

Issued by

NMi Certin B.V.

In accordance with

- OIML R85, 2008: Automatic level gauges for measuring the level of liquid in stationary storage tanks
- WELMEC 7.2, 2019: Software Guide

Producer

Endress+Hauser SE+Co. KG
Hauptstrasse 1
79689 Maulburg
Germany

Part

A **calculating and indicating device**, intended for use as part of an automatic level gauge for liquid level measurements

Manufacturer's mark or name : Endress+Hauser SE+Co. KG

Type designation : NRF81

Further properties are described in the annexes:

- Description TC8909 revision 6;
- Documentation folder TC8909-4.

Initially issued

19 December 2016

Remarks

- This revision replaces the previous revisions;
- The documentation folder is not changed.

Issuing Authority

The Designated Body, NMI Certin B.V.
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Certification Board

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1 General information about the calculating and indicating device

Properties of the calculating and indicating device, whether mentioned or not, shall not conflict with the legislation.

This Test 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 calculating and indicating device is a tank gauging device without a sensor. It has several I/O functionalities in order to acquire measurement data from the tank, calculate the level in a tank and provide the data to a host system.

1.1 Essential parts

See document number 8909/0-02 for assembly drawing of the calculating and indicating device housing.

1.1.1 Electronics parts

The calculating and indicating device is composed of the following parts:

Part	Documentation	Remarks
Display/Keyboard	8909/0-03, 0-04, 0-05, 3-01, 3-02, 3-03	-
Frontplane	8909/0-06, 0-07	-
IOM-Analog AEXd	8909/0-08, 0-09, 0-10, 2-01, 5-01	-
IOM-Analog AEXi	8909/0-11, 0-12, 0-13, 2-02, 5-02	-
IOM-Digital	8909/0-14, 0-15, 0-16	-
IOM-Modbus	8909/0-17, 0-18, 0-19, 5-03	-
IOM-V1/WM550	8909/0-20, 0-21, 0-22, 3-04, 3-05, 3-06, 5-04	-
Main Board (CPU)	8909/0-23, 0-24, 0-23, 5-05	-
Power supply HV AC	8909/0-26, 0-27, 0-28	HV = High voltage
Power supply LV AC	8911/3-07, 3-08, 3-09	LV = Low voltage
Power supply LV DC	8911/3-10, 3-11, 3-12	LV = Low voltage

1.1.2 Remote indications (optional)

The following remote indications can be used optionally:

- Tankvision, as described in the Test Certificate TC7445.
- Tankvision Professional, as described in the Test Certificate TC8732.

1.2 Essential characteristics

1.2.1 Temperature range ambient

- -40 °C / +70 °C

1.2.2 Electromagnetic environment class

- E2

1.2.3 Power supply

The calculating and indicating device can be powered by one of these options:

- AC high voltage (HV), in the range of 100 ... 240V AC (-15% / +10%) @ 50/60Hz.
- AC low voltage (LV), with 65 V AC (-20% / +15%) @ 50/60Hz.
- DC low voltage (LV), in the range of 24 ... 55 V DC (-20% / +15%) @ 50/60Hz.

1.2.4 Indication

- Scale interval of the indication, in m or mm, shall not be greater than 1 mm.
- Level indication information and gauge status (level balance, etc.).
- Indication of status messages, error messages and alarm messages.
- Indication of the device locking status.

1.2.5 Software specification (refer to WELMEC 7.2):

- Software type P;
- Risk Class C;
- Extension T, while extensions L, S and D are not applicable.

Software version	Checksum	Remarks
01.02.00	0x02FE	-
01.02.01	0x0D3E	-
01.03.03	0x8D45	-
01.04.01	0xfa7a	-
01.05.00	0x991f	-
01.06.00	0x6fdb	-
01.07.00	0xa563	-

Software version and belonging checksum can be viewed by the display as stated in paragraph 1.5.1.

1.2.6 Data communication

The calculating and indicating device is capable of indicating several quantities. Use for Weights and Measures related purposes is allowed for the following quantities:

- Level.

The following input(s) can be used for legally relevant data:

- 4...20 mA analog input;
- HART superimposed;
- Digital input.

The following output(s) can be used for legally relevant data:

- Display;
- 4...20 mA analog output;
- HART superimposed;
- Digital output;
- 2-wire serial communication.

The following transmission protocols can be used for legally relevant data:

- Modbus protocol;
- V1 protocol;
- WM550 protocol.

1.3 Essential shapes

1.3.1 Markings

On the calculating and indicating device, clearly visible, at least the following is inscribed:

- Test certificate number TC8909;
- Name or trade mark of the manufacturer;
- Serial number and year of manufacture;
- Identification of the measuring tank the connected level gauged is mounted upon.

1.4 Conditional parts

1.4.1 Housing

The material of the housing of the calculating and indicating device is aluminium or stainless steel.

1.5 Conditional characteristics

1.5.1 Programming

When the Weights & Measures switch is set to "W&M sealed" W&M parameters cannot be changed.

Below an overview is given of the parameters that are important from a legal point of view, with the correct setting:

Parameter	Value	Remarks
Setup		
Units preset	mm or m	Used to select one of a preset unit settings.
Tank reference height	verification	Defines the distance from the dipping reference point to the zero position (tank bottom or datum plate).
Level source	verification	Defines the level source.
Setup->Advanced Setup->Display		
Value 1 display	tank level	Select the measured value that is shown on the local display.
Setup->Advanced Setup->System units		
Distance unit	mm or m	Select the unit for distance. This selection does not affect the measurement and calculation accuracy of the device.
Diagnostics->Device info		
Firmware version	See § 1.2.5	Shows the device firmware version installed.
Firmware CRC	See § 1.2.5	Shows the checksum of the installed firmware version.
W&M config CRC	information	Shows the checksum of all W&M parameter.

1.5.2 Error messages

On the indication or indications a message is presented if the measured value is not legal and/or a technical problem occurs.

2 Seals

The following seals are applied:

- The Weights and Measures key switch. A seal or sealing sticker has to be placed over the switch after system is configured and sealed and switch is closed;
- The data plate is fixed to the calculating and indicating device and secured against removal by seal or it will be destroyed when removed;
- The housing is sealed against opening.

For an example of the sealing see document number 8909/3-13.

3 Conditions for Conformity Assessment

- The calculating and indicating device shall be constructed in conformity with the description and documentation folder that belong to this Test certificate;
- The seals shall be applied as described in chapter 2;
- Other parties may use this Test Certificate only with the written permission of the producer.

4 Reports

An overview of performed tests is given in the reports:

- NMI-16200591-05;
- NMI-16200591-06;
- NMI-2491609-01;
- NMI-2491609-02.

A report can be a test report, an evaluation report, a type evaluation report and/or a pattern evaluation report.