Evaluation Certificate

Number **TC12470** revision 2
Project number 3901026

Issued by: NMi Certin B.V.

In accordance with:
- WELMEC 8.8, 2017 "Guide on the General and Administrative Aspects of the Voluntary System of Modular Evaluation of Measuring instruments";
- OIML R140 Edition 2007 (E) "Measuring systems for gaseous fuel".

Producer:
Mems AG
Bruggerstrasse 30
5413 Birmenstorf
Switzerland

Part: A model of a **calorific value determination device (CVDD)**, intended to be used as a part of a measuring system for gaseous fuel.

Type	:	gasQS flonic
Producer's mark or name	:	gasQS mems®
Destined for the measurement of	:	calorific value of natural gases
Accuracy class	:	B
Ambient temperature range	:	-10 °C / +40 °C
Destined for	:	non-condensing humidity
Environment classes	:	M1 / E2

The intended location for the instrument is closed.

Further properties and test results are described in the annexes:
– Description TC12470 revision 2;
– Documentation folder TC12470-1.

Initially issued: 2 February 2024

Remark: This revision replaces the earlier version(s), except for its documentation folder.

Issuing Authority: **NMi Certin B.V., Notified Body number 0122**
10 December 2024

Certification Board

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PRODUCTS RvA C 681

1 General information of the CVDD

All properties of the instrument, 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 8.8.

The complete measuring instrument must be covered by relevant metrological certification that is valid in the country where the instrument is put into use.

1.1 Essential parts

Part	Document	Remarks
Pressure sensor	12470/0-02	-
TITAN sensor	12470/0-03	-
Main PCB - 20171005FK04	12470/0-08	-
GDPA adapter - 20170705FK03	12470/0-09	-

The construction of the CVDD is presented in drawing no. 12470/0-01.

EMI protection measures:
- A ferrite bead on the cable between the AC power supply and the gasQS flonic;
- The AC power supply is enclosed inside a metal casing;
- The device is connected to protective earth.

The assembly with EMI protection measures of the power supply is presented in document no. 12470/0-07.

1.2 Essential characteristics

1.2.1 Working range
Natural gas, with a heating value from 30,2 to 47,2 MJ/m^3, with the following ranges for the different components:

Component	Range NG-H [mol%]	Range NG-L [mol%]
Methane	50 – 100	50 – 100
Ethane	0 – 15	0 – 15
Propane	0 – 13	0 – 13
Butane	0 – 5	0 – 5
Larger hydrocarbons	0 – 2	0 – 2
Nitrogen	0 – 30	0 – 30
Oxygen	0 – 5	0 – 5
Carbon dioxide	0 – 25	0 – 25
Hydrogen	0 – 23	0 – 5

1.2.2 Calculations
The calculation of the heating value and density at base conditions is performed according to ISO 6976:2016. The calculation of compressibility is performed according to ISO 12213-2:2006.

1.2.3 Gas temperature range
The temperature range at the device is: -10 °C ≤ t ≤ +40 °C.

1.2.4 Calibration
The CVDD can be calibrated manually at an interval of maximum 1 year with a calibration gas. The calibration procedure is described in manual no. 12470/0-10.

1.2.5 Accountable alarms
Accountable alarms will be generated if extreme values are measured by the CVDD or if otherwise a defect arises. See document 12470/0-06 for a list of all alarms.

Depending on the alarm the results will be either presented with an alarm code or will not be processed at all.

1.2.5. Software specification (refer to WELMEC 7.2):
- Software type P;
- Risk Class C;
- Extension T, while extensions O, L, D and S are not applicable.

Software version	Checksum	Remarks
01.03.02	0x97946AE3	The software version number, checksum and the latest result of the check whether the calculated checksum matches the nominal value can be read over the modbus interface.
01.03.04	0xE1EE107D	
01.03.10	0x4B2D6F09	

1.3 Essential shapes

1.3.1 The name plate on the CVDD contains at least, clearly legible, the following:
- Name of the producer
- Type designation
- Evaluation Certificate number TC12470
- Year of manufacture
- Serial number
- Ambient temperature range

An example of the markings is shown in documentation no. 12470/0-04.

1.3.2 Sealing: see chapter 2.

1.4 Conditional parts

1.4.1 Housing
The housing of the CVDD has sufficient tensile strength. See document 12470/0-01 for an example of the housing.

1.4.2 Power supply
The device is powered by an R. STAHL, type 9143/10-156-160-20s AC power supply.

1.4.3 Calibration gas
The applied calibration gas used for recalibration must be traceable to (inter-)national standards and shall have an appropriate uncertainty. When methane is used as the calibration gas, it shall have a purity of at least 99,995%.
The temperature of the calibration gas must be kept above the minimum storage temperature as mentioned in the Certificate.

1.4.4 Serial communication
The CVDD is equipped with a port for serial communication. Use of the serial communication may not influence the working of the CVDD. In the normal situation the CVDD is connected with an EVCD which can display the measured and calculated values of the CVDD in addition to the software identification and details about any alarms. The essential parameters needed for the legal working of the CVDD cannot be changed via the serial communication.

1.5 Conditional characteristics

1.5.1 Programming
The parameters which are essential for the legal functioning of the CVDD can be changed only while using a correct password.

2 Seals

The following items are sealed:
- the housing against opening;
- the nameplate with the markings.

See drawing no. 12470/0-05 for an example of the sealing.

The contents of the audit trail can be read over the serial communication interface.

3 Conditions for conformity assessment

Other parties may use this Evaluation Certificate only with the written permission of the owner of this Evaluation certificate.

4 Reports

An overview of the performed tests is given in Evaluation Report ER12470 revision 2 issued together with this Evaluation Certificate.