



# OIML Certificate

**OIML Member State**  
The Netherlands

Number R 117/2019-A-NL1-23.07 revision 1  
Project number 3793476  
Page 1 of 7

Issuing authority NMI Certin B.V.  
Person responsible: M.Ph.D. Schmidt

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Identification of the certified type An **electronic calculating and indicating device** intended to be used as a part of a dynamic measuring system for liquids other than water.  
Manufacturers mark: GUIDANT  
Type: Sigma<sup>3</sup>

Characteristics See following pages

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 117-1: 2019** "Dynamic measuring systems for liquids other than water"

Accuracy class 0,3

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.

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Issuing Authority **NMI Certin B.V., OIML Issuing Authority NL1**  
5 April 2024

## Certification Board

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**OIML Member State**  
The Netherlands

# OIML Certificate

Number R 117/2019-A-NL1-23.07 revision 1  
Project number 3793476  
Page 2 of 7

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

- No. NMI-2546746-01 dated 30 November 2023 that includes 127 pages.

## Characteristics of the electronic calculating and indicating device

In Table 1 the general characteristics of the electronic calculating and indicating device are presented. The construction of the electronic calculating and indicating device is recorded in the Documentation folder no. TC12658-1.

Sigma<sup>3</sup> is a panel mounted or rack mounted flow computer designed for fiscal measurement, custody transfer and batch loading of petroleum products in liquid phases. Sigma<sup>3</sup> can be configured in single or multi stream operation with dual pulse input.

It consists of 8 channels of pure HART and 8 channels of analog I/O with HART.

16 channels for digital input are also available.

Sigma<sup>3</sup> is equipped with a 7" touch screen for easy setup and control. Serial and Ethernet communication ports and runs in a Linux environment on ARM architecture.

The Sigma<sup>3</sup> is always combined with the human interface software type HMI-207CE by the same manufacturer that can be used on a remote computer and is intended for reading measurements, stored measurement data and for setting of parameters for the flow computer. This can act as an additional indicating device of the flow computer.

**Table 1 General characteristics**

|                                                                 |                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Approved for application                                        | Measuring systems on pipelines and loading of ships                                                                                                                                                                                                                                                                     |
| Measuring system type                                           | Non-interruptible measuring system                                                                                                                                                                                                                                                                                      |
| Approved for measuring                                          | <ul style="list-style-type: none"><li>- Volume at flowing conditions</li><li>- Volume at standard condition (0 kPa, 15 °C)</li><li>- Mass</li></ul>                                                                                                                                                                     |
| Environmental classes                                           | M3 / E2 / H1; Temperature controlled enclosed location                                                                                                                                                                                                                                                                  |
| Ambient temperature range                                       | +5 – +55 °C; non-condensing humidity                                                                                                                                                                                                                                                                                    |
| Power supply voltage                                            | Redundant 2x 110 – 230 V AC; 50/60 Hz                                                                                                                                                                                                                                                                                   |
| Software identification for Sigma <sup>3</sup> <sup>[1]</sup>   | Software version: V.20.03 MID<br>Checksum: f8de26547c406794d8104b5c1131e4a9<br>Software version: V.20.05 MID<br>Checksum: 07dab74cf2aeb53f6f17031fc7b3a97e                                                                                                                                                              |
| Software identification for HMI client HMI-207CE <sup>[2]</sup> | Software version: 2.0.1<br>Checksum: 6c102ed4584efa73e379b163d48e7acf                                                                                                                                                                                                                                                   |
| Approved inputs                                                 | <ul style="list-style-type: none"><li>- Volume / mass pulse input</li><li>- 4...20 mA signal for temperature, pressure and density;</li><li>- RJ45 Modbus TCP connection</li><li>- HART</li><li>- HART superimposed on 4...20 mA signal</li><li>- Modbus RS485</li><li>- Time period signal for density input</li></ul> |



