

**OIML Member State**  
The Netherlands

Number R 117/2019-A-NL1-23.07 revision 0  
Project number 2546746  
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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: TechnipFMC  
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**  
30 November 2023

Certification Board

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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 Checksum: f8de26547c406794d8104b5c1131e4a9
Software identification for HMI client HMI-207CE <sup>[2]</sup>	Software version: 2.0.1 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>

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 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 **Error! Reference source not found.** and secured against removal by a sticker seal;
- The expansion IO cards are sealed against removal using sticker seals;
- The **Error! Reference source not found.** 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 **Error! Reference source not found.** are sealed against removal.
- External indicating device connected to the **Error! Reference source not found.** is sealed against removal using sticker seals;
- Connection between the external indicating device and the **Error! Reference source not found.** are sealed against removal using sticker seals.



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## Certificate history:

This revision replaces the previous version.

Revision	Date	Description of the modification
Initial	30 November 2023	-