Operating Instructions

for

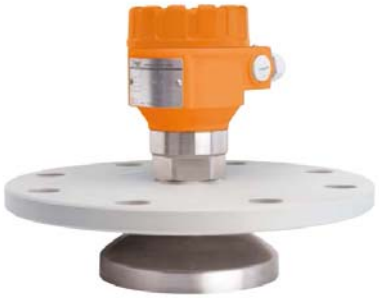
Non-Contact Radar Level Transmitter

Model: NRM

Compact version

High temperature version

Stainless steel housing



Parabolic antenna

We don’t accept warranty and liability claims neither upon this publication nor in case of improper treatment of the described products.

The document may contain technical inaccuracies and typographical errors. The content will be revised on a regular basis. These changes will be implemented in later versions. The described products can be improved and changed at any time without prior notice.

1. Contents

Manufactured and sold by:

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2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.
The instruction manuals on our website www.kobold.com are always for currently manufactured version of our products. Due to technical changes, the instruction manuals available online may not always correspond to the product version you have purchased. If you need an instruction manual that corresponds to the purchased product version, you can request it from us free of charge by email (info.de@kobold.com) in PDF format, specifying the relevant invoice number and serial number. If you wish, the operating instructions can also be sent to you by post in paper form against an applicable postage fee.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.
Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:
The standard delivery includes:
- Non-Contact Radar Level Transmitter model: NRM

4. Regulation Use

Any use of the Non-Contact Radar Level Transmitter, model: NRM, which exceeds the manufacturer's specification, may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

5. Operating Principle

The reflection of the emitted microwave impulses is considerably depending on the relative dielectric constant of the measured medium. The essential condition of microwave level measurement is that the relative dielectric constant (εr) of the medium should be more than 1.9.
The operation of the non-contact microwave level transmitters is based on the measurement of the time of flight of the reflected signals, so-called Time Domain Reflectometry (TDR) method.
The propagation speed of microwave impulses is practically the same in air, gases and in vacuum, independently from the process temperature and pressure, so the measured distance is not affected by the physical parameters of medium to be measured.
The NRM level transmitter is a Pulse Burst Radar operating at 25 GHz (K-band) microwave frequency.
The 25 GHz models' most noticeable advantage over the lower frequency (5-12 GHz) radars are the smaller antenna size, the better focusing, lower dead-band and smaller transmission angle.
The level transmitter induces few nanosecond length microwave impulses in the antenna and a part of the energy of the emitted signals reflects back from the measurement surface depending on the measured media. The time of flight of the reflected signal is measured and processed by the electronics, and then this is converted to distance, level or volume proportional data.

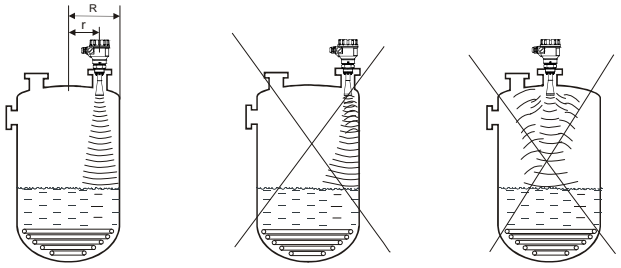
6. Installation

6.1 Mounting

When choosing the installation place please ensure proper space for later calibrations, verification or maintenance service.

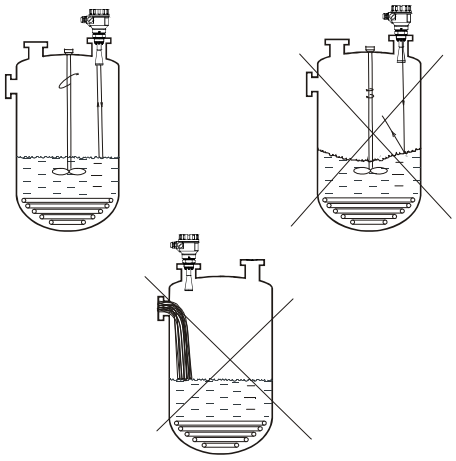
PLACEMENT

The ideal position for the NRM is on the
r = (0.3 … 0.5) R (in case of cylindrical tank).
It is highly recommended to consider the beam cone. The distance between the sensor and the tank wall should be at least 200 mm.
If the unit is installed into dome top or spherical tank, unwanted multiple reflections may appear, which can cancel each other and the measuring signal out, this way it can interfere the measurement.



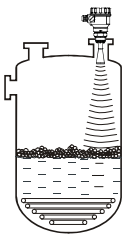
MOVING LIQUID SURFACE

Waving, vortex or strong vibration effects can have negative influence on the measurement accuracy and the maximal measuring range. To avoid these effects, the mounting placement should be as far as possible from the sources of these disturbing effects. According to measurement experiences the maximal measuring distance may decrease by 50-70% when the liquid surface is vortexing. For this reason the device should be mounted as far as possible from the filling stream or the tank outlet.



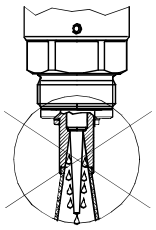
FOAMING

Filling, stirring or any other processes in the tank can generate dense foams on the liquid surface, which may considerably damp the reflected signals.
According to measurement experiences, in these cases the maximal measuring distance decreases at least approximately by 50%.



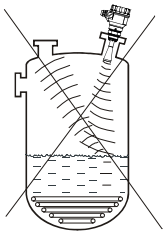
FUMES, VAPOURS

If the measured medium or its foam can reach the antenna or the measured medium is highly fuming, these cases build-ups can form on the sensor, which may result unreliable level measurement.



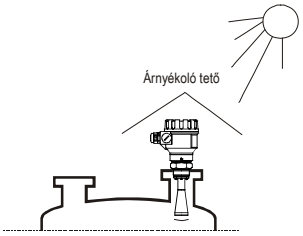
SENSOR ALIGNMENT

The antenna face should be parallel to the medium surface within ± 2-3°.



TEMPERATURE

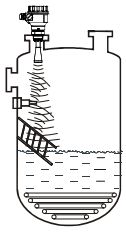
To avoid overheating the instrument should be protected against direct sunshine.



OBSTACLES

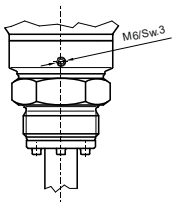
Prior to the installation make sure that no objects (cooling pipes, bracing elements, thermometers, etc.) cross the microwave signals. Especially in case of extraordinary large silos bracing elements and other structural obstacles may cause false reflections which can be damped in most cases: a small bent metal deflector plate mounted above the obstacle can disperse the microwave signals and eliminates the false reflections which disturb the reliable measurement.

If there is no possible mechanical solution to avoid these kinds of false reflections, the programming of the instrument allows blocking out the obstacles. (see: 8.3.4.5)

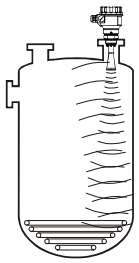


POLARIZATION PLANE

The emitted radar impulses of NRM are electromagnetic waves. The orientation of the polarization plane is the same as for the electric wave component of the electro-magnetic wave. The rotation of the polarization plane compared to the tank position could be useful (for example to avoid disturbing reflections) in certain applications. To rotate the polarization plane loosen the M6 hex socket set screw above the process connection and rotate the instrument. Then tighten the unit by the screw.



EMPTY TANK

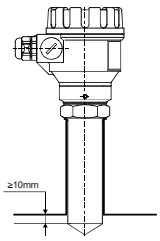


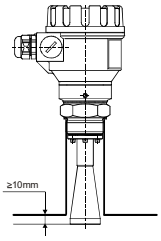
Especially in case of standing tanks with hemispherical bottom and in case of tanks which have any equipment inside at the bottom (e.g. heating element, stirrer) wrong level measurement may happen when the tank is totally emptied. The reason for this measurement error is that the tank bottom or the objects at the bottom disperse or reflect the emitted microwave signals. Furthermore the lower signal-level dispersed radar impulses may interfere with itself inside the tank.

In order to perform reliable level measurement there should be at least 100 mm liquid level above the disturbing objects at the bottom or above the hemispherical tank bottom.

SOCKET, NOZZLE

The process connection should be implemented that the antenna end should protrude at least 10 mm out of the socket.

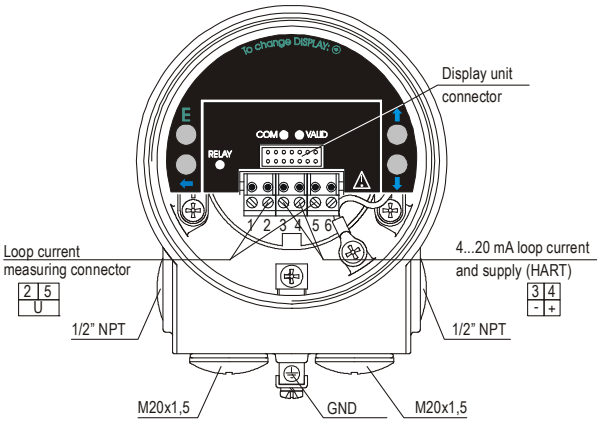




7. Wiring

The instrument operates from 20 … 36 V galvanic isolated and not grounded DC power supply in two-wire system. (For Ex version: 20 … 30 V DC!)

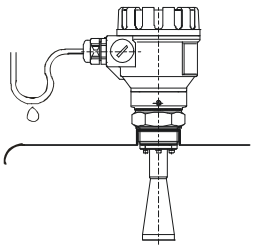
The voltage value measured on the terminal of the instrument should be minimum 20 V (in case of 4 mA)! In case of using HART interface – to achieve proper communication between the transmitter's interface and the power-supply – a minimal 250 Ohm resistance should be maintained within the network. The instrument should be wired with shielded cable led through the cable gland. The wiring of the cables can be done after removing the cover of the instrument and the NRM-300P display unit.



IMPORTANT: The grounding screw on the housing of the transmitter should be connected to the equipotential network. Resistance of the EP network should be R ≤ 2 Ohm measured from the neutral point. Shielding of the cable should be grounded at the control room side to the EP network. To avoid disturbing noises, keep away of closeness to high-voltage cables. Especially the inductive couplings of AC harmonics can be critical (which are present at frequency converter control) because even cable shielding does not supply effective protection against these cases.

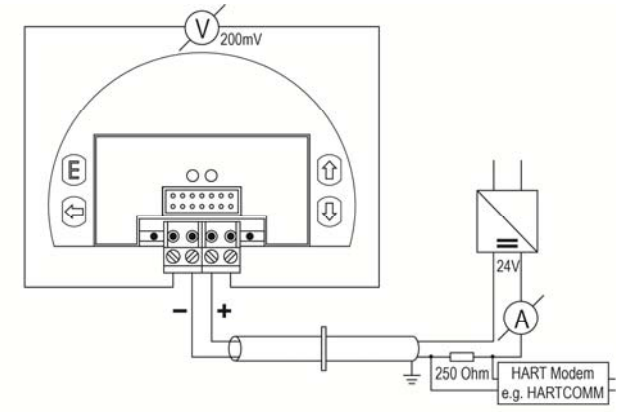
The instrument may be damaged by electrostatic discharge (ESD) via its terminal, thus apply the precautions commonly used to avoid electrostatic discharge e.g. by touching a properly grounded point before removing the cover of the enclosure.
A possible electrostatic discharge can cause damage for the instrument. Do not touch the internal terminals!

WATER / VAPOUR

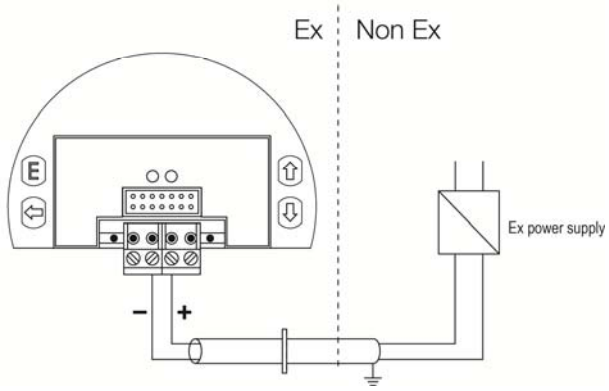


To achieve suitable ingress protection Kobold recommends using the suggested cable outer diameter and fasten properly the cable gland.
Kobold also recommends leading the connecting cables downwards to lead aside the rain water and the condensed water. This is needed in case of outside installations and some special applications where there is very high humidity or the possibility of water condensation is quite high (for example in cleaning, purification processes, in cooled and / or heated tanks).

