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Issued by NMI Certin B.V.

In accordance with The "Metrologiewet" (Stb. 2006, 137) and the "Meetinstrumentenbesluit II", article 5, point a (Stb. 2009, 494)

Manufacturer Endress+Hauser Yamanashi Co., Ltd.  
Yamanashi Operation Center  
862-1 Mitsukunugi Sakaigawa-cho,  
Fuefuki-shi, Yamanashi Pref. 406-0846  
Japan

Measuring instrument An **automatic level gauge**

Manufacturer's mark or name : NMS530 / NRF 560:  
Endress+Hauser Japan Co., Ltd., Japan,  
or  
Endress+Hauser Yamanashi Co., Ltd.,  
Japan  
Make NRF 590 / Tankvision / Tankvision  
Professional:  
Endress+Hauser GmbH + Co. KG,  
Germany

Type : NMS530, with optionally connected a  
remote indication as described in §1.1.2

Measuring height : 40 m  
Ambient temperature range : -25 °C ... + 55 °C

Further properties are described in the annexes:  
- Description T7307 revision 6.  
- Documentation folder T7307-3.

Remarks This revision replaces the previous versions except for its documentation folder.

Issuing Authority **The Designated Body, NMI Certin B.V.**  
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C. Oosterman  
Head Certification Board



# Description

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## 1 General information concerning the automatic level gauge

Properties, whether mentioned or not, of this level gauge shall neither violate the "Metrologiewet" (the Dutch Weights and Measures law), nor the Dutch Weights and Measures regulations for automatic liquid level gauges.

### 1.1 Essential parts

#### 1.1.1 NMS530

Electronic device, containing the following parts:

Part	Documentation
processor board components lay out	7307/5-01, -02
keyboard / display unit components lay out	7307/5-03, -04
interface "I/O-4" components lay out	7307/5-05, -06
interface "commodul" components lay out	7307/5-07, -08
interface "com-4" components lay out	7307/5-09, -10, -11
interface "analogue output" components lay out	7307/5-12, -13
mains filter components lay out	7307/5-14, -15
power supply components lay out	7307/5-16, -17
70 mm displacer in conformity with Sakura drawing RP4-9302-2	7307/5-23
70 mm displacer in conformity with Sakura drawing RP4-1254-2	7307/5-24
70 mm displacer in conformity with Sakura drawing L4-4643	7307/5-25

software version 4.0.X, with hardware version number 7.00;  
software version 4.2.X, with hardware version number 7.00.

#### 1.1.2 Remote indications (optional)

##### 1.1.2.1 Indication device NRF560; containing the following parts:

Part	Documentation
processor board components lay out	7307/5-18, -19, -20
keyboard / display unit components lay out	7307/5-03, -04
mains filter components lay out	7307/5-21, -22
power supply components lay out	7307/5-16, -17

Software version 1.8x or 1.9x.

##### 1.1.2.2 NRF590, as described in the Test Certificate TC7351.

##### 1.1.2.3 Tankvision, as described in the Test Certificate TC7445.

##### 1.1.2.4 Tankvision Professional, as described in the Test Certificate TC8732.

## 1.2 Essential characteristics

- 1.2.1 The characteristics as specified on page 1.
- 1.2.2 Indication
  - 1.2.2.1 Indication of the measured level, in m, with a resolution of 0,1 mm.
  - 1.2.2.2 Optionally indication of the product temperature.
  - 1.2.2.3 Optionally indication of calculated volume.
  - 1.2.2.4 Indication of the measuring mode (innage or ullage; shall always be innage).
  - 1.2.2.5 Indication of status messages, error messages and alarm messages.
- 1.2.3 Protection of the legal parameters of the NMS530 against unauthorized alterations.
- 1.2.4 Protection of the legal parameters of the NRF560 against unauthorized alterations.
- 1.2.5 Protection of the legal parameters of the NRF590 against unauthorized alterations.
- 1.2.6 Protection of the legal parameters of Tankvision against unauthorized alterations.
- 1.2.7 Density range
- 1.2.8 For each displacer type the density range shall be determined using the following "Additional information in order to be able to determine the influence of alternating product density".

### **Additional information in order to be able to determine the influence of alternating product density**

As the balance criteria is not a virtual displacer weight, but the arithmetic product of a balance volume and a reference density (so a virtual weight at the reference density), for the given displacer a limited density range applies. This density range depends on the given reference density, and therefore has to be calculated for this reference density. The calculation is as follows:

1. Virtual displacer weight during balance, at reference density:

#### **Balance volume x actual density**

Balance volume also may be expressed as:

(Submerged displacer height during balance) x (surface balance volume).

Balance volume and operational density are adjustable parameters. The submerged displacer height during balance can be calculated out of the fore mentioned parameters, and the surface of the cylindrical part of the displacer.