**OIML Member State**  
The Netherlands

# OIML Certificate

Number R 117/2019-A-NL1-23.07 revision 1  
Project number 3793476  
Page 3 of 7

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Approved outputs            | <ul style="list-style-type: none"><li>- LCD display</li><li>- RJ45 Modbus TCP connection</li><li>- Modbus RS485</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| EMC Measures                | <ul style="list-style-type: none"><li>- All cables connected should be shielded cables</li><li>- Body of the electronic calculating and indicating device should be grounded</li><li>- Volume / mass pulse input should have an amplitude voltage of at least 24 Volts peak to peak</li><li>- Analog IO cable should be less than 10 metres</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                        |
| Approved conversion methods | <ul style="list-style-type: none"><li>- API Manual of Petroleum Measurements Standards, Chapter 11, Physical Properties Data, Section 1 (also known as ASTM D1250-07) at reference conditions (0 kPa, 15 °C)<ul style="list-style-type: none"><li>tables 53A and/or 54A (crude oil)</li><li>tables 53B and/or 54B (refined petroleum products);</li></ul></li><li>- API Manual of Petroleum Measurements Standards, chapter 11.2.1M 1996; Compressibility calculation for hydrocarbons in the range from 638 kg/m<sup>3</sup> to 1074 kg/m<sup>3</sup></li><li>- API Manual of Petroleum Measurements Standards, chapter 11.2.2M 1997; Compressibility calculation for hydrocarbons in the range from 350 kg/m<sup>3</sup> to 637 kg/m<sup>3</sup></li></ul> |

<sup>[1]</sup> The metrological software of Sigma<sup>3</sup> is identified by the software version and checksum, which can be checked on the local display via the menu structure **System → Status**.

<sup>[2]</sup> The metrological software of the HMI Client HMI-207CE is identified by the software version and checksum, which can be checked on the local display via the menu structure **Help → About**.

**Table 2 Legally relevant parameter list**

| Object number | Description                       | Unit               | Value                                              |
|---------------|-----------------------------------|--------------------|----------------------------------------------------|
| 400           | Prover Volume A                   | Sm <sup>3</sup>    | As per prover certificate                          |
| 401           | Prover Volume B                   | Sm <sup>3</sup>    |                                                    |
| 402           | Prover Volume C                   | Sm <sup>3</sup>    |                                                    |
| 403           | Prover Volume D                   | Sm <sup>3</sup>    |                                                    |
| 404           | K0 Thermal Expansion Coeff.       | -                  | For specific product code A or B                   |
| 405           | K1 Thermal Expansion Coeff.       | -                  |                                                    |
| 412           | K2 Thermal Expansion Coeff.       | -                  |                                                    |
| 406           | Vapour Pressure                   | barg               | 0 to 10                                            |
| 419           | Reference Density                 | kg/Sm <sup>3</sup> | 350 to 1163,5                                      |
| 407           | Shrinkage Factor                  | -                  | 0,8 to 1,2                                         |
| 409           | Reference Density Water           | kg/Sm <sup>3</sup> | 900 to 1050                                        |
| 413           | Thermal Expansion Factor API 11.1 | /degC              | As per calibration certificate                     |
| 414           | Rounding Mode for API 11.1        |                    | From certificate                                   |
| 415           | EM - Prover Cubical Exp. Coeff.   | /degC              | From certificate                                   |
| 416           | DP - Prover Internal Diameter     | m                  | From certificate                                   |
| 417           | TP - Prover Wall Thickness        | m                  | From certificate                                   |
| 418           | EMP - Prover Elasticity           | bar                | From certificate                                   |
| 535           | K0 - Densitometer A               | -                  | As per calibration certificate of the densitometer |
| 536           | K1 - Densitometer A               | -                  |                                                    |
| 537           | K2 - Densitometer A               | -                  |                                                    |
| 538           | K18 - Densitometer A              | -                  |                                                    |
| 539           | K19 - Densitometer A              | -                  |                                                    |
| 540           | K20A Low - Densitometer A         | -                  |                                                    |
| 541           | K20B Low - Densitometer A         | -                  |                                                    |
| 542           | K21A Low - Densitometer A         | -                  |                                                    |
| 543           | K21B Low - Densitometer A         | -                  |                                                    |
| 544           | K20A High - Densitometer A        | -                  |                                                    |
| 545           | K20B High - Densitometer A        | -                  |                                                    |
| 546           | K21A High - Densitometer A        | -                  |                                                    |
| 547           | K21B High - Densitometer A        | -                  |                                                    |