7.1 Wiring of the devices



Using HART communication
In non-Ex environment

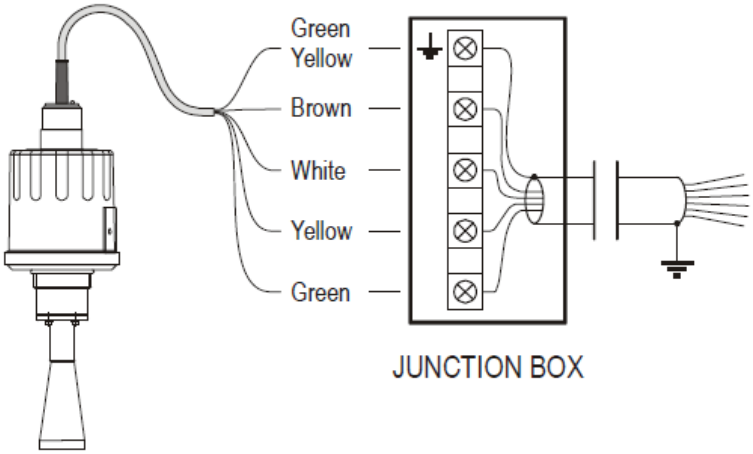


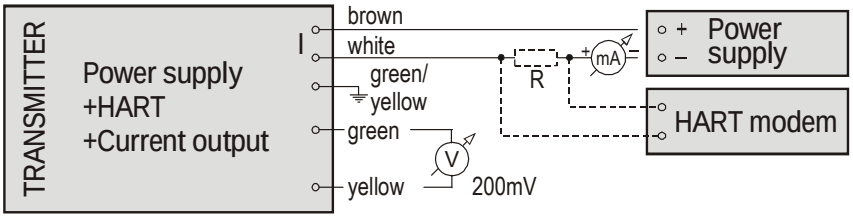
Using Ex approved instrument
in hazardous environment

In case of integrated version:
Prior to wiring ensure that the power supply is turned off at the source.
(For wiring the unit 6 x 0.5 mm^2 cross section or greater cable is recommended).
The necessary programming can be made after energizing the unit.

Colour codes of the wires:

Green	–		(+) Positive point of current loop measurement
Yellow	–		(-) Negative point of current loop measurement
White	–	**I**	(-) Negative point of current loop, power supply and HART
Brown	–	**I**	(+) Positive point of current loop, power supply and HART
Green/Yellow	–	**GND**	Grounding and shielding point



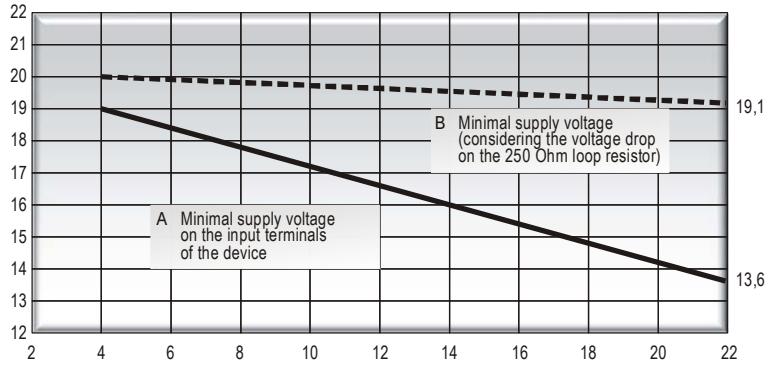


Extension of the integrated cable:

The usage of a junction box is recommended for extending the cable.
The shielding of the two cables should be connected and grounded at the signal processing device.

7.2 Determine the appropriate power supply voltage

The minimal power supply voltage required by the NRM devices is depending on the load impedance in accordance to the below diagram:



A: minimal supply voltage on the input terminals of the device

B: minimal supply voltage (considering the voltage drop on the 250 Ohm loop resistor)

Calculation example: Voltage drop calculated with 22 mA:
$U_{\text{minimal supply voltage (22 mA)}}$ = 22 mA x load resistance+ $U_{\text{input minimum (22 mA)}}$
$U_{\text{minimal supply voltage (22 mA)}}$ = 22 mA x 250 Ohm + 9 V = 5.5 V + 13.6 V = 19.1 V

In order to provide operation in the total current loop range the calculation should be also checked with 4 mA:

$U_{\text{minimal supply voltage (4 mA)}}$ = 4 mA x load resistance + $U_{\text{input minimum (4 mA)}}$
$U_{\text{minimal supply voltage (4 mA)}}$ = 4 mA x 250 Ohm + 19 V = 1 V + 19 V = 20 V

Therefore in case of 250 Ohm load resistance 20 V power supply voltage is just enough for the total 4-20 mA measuring range.

7.3 Loop current checking with hand instrument

After removing the cover and the Display Module, the actual loop current can be measured throughout an internal 1 Ohm shunt resistor by connecting a voltmeter (in the range of 200 mV) to the points 2 and 5 indicated on the wiring drawing above (see 7.1)

8. Programming

The NRM transmitters can be programmed (basically) with the following two ways:

- **Programming with the NRM-300P display unit** (see 8.2)
  All features of the unit can be accessed and all parameters can be set, such as measurement configuration and optimisation, outputs, dimensions for 11 tanks with different shape, 99-point linearization.
- **Programming with NUS-NTB-NRM-SW configuration software (using HART® modem e.g. HARTCOMM)**

The **NRM-4...1x** and **NRM-4...Hx** types include the NRM-300P display unit.
The NRM transmitters are fully operational without the NRM-300P display as well; it is only needed for local programming and / or local measurement displaying.

FACTORY DEFAULT SETTING
The NRM series level transmitters are factory programmed by the following way:

⇒ Measurement mode: Level (LEV). The displayed value is the measured level.
⇒ The current output and the bargraph on the right are proportional to the measured level.
⇒ 4 mA and 0% are assigned to zero level.
⇒ 20 mA and 100% are assigned to the maximal level.
⇒ Error indication by the current output: holding the last value.
⇒ Level tracking time constant: 15 sec.

The instrument regards the distance (DIST) measured from the antenna end as the basic measurement value. This distance is handled and display in one of the selected dimensions: m, cm, mm, feet, or inch. Since the maximal measurement distance is given (entered in P04) the instrument can calculate the actual level (LEV) value. If the proper mechanical dimensions of the mounting – distance between the sealing and the tank bottom – is known, the measured level values can be more accurate by adding this data. The level values calculated that way are the base for volume (VOL) calculation and the 99-point linearization table (VMT) also uses these values as input data.

8.1 The NRM-300P display unit

8.1.1 Primary measurement screen

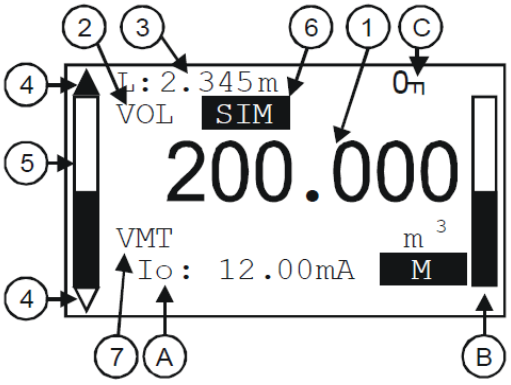
The NRM-300P is a 64x128 dot-matrix LCD display which can be plugged into the transmitter. (It is universal – usable in other Kobold devices as well – provided that the system software supports NRM-300P.)

Warning! The NRM-300P module is based on LCD technology, so please make sure it is not exposed to permanent heat or direct sunlight, in order to avoid damage of the display unit. If the instrument cannot be protected against direct sunlight or high temperature that is beyond the standard operating temperature range of the NRM-300P, please do not leave the NRM-300P display in the instrument.

Measurement displaying with the NRM-300P display unit

Elements of the displaying:

1. Primary (Measured) Value (PV), in accordance to BASIC SETUP / PV. MODE.
2. Calculation mode of Primary Value (PV), in accordance to BASIC SETUP / PV. MODE.
3. Type and value of the initial quantity used for calculating the Primary Value (PV):
   - in case of Level measurement (LEV) it is Distance (DIST),
   - in case of Volume measurement (VOL) it is Level (LEV).
4. Trend direction arrows. The empty triangle shows when the change of the measured value is small, the filled triangle shows large-scale change. If none of the arrows are shown the measured value is constant.
5. Measured PV (Distance Value) in relation to measurement range (Sensor range) displayed in a bargraph.



6. Indication of Primary Value simulation. In this case the display and output show the values of the simulation and not the measured values.

7. Indication of active (**V**olume / **M**ass **T**able - VMT) calculation mode.

During active simulation the critical measurement errors will be displayed to give information to the user.

A, Calculated value of the output current.

After the dimension, the mode of current output is indicated by inverse inscription:

M

Manual mode (see 8.3.2.1)

H

HART address is not 0, so output current has become overwritten to 4 mA (see 8.3.2.1)

E!

Analogue transmission reacts to a programmed failure condition
if an upper or lower fault current is programmed (see 8.3.2.4)

B, Output range (4-20 mA) indicated in a bargraph.

The bottom of the bargraph is assigned to 4 mA and the top is assigned to 20 mA.

C, Indication of Menu Lock:

- If key symbol is visible, the unit is protected with a password. When entering the menu, the instrument asks for the correct password (see 8.3.6.1).
- If REM message is visible, the instrument is in remote programming mode and the main menu cannot be accessed.

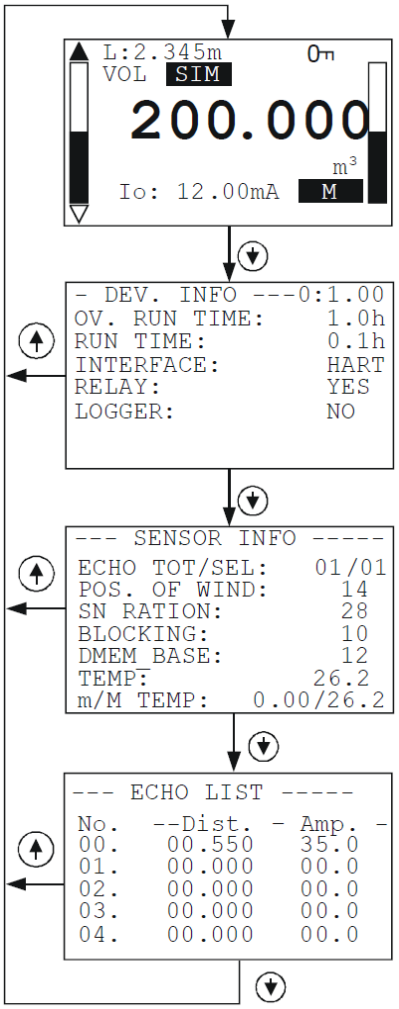
Errors occurred during the measurement can be seen at the bottom line of the display.

8.1.2 Information screens

Press ⓓ button to cycle between the main measurement screen and the information display screen:

1. General information screen (DEV. INFO)
   Overall running time (OV. RUN TIME)
   Run time after power on (RUN TIME)
   Type of interface (INTERFACE) in the instrument.
   Type of the instrument (TYPE)
2. Sensor information screen: (SENSOR INFO)
   Number of echoes (ECHO TOT/SEL)
   Blocking (BLOCKING)
   Signal-to-noise ratio (SN)
   Temperature (TEMP)
3. Echo table: (ECHO TABLE)

The location (distance) and the amplitude of the echoes (Dist. / Amp.) are listed



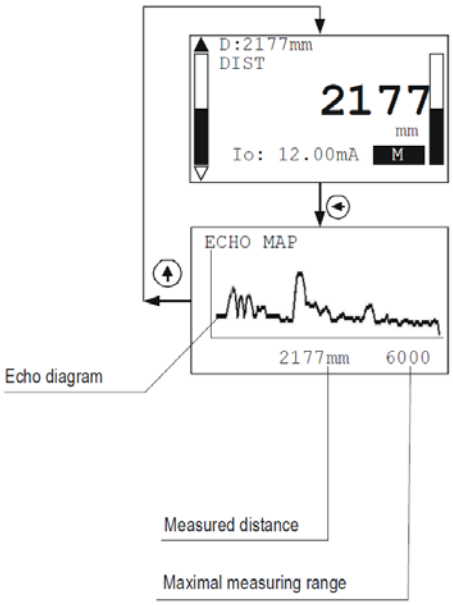
The listed items are the reflections detected by the NRM (measured in dB) and the approximate distance from the process connection. The listed values are not accurate measurement values, since around the selected echo (measurement window) there are further measurements and signal processing procedures in order to provide accurate measurement display and level transmission.

The informative screen returns back to main screen after 30 seconds. By pressing the ⓤ button the user can return to the main screen any time. Pressing the Ⓔ button in any of the screens the user can enter the main menu. After exiting the menu always the main screen will be shown.

8.1.3 Echo map

Pressing the ⊙ button in the measurement screen the echo map screen will appear. This screen shows the following information:

1. Echo diagram
2. Actual measured distance
3. Maximal measuring range



The echo map screen returns back to main screen after 30 seconds.

By pressing the ⊙ button the user can return to the main screen any time. Pressing the Ⓔ button in any of the screens the user can enter main menu. After exiting the menu always the main screen will be shown.

