Type Approval

Number : **T7307** revision 4
Project number : 800739

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)
Applicant	Endress+Hauser Yamanashi Co., Ltd. Yamanashi Operation Center 862-1 Mitsukunugi Sakaigawa-cho, Fuefuki-shi, Yamanashi Pref. 406-0846 Japan
In respect of	The model of **an automatic tank level gauge, with optional remote indicators.**

Characteristics

Make NMS530 / NRF 560	:	Endress+Hauser Japan Co., Ltd., Japan, or Endress+Hauser Yamanashi Co., Ltd., Japan
Make NRF 590 and Tankvision	:	Endress+Hauser GmbH + Co. KG, Germany
Type	:	NMS530, with optionally connected a remote indicator from the same manufacturer, type NRF560 and / or type NRF590 and / or type Tankvision
Measuring height	:	28 m
Ambient temperature range	:	-25 °C ... + 55 °C

Further properties are described in
- Description T7307 revision 4
- Documentation folder T7307-2

Remarks

This revision 4 is extended with an indicating device board, and replaces the previous revision 3. Page 1 of the documentation folder T7307-2 replaces page 1 of the previous documentation folder T7307-1. The documentation is extended with pages 4 and 5.

Issuing Authority

The Designated Body, NMi Certin B.V.
3 August 2010

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Description

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1 General information concerning the tank level gauge

Properties of the measuring instrument shall not be in conflict with the legislation, in particular the "Regeling meetreservoirs, vloeistofhoogtemeters en discontinue brandstofmeters (Stcrt. 2008, 069)".

1.1 Essential parts

1.1.1 Electronic device NMS530;
1.1.1.1 electronic device;
1.1.1.2 software version 4.0.X, with hardware version number 7.00;
1.1.1.3 software version 4.2.X, with hardware version number 7.00.

1.1.2 Displacer;
1.1.2.1 the type as has been documented in drawing T2989-28;
1.1.2.2 the type as has been documented in drawing T2989-29;
1.1.2.3 the type as has been documented in drawing T2989-40.

1.1.3 Optional indication device NRF560;
1.1.3.1 electronic device;
1.1.3.2 software version 1.8x or 1.9x;

1.1.4 Optional indication device NRF590, known from TC7351;
1.1.4.1 electronic device;
1.1.5 software versions as indicated in the Test certificate TC7351;

1.1.6 Optional calculating and indication device Tankvision, known from TC7445;
1.1.6.1 electronic devices;
1.1.6.2 software versions as indicated in the Test certificate TC7445.

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:

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

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

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

O	=	displacer area, in mm^2
h_{ref}	=	displacer's immersion, in mm
ρ_{ref}	=	reference density, or density the user considers as reference, in kg/m^3
ρ_{min}	=	minimum allowed density, in kg/m^3
ρ_{max}	=	maximum allowed density, in kg/m^3

1.3 Essential shapes

1.3.1 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.

1.3.2 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.

1.3.3 Sealing of the NRF590'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.

1.3.4 Sealing of the Tankvision Weights & Measures switch and the service port. See the Test certificate TC7445 for details.

1.3.5 Sealing of the NMS530's name plate.
The name plate is sealed with the Metrological mark.

1.3.6 Sealing of the NRF560's name plate.
The name plate is sealed with a seal.

1.3.7 Sealing of the NRF590's name plate.
The name plate is sealed with a seal.

1.3.8 Sealing of the Tankvision name plate or name plates.
Each name plate is sealed with a seal.

1.3.9 Inscriptions on the NMS530's name plate
1.3.9.1 Manufacturer's name or logo.
1.3.9.2 The number of this type approval: T7307.
1.3.9.3 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).
1.3.9.4 The text: "Niveau uitsluitend aflezen tijdens aanduiding BAL" (only read level when indication "BAL" is present).
1.3.9.5 The minimum and maximum product density, in kg/m^3 (only if this differs from a range of 600 kg/m^3 to 1000 kg/m^3).
1.3.9.6 The identification of the measuring tank the level gauged is mounted upon.
1.3.9.7 A description of the symbols on the display, or a reference where this description can be found.

1.3.10 Inscriptions on the NRF560's name plate
1.3.10.1 Manufacturer's name or logo.
1.3.10.2 The identification of the measuring tank the connected level gauged is mounted upon.
1.3.10.3 A description of the symbols on the display, or a reference where this description can be found.

1.3.11 Inscriptions on the NRF590's name plate
See the Test certificate TC7351 for details.

1.3.12 Inscriptions on the Tankvision name plate or name plates.
See the Test certificate TC7445 for details.

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.

For detailed information concerning the NRF590 see the test certificate TC7351.
For detailed information concerning Tankvision see the test certificate TC7445.

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.

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

matrix-position (V,H) (see end-remarks)	parameter	explanation	value	remarks
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
D7,7	ope density	density used for carrying out the displacer calculations	verification or 800 kg/m^3	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

matrix-position (V,H) (see end-remarks)	parameter	explanation	value	remarks
S4,4	balance volume	displacer's immersed volume when balanced	25 ml	W&M
S4,5	volume tolerance	tolerance in immerged 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.

1.4.1.2 For the NRF590 parameters see the test certificate TC7351.

1.4.1.3 For the Tankvision parameters see the test certificate TC7445.

2 Conditions for legal granting

2.1 The level gauge and the indicating devices shall be constructed in conformity with the description and documentation of their approval documents.

2.2 The seals and Metrological mark shall be attached as described in chapter 3.

2.3 Other parties may use this Type approval document only with the written permission of Endress+Hauser.

3 Legal stamps and sealing stamps

3.1 Sealing with a seal of the enclosure part that is covering the Weights & Measures switch.

3.2 Sealing of the NMS530's nameplate with the Metrological mark.

3.3 Sealing of the NRF560's nameplate with a seal.

3.4 For the sealing of the NRF590 see the Test certificate TC7351.

3.5 For the sealing of Tankvision see the Test certificate TC7445.