through the liner, the 3 electrodes are in contact with the liquid. The flow sensor is equipped with a magnetic circuit containing 2 electromagnetic coils.
Calculator and indicating device	10970/0-06; 10970/0-07; 10970/0-08; 10970/0-09; 10970/0-10; 10970/0-11; 10970/0-12	Signal converter and meter reading. Used to drive the magnetic spools and convert the electrode voltage to a flow rate.

1.2 Essential characteristics

1.2.1 Flow characteristics

Meter size	Ø in- and outlet [mm]	Flow rates [m³/h]				Ratio Q3/Q1
		Minimum Q1	Transitional Q2	Permanent Q3	Overload Q4	
DN50	50	0,252	0,4032	63	78,75	250
DN65	65	0,4	0,64	100	125	250
DN80	80	0,64	1,024	160	200	250
DN100	100	1	1,6	250	312,5	250
DN125	125	1,6	2,56	400	500	250
DN150	150	2,52	4,032	630	787,5	250
DN200	200	4	6,4	1000	1250	250
DN250	250	6,4	10,24	1600	2000	250
DN300	300	10	16	2500	3125	250
DN350	350	10	16	2500	3125	250
DN400	400	16	25.6	4000	5000	250
DN450	450	25.2	40.32	6300	7875	250
DN500	500	25.2	40.32	6300	7875	250
DN600	600	25.2	40.32	6300	7875	250

Meter size	Ø in- and outlet [mm]	Flow rates [m³/h]				Ratio Q3/Q1
		Minimum Q1	Transitional Q2	Permanent Q3	Overload Q4	
DN800	800	40	64	10000	12500	250

Please note that the flow rates Q1, Q2, Q3 and Q4 can be freely chosen as long as:
- Values mentioned for Q1 and Q2 are minimum values and the ratio Q2/Q1 = 1,6;
- Values mentioned for Q3 and Q4 are maximum values and the ratio Q4/Q3 = 1,25;
- The ratio Q3/Q1 is at least 40.

1.2.2 Water temperature class
- T50 (+0,1 °C / +50 °C)

1.2.3 Maximum admissible pressure (MAP)
- 1,6 MPa (16 bar)

1.2.4 Orientation limitation
The sensor can be used in horizontal, vertical or diagonal position (all positions).

1.2.5 Flow profile sensitivity class
- U0 and D0 (0 x DN upstream and 0 x DN downstream)

1.2.6 Reverse flow
The sensor is also designed to measure reverse flow.

1.2.7 Pressure loss class
- Δp 10 (0,10 bar)

1.2.8 Temperature range ambient
- -25 °C / +55 °C

1.2.9 Environmental classification
- M1 / E2 / O (installed outdoors)

1.2.10 Power supply
The water meter has two different power supply versions:
- AC version: 85 – 265 VAC (45 – 65 Hz)
- DC version: 9 – 36 VDC (grounding mandatory)

1.2.11 Measuring principle
The magnetic field, generated through the 2 magnetic coils, induces a voltage across the flowing (conductive) liquid (Faraday's law for conductors moving through a magnetic field).
This induced voltage is measured with the 2 electrodes and is directly proportional to the flow speed. By taking into account the pipe dimensions the flow rate can be calculated, displayed and outputted. By integrating over time the total measured volume can be calculated and displayed.
A third electrode is used for empty pipe detection.

1.2.12 Operation and presentation of legal data
The meter is equipped with an electronic LCD display and can be operated using the three push buttons. See documentation number for operation 10970/0-01.

The measured volume is presented by means of an electronic display. On the display the volume amount in whole cubic meters before the decimal point are shown on the first line with 7 digits.

On the second line 4 decimals of the cubic meters (after the comma) are given together with the name of the totalizer and unit (cubic meter). The totalizer name and unit alternate.

The display register is built up as followed:

Meter size	Indicating range (minimum value) [m³]	Verification scale interval (maximum value) [m³]	Totalizer Resolution setting	Dial type setting
DN50	99 999	0,0001	0,0001	6 dial
DN65 till DN150	999 999	0,001	0,001	7 dial
DN200 till DN600	9 999 999	0,01	0,01	8 dial
DN800	99 999 999	0,1	0,1	9 dial

1.2.13 Accountable alarms
If malfunctions are detected a visible alarm indication will be displayed until the alarm is acknowledged. During the accountable alarms the registration of the volume in the totalizers is stopped. See documentation number 10970/0-01.

