Evaluation Certificate

Number **TC8064** revision 2
Project number: SO16202103

Issued by	NMi Certin B.V.
In accordance with	– WELMEC guide 8.8 "General and Administrative Aspects of the Voluntary System of Modular Evaluation of Measuring instruments under the MID". – OIML R81:1998 "Dynamic measuring devices and systems for cryogenic liquids" – OIML R117-1:2007 "Dynamic measuring systems for liquids other than water".
Producer	Emerson Process Management Flow B.V. 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.

Manufacturer	:	Micro Motion
Type	:	F100 and ETO19712
Minimum – maximum flow rate	:	see § 1.2 of the description
Maximum pressure	:	see § 1.2 of the description
Minimum measured quantity	:	see § 1.2 of the description
Accuracy class	:	1,5 / 2,5
Environment classes	:	M3 / E3
Temperature range liquid	:	-200 °C / +50 °C
Temperature range ambient	:	- 40 °C / +55 °C
intended for the measurement of	:	Cryogenic liquids and LNG with densities between 350 and 1500 kg/m^3

Further properties and test results are described in the annexes:
– Description TC8064 revision 2;
– Documentation folder TC8064-1.

Remarks

- An overview of performed tests in given in the Appendix to TC8064;
- The measurement sensor is approved for measuring mass;
- This revision replaces the previous versions, except for its documentation folder.

Issuing Authority

NMi Certin B.V.
29 June 2016

C. Oosterman
Head Certification Board

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1 General information on the measurement sensor

All properties of the measurement sensor, whether mentioned or not, shall not be in 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 guide 8.8.

The complete measuring instrument must be covered by an EC type-examination certificate or an EU-type examination certificate.

1.1 Essential Parts

- Measurement sensor, see the accompanying Documentation folder.
  Essentially, 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.
  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 same external device that controls the drive coil.
- In- and outputs
  The measurement sensor is equipped with several in- and outputs:
  - Drive current input, for setting the measurement tubes in a vibrating motion;
  - Two Pick-off outputs, generating sinusoidal millivolt signals
  - One three-wire PT100 output, for the measurement of the measurement tube temperature.

1.2 Essential Characteristics

1.2.1 Flow Characteristics
Beside the characteristics stated on page 1 of this TC8064, the sensor has the following characteristics:

	F100 and ETO19712 y)
Maximum Q_{max} [kg/min]	450
Minimum Q_{min} [kg/min]	7 (Class 1,5) 3,5 (Class 2,5)
Maximum pressure [bar(g)]	100 **(1)** 148 **(2)**
Minimum Measured Quantity sensor [kg]	10
Diameter in- and outlet [mm]	25 (nominal) 40 (optional)*

* The flange reduces the outer diameter from 40 mm to an inner diameter of 25 mm.

Notes:
y) indicates the type of material the meter is build of:
(1): y) = S or A;
(2): y) = H or B;

Further characteristics:
- The F100 sensor can be used bi-directional.
- The F100 sensor can only be used in combination with the electronic flow transmitters mentioned in, and constructed according to Evaluation Certificates TC7057 and TC8519.

1.3 Essential Shapes

1.3.1 Inscriptions.
On the measurement sensor, clearly visible, at least the following is inscribed:
- This Evaluation Certificate number: **TC8064**.
- The sensor designation (type)
- Serial number.

1.3.2 Seals.
If present, the junction box with the 9-wire connection to the (remote) Core Processor is sealed against opening. This accounts for configurations 2 and 3 as mentioned in TC7057 and for configurations 2 and 4 as mentioned in TC8519.

2 Conditions for Conformity Assessment

- If the measurement sensor is used bi-directional, the verification in one direction is sufficient.
- The use of this Evaluation Certificate is limited to:
  Other parties may use this Evaluation Certificate only with the written permission of Emerson Process Management Flow B.V., Neonstraat 1, 6718 WX Ede, the Netherlands.

3 Test Reports

See the Appendix to this Evaluation Certificate.

Appendix

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Performed tests on behalf of this Evaluation Certificate:

TEST	PART	TYPE	TEST REPORT	TEST HOUSE	REMARKS
Accuracy, minimum measured quantity and vibration on water and gasoline	F100 with MVD transmitter	F100	CPC- 607073-02	NMi Certin B.V.	According OIML R117-1
Accuracy on liquid Nitrogen	F100 and ETO19712	F100	NMi-11200823-01	NIST(W), Boulder, USA	According OIML R81
Accuracy on water	F100 and ETO19712	F100	NMi-11200823-02	Emerson(W), Boulder, USA	According OIML R117-1
Comparison of test results	F100 and ETO19712	F100	NMi-11200823-03	NMi Certin B.V.	-
Climate tests	CNG050(★)	CNG050	NMi-11200345-2	NMi Certin B.V.	According OIML R81 and R117-1

(W) The tests were witnessed by NMi Certin B.V.
(★) The CNG050 measurement sensor has the same construction as the F100.