2. Minimum density, at the given reference density.

At each density, the virtual weight is equal. So, the minimum density may be calculated as follows:

$$O \times h_{ref} \times \rho_{ref} = O \times [h_{ref} + 2,6] \times \rho_{min}$$

From this formula, the minimum density may be determined as:

$$\rho_{\min} = \frac{h_{\text{ref}}}{h_{\text{ref}} + 2,6} \times \rho_{\text{ref}}$$

In the same way, the maximum density may be determined as:

$$\rho_{\max} = \frac{h_{\text{ref}}}{h_{\text{ref}} - 2,6} \times \rho_{\text{ref}}$$

- O = displacer area, in mm<sup>2</sup>
- $h_{\text{ref}}$  = displacer's immersion, in mm
- $\rho_{\text{ref}}$  = reference density, or density the user considers as reference, in kg/m<sup>3</sup>
- $\rho_{\min}$  = minimum allowed density, in kg/m<sup>3</sup>
- $\rho_{\max}$  = maximum allowed density, in kg/m<sup>3</sup>

### 1.3 Essential shapes

#### 1.3.1 Inscriptions on the NMS530's name plate

- 1.3.1.1 Manufacturer's name or logo.
- 1.3.1.2 The number of this type approval: T7307.
- 1.3.1.3 The text: Het nulpunt van de vloeistofhoogtemeter ligt... mm beneden het referentiepunt (the zero point of the level gauge is..mm below the reference point).
- 1.3.1.4 The text: "Niveau uitsluitend aflezen tijdens aanduiding BAL" (only read level when indication "BAL" is present).
- 1.3.1.5 The minimum and maximum product density, in kg/m<sup>3</sup> (only if this differs from a range of 600 kg/m<sup>3</sup> to 1000 kg/m<sup>3</sup>).
- 1.3.1.6 The identification of the measuring tank the level gauged is mounted upon.
- 1.3.1.7 A description of the symbols on the display, or a reference where this description can be found.

#### 1.3.2 Inscriptions on the NRF560's name plate

- 1.3.2.1 Manufacturer's name or logo.
- 1.3.2.2 The identification of the measuring tank the connected level gauged is mounted upon.
- 1.3.2.3 A description of the symbols on the display, or a reference where this description can be found.

### 1.4 Conditional characteristics

#### 1.4.1 Error messages.

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

For detailed information concerning the NMS530 see the manual "Proservo NMS53..Series Tank Gauging System", version BA 001N08e/12.99, chapter 24.

##### 1.4.1.1 Legal parameter setting if the NMS530

For an overview of all parameters and their location within the menu-structure see the manual "Proservo NMS53..Series Tank Gauging System", version BA 001N08e/12.99, paragraphs 10.5 and 10.6.

Below an overview is given of the NMS530's parameters that are important from a legal point of view, with the correct setting.



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matrix-position (V,H) (see end-remarks)	parameter	explanation	value	remarks
S1,7	zero	zero point	verification	W&M
S1,8	span	span of the gauge	verification	W&M
S1,9	length unit		'0" (= mm)	W&M
S2,0	operation	level, up, stop, bottom	verification	
C4,0	tank height		verification	W&M
C4,1	dip point offset	disposition of the real measured level with respect to the presented level	verification	W&M
C5,0	set level	input of the real level, into the gauge	verification	W&M
C5,2	tank correct level			W&M
C5,3	tank correct. coeff.	tank correction coefficient		W&M
C6,0	upper stop	displacer's highest possible level	verification	W&M
C6,1	lower stop	displacer's lowest possible level	verification	W&M
C7,3	auto compensat.	automatic setting of the wire weight after wire weight calibration	OFF	W&M
C7,4	zero corr.	zero point correction		W&M
C8,3	auto compensat.	automatic setting of the displacer weight after displacer weight calibration	OFF	W&M
C8,4	zero corr.			W&M
C9,0	select disp. mode	indication of either innage or ullage	innage	W&M
C9,8	select decimal	decimal separator	"/"or"/"	not sealed
C9,9	lcd check	visual display check	start with ON	
D7,5	software version		See paragraph 1.1.1.	W&M
D7,6	hardware version		See paragraph 1.1.1.	W&M

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matrix-position (V,H) (see end-remarks)	parameter	explanation	value	remarks
D7,7	ope density	density used for carrying out the displacer calculations	verification or 800 kg/m <sup>3</sup>	W&M
S4,0	wire drum circ.	circumference of the measuring drum	verification	W&M; indicated on measuring drum
S4,1	wire weight	wire weight	1,4 g/10 m	W&M
S4,2	displacer weight	displacer weight	verification	W&M; indicated on displacer
S4,3	displacer volume	displacer volume	verification	W&M; indicated on displacer
S4,4	balance volume	displacer's immersed volume when balanced	25 ml	W&M
S4,5	volume tolerance	tolerance in immersed volume (=hysteresis)	1 ml	W&M
S4,7	delay mode	delay in gauge's reaction to changed volume, in units of 100 ms	5	W&M
S4,8	drum correction	drum correction	0	W&M
S7,3	weight cal.			W&M

**Explanation:**

Matrix position Sx,y: Parameter in the service matrix

Matrix position Cx,y: Parameter in the calibration matrix

Matrix position Dx,y: Parameter in de dynamic matrix

"Verification": These parameters are or shall be determined during verification.

"W&M": These parameters are protected by the W&M switch.



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## 2 Seals

- Sealing of the NMS530's Weights & Measures switch.  
The enclosure, covering the Weights & Measures switch, is sealed with a seal.  
When the Weights & Measures switch is sealed the legal parameters cannot be altered.
- Sealing of the NRF560's Weights & Measures switch.  
The enclosure, covering the Weights & Measures switch, is sealed with a seal.  
When the Weights & Measures switch is sealed the legal parameters cannot be altered.
- Sealing of the NMS530's name plate.  
The name plate is sealed with the Metrological mark.
- Sealing of the NRF560's name plate.  
The name plate is sealed with a seal.

## 3 Conditions for conformity assessment

- The level gauge and the indicating devices shall be constructed in conformity with the description and documentation of their approval documents.
- The seals and Metrological mark shall be attached as described in chapter 2.