1.2.14 Software specification (refer to WELMEC 7.2):

- Software type P;
- Risk Class C;
- Extensions L, T, S and D are not applicable.

Version	Checksum per language						
	English / German	English / Czech	English / Spanish	English / French	English / Russian	English / Swedish	English / Turkish
v1.15	DBDE	A020	7909	B8D6	A351	F370	477E
v1.18	6B41	6231	424E	83F6	74A1	DC9F	30AB
V1.19	92F2	D414	E27D	7501	225C	0156	B8AA
V1.20	FAD0	418C	9833	7EA8	5DB6	C8DC	A0C5
V1.21	5436	A588	064A	EEF2	D7B1	0B1F	BFDF
V1.22	9CDF	F1B5	5640	3F93	2B65	4B8A	F2DE
V1.23	4D0A	A1E9	676	EFC6	DB91	FBC2	A30F
V1.24	2D7C	9742	C814	A2A7	6355	E816	5CB2

The software version and checksum can be shown by pressing by pressing the two buttons ▲(+) and ▼(-) at the same time or can be checked with user interface going to menu: 'Main Menu' → 'Version/Help' → 'Version Info'.

The validity of the program and the parameters are continuously checked. If these checks fail, an alarm is generated.

1.3 Essential shapes

1.3.1 Markings

See documentation number 10970/0-02 for an example. The following inscriptions shall be clearly marked on the water meter:

- CE marking including the supplementary metrological marking (M + last two digits of the year of its affixing);
- Notified Body identification number, following the supplementary metrological marking;
- This EU-type examination certificate number T10970;
- Manufacturers name, registered trade name or trade mark;
- Manufacturers postal address;
- Type;
- Year of manufacture and a serial number;
- The permanent flow rate Q3;
- The ratio between Q3 and Q1. This may be indicated as R followed by the ratio;
- The maximum working pressure, indicated as MAP followed by the max. pressure;
- Maximum water temperature, indicated as T50;
- Environmental classification;
- Electromagnetic environmental classification;

1.3.2 Further inscriptions

- An arrow indication for the positive direction of the water flow is placed on the measurement sensor.

1.3.3 EMI protection measures

- Grounding of the measurement sensor;
- Shielded display with the calculator and indicating device;
- Shielded cables of the I/O cables.

1.4 Conditional parts

1.4.1 Housing

The housing of the calculator and indicating device is made of metal. See documentation numbers 10970/0-05 and 10970/0-06.

1.5 Conditional characteristics

1.5.1 Programming

When the meter is set to manufacturing lock by installing a specially programmed “locking” token into the available token receptacle, no parameters or settings can be changed. The water meter should be powered on with the “locking” token inserted. The manufacturing lock is now enabled and the “locking” token shall be removed. Thereafter the housing of the meter can be sealed for preventing access to the token receptacle.

1.6 Conditional shapes

1.6.1 Cylindrical pipe

The cylindrical pipe is constructed so that the combination of material and wall thickness is such that the influence due to changing liquid pressure is negligible.

1.7 Non essential characteristics

- Digital input and outputs.

2 Seals

The following seals are applied:
- The markings are fixed to the water meter and secured against removal by seal or it will be destroyed when removed.
- The housing of the calculator and indicating device is sealed against opening after the meter is set to manufacturing lock by installing the “locking” token into the available token receptacle.

See documentation number 10970/0-03 for examples of the seals.

3 Conditions for conformity assessment

- At the initial verification the performance of the water meter has to be determined at least at Q1, Q2 and Q3.
- Bi-directional flow measurement
  During conformity assessment it is sufficient to verify a bi-directional meter only in one direction.
- The meter shall be set in manufacturing lock. When this mode is ON in menu at each legally relevant parameter the description LOCKED can be seen on the lowest row of the display.
- The settings of the meter shall be set for the correct purpose of use (see documentation number 10970/0-01), with special attention to the following settings:
  - At section “Meter setup” and “Measurement” the settings shall be in accordance with calibration data.
  - At section “Measurement” the setting “Totalizer Unit” shall be set to cubic meter M^3.
  - The “dial type” and “resolution” must be set according to the table in paragraph 1.2.12.