Evaluation Certificate

Number **TC11955** revision 1
Project number 3692100

Issued by	NMi Certin B.V.
In accordance with	- WELMEC 8.8, 2017 "General and Administrative Aspects of the Voluntary System of Modular Evaluation of Measuring instruments under the MID". - OIML R117-1, 2019 "Dynamic measuring systems for liquids other than water". - WELMEC 7.2, 2019 "Software Guide" - WELMEC 10.10, 2019 " Guide on evaluation of Purely Digital Parts"
Producer	Endress + Hauser Flowtec AG Kägenstrasse 7 4153 Reinach Switzerland
Part	An **electronic calculating and indicating device** (flow computer), intended to be used as a part of a liquid measuring system for LNG.

Producer's mark or name	:	Endress + Hauser Flowtec AG
Type designation	:	LNG Metering Computer
Accuracy class	:	1.5

Further properties and test results are described in the annex:
– Description TC11955 revision 1.

Initially issued	18 December 2020
Remarks	– This revision replaces the previous revision.

Issuing Authority	**NMi Certin B.V., Notified Body number 0122** 29 September 2023 Certification Board

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PRODUCTS
RvA C 681

Description

1 General information on the electronic calculating and indicating device

Properties of the electronic calculating and indicating device, whether mentioned or not, shall not 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, 2017.

The complete measuring system must be covered by an EU-type examination certificate.

LNG Metering Computer installed a cabinet.

1.1 Essential parts

The following chapters presents the different hardware components of the electronic calculating and indicating device. All used components shall bear the CE marking.

1.1.1 Hardware components

- Computer of brand B&R, type PANEL PC xxxx[1], equipped with a touch screen and running on Windows® 10 IoT Ent 2019 or later versions.
  There are no keyboard and mouse connected to the computer.
  Power supply is 24 V DC.

1.2 Essential characteristics

1.2.1 Environment classes: M1 / E1

1.2.2 Temperature range ambient: +5 °C … +70 °C

1.2.3 Software specification (refer to WELMEC 7.2)

- Software type U.
- Risk Class C.
- Extension T, while extensions S and D are not applicable.
  - Extension L is not applicable for HMI Version 1.
  - Extension L is applicable for HMI version 2.
- Software versions:

Part	Versions	Checksum
HMI Legally relevant version	1.00.02	90f35ef071dbc4761b7915a85a229b5e
	2.01.02	5fda37a736e3f79c68b0671fa69bb585

  The metrological software version can be checked via the following screen buttons on the main HMI screen:
  - HMI version 1: [System] – [Energy Computer].
  - HMI version 2: [System] – [Software]
- The validity of the program and the parameters are checked every 5 minutes. If these checks fail, an alarm is generated.

1.2.4 External communications

All external communications are routed via a KEP server. The following configuration indications are approved (Configuration – Application version):

- HMI version 1: LNGMCV6.1 – V6.9.572.0
- HMI version 2: LNGMC 02.01.01 – V6.12

The KEP server configuration version is also indicated with the legal software version. The configuration file is stored encrypted to protect it against changes.

1.2.5 Legal software functions of the electronic calculating and indicating device

- The Weights and Measures part of the program that contains the test routines for memory, transmissions and calculation.
- Communication with the connected NÅNOflow flow computers, see Evaluation Certificate TC11943. The NÅNOflow flow computer has its own specific software version installed, instead of the software mentioned in TC11943. See the EU-type examination certificate of which the LNG Metering Computer is part of, for information on the approved software versions which are installed.

[1] With xxxx being a non-significant indication.

- Reading of the mass and energy totalisers of the connected NÅNOflow flow computers for the determination of the delivered mass of LNG, the mass of the received BOG and the delivered energy.
- Reading the LNG composition of the Raman analyser and transmitting this composition to the NÅNOflow flow computer.
- Printing of the delivery note.
- Storing the delivery data on the NÅNOflow flow computer.

1.2.6 Legal software functions performed by the NÅNOflow flow computer

For correct calculation of the delivered energy, the LNG Metering Computer depends on the calorific values being calculated in the dedicated LNG App in the NÅNO flow computer. Information on this LNG App can be found in the EU-type examination certificate of which this Evaluation Certificate is part of.

