

Issued by NMI Certin B.V.

In accordance with

- WELMEC 8.8 "General and Administrative Aspects of the Voluntary System of Modular Evaluation of Measuring instruments under the MID".
- OIML R117-1 Edition 2007 (E) "Dynamic measuring systems for liquids other than water".
- OIML R81 edition 1998 (E) "Dynamic measuring devices and systems for Cryogenic liquids"

Producer

Emerson Process Management Flow BV
 Neonstraat 1
 6718 WX Ede
 The Netherlands

Measuring instrument A **measurement sensor** (Coriolis sensor), intended to be used as a part of a measuring instrument.

Producer's mark or name : Micro Motion Inc.

Type designation : LNGM10S
 with optional LNGS06S (for vapour return line)

Accuracy class : 1.0; 1.5; 2.5
 See § 1.2.1 of the description.

Destined for the measurement of : Liquefied natural gas (LNG);
 cryogenic liquids;
 Liquefied Propane, Liquefied Butane and mixtures thereof (LPG);
 Liquefied Carbon dioxide and Liquefied gases under pressure measured at temperature below -10 °C.
 See details in § 1.2 of the description.

Further properties and test results are described in the annexes:
 – Description TC11128 revision 1;
 – Documentation folder TC11128-1.

Remark

The measurement sensor is approved for measuring mass.
 This revision replaces the previous version, except for its documentation folder.

Issuing Authority

NMI Certin B.V.
 2 April 2019


 C. Oosterman
 Head Certification Board

1 General information about the measurement sensor

Properties of this measurement sensor, whether mentioned or not, shall not conflict with the legislation.

This Evaluation Certificate is the positive result of the applied voluntary, modular approach, for a component of a measuring instrument, as described in WELMEC 8.8.

The complete measuring system must be covered by an EU-type examination certificate.

This Evaluation Certificate is valid for the Micro Motion Inc. sensor as described in paragraph 0 of the description and may only be combined with remote dual core processor 820 and remote enhanced core processor 800 as described in Evaluation Certificate TC7057.

Optional LNGS06S sensor can be used for the measurement of the boil-off gas (BOG) in the vapour return line (as correction device) for LNG. The construction of the LNGS06S is laid down in Evaluation Certificate TC7050 with type designation F025 and size DN6. The LNGS06S sensor can be used as correction device.

1.1 Essential parts

The measurement sensor LNGM10S is composed of the following parts:

Description	Documentation	Remarks
Sensor construction LNGM10S	11128/0-01	The measurement sensor consists of a housing in which two parallel measuring tubes are mounted. On the measurement tubes, three coils are mounted: one drive-coil and two pick-off coils. A 9 wire shielded cable is used to connect the sensor to the measurement transmitter

1.2 Essential characteristics

1.2.1 Accuracy class and flow characteristics

The following accuracy classes and flow characteristics are applicable for the LNGM10 measurement sensor per application:

Application	Accuracy class	Minimum Measured Quantity [kg]	Q _{min} [kg/min]	Q _{max} [kg/min]
Cryogenic Liquids ¹	2.5	2	4,2	300
	1.5		8,4	
	1.0		10,5	
Liquefied Natural Gas (LNG); Liquefied Carbon dioxide; Liquefied gases under pressure measured at temperature below -10 °C.	1.5	2	8,4	300
	1.0		10,5	
Liquefied Propane, liquefied Butane or mixtures thereof (LPG).	1.0	2	10,5	300

¹ Liquid temperatures lower than -153 °C.

1.2.2 Product range

The following liquid products with densities between 400 and 1100 kg/m³:

- Liquefied Propane, liquefied Butane or mixtures thereof (LPG);
- Liquefied Natural Gas (LNG);
- Cryogenic liquids;
- Liquefied Carbon dioxide;
- Liquefied gases under pressure measured at temperature below -10 °C.

1.2.3 Maximum operating pressure

- 20 bar(g)

1.2.4 Temperature range liquid

- -200 °C / +55 °C

1.2.5 Temperature range ambient

- -40 °C / +55 °C

1.2.6 Environment classes

- M3 / E2
- M3 / E3 (interruptible measuring systems only)

1.2.7 Flow direction

The sensors can be used to measure flow in forward and/or reverse direction. The forward flow direction must be indicated on the meter housing. See also the conditions as stated in chapter 3.