8.2 Programming with the NRM-300P display module

When entering the menu the instrument makes a copy of the actual parameters and all changes are done to this duplicated parameter set. During programming the instrument keeps measuring and transmitting with the current (and intact) parameter set. After exiting the menu the instrument replaces the original parameters with the new parameter set and will measure according to the new parameters. This means that the change of the parameters does not become immediately effective when pressing the Ⓔ button!

Entering the menu can be done by pressing the Ⓔ button, while exiting the menu can be done by pressing the ⊙ button.
If the instrument is left in programming mode after 30 minutes it will automatically return to measuring mode. If the NRM-300P display is removed during programming the instrument immediately returns to measuring mode.
As programming with NRM-300P (manual programming) and HART (remote mode) programming is not possible at the same time, only one programming method could be chosen. Measured values can be read out through HART at any time.

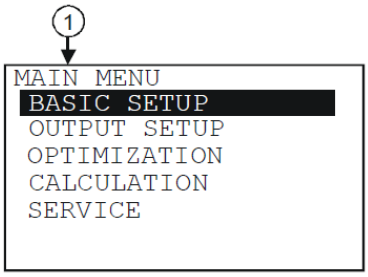
8.2.1 Components of the programming interface

The parameters of the instrument are grouped according to their functions. The programming interface consists of lists, dialog windows, edit windows and report windows.

Lists

Navigation between the lines of a list can be done by pressing the ⊕ / ⊖ buttons. Pressing the Ⓔ button activates a list item. The selected list item is marked with inverse colour. Exit from a list by pressing the ⊖ button.

Menu list



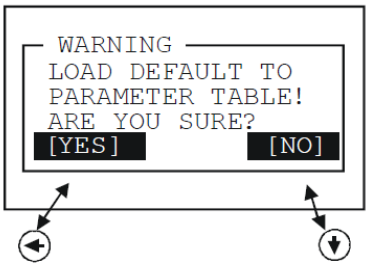
The Menu list is a specialized list. Its characteristic is that upon selecting a list item we directly get into another list, and these lists are opening from each other in different levels.

The menu header (1) helps to navigate.

Entering the main menu can be done by pressing the Ⓔ button. Navigation between the menu items can be done by pressing the ⊕ / ⊖ buttons. Enter to the selected menu by pressing the Ⓔ button. The selected list item is marked with inverse colour.
Exit from a submenu by pressing the ⊖ button. Pressing the ⊖ button in the main menu will quit from the programming mode and the instrument will return to measuring mode.

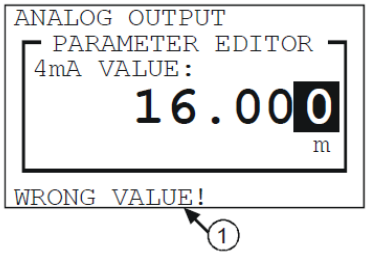
Dialog window

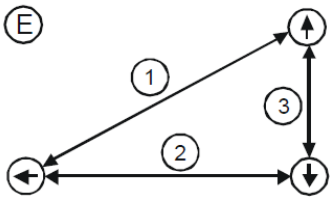
During the programming the system sends messages or warnings to the users by dialog windows. These usually can be acknowledged by pressing the ⊖ button or the user can choose between two options (usually YES or NO) by pressing the ⊖ / ⊖ buttons. In some cases one of the parameters has to be changed to correct an error.



Edit window

An edit window is used for modifying a numeric parameter value. The selected character can be changed by pressing the ⊕ / ⊖ buttons. The cursor can be moved to left, by pressing the ⊖ button.
The direction of the cursor movement through the digits is right to left. The changed value can be validated by pressing the Ⓔ button. The software checks if the entered value is appropriate, exiting from the edit window is only possible after entering a correct value. If the entered value is uninterpretable the software sends an error message in the bottom line (1) of the display.





Edit window – button combinations

In the edit window the following button combinations are available:

1. Recalling the parameters to the state before editing (⊖ + ⊕, pressed for 3 sec.)
2. Recalling default parameters (⊖ + ⊖, pressed for 3 sec.)
   Inserting (currently) measured value to the edit window (⊕ + ⊖, pressed for 3 sec.)
   Only for certain parameters!

8.2.2 Menu structure

Main menu

BASIC SETUP	Parameter group of the basic measurement parameters
OUTPUT SETUP	Parameter group of the output parameters
OPTIMIZATION	Parameter group for measurement optimization settings
CALCULATION	Calculations
SERVICE	Service functions, calibration, test and simulation

8.3 Programmable features description

8.3.1 Basic measurement settings

8.3.1.1 Default unit system

Parameter: P00: c, where c: 0, 1. Default value: EU
Path: BASIC SETUP / UNITS / ENGINEERING SYSTEM
Description: This should be configured as the first step of the programming.
Here you can choose the default unit system:

- EU European unit system
- US Anglo-Saxon / American unit system

8.3.1.2 Dimension of the fault unit system

Parameter: P00:b, and P02:b, or P02:c Default value: mm, m^3, t
Path: BASIC SETUP / UNITS / ENGINEERING UNITS
Description: The dimension of the selected default unit system can be specified in this menu. The selected measurement mode here will define the primary measured value and the displayed value, furthermore it will be the source for the current output:

- BASIC UNITS (m, cm, mm, ft, inch)
- VOLUME / FLOW UNITS (m^3, l, ft^3, gallon)
- MASS UNITS (t, t)

If the dimension is modified, the device resets all the parameters after a warning message.

8.3.1.3 Primary value mode

Parameter: P01: b a Default value: DIST
Path: BASIC SETUP / PV MODE
Description: This mode determines the primary value and the displayed value. It also determines the value which will be proportional to the output current.

- DISTANCE
- LEVEL
- VOLUME
- MASS

8.3.1.4 Maximal measuring distance

Parameter: P04 Default value:
Path: BASIC SETUP / MAX. MEAS.DIST
Description: This parameter should be entered all the cases, except distance measurement mode. But it is suggested to be programmed in case of distance measurements in order to avoid the disturbing effects of possible unwanted multiple reflections!

8.3.1.5 Damping time

Parameter: P20 Default value: 15 sec
Path: BASIC SETUP / DAMPING TIME
Description: Damping time is used to damp the unwanted fluctuations of the output and display.
If the measured value changes rapidly the new value will settle with 1% accuracy after this set time. (Damping is according to the exponential function).

8.3.1.6 Demo mode

Parameter: P00: d Default value: OFF
Path: BASIC SETUP / DEMO MODE
Description:

- OFF: The operation is performed with considering all the application parameters (such as filling, emptying speed, echo selection, etc..)
- ON: This fast operation mode ignores the application parameters. The demo mode uses a fast algorithm evaluation independently from P25, P26 and P27 parameters. The measurement accuracy and reliable operation between process environments are not guaranteed!

8.3.2 Analogue output

8.3.2.1 Output current mode

Parameter: P12:b, where b: 0, 1. Default value: AUTO
Path: OUTPUT SETUP / ANALOG OUTPUT / CURRENT MODE
Description: Transmission mode of the current output.

- AUTO The output current is calculated from the measured value, output is active.
- MANUAL The output current is fixed at a constant (set) value (see 8.3.2.5). In this mode the setting of the error current is irrelevant. The set (current) value overwrites the 4mA output of HART multidrop mode!

8.3.2.2 Output current value assigned to 4 mA

Parameter: P10 — Default value: 0 mm
Path: OUTPUT SETUP / ANALOG OUTPUT / 4 mA VALUE
Description:
- Measured value assigned to 4 mA current value.
- The transmitted value is in accordance to the primary value (PV) (P01:a). Assignment can be done that the change in measured value and the change in the output value are the same (normal), or opposite directional (inversive operation). For example; 1 m level is 4 mA, 10 m level is 20 mA, or 1 m level is 20 mA and 10 m level is 4 mA.

8.3.2.3 Output current value assigned to 20 mA

Parameter: P11 — Default value: Maximal measurement range (mm)
Path: OUTPUT SETUP / ANALOG OUTPUT / 20mA VALUE
Description: Measured value assigned to 20 mA current value.
The transmitted value is in accordance to the primary value (PV) (P01: a). Assignment can be done that the change in measured value and the change in the output value are the same (normal), or opposite directional (inverse operation). For example: 1m level is 4 mA, 10m level is 20 mA, or 1m level is 20 mA and 10m level is 4 mA.

8.3.2.4 Output current error mode

Parameter: P12:a, ahol a: 0, 1, 2 — Default value: HOLD
Path: OUTPUT SETUP / ANALOG OUTPUT / ERROR MODE
Description: Error indication by the current output:
- HOLD Error indication has no effect on the output current.
- 3.8 mA Error indication: the output current gets 3.8 mA.
- 22 mA Error indication: the output current gets 22 mA.

Warning: This error indication is active unless the failure is fixed, or until the failure terminates.

8.3.2.5 Fixed output current

Parameter: P08 — Default value: 4 mA
Path: OUTPUT SETUP / ANALOG OUTPUT / MANUAL VALUE
Description: Parameter for setting the fixed output current:
Values between 3.8 and 20.5 can be entered. The output current will be set to the entered value and analogue transmission will be suspended (see 8.3.2.1). This error indication overrides all other error indication.

8.3.3 Digital output

8.3.3.1 HART Polling address

Parameter: P19 Default value: 0
Path: OUTPUT SETUP / SERIAL OUTPUT / ADDRESS
Description: HART Polling Address
The polling address can be set between 0 and 15. For a single instrument the polling address is 0 and the output is 4-20 mA (analogue output). If multiple units are used in HART Multidrop mode (max. 15 pcs.) the polling addresses should differ from 0 (1-15), in this case the output current will be fixed at 4 mA.

8.3.4 Measurement optimization

8.3.4.1 Blocking, Dead zone

Parameter: P05 Default value: 300 mm
Path: OPTIMIZATION / DEAD ZONE
Description: The instrument ignores all reflections within the dead zone and the close-end blocking distance. The disturbing objects and false reflections which are close to the sensor can be eliminated by entering the dead zone value manually.

8.3.4.2 Echo selection

Parameter: P25:a, where a: 0, 1, 2, 3 Default value: AUTO
Path: OPTIMIZATION / ECHO SELECTION
Description: Selection of Echo within the measuring window. In order to avoid disturbing reflections the instrument forms a so-called measuring window around the reflected signal. The distance measurement is performed with the echo signal within the measurement window.

- AUTO
- FIRST
- HIGHEST AMPLITUDE
- LAST

8.3.4.3 Emptying speed

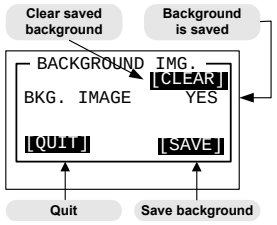
Parameter: P27 Default value: 50 m/h
Path: OPTIMIZATION / EMPTYING SPEED
Description: This parameter provides additional protection against echo loss in applications involving very heavy fuming during emptying process. Correct setting increases the reliability of the measurement during the emptying. The parameter must not be smaller than the fastest possible emptying rate of the actual process.

8.3.4.4 Filling speed

Parameter: P26 Default value: 50 m/h
Path: OPTIMIZATION / FILLING SPEED
Description: This parameter provides additional protection against echo loss in applications involving very heavy fuming during filling process. Correct setting increases the reliability of the measurement during the filling. The parameter must not be smaller than the fastest possible filling rate of the actual technology.

8.3.4.5 Background Image

Parameter: OPTIMIZATION / BACKG.ECHO IMAGE / SAVE BACKG. IMAGE
Path: The not-moving disturbing objects inside the tank which generates unwanted false reflections can be blocked out from the measurement range. For this purpose the instrument needs to map the totally empty tank to create a ”background image”. After this procedure the software will automatically recognise and ignore the reflections coming from the disturbing objects crossing the microwave beam (see 6.1 - Obstacles).
Warning! The background image should be saved only when the tank does not contain measurement medium but the disturbing objects inside the tank are not removed. The background image is not recommended to be saved when the tank is filled with the measurement medium since it might result wrong level measurement.



8.3.4.6 Using saved background image

Parameter: P35: a, where a: 0, 1 Default value: OFF
Path: OPTIMIZATION / BACKG.ECHO IMAGE / SAVE BACKG: IMAGE
Description: Turning ON or OFF the usage of saved background image during the calculations as per the above 8.3.4.5 point described.

- OFF: Ignoring the saved background image.
- ON: Saving background image, damping reflections coming from the disturbing objects.

8.3.4.7 Threshold value

Parameter: P29 Default value: 4 dB
Path: OPTIMIZATION / TRESHOLD VALUE
Description: Defining an upper limit value above the saved background image described in 8.3.4.5 point.
The instrument will evaluate the measurement result as a real echo when the reflected signal exceeds the saved background level with the threshold value entered here. Setting the threshold value is useful when the level in the tank and the position of the (small surface) not-moving disturbing object are the same. This case the instrument will not regards the echo signal as false reflection.