- Calculation of the total mass delivered by the measurement sensor to which it is connected.
- Calculation of the calorific value (MJ/kg) according ISO 6976:2016. The LNG composition read from the LNG Metering Computer is used for this calculation.
- Calculation of the total delivered energy. For the vapour return, a fixed user entered value is used for the calorific value. This user entered value is printed on the delivery note and stored with the measurement data.
- Calculation of the LNG density according ISO 6578:2017. The LNG composition and the product temperature are used for this calculation. This value is an indicative value only.
- Calculation of the flow weighted averages of LNG composition, the calorific values and density of the LNG.
- Storage of the delivery data received from the LNG Metering Computer after the delivery is ended.

1.2.7 Data communication

All the data communication of the electronic calculating and indicating device with other instruments is via

- HMI version 1: TCP/IP protocols only.
- HMI version 2: OPC-UA protocols only

1.2.8 Protective measures

The following protective measures are taken:

- The BIOS of the computer is password protected. The (long) password is only known to E+H service engineers.
- All boot devices, except the hard disk are disabled.
- All USB ports are sealed against use.
- After BIOS boot, the HMI interface is automatically loaded. The HMI program only runs in full screen mode.
- The user is prevented accessing the operating system, to prevent the start of other programs. For this, the HMI only allows the user to enter the information needed. Special key combinations (like CTRL – ALT – DEL, ⊞ + E, …) are not possible.

- Firewall settings are used to control all TCP/IP traffic. Only TCP/IP traffic on specific ports from specific IP addresses are allowed. The applicable firewall rules are given below:
  - HMI version 1:

Name	Type	Action	Scope (Remote IP addresses)	Port
LNG Modbus TCP	Port Incoming	Allow the connection	<Raman IP> <Customer DCS IP>	502 (TCP)
LNG Printer	Port Outgoing	Allow the connection	<Printer IP>	9100 (TCP)

  - HMI version 2:

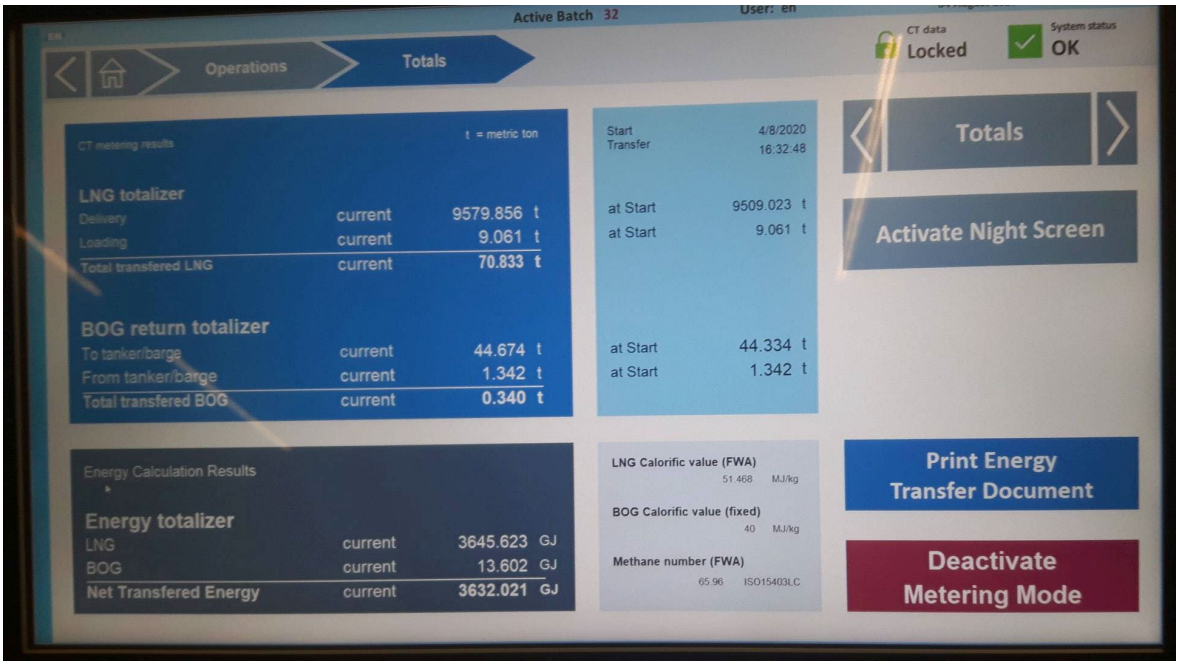
Name	Type	Action	Scope (Remote IP addresses)	Port
Modbus TCP	Port Incoming	Allow the connection	<all>	502 (TCP)
OPC-UA	Port Incoming	Allow the connection		49321 (TCP)
OPC Expert	Port Incoming	Allow the connection	OPC expert.exe	All (UDP, TCP)
NTP	Port Incoming	Allow the connection		123 (UDP)
Windows Security	Port Incoming	Allow the connection		All
Core Networking	Port Incoming	Allow the connection		All

1.2.9 The use of the BOG line during a measurement is optional. At the start of the measurement the operator must indicate if the BOG line is used or not.

