OIML Certificate

OIML Member State
The Netherlands

Number R137/2012-A-NL1-21.02
Project number 2393688

Issuing authority Person responsible:	NMi Certin B.V. M.Ph.D. Schmidt
Applicant and Manufacturer	Sensia 1000 McClaren Woods Drive Coraopolis PA15108 United States of America
Identification of the certified type	An **Ultrasonic gas meter** Brand: Caldon Type: LEFM 38xCi[1] ; LEFM / SVM 389Ci[1] LEFM 34xCi[2]
Characteristics	See page 2 and further

This OIML Certificate is issued under scheme A

This Certificate attests the conformity of the above identified type (represented by the sample(s) identified in the OIML Type Evaluation Report) with the requirements of the following Recommendation of the International Organization of Legal Metrology (OIML):

R 137-1 (2012) "Gas meters"

Accuracy class 0.5[1]; 1.0[2]

This Certificate relates only to the metrological and technical characteristics of the type of measuring instrument covered by the relevant OIML International Recommendation identified above. This Certificate does not bestow any form of legal international approval.

This certificate and supporting reports comply with the requirements of OIML-CS-PD-07 clause 6.2.

Important note: Apart from the mention of the Certificate's reference number and the name of the OIML Member State in which the Certificate was issued, partial quotation of the Certificate and of the associated OIML Type Evaluation Report(s) is not permitted, although either may be reproduced in full.

---

[1] LEFM 38xCi and LEFM / SVM 389Ci meters approved for accuracy class 0.5.
[2] LEFM 34xCi meter approved for accuracy class 1.0.

Issuing Authority **NMi Certin B.V., OIML Issuing Authority NL1**
5 October 2021

Certification Board

NMi Certin B.V.
Thijsseweg 11
2629 JA Delft
The Netherlands
T +31 88 636 2332
certin@nmi.nl
www.nmi.nl

OIML Member State
The Netherlands

Number R137/2012-A-NL1-21.02
Project number 2393688

The conformity was established by the results of tests and examinations provided in the associated reports:

Report number	Issue date	Number of pages
NMi-12200428-01	15 January 2014	40
NMi-12200428-02	16 January 2016	8
NMi-14200132-01	30 September 2015	30
NMi-1902506-01	29 April 2019	18
NMi-2393688-02	5 October 2021	19
NMi-2393688-04	5 October 2021	31

Characteristics of the measurement transducer
In Table 1 the general characteristics of the measuring instrument are presented.

Table 1 General characteristics

Destined for the measurement of	Gas volume of natural gas
Environmental classes	M2 / E2
Designed for	Condensing humidity
Accuracy class	0.5
Measurement sensor design	Full bore sensor and Reduced bore sensor
Transducers	0,2 MHz
Path angle	75°
Bi-directional measurement	Yes, if calibrated in both directions.
Operating pressure range	8 – 200 bar(a)
Ambient temperature range	-40 – +70 °C ; condensing humidity
Product temperature range	-40 – +70 °C
Power supply voltage	24V DC ± 6V
Approved Electronics	G2 and G3 electronics

Table 2 Path configurations

Meter type	Path configuration
LEFM 340Ci	Four acoustic paths in one plane.
LEFM 341Ci/342Ci/343Ci	Four acoustic paths in one plane. With additional check or diagnostic path(s), horizontal and/or vertical
LEFM 344Ci	2 four-path meters in series in one body, each with four paths in one vertical plane and each having its own electronics head. Used either as two separate meters or used as a pay and check meter.

Meter type	Path configuration
LEFM 380Ci	Eight-path meter with 4+4 paths in an X-shape configuration (plane A and B). One long-path and/or one short-path may fail, and the meter still meets the requirements.
LEFM 388Ci	2 eight-path meters in series in one body, each with eight paths in a 4+4 X-shape configuration and each having its own electronics head. Used either as two separate meters or used as a pay and check meter.
LEFM / SVM 389Ci	Eight-path meter with 8 paths in an X-shape configuration (four paths in each of the two vertical planes A and B) and with additional eight verification paths in the following configuration: - 1 vertical path for the detection of two-phase flow or contamination. - 2 additional horizontal paths on the diameter in the vertical A and B plane. - 5 additional paths in a single plane (plane C) with a different path angle relative to the A and B plane. Each of the paths is at the same chordal height as the paths in the A and B planes.