8.3.5 Calculations

8.3.5.1 Specific gravity

Parameter: P32 Default value: 0
Path: CALCULATION / SPECIFIC GRAVITY
Description: Entering a value (other than “0”) of specific gravity in this parameter, the MASS value will be displayed instead of Volume (VOL) in the dimension of tonne or lb/tonne depending on P00 (c) and P02 (b).

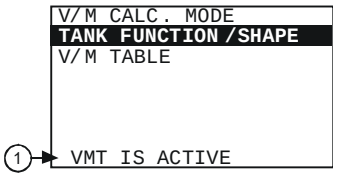
8.3.5.2 Volume / Mass calculation mode

Parameter: P47: a Default value: 0
Path: CALCULATION / V/M CALC. MODE
Description: Calculation of the volume and mass can be performed with two ways:

- TANK FUNCTION/SHAPE – volume and mass calculation with a tank shape formula. Entering this menu point the table is automatically OFF.
- V/M TABLE – volume and mass calculation with a table.
  Entering this menu point the table automatically turns ON.

8.3.5.3 Volume / Mass table

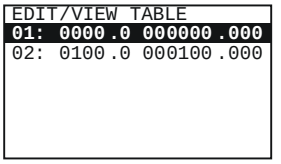
Parameter: -
Path: CALCULATION / V/M CALC. MODE / V/M TABLE
Description:
- VIEW/EDIT TABLE
- ADD ITEM
- DELETE ITEM



If none of the formulas match perfectly to the characteristics of the needed tank, there is a possibility to use table calculation mode. The device can handle a 99-point table on this purpose and counts values between the neighbouring point pairs with linear interpolation.
The input (left) side of the table contains the level data, the output (right) side contains the volume or mass data.
The first point pair of the table should be 0,0. If a long table wanted to be shortened, 0,0 point pair should be entered into the last item of the table and the device modifies the unused point pairs automatically in the background to 0,0.
The status (ON or OFF) of the table is shown on a warning message (1) on the bottom line of the display.

All modifications are done on a temporary table. This temporary table becomes valid after exiting.

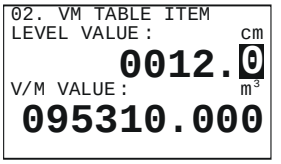
Modifications during the programming procedure have no effect on the measurement and the transmitting.



Entering the point pairs can be done in arbitrary order, because the device sorts according to ascending order. Both sides of the table have to be strictly monotonic increasing. In case of any error, warning message (see: 9th chapter) will appear. When entering again the table an inscription indicates the first wrong line.

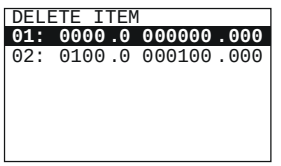
View table:

In VIEW/EDIT TABLE menu point items of the ordered table can be checked. For moving in the list use the ⊙ and ⊙ buttons, for editing the selected item use the Ⓔ button. Exiting from the list can be done by pressing the ⊙ button.



Edit table:

Adding a point pair (ADD ITEM) to the list or pressing Ⓔ button on an existing item, an edit screen will appear. In this edit screen there are two editing filed. Both editing field works as same as editing a parameter. Getting from the first field to the second field press the Ⓔ button. Pressing Ⓔ button in the second field will return back to the previous menu point. When exiting from the last field, the device performs the ordering of the table.



Delete item

Moving in the list can be done with ⊙ and ⊙ buttons, for deleting an item press the Ⓔ button on the selected item. Exiting from the list can be done by pressing the ⊙ button. The table should contain at least 2 items.

8.3.5.4 Tank functions / shape

Parameter: P40:a, where a: 0,1, 2, 3, 4. Default value: 0

Path: CALCULATION / V/M CALC. MODE / TANK FUNCTION/SHAPE

Description:
- STANDING CYL. - Standing cylindrical tank
- STD. CYL. CON. BOT. - Standing cylindrical tank with conical bottom
- STD. RECT. W/CHUTE - Standing rectangular tank with or without chute
- LYING CYLINDRICAL - Lying cylindrical tank
- SPHERICAL - Spherical tank

8.3.5.5 Tank bottom shape

Parameter: P40:b, where b: 0,1, 2, 3 Default value: 0

Path: CALCULATION / V/M CALC. MODE / TANK FUNCTION/SHAPE

Description: This menu only appears, if it has an importance on the selected tank shape type!
- SHAPE0
- SHAPE1
- SHAPE2
- SHAPE3

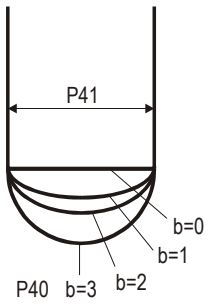
8.3.5.6 Tank dimensions

Parameter: P41- P45 Default value: 0

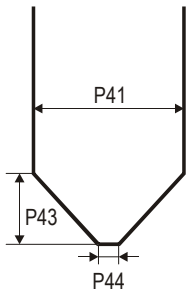
Path: CALCULATION / V/M CALC. MODE / TANK FUNCTION/SHAPE

Description:
- DIM1 (P41)
- DIM2 (P42)
- DIM3 (P43)
- DIM4 (P44)
- DIM5 (P45)

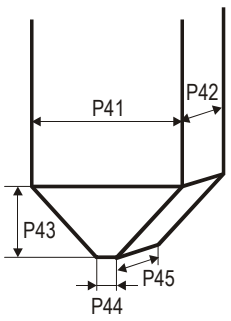
Standing cylindrical tank with hemispherical bottom a = 0



Standing cylindrical tank with conical bottom a = 1 ; b = 0

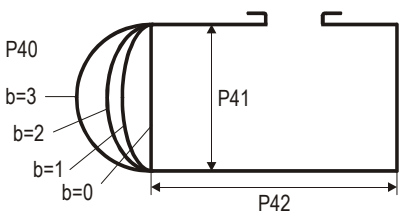


Standing rectangular tank with or without chute a = 2 ; b = 1

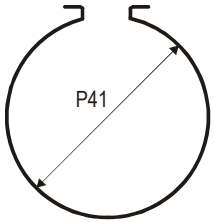


If no chute: P43, P44 and P45 = 0

Lying cylindrical tank a = 3



Spherical tank a = 4 ; b = 0



8.3.6 Service Functions

8.3.6.1 Security codes

User codes

Path: SERVICE / SECURITY / USER LOCK
Description: Setting or unlocking the user security code.
The instrument can be protected against unauthorized programming with a 4 digit PIN (Personal Identification Number) code. If either of the digits differs from 0 the code is active. If zero is specified, then the secret code has been deleted!
In case of Active code, this code is requested at menu entry.

Service code

Path: SERVICE / SECURITY / SERVICE LOCK
Description: Setting of the service code.
Only for trained personnel!

8.3.6.2 Current output test

Parameter: P80
Path: SERVICE / OUTPUT TEST / ANALOG OUTPUT / CURRENT VALUE
Description: Loop current test (mA)
Entering this Parameter the current value which is proportional to the actual measurement value will appear on the display and the output. In loop current test mode, values between 3.9 and 20.5 can be entered. The output current will be set to the entered value. The measured current on the output should be equal to the set value.
In test mode a dialog window warns the user of the fixed output current until the user exits the warning message window.
Exiting can be done by pressing the Ⓔ button.

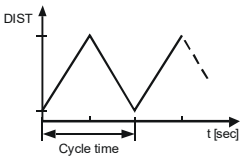
8.3.6.3 Distance simulation

This function facilitates the user to be able to check the calculations (tank formula, table), outputs, and the additional processing instruments connected to the output. NRM transmitters can perform simulation on the value of a constant or a variable. To start simulation the instrument must return to Measurement mode. In Measurement mode if simulation is in progress, an inverse SIM caption appears on the display.

Simulation mode

Parameter: P84:a, where a: 0,1, 2, 3, 4 Default value: OFF
Path: SERVICE / DIST SIMULATION / MODE
Description: Simulation mode:

OFF	No simulation
FIX VALUE	Value of the simulated distance is set acc. to the lowest value of the simulation.
MANUAL VALUE	. . . .
TRIANGLE WAVE	Value of the simulated distance changes linearly between the lowest and highest values with an adjustable cycle time.
SQUARE WAVE	The simulated value jumps between the lowest and highest values with an adjustable cycle time.



Simulation cycle

Parameter: P85 Default value: 60 sec
Path: SERVICE / DIST. SIMULATION / TIME
Description: Cycle time of the simulation

Bottom value of the simulation

Parameter: P86 Default value: 0 mm
Path: SERVICE / DIST. SIMULATION / BOTTOM VALUE
Description: Lowest value of the simulation

Upper value of the simulation

Parameter: P87 Default value: Programmed measurement range
Path: SERVICE / SIMULATION / UPPER VALUE
Description: Highest value of the simulation

8.3.6.4 Load Default Values

Path: SERVICE / DEFAULTS / LOAD DEFAULT
Description: This command loads all default values of the instrument.
After loading the default values the parameters can freely be changed, the effect of the changes does not affect on the measurement until the user exits from the Programming mode and returns to Measurement mode. Before loading the defaults the software asks for a confirmation from the user because all user parameters will be lost!

9. Error Codes

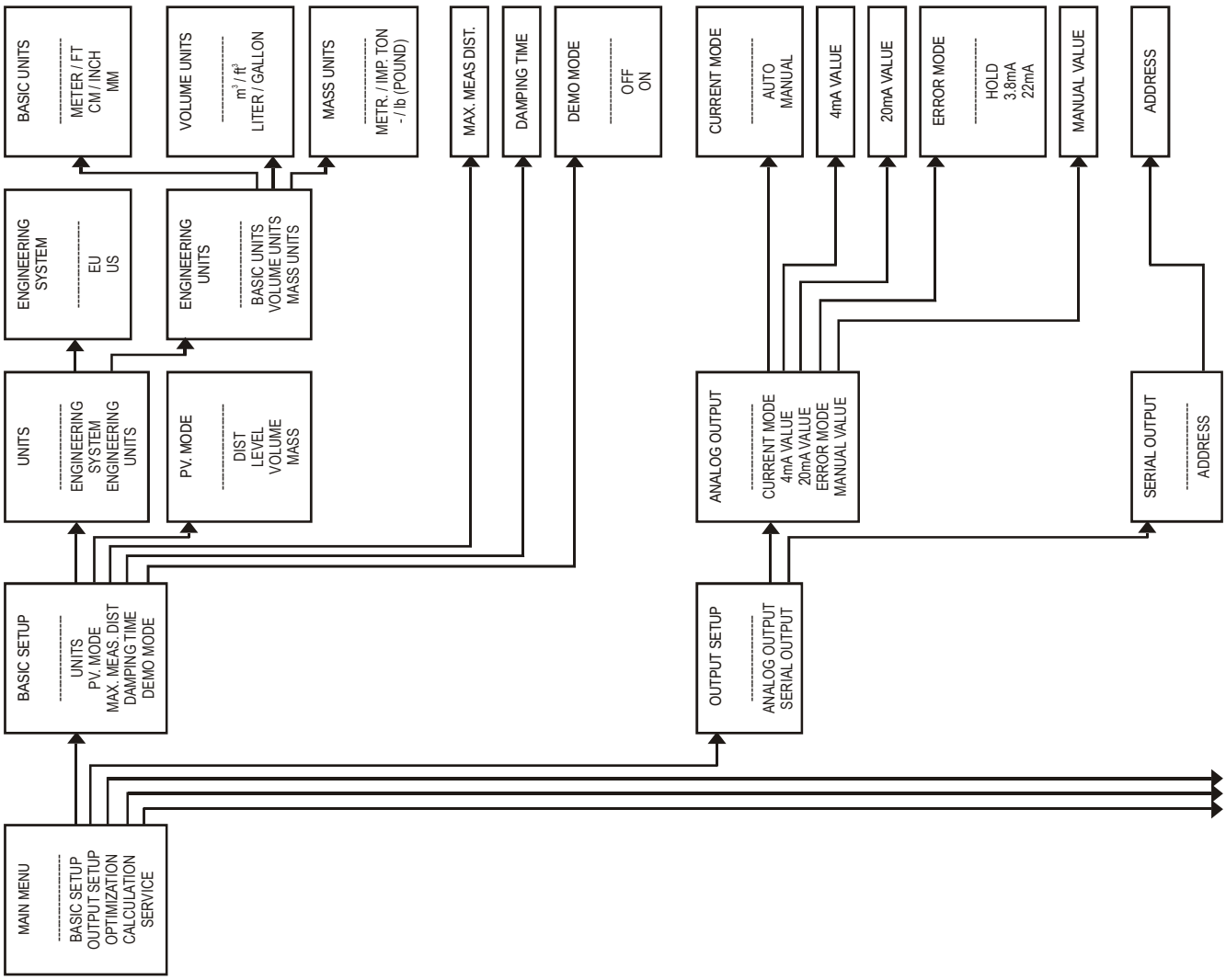
MESSAGE ON THE SCREEN	ERROR DESCRIPTION	PROCEDURE TO DO	CODE
MEMORY ERROR	Memory error	Contact the service!	1
NO ECHO	Sensor error	Contact the service!	2
EE COM. ERROR	Hardware error (EEPROM communication error)	Contact the service!	3
MATH. OVERLOAD	Calculation overflow	Check the programming!	4
SIGNAL IN N.D.B.	Sensor or calibration error (Measured value is in the close-end dead-zone)	Contact the service!	5
SIGNAL IN F.D.B.	Sensor or calibration error (Measured value is in the far-blocking zone)	Check the installation conditions!	7
VMT SIZE ERROR	Linearization error: Less than two items are in the table.	Check the content of the VMT! See: 8.3.5.3.	12
VMT INPUT ERROR	Linearization table error: monotonicity error in the input (level) side of the table.	Check the content of the VMT! See: 8.3.5.3..	13
VMT OUTPUT ERROR	Linearization table error: monotonicity error in the output (volume or mass) side of the table.	Check the content of the VMT! See: 8.3.5.3.	14
VMT INPUT OV.RNG.	Linearization table error: The measured level is greater than the highest level of the table's input side.	Check the content of the VMT! See: 8.3.5.3. Device performs extrapolation according to the last point pairs!	15
EE CHK ERROR	Parameter checksum error.	Check the programming! For recalculate the checksum modify a parameter and return to Measurement mode. If this error still remains, contact the service!	16
INTEGRITY ERROR	Parameter integrity error (Automatically corrected internal error). Only WARNING message.	Check the programming!	17
AC COM. ERROR	Hardware error	Contact the service!	18
CALIBRATION ERROR	Sensor calibration error	Contact the service!	