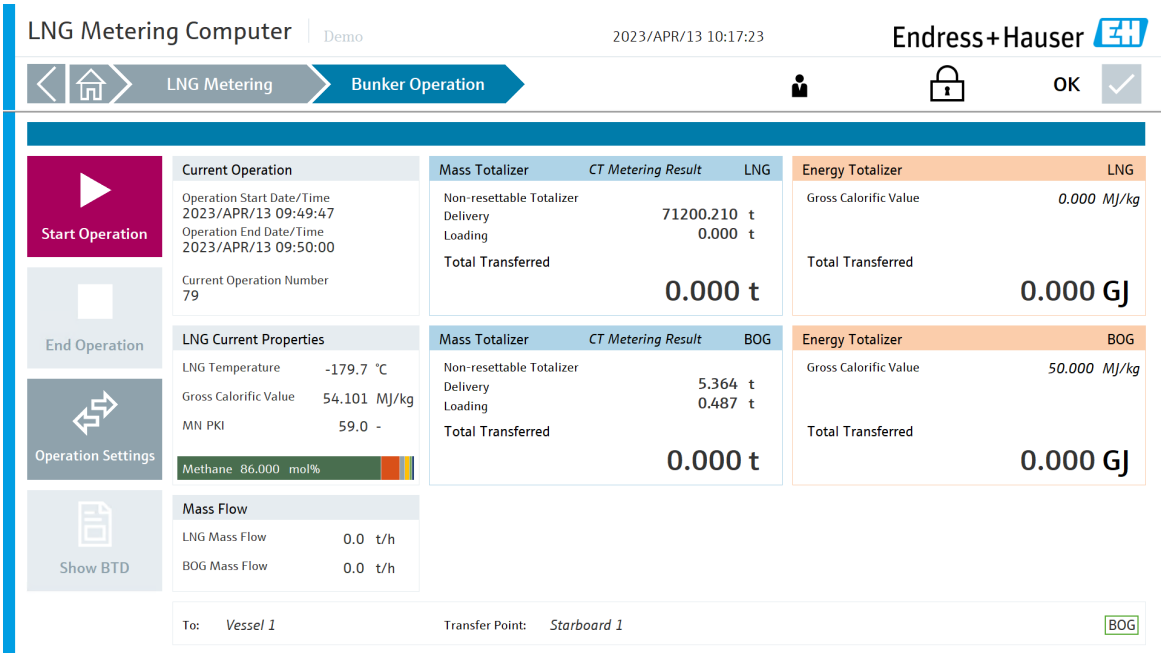
1.3 Essential shapes

1.3.1 Inscriptions
On the electronic calculating and indicating device, clearly visible, at least the following is inscribed on a type plate:
- Evaluation Certificate number **TC11955**.
- Name or trademark of the producer.
- Type designation.
- Serial number and year of manufacture.

1.3.2 Indications
See screenshots below:



HMI version 1



HMI version 2

1.4 Non-essential characteristics

1.4.1 Methane number

The methane number is calculated and printed for information purposes only. The table below shows the supported calculation method and where this calculation is performed.

Methane number calculation method	HMI version 1		HMI version 2	
	Excel file	Nano	Excel file	Nano
PKI	✓	✗	✗	✓
CARB	✓	✗	✗	✓
ISO 14503 L/C	✓	✗	✗	✓
ISO 14503 H/C	✓	✗	✗	✓
MWM	✓	✗	✓	✗
AVL	✓	✗	✓	✗

The excel file is stored on the panel PC, the methane number is transferred to the HMI via OPC Expert and KEP Server via secured communication. The file is not accessible to the user.

2 Seals

The following seals are applied:

- The type plate is fixed to the electronic calculating and indicating device and sealed against removal. No seal is required if the type plate is of a self-destruct type when is being removed.
- The cabinet is sealed against opening, preventing access to the LNG Metering Computer. The sealing includes side panels of the cabinet and all access doors.

3 Conditions for conformity assessment

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

4 Reports

An overview of the performed tests is given in Evaluation Report ER11955 revision 1 issued together with this Evaluation Certificate.