| Object number | Description                       | Unit | Value                                              |
|---------------|-----------------------------------|------|----------------------------------------------------|
| 548           | Calib. Temp. - Densitometer A     | degC | As per calibration certificate of the densitometer |
| 549           | Calib. Pres. - Densitometer A     | bara |                                                    |
| 435           | K0 - Densitometer B               | -    |                                                    |
| 436           | K1 - Densitometer B               | -    |                                                    |
| 437           | K2 - Densitometer B               | -    |                                                    |
| 438           | K18 - Densitometer B              | -    |                                                    |
| 439           | K19 - Densitometer B              | -    |                                                    |
| 440           | K20A Low - Densitometer B         | -    |                                                    |
| 441           | K20B Low - Densitometer B         | -    |                                                    |
| 442           | K21A Low - Densitometer B         | -    |                                                    |
| 443           | K21B Low - Densitometer B         | -    |                                                    |
| 444           | K20A High - Densitometer B        | -    |                                                    |
| 445           | K20B High - Densitometer B        | -    |                                                    |
| 446           | K21A High - Densitometer B        | -    |                                                    |
| 447           | K21B High - Densitometer B        | -    |                                                    |
| 448           | Calib. Temp. - Densitometer B     | degC |                                                    |
| 449           | Calib. Pres. - Densitometer B     | bara |                                                    |
| 460           | Daily report time                 | h    | 0                                                  |
| 461           | Line Reference Temperature        | degC | 15                                                 |
| 462           | Line Reference Pressure           | barg | 0                                                  |
| 486           | Repeatability Limit Proving       | %    | From calibration certificate of the prover         |
| 1449          | BS&W Parameter                    | %    | From analysis certificate of BS&W                  |
| 1450          | Nominal K-Factor from certificate | P/m3 | As per calibration certificate of the Meter        |
| 1451          | Meter Factor                      | -    |                                                    |
| 1474          | V-Cone Flow Coefficient           | -    | From certificate                                   |
| 1475          | Venturi Discharge Coefficient     | -    | From certificate                                   |
| 1482          | Flowrate Cutoff Limit             | m3/h | From certificate                                   |
| 1489          | Commodity group                   |      | A → crude Oil<br>B → Refined products              |

| Object number | Description                    | Unit | Value                                       |
|---------------|--------------------------------|------|---------------------------------------------|
| 1600          | M-Factor curve - factor 01     | -    | As per calibration certificate of the Meter |
| 1601          | M-Factor curve - factor 02     | -    |                                             |
| 1602          | M-Factor curve - factor 03     | -    |                                             |
| 1603          | M-Factor curve - factor 04     | -    |                                             |
| 1604          | M-Factor curve - factor 05     | -    |                                             |
| 1605          | M-Factor curve - factor 06     | -    |                                             |
| 1606          | M-Factor curve - factor 07     | -    |                                             |
| 1607          | M-Factor curve - factor 08     | -    |                                             |
| 1608          | M-Factor curve - factor 09     | -    |                                             |
| 1609          | M-Factor curve - factor 10     | -    |                                             |
| 1610          | M-Factor curve - volumerate 01 | m3/h |                                             |
| 1611          | M-Factor curve - volumerate 02 | m3/h |                                             |
| 1612          | M-Factor curve - volumerate 03 | m3/h |                                             |
| 1613          | M-Factor curve - volumerate 04 | m3/h |                                             |
| 1614          | M-Factor curve - volumerate 05 | m3/h |                                             |
| 1615          | M-Factor curve - volumerate 06 | m3/h |                                             |
| 1616          | M-Factor curve - volumerate 07 | m3/h |                                             |
| 1617          | M-Factor curve - volumerate 08 | m3/h |                                             |
| 1618          | M-Factor curve - volumerate 09 | m3/h |                                             |
| 1619          | M-Factor curve - volumerate 10 | m3/h |                                             |

## Sealing of flow computer

The following items are sealed:

- The inscriptions are fixed to the electronic calculating and indicating device and secured against removal by a sticker seal;
- The expansion IO cards are sealed against removal using sticker seals;
- The electronic calculating and indicating device is sealed against opening;
- The physical sealing key position is sealed using a sticker seal after putting the device in custody transfer mode;
- Cables connected to the electronic calculating and indicating device are sealed against removal;
- External indicating device connected to the electronic calculating and indicating device is sealed against removal using sticker seals;
- Connection between the external indicating device and the electronic calculating and indicating device are sealed against removal using sticker seals.



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# OIML Certificate

Number R 117/2019-A-NL1-23.07 revision 1  
Project number 3793476  
Page 7 of 7

## Certificate history:

This revision replaces the previous version.

| Revision | Date             | Description of the modification                                                            |
|----------|------------------|--------------------------------------------------------------------------------------------|
| Initial  | 30 November 2023 | -                                                                                          |
| 1        | 5 April 2024     | Applicant and Manufacturer name changed, Manufacturers mark changed, Software update added |