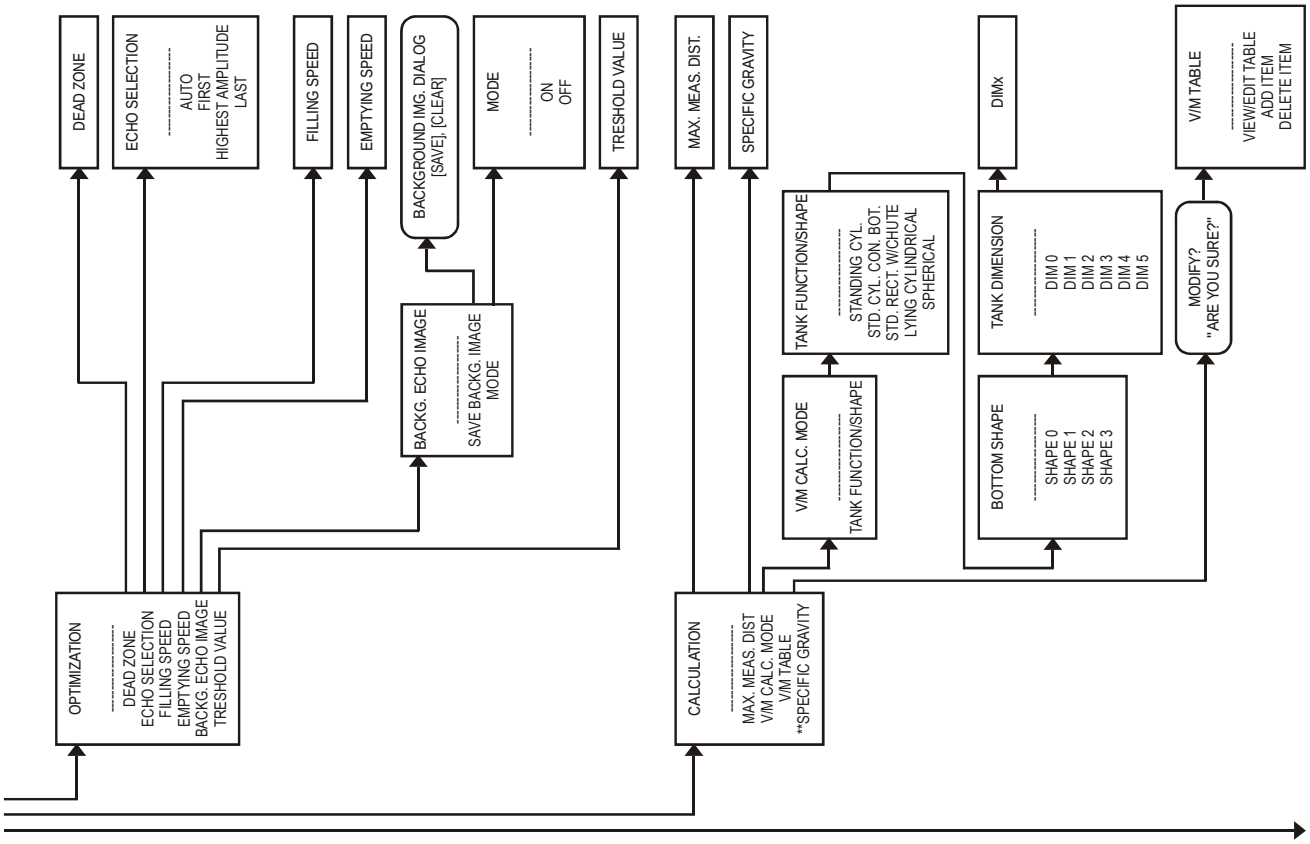
10. NRM Parameter table

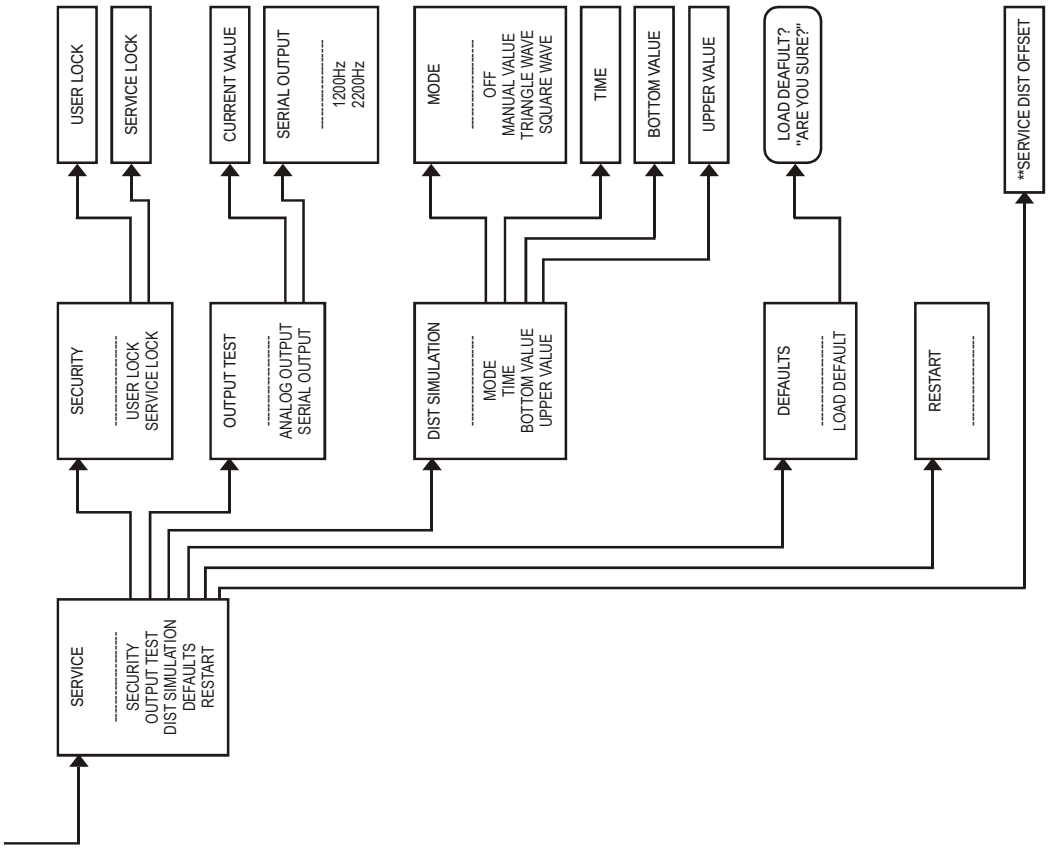
Pxx	Parameter name	d	c	b	a
00	**Engineering system, dimensions**	DEMO mode 0 = Normal mode 1 = Demo mode	Engineering system: 0 = EU 1 = US	Dimension: (EU) 0 = m, 1 = cm, 2 = mm (US) 0 = ft, 1 = inch	
01	**Source of Primary Value (PV)**				0 = DIST, 1 = LEVEL, 2 = VOLUME, 3 = MASS
02	**Selectable dimensions**		Time units: 0= sec 1= min 2= hour 3=day	(VOL/F-EU) 0 = m^3, 1=liter (VOL/F-US) 0 = ft^3, 1 = US gallon (MASS-EU) 0 = tonne, 1= US tonne (MASS-US) 0 = tonne, 1 =lb(pound)	Temperature unit: 0= °C
04	**Max. measuring distance**	Maximal measuring distance of the level transmitter can be defined			
05	**Blocking / DEAD ZONE**	Minimal measuring distance within the ignores all the measurement values			
08	**Fix current output**	Fix forced value on the output current between 3.8 and 20.5 mA for loop current measuring purposes (operation mode : manual)			
10	4 mA	Measured and transmitted value (PV) assigned to 4 mA current value			
11	20 mA	Measured and transmitted value (PV) assigned to 20 mA current value			
12	Output current mode			Operation mode: 0= AUTO 1= MANUAL	Error indication of the current output: 0= HOLD 1= 3.8mA 2= 22mA
19	HART polling address	HART Short Address of the level transmitter (0-15)			
20	Damping time	Damping time of the accurate transmitted (displayed) value in sec. after a high fluctuation in the measured value (0-999			
25	Echo selection in the measuring windo				0 = AUTO 1= FIRST 2= HIGHEST AMPLITUDE 3= LAST
26	Filling speed	Rate of change of the measured value (when distance is decreasing) which can be just followed with the level transmitt			
27	Emptying speed	Rate of change of the measured value (when distance is increasing) which can be just followed with the level transmitte			
29	Threshold value	Threshold limit value (0 - 6 dB) for the received echo evaluation			
32	Specific gravity of the medium	Data for mass calculation			
35	Background mode				Calculating with the saved background image: 0= OFF 1= ON
40	Tank shape				0 = Standing cylindrical tank with dome bottom 1 = Standing cylindrical tank with conica bottom 2 = Standing rectangular tank with or without chute 3 = Lying cylindrical tank 4 = Spherical tank
41-45	Tank dimensions				
47	VMT mode				Operation of the linearization: 0 = OFF, 1 = ON
60	Overall runtime	Elapsed overall operating hours of the level transmitter (working time) with 0.1 hour accuracy. Service data			
61	Runtime after last reset	Elapsed operating hours of the level transmitter since the last turning ON with 0.1 hour accuracy. Service data			
70	Number of echoes	Service data			
71	Position of the measuring window	Service data			
74	Signal-to-noise ratio	Service data			
75	Blocking distance value	Service data			
80	Current output test	Fix forced value on the output current between 3.8 and 20.5 mA for checking the accuracy of the current generator			

84	Simulation				Distance simulation mode: = No simulation = Fix value = Simulation with a manual value: PV=a entered in P86 = Simulation between P86 and P87 levels w P85 cycle time (triangle wave) 4= Simulation between P86 and P87 leve with P85 cycle time (square wave)
85	Cycle time of DIST simulation	Cycle time of the distance simulation in seconds. Default value: 60 sec			
86	Bottom value of the simulation	Initial value of the distance simulation in the selected unit (e.g.: mm). Default value: 0 (mm)			
87	Upper value of the simulation	Final value of the distance simulation in the selected unit (e.g.: mm). Its default value is the same as the programmed maximal measurement range.			

11. Menu map




OPTIMIZATION
DEAD ZONE
ECHO SELECTION
FILLING SPEED
EMPTYING SPEED
BACKG. ECHO IMAGE
TRESHOLD VALUE
DEAD ZONE
ECHO SELECTION
AUTO
FIRST
HIGHEST AMPLITUDE
LAST
FILLING SPEED
EMPTYING SPEED
BACKG. ECHO IMAGE
SAVE BACKG. IMAGE
MODE
BACKGROUND IMG. DIALOG
[SAVE], [CLEAR]
MODE
ON
OFF
TRESHOLD VALUE
CALCULATION
MAX. MEAS. DIST
V/M CALC. MODE
V/M TABLE
**SPECIFIC GRAVITY
MAX. MEAS. DIST.
SPECIFIC GRAVITY
V/M CALC. MODE
TANK FUNCTION/SHAPE
TANK FUNCTION/SHAPE
STANDING CYL.
STD. CYL. CON. BOT.
STD. RECT. W/CHUTE
LYING CYLINDRICAL
SPHERICAL
DIMx
TANK DIMENSION
DIM 0
DIM 1
DIM 2
DIM 3
DIM 4
DIM 5
BOTTOM SHAPE
SHAPE 0
SHAPE 1
SHAPE 2
SHAPE 3
V/M TABLE
VIEW/EDIT TABLE
ADD ITEM
DELETE ITEM
MODIFY?
"ARE YOU SURE?"