Table 3 Inlet and outlet piping

Meter type	Path configuration
LEFM 34xCi	Mild flow disturbances: 10D – USM – 3D Severe flow disturbance: 5D – FC – 10D – USM – 3D
LEFM 38xCi	Mild flow disturbances: 5D – USM – 3D (excluding expanders) Mild flow disturbances: 10D – USM – 3D (including expanders) Severe flow disturbance: 15D – USM – 3D Severe flow disturbance: 5D – FC – 10D - USM – 3D

Notes:
- The mentioned pipe length are minimum required lengths.
- The flow conditioner must be constructed as given in ISO 5167-1:2013, chapter C.3.2.2. “Nova’s design of K-Lab Perforated Plate Conditioner”.

Table 4 General characteristics of the family of instruments

Diameter size			Minimum v_{min} [m/s]	Minimum v_t [m/s]	Maximum v_{max} [m/s]
Inch	DN	Typical ranges [mm]			
4[3]	100	80 ~ 110	0,30	3,05	36,6
6	150	124 ~ 163			
8	200	173 ~ 214			
10	250	215 ~ 267			
12	300	257 ~ 316		1,5	

[3] Only applicable for the LEFM 38xCi meter and not for the LEFM 34xCi.

OIML Member State
The Netherlands

Number R137/2012-A-NL1-21.02
Project number 2393688

Diameter size			Minimum v_{min} [m/s]	Minimum v_t [m/s]	Maximum v_{max} [m/s]
Inch	DN	Typical ranges [mm]			
14	350	284 ~ 348			
16	400	325 ~ 398			
18	450	366 ~ 449			
20	500	408 ~ 499	0,30	1,5	36,6
22	550	450 ~ 550			
24	600	490 ~ 599			
26	650	635 ~ 645			
28	700	679 ~ 696			
30	750	730 ~750			
32	800	777 ~ 797			
34	850	801 ~ 851			
36	900	851 ~ 901			
38	950	902 ~ 949			
40	1000	953 ~ 1000			
42	1050	1004 ~ 1045			

The corresponding flow rates can be calculated as follows:

$$Q = v \cdot \frac{1}{4} \cdot \pi \cdot D^2 \cdot 3600 = 900 \cdot \pi \cdot D^2 \cdot v$$

Where:
Q = flow rate [m³/h]
v = velocity [m/s]
D = diameter [m]

Table 5 Software versions

Software version	Checksum	Software version	Checksum	Software version	Checksum
G2 electronics					
101A960 03.01.02	FCEE	101A960 03.01.03	185E	101A960 04.01.01	13F8
G3 electronics					
SW000062 01.01.01	E4781D8F	SW000082 01.01.05	C92E28DF	SW000082 01.01.10	AB14ADF4
SW000070 01.02.01	E2E72794	SW000082 01.01.06	881927E2	SW000082 01.01.11	21AB2489
SW000082 01.01.03	48CDDFA8	SW000082 01.01.07	2CF3D2F1	SW000082 01.01.12	674D72F2

OIML Member State
The Netherlands

Number R137/2012-A-NL1-21.02
Project number 2393688

SW000082 01.01.04	106F0E18	SW000082 01.01.08	669F8ED9	SW000128-SVM 01.01.01	EC02626B

The software version can be read-out on the display (immediately after power on) or can be read out digitally via Modbus communication.

Replacement of transducers and electronics

The ultrasonic transducers and the electronics can be replaced with units of the same type and the meter still meets the requirements without the need for recalibration. After exchange of a part of the system, a diagnostic check shall be carried out. After exchange of an electronic board all parameters of the old electronics board need to be transferred to the replacement CPU board.