1.2.8 Measuring principle

The drive coil, controlled by an external device, sets the measurement tubes in a vibrating motion. The pick-off coils generate signals representative for the frequency of motion of the measurement tubes. The resonant frequency depends, among other things, on the density of the liquid in the measurement tubes. The time difference between the signals from both pick-off coils depends on the mass flow of the liquid through the measurement tubes. Processing of the measurement signals is performed by the transmitter that controls the drive coil.

1.2.9 Temperature correction

In the measurement transmitter connected to the measurement sensor, a temperature correction is applied depending on the sensor type.

Temperature correction for the sensor behaviour due to process temperature variations takes automatically place by default, based on the integral temperature sensor and the configured temperature coefficients in the electronics.

- The temperature dependency on mass flow is called mass Flow Temperature coefficient FT (in % per 100 °C).
- The temperature dependency on density is called mass Density Temperature coefficient DT (in % per 100 °C).

1.2.10 In- and outputs

A 9 Wire cable is used to connect the measurement sensor to the measurement transmitter. This cable provide connection for the following signals:

- Drive signal;
- Pick up signals;
- Temperature signals;

A separate grounding connection is present on the sensor body.

1.3 Essential shapes

1.3.1 Inscriptions

On the measurement sensor LNGM10S and on the optional correction device LNGS06S, clearly visible, at least the following is inscribed:

- The Evaluation Certificate number TC11128;
- Name or trade mark of the manufacturer;
- Type designation;
- Serial number and year of manufacture.

1.3.2 EMI protection measures

The following measures are taken for EMI protection:

- The cables connected to the measurement sensor are shielded.

1.4 Conditional parts

1.4.1 Power supply

See Evaluation certificate TC7057 for the applicable remote dual core processor 820 and remote enhanced core processor 800.

1.4.2 Housing

The housing of the sensor is made of stainless steel.

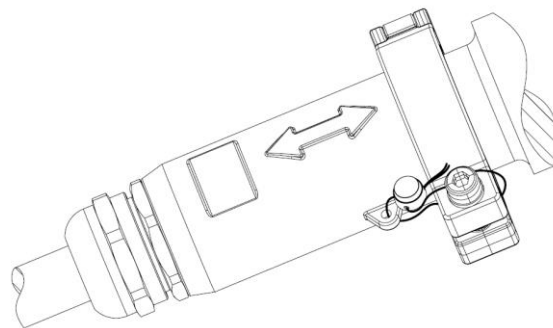
1.4.3 Cable interface

The cable interface is made with a possibility to seal against removal. See documentation no. 11128/0-02.

2 Seals

The following seals are applied:

- The inscriptions are fixed to the measurement sensor and secured against removal by seal or it will be destroyed when removed.
- The cable connections are sealed at both sides. Also the base unit is sealed. See below an example of the sealing of the cable connection:



3 Conditions for conformity assessment

- Other parties may use this Evaluation Certificate only with the written permission of the producer.
- Verification procedure
For the initial verification, the NMI procedure C-SP-HW-280 can be applied. The title of the procedure is "Procedure C-SP-HW-280 for the MID conformity assessment for the Micro Motion Flow meter when used for custody transfer in gas applications (annex MI-002) and liquid applications (annex MI-005)".

The initial verification can be based on:

- a water calibration, which includes:
 - a zero mass flow setting at water calibration facility;
 - mass flow tests.
- In the field
 - a zero mass flow setting, if needed;
 - a zero mass flow verification.

Note: a zero mass flow verification and if applicable a density verification, can be used for subsequent verifications.

If the measurement sensor is used bi-directional, the verification in one direction is sufficient.

This procedure is justified because of the fact that tests have proven that the mass accuracy on water is representative for mass accuracy on other liquids.

4 Reports

An overview of performed tests is given in the reports:

- No. NMI-1901208-01;
- No. NMI-1901208-03;
- No. NMI-2272493-01;
- CPC-2272493-BD-01.

A report can be a test report, an evaluation report, a type evaluation report and/or a pattern evaluation report.