SERVICE
SECURITY
OUTPUT TEST
DIST SIMULATION
DEFAULTS
RESTART
SECURITY
USER LOCK
SERVICE LOCK
USER LOCK
SERVICE LOCK
OUTPUT TEST
ANALOG OUTPUT
SERIAL OUTPUT
CURRENT VALUE
SERIAL OUTPUT
1200Hz
2200Hz
DIST SIMULATION
MODE
TIME
BOTTOM VALUE
UPPER VALUE
MODE
OFF
MANUAL VALUE
TRIANGLE WAVE
SQUARE WAVE
TIME
BOTTOM VALUE
UPPER VALUE
DEFAULTS
LOAD DEFAULT
LOAD DEAFULT?
"ARE YOU SURE?"
RESTART
**SERVICE DIST OFFSET

12. Explosion protection, Ex-marking, Ex limit data

TYPE	PLASTIC HOUSING COMPACT	PLASTIC HOUSING INTEGRATED	METAL HOUSING	HIGH TEMPERATURE VERSION WITH METAL HOUSING
IEC Ex	Ex ia IIB T6…T5 Ga/Gb Li: 200µH Ci: 16nF Ui:30V Ii:140mA Pi:1W	Ex ia IIB T6…T5 Ga Li: 200µH Ci: 30nF Ui:30V Ii:140mA Pi:1W	Ex ia IIB T6…T4 Ga Ex ia IIIC T85°C…T110°C Da/Db Li: 200µH Ci: 16nF Ui:30V Ii:140mA Pi:1W	Ex ia IIB T6…T3 Ga Ex ia IIIC T85°C…T180°C Da/Db Li: 200µH Ci: 16nF Ui:30V Ii:140mA Pi:1W
ATEX	⟨Ex⟩ II 1/2 G Ex ia IIB T6…T5 Ga/Gb Li: 200µH Ci: 16nF Ui:30V Ii:140mA Pi:1W	⟨Ex⟩ II 1 G Ex ia IIB T6…T5 Ga Li: 200µH Ci: 30nF Ui:30V Ii:140mA Pi:1W	⟨Ex⟩ II 1G Ex ia IIB T6…T4 Ga ⟨Ex⟩ II 1/2 D Ex ia IIIC T85°C…T110°C Da/Db ⟨Ex⟩ II 1/2 D Ex ta/tb IIIC T85°C…T110°C Da/Db Li: 200µH Ci: 16nF Ui:30V Ii:140mA Pi:1W	⟨Ex⟩ II 1G Ex ia IIB T6…T3 Ga ⟨Ex⟩ II 1/2 D Ex ia IIIC T85°C…T180°C Da/Db ⟨Ex⟩ II 1/2 D Ex ta/tb IIIC T85°C…T180°C Da/Db Li: 200µH Ci: 16nF Ui:30V Ii:140mA Pi:1W

Temperature limit data for hazardous atmospheres:

TEMPERATURE DATA	HAZARDOUS GAS ATMOSPHERES							EXPLOSIVE DUST ATMOSPHERES			
	PLASTIC HOUSING		METAL HOUSING					METAL HOUSING			
						HIGH TEMPERATURE					HIGH TEMPERATURE
	Ex ia IIB		Ex ia IIB					Ex ia IIIC, Ex t IIIC			
Maximum permissible medium temperature	+80°C	+95°C	+80°C	+95°C	+100°C	+130°C	+180°C	+80°C	+95°C	+100°C	+180°C
Maximum permissible ambient temperature	+60°C										
Maximum resulting surface temperature	+80°C	+95°C	+80°C	+95°C	+100°C	+130°C	+133°C	+80°C	+95°C	+100°C	+133°C
Temperature class	**T6**	**T5**	**T6**	**T5**	**T4**	**T4**	**T3**	**T85°C**	**T100°C**	**T110°C**	**T180°C**

13. Conditions of safe operation

To avoid the danger of electrostatic charge accumulation, in case of the NRM with antenna/housing options “P” & “M” types (with plastic electronic housing, plastic antenna enclosure or PP flange) the following safety rule shall be observed:

- The measured medium should be an electrostatic conductor and the electrical resistivity of the measured medium cannot exceed 10^4 Ω.
- The speed and the method of the filling and emptying process should be chosen properly according to the measured medium.
- The material of the plastic antenna enclosures can produce static electricity. The antenna enclosure is allowed to clean only with wet rag.

If the NRM-4 with aluminium housings is installed into a location which requires ‘Ga’ protection level, the units should be mounted that they are protected against rare occurring impacts and friction effects that may be source of a potential ignition.

Meeting the requirements of the technical process

Please carefully consider that all parts of the instrument which possible to come into contact with the measured medium – including the transducer, the sealing and any other mechanical parts – should meet all requirements of the applied technological process, such as the process pressure, temperature and chemical effects of the used technologies. In addition, it is necessary to take into account at devices with PP flange that the PP flange’s mechanical strength is much smaller than the same sized metal flanges.

Changes or modifications not expressly approved by the manufacturer could void the user’s authority to operate the equipment.

14. Maintenance

The NRM does not require maintenance on a regular basis. Repairs during or after the warranty period are carried out exclusively at the manufacturer. The equipment sent back for repairs should be cleaned or neutralised (disinfected) by the user!

15. Technical Information

Type		Integrated (NRM-7)	Compact (NRM-4)		
			Plastic housing	Metal housing	High temperature version
Measured values		level, distance, volume, mass			
Frequency of measurement signal		-25 GHz (K-band)			
Measuring range		0.2 – 23 m			
Linearity error *		<0.5 m; ±25 mm, 0.5-1 m: ±15 mm, 1-1.5 m: ±10 mm, 1.5-8 m: ±3 mm, >8 m: ±0.04 % of the measured distance			
Min. beam angle		11° depending on the antenna type	6° depending on the antenna type		
Min. Ɛr of the medium		1.9 depending on the meas. range	1.4 depending on the meas. range		
Resolution		1 mm			
Temperature error (acc. to EN 61298-3)		0.05 % FSK / 10 °C (-20...+60 °C)			
Power supply		20...36 V_{DC}, ATEX: 20...30 V_{DC}			
Output	Digital communication	4-20 mA + HART®			
	Display		NRM-300P graphical display unit (optional)		
Measuring frequency		10...60 s as per application settings			
Antenna diameter		38 mm, 48 mm, 75 mm, 148 mm			
Antenna material		antenna (horn, parabolic): stainless steel 1.4571 (316 Ti); enclosure: PP, PTFE			antenna (horn, parabolic); stainless steel 1.4571 (316 Ti); enclosure: PTFE
Process temperature		-30...+100 °C (up to max. 2 min.: 120 °C); with PP antenna enclosure: max. 80 °C			-30...+180 °C
Maximal medium pressure		25 bar (at 120 °C), with plastic antenna enclosure or plastic flange: 3 bar (at 25 °C)			
Ambient temperature		-20...+60 °C			
Process connection		thread, flange, Tri-Clamp®, sanitary connection			
Protection		IP68 (Ex: IP67)	IP67		
Electrical connection		LiCY cable 2x0.5 mm² (AWG20) shielded ø 6 mm standard cable length 5 m (max. 30 m)	2 x M20x1.5 cable glands + internal thread for 2 x ½“ NPT cable protective pipe, cable outer diameter ø7-13 mm, wire cross section: max. 1.5 mm²		
Housing material		RP	PBT	paint coated aluminium or stainless steel	
Sealing		FKM, EPDM			
Communication certifications		R&TTE			
Weight		1-1.6 kg		aluminium 2-2.6 kg stainless steel 3.3-3.9 kg	aluminium 2.7-3.3 kg stainless steel 4-4.6 kg

* Under reference conditions: Examined in case of proper application settings at 95% sample rate level. The environment should be free of EMC noises and power supply voltage fluctuations in accordance to the standard, under constant temperature. The reflector should be a plane plate reflector with ideal material, surface and dimensions (min. 3x3 m). The largest false echo should be 20 dB smaller than the useful echo.

16. Order Codes

Compact version (Example: **NRM-4 A P R80 00 0**)

Model	Antenna/ measuring range	Material antenna/ housing	Process connection	Output/version/ approval	Options
NRM-4	**A**= horn antenna DN40, 1½“ / (0.2 … 18 m)	**P** [2)4)]= PP/PBT **M**= 1.4571/ PBT **S**= 1.4571/ aluminum (coated) **K**= 1.4571/ st. steel	**R80** = BSP **R8P** [2)] = BSP connection with PP enclosure **R8T** [2)]= BSP connection with PTFE enclosure **N80** = NPT **N8P** [2)]= NPT connection with PP enclosure **N8T** [2)]= NPT connection with PTFE enclosure **T9T** [2)]= TriClamp 2“ (1.4571) with PTFE enclosure **C9T** [2)]= Pipe coupling DN50 (1.4571) with PTFE enclosure	**00**= 4-20 mA HART / without display/ without **0A**=4-20 mA HART / without display / ATEX **0I**=4-20 mA HART / without display / IECEx **H0** [1)]= 4-20 mA HART / without display (high temp.)/ without **HA** [1)]= 4-20 mA HART / without display (high temp.)/ ATEX **HI** [1)]= 4-20 mA HART / without display (high temp.)/ IECEx **10**= 4-20 mA HART / with display / without **1A**= 4-20 mA HART / with display / ATEX **1I**= 4-20 mA HART / with display/ IECEx **D0** [1)]= 4-20 mA HART / with display (high temp.)/ without **DA** [1)]= 4-20 mA HART / with display (high temp.) / ATEX **DI** [1)]= 4-20 mA HART / with display (high temp.) / IECEx	**0**= without **Y** [2)]= special version (acc. to description)
	B= horn antenna DN50, 2“ / (0.2 … 23 m)		**R90** = BSP **R9P** [2)] = BSP connection with PP enclosure **R9T** [2)]= BSP connection with PTFE enclosure **N90** = NPT **N9P** [2)]= NPT connection with PP enclosure **N9T** [2)]= NPT connection with PTFE enclosure		
	C= horn antenna DN80, 3“ / (0.2 … 23 m)	**M=** 1.4571/ PBT **S=** 1.4571/ aluminum (coated) **K=** 1.4571/ st. steel	**FBE**= DN80 PN25 1.4571 **FCE**= DN100 PN25 1.4571 **FEE**= DN150 PN25 1.4571 **FBP** [3)]= DN80 PP (PN25) **FCP** [3)]= DN100 PP (PN25) **ABE**= 3“ RF 150 psi 1.4571 **ACE**= 4“ RF 150 psi 1.4571 **ABP** [3)]= 3“ RF PP (150 psi) **ACP** [3)]= 4“ RF PP (150 psi) **JBE**= JIS 10K 80A 1.4571 **JCE**= JIS 10K 100A 1.4571 **JBP** [3)]= JIS 80A PP (10K) **JCP** [3)]= JIS 100A PP (10K)		
	D= parabolic antenna DN150, 6“ / (0.4 … 23 m)		**FEE**= DN150 PN25 1.4571 **FEP** [3)]= DN150 PP (PN25) **AEE**= 6“ RF 150 psi 1.4571 **AEP** [3)]= 6“ RF PP (150 psi) **JEE**= JIS 10K 150A 1.4571 **JEP** [3)]= JIS 150A PP (10K)		

1) Only possible with material combination „S“ or „K“; not available with PP enclosure
2) Not available for Ex-version
3) Hole pattern as per specification in brackets (xx): p_{max} is 3 bar
4) Only in combination with process connection “xxP”

Integrated version (Example: **NRM-7 A P R80 P0 0**)

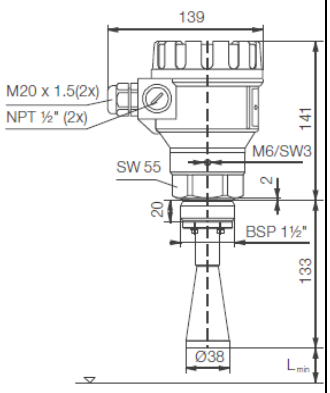
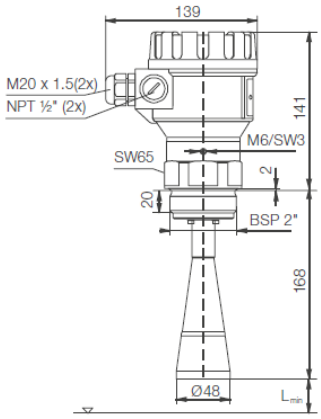
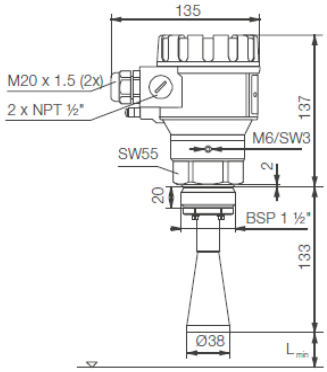
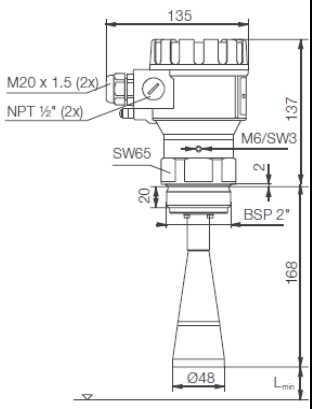
Model	Antenna/ measuring range	Material antenna/ housing	Process connection	Output/version/ approval	Options
NRM-7	**A**= horn antenna DN40, 1½“ / (0.2 … 18 m)	**P** [1)4)]= PP/PBT **M**= 1.4571/ PBT	**R80** = BSP **R8P** [1)] = BSP connection with PP enclosure **R8T** [1)]= BSP connection with PTFE enclosure **N80** = NPT **N8P** [1)]= NPT connection with PP enclosure **N8T** [1)]= NPT connection with PTFE enclosure **T9T** [1)]= TriClamp 2“ (1.4571) with PTFE enclosure **C9T** [1)]= Pipe coupling DN50 (1.4571) with PTFE enclosure	**P0 =** 4-20 mA HART® / without display (integrated) / without **PA**[3)] **=** 4-20 mA HART® / without display (integrated) / ATEX Ex ia **PI**[3)] **=** 4-20 mA HART® / without display (integrated) / IECEx	**0**= without **Y** [1)]= special version (acc. to description) **Y**[1)] = special cable length (max. 30 m)
	B= horn antenna DN50 / (0.2 … 23 m)		**R90** = BSP **R9P** [1)] = BSP connection with PP enclosure **R9T** [1)]= BSP connection with PTFE enclosure **N90** = NPT **N9P** [1)]= NPT connection with PP enclosure **N9T** [1)]= NPT connection with PTFE enclosure		
	C= horn antenna DN80 / (0.2 … 23 m)	**M=** 1.4571/ PBT	**FBE**= DN80 PN25 1.4571 **FCE**= DN100 PN25 1.4571 **FEE**= DN150 PN25 1.4571 **FBP** [2)]= DN80 PP (PN25) **FCP** [2)]= DN100 PP (PN25) **ABE**= 3“ RF 150 psi 1.4571 **ACE**= 4“ RF 150 psi 1.4571 **ABP** [2)]= 3“ RF PP (150 psi) **ACP** [2)]= 4“ RF PP (150 psi) **JBE**= JIS 10K 80A 1.4571 **JCE**= JIS 10K 100A 1.4571 **JBP** [2)]= JIS 80A PP (10K) **JCP** [2)]= JIS 100A PP (10K)		

1) Not available for Ex version
2) Hole pattern as per specification in brackets (xx): p_{max} is 3 bar
3) Ex version comes with 5 m cable only
4) Only in combination with process connection “xxP”

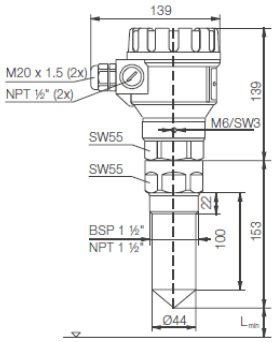
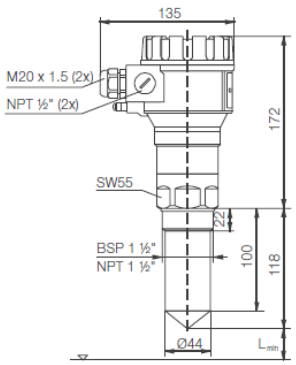
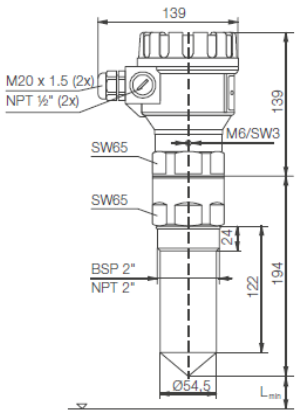
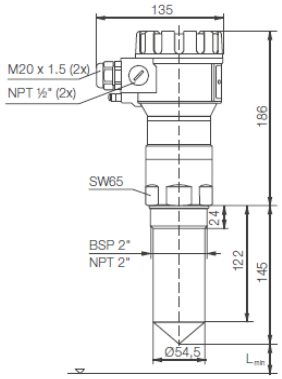
Accessories

Description	Order code
HART® USB modem	HARTCOMM
Display	NRM-300P

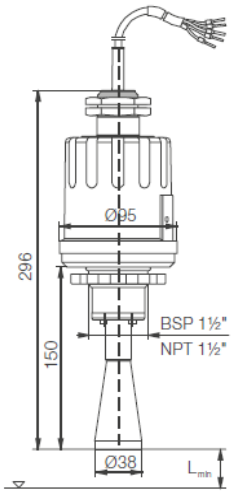
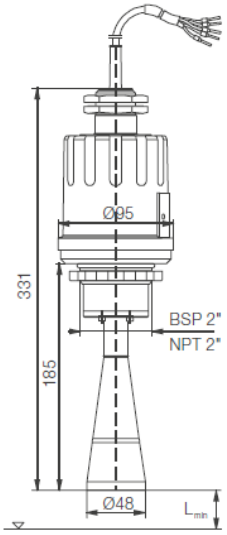
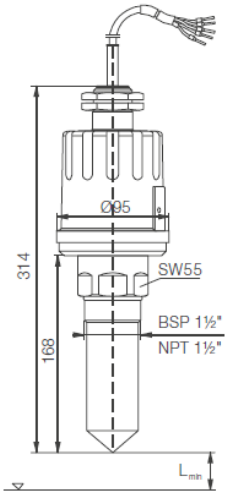
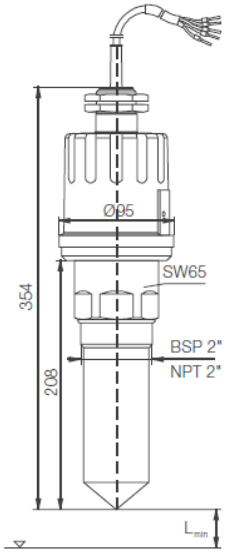
17. Dimensions

	Aluminium housing, 1½" horn antenna	Aluminium housing, 2" horn antenna	Plastic housing, 1½" horn antenna	Plastic housing, 2" horn antenna
				
Material of wetted parts	1.4571, PTFE	1.4571, PTFE	1.4571, PTFE	1.4571, PTFE
Process connection	1½" BSP, 1½" NPT	2" BSP, 2" NPT	1½" BSP, 1½" NPT	2" BSP, 2" NPT
Beam angle (-3 dB)	19°	16°	19°	16°
Dead zone L_{min} *	200 mm	200 mm	200 mm	200 mm

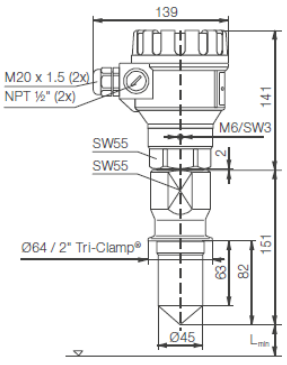
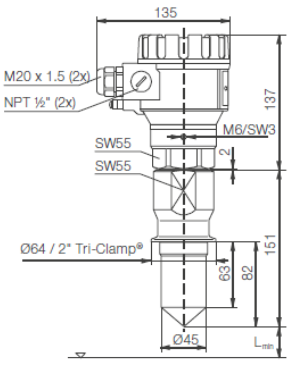
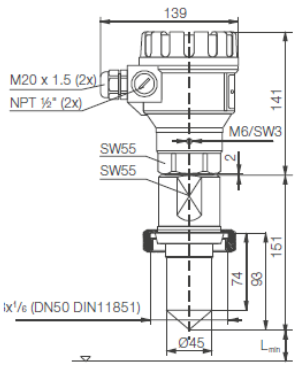
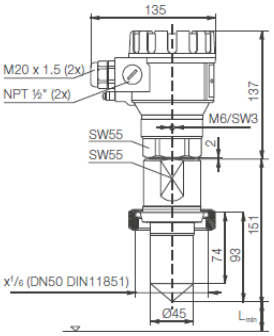
* Under reference conditions

	Aluminium housing, 1½" antenna with PP enclosure	Plastic housing, 1½" PP encapsulated antenna	Aluminium housing, 2" antenna with PP enclosure	Plastic housing, 2" PP encapsulated antenna
				
Material of wetted parts	PP	PP	PP	PP
Process connection	1½" BSP, 1½" NPT	1½" BSP, 1½" NPT	2" BSP, 2" NPT	2" BSP, 2" NPT
Dead zone L_{min} *	300 mm	300 mm	300 mm	300 mm

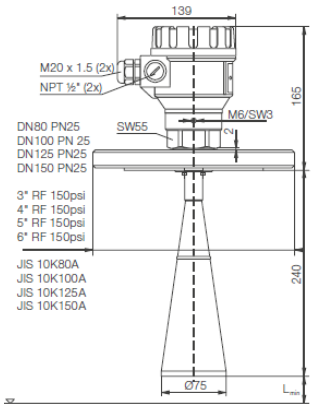
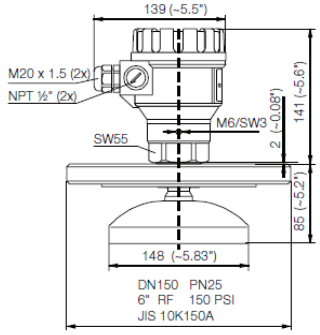
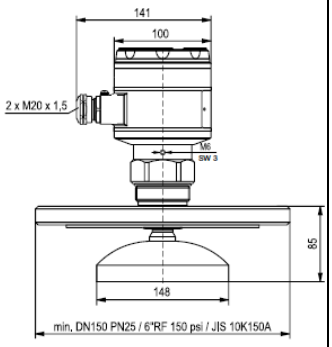
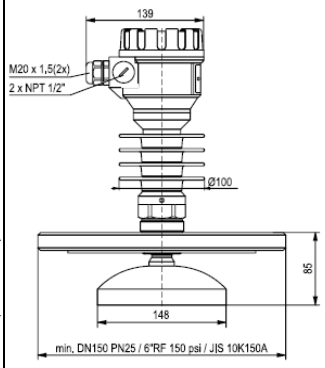
* Under reference conditions

	Integrated plastic housing, 1½" horn antenna	Integrated plastic housing, 2" horn antenna	Integrated plastic housing, 1½" PP encapsulated antenna	Integrated plastic housing, 2" PP encapsulated antenna
				
Material of wetted parts	1.4571, PTFE, PP	PP	1.4571, PTFE, PP	PP
Process connection	1½" BSP, 1½" NPT	2" BSP, 2" NPT	1½" BSP, 1½" NPT	2" BSP, 2" NPT
Beam angle (-3 dB)	19°	16°	25°-27°	25°-27°
Dead zone L_{min} *	200 mm	200 mm	300 mm	300 mm

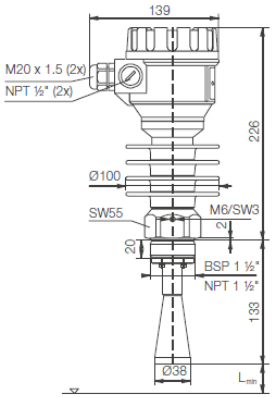
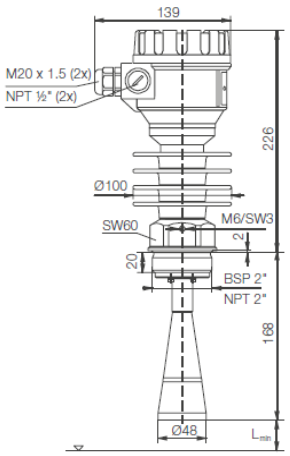
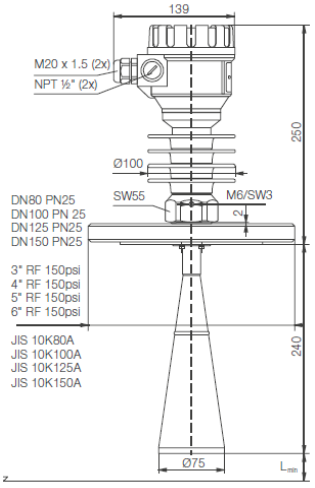
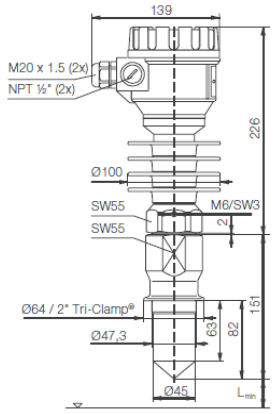
* Under reference conditions

	Aluminium housing, 2" Tri-Clamp® antenna with PTFE enclosure, hygienic version	Plastic housing, 2" Tri-Clamp® antenna with PTFE enclosure, hygienic version	Aluminium housing, DN50 pipe coupling antenna with PTFE enclosure, hygienic version	Plastic housing, DN50 pipe coupling antenna with PTFE enclosure, hygienic version
				
Material of wetted parts	1.4571, PTFE, PP	1.4571, PTFE, PP	1.4571, PTFE, PP	1.4571, PTFE, PP
Process connection	2" Tri-Clamp®	2" Tri-Clamp®	DN50 (DIN 11851)	DN50 (DIN 11851)
Dead zone L_{min} *	300 mm	300 mm	300 mm	300 mm

* Under reference conditions

	Aluminium housing, horn antenna with flange	**Aluminium or plastic housing, parabolic antenna with flange**	**Stainless steel housing, parabolic antenna with flange**	**High temperature version, aluminium housing, parabolic antenna with flange**
				
Material of wetted parts	1.4571, PTFE	1.4571, PTFE	1.4571, PTFE	1.4571, PTFE
Process connection	flange	flange	flange	flange
Beam angle (-3 dB)	11°	6°	6°	6°
Dead zone L_{min} *	200 mm	200 mm	200 mm	200 mm

* Under reference conditions

	High temperature version, aluminium housing, 1½ " horn antenna	**High temperature version, aluminium housing, 2 " horn antenna**	**High temperature version, aluminium housing, horn antenna with flange**	**High temperature version, aluminium housing, 2" Tri-Clamp® antenna with PTFE enclosure, hygienic version**
				
Material of wetted parts	1.4571, PTFE	1.4571, PTFE	1.4571, PTFE	1.4571, PTFE
Process connection	1½" BSP, 1½" NPT	2" BSP, 2" NPT	flange	2" Tri-Clamp®
Beam angle (-3 dB)	19°	16°	11°	25°-27°
Dead zone L_{min} *	200 mm	200 mm	200 mm	300 mm

* Under reference conditions

18. EU Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Microwave compact level transmitter **Model: NRM**

to which this declaration relates is in conformity with the standards noted below:

EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

EN 61326-2-3:2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-3: Particular requirements - Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning

EN 61010-1:2011 Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements

EN 302372-1:2017 Electromagnetic compatibility and Radio spectrum Matters (ERM) - Short Range Devices (SRD) - Equipment for Detection and Movement - Tanks Level Probing Radar (TLPR) operating in the frequency bands 5,8 GHz, 10 GHz, 25 GHz, 61 GHz and 77 GHz - Part 1: Technical characteristics and test methods

EN 302729:2017 Short Range Devices (SRD) - Level Probing Radar (LPR) equipment operating in the frequency ranges 6 GHz to 8,5 GHz, 24,05 GHz to 26,5 GHz, 57 GHz to 64 GHz, 75 GHz to 85 GHz - Harmonised Standard covering the essential requirements of article 3.2 of the EU Directive 2014/53/EU

EN 50581:2013 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Also, the following EC guidelines are fulfilled:

2014/30/EU	**EMC Directive**
2014/35/EU	**Low Voltage Directive**
2014/53/EU	**RED Directive**
2011/65/EU	**RoHS**
2015/863/EU	Delegated Directive (RoHS III)

Hofheim, 02 June 2021

H. Volz
General Manager

M. Wenzel
Proxy Holder

19. EU Declaration of Conformance (ATEX)

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Microwave compact level transmitter **Model: NRM-... (Ex version)**

to which this declaration relates is in conformity with the standards noted below:

EN 60079-0:2013 Explosive atmospheres - Part 0: Equipment - General requirements

EN 60079-0:2013/A11:2014 Explosive atmospheres - Part 0: Equipment - General requirements

EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

EN 61326-2-3:2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-3: Particular requirements - Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning

EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements

EN 302372-1: 2017 Electromagnetic compatibility and Radio spectrum Matters (ERM) - Short Range Devices (SRD) - Equipment for Detection and Movement - Tanks Level Probing Radar (TLPR) operating in the frequency bands 5,8 GHz, 10 GHz, 25 GHz, 61 GHz and 77 GHz - Part 1: Technical characteristics and test methods

EN 302729:2017 Short Range Devices (SRD) - Level Probing Radar (LPR) equipment operating in the frequency ranges 6 GHz to 8,5 GHz, 24,05 GHz to 26,5 GHz, 57 GHz to 64 GHz, 75 GHz to 85 GHz - Harmonised Standard covering the essential requirements of article 3.2 of the EU Directive 2014/53/EU

EN 60079-11:2012 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

EN 60079-31:2014 Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"

EN 50581:2013 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Also, the following EC guidelines are fulfilled:

2014/30/EU **EMC Directive**
2014/53/EU **RED Directive**
2014/34/EU **ATEX**
Quality Management Production
Certificate number: BVS 21 ATEX ZQS/E110
Notified body: DEKRA Exam GmbH
Identification number: 0158
2011/65/EU **RoHS**
2015/863/EU Delegated Directive (RoHS III)

Hofheim, 02 June 2021

H. Volz
General Manager

M. Wenzel
Proxy Holder

20. ATEX certificate

A NAH által NAH-6-0027/2013 számon akkreditált terméktanúsító szervezet. /
Product certification organisation accredited by NAH under No. NAH-6-0027/2013

Robbanásbiztos Berendezések BKI Vizsgáló Állomása Ex

(1)

EU-Típus Vizsgálati Tanúsítvány
EU-Type Examination Certificate

(2) A potenciálisan robbanásveszélyes környezetben történő alkalmazásra szánt berendezések, védelmi rendszerek 2014/34/EU Direktíva /

Equipment or Protective Systems Intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU

(3) EU-Típus Vizsgálati Tanúsítvány száma / EU-Type Examination Certificate Number: **BKI17ATEX0025 X**

(4) A gyártmány / Product:

Kétvezetékes sugárzott mikrohullámú szinttávadó család / Two-wire non-contact microwave level transmitter family

Típusa / Type:

NRM-****

(5) Gyártó / Manufacturer:

KOBOLD Messring GmbH

(6) Cím / Address:

Nordring 22-24,
65719, Hofheim am Taunus
Germany

(7) A gyártmány és annak változatai a jelen tanúsítvány vonatkozó pontjában vannak feltüntetve. / This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) A ExVÁ Robbanásbiztos Berendezések Vizsgáló Állomása Kft., 1418 sz. kijelölt testület, a 2014. február 26-i Európai Parlament és Tanács 2014/34/EU Direktívájának 17. cikkelye szerint tanúsítja, hogy a gyártmány megfelel az Alapvető Egészségügyi és Biztonsági Követelményeknek a Direktíva II. számú Mellékletében a potenciálisan robbanásveszélyes térben alkalmazásra szánt gyártmányok tervezése és gyártása szerint. / ExVÁ Testing Station for Explosion Proof Equipment Company Limited, notified body number 1418 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

A vizsgálat eredményeit az alábbi nyilvántartási számú bizalmas vizsgálati dokumentáció tartalmazza: / The examination and test results are recorded in confidential report No.: **R-012-17**

Ez a tanúsítvány csak a maga egészében és változatlan formában használható fel, mellékleteivel együtt. / This certificate may only be reproduced in its entirety and without any changes, schedule included.

Lapszám / Page:1/7

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EU-Típus Vizsgálati Tanúsítvány/
EU-Type Examination Certificate

(9) Az alapvető egészségügyi és biztonsági követelményeknek való megfelelést a következők biztosítják: / Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0:2012 (=MSZ EN 60079-0:2013)
EN 60079-0:2012 / A11:2013 (=MSZ EN 60079-0:2013 / A11:2014)
EN 60079-11: 2012 (=MSZ EN 60079-11:2012)
EN 60079-31:2014 (=MSZ EN 60079-31: 2014)
kivéve a 18. pontban felsorolt követelményekre vonatkozóan.
except in respect of those requirements listed at item 18 of the Schedule.

(10) A tanúsítvány száma után álló „X" jel azt mutatja, hogy a gyártmány speciális feltételek megtartása mellett felel meg a jelen tanúsítvány vonatkozó pontjában feltüntetett biztonságos alkalmazás feltételeinek. / If the sign „X" is placed after the certificate number, it indicates that the product is subject to Specific Conditions of Use specified in the schedule to this certificate.

(11) Jelen EU-TÍPUS VIZSGÁLATI TANÚSÍTVÁNY csak a megjelölt gyártmány tervezésére és kivitelezésére vonatkozik. A jelen Direktíva további követelményei vonatkoznak a gyártmány gyártási folyamatára és szállítására. Ezek nem tartoznak e tanúsítvány alá. / This EU-TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified product. Further requirements of this Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

(12) A gyártmány jele a következő / The marking of the product shall include the following:

Ex II 1/2 G Ex ia IIB T6...T5 Ga/Gb	(műanyag házas kompakt kivitel / compact, with plastic housing)
Ex II 1 G Ex ia IIB T6...T5 Ga	(műanyag házas integrált kivitel / integrated, with plastic housing)
Ex II 1 G Ex ia IIB T6...T4 Ga	(fém házas kivitel / metal housing)
Ex II 1 G Ex ia IIB T6...T3 Ga	(fém házas kivitel, magas hőmérs. / metal housing, high temp.)
Ex II 1/2 D Ex ia IIIC T85°C...T110°C Da/Db	(fém házas kivitel / metal housing)
Ex II 1/2 D Ex ia IIIC T85°C...T180°C Da/Db	(fém házas kivitel, mag. hőm. / metal housing, high t.)
Ex II 1/2 D Ex ta/tb IIIC T85°C...T110°C Da/Db	(fém házas kivitel / metal housing)
Ex II 1/2 D Ex ta/tb IIIC T85°C...T180°C Da/Db	(fém házas kivitel, magas hőmérsékletre / metal housing, high temperature)

$T_{körny}$ / T_{amb}= -20°C ... +60°C **$T_{techn.}$ / $T_{process}$= 15.4 pont táblázata szerint / according to table of clause 15.4**

ExVÁ Robbanásbiztos Berendezések Vizsgáló Állomása Kft.

ExVÁ Robbanásbiztos Berendezések Vizsgáló Állomása Kft.
ExVÁ Testing Station for Explosion Proof Equipment Ltd.
Hungary, 1037 Budapest, Mikoviny u. 2-4.
Tel.: 36 1 250 1720
E-mail: bkiex@bki.hu

Molnár Edit
Tanúsító Szervezet Vezető /
Head of Certification Body

Budapest, 2017. augusztus / August 29.

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(13) Melléklet / Schedule

(14) EU-TÍPUSVIZSGÁLATI TANÚSÍTVÁNY szám / EU-TYPE EXAMINATION CERTIFICATE N^{O} BKI17ATEX0025 X

(15) Gyártmány leírása / Description of Product

15.1 Az NRM-****** szinttávadó egy impulzus üzemű radar, amely 24 GHz-es mikrohullámú frekvencián üzemel (K-sáv). A készülékeket ömlesztett anyagokat vagy folyadékot tartalmazó nagyméretű tartályok nagy pontosságú szintmérésére fejlesztették ki. Az érintésmentes mikrohullámú szinttávadó működése a jel visszaverődés futási idejének mérésén, az ún. TDR módszeren alapul. A futási időt elektronika méri és dolgozza fel, majd távolsággá, szintté vagy térfogattal arányos jellé alakítja át, amely lehet 4-20 mA-es analóg jel, vagy digitális átvitel HART kommunikációval.
A készülék háromféle védelmi móddal rendelkezhet: "Ex ia IIB" védelemmel éghető gázok vagy gőzök által veszélyeztetett környezetek számára, és "Ex ia IIIC" vagy "Ex ta/tb IIIC" védelemmel éghető porok által veszélyeztetett környezetek számára. /

The level transmitter type NRM-****** is a Pulse Burst Radar operating at 24 GHz (K-band) microwave frequency. The instruments are designed for high precision level measurement in large storage tanks containing bulk solids or liquids. The operation of the non-contact microwave level transmitters is based on the measurement of the time of flight of the reflected signals, so-called the Time Domain Reflectometry (TDR) method. The time of flight of the reflected signal is measured and processed by the electronics, and then this is converted to distance, level or volume proportional data which can be 4–20 mA analogue, or digital transmitted signal by HART communication.
The equipment is available in three different type of protection: "Ex ia IIB" for explosive gas atmospheres and "Ex ia IIIC" or "Ex ta/tb IIIC" for combustible dust atmospheres.

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15.2 Típusjel / Type mark

NRM-

Opciók / Options

0	opció nélkül / without option

Version, approval / Version, approval

0A	kijelző nélkül / without display, ATEX (Ex ia IIB)
05	kijelző nélkül / without display, ATEX (Ex ia IIIC)*
06	kijelző nélkül / without display, ATEX (Ex ta/tb IIIC)*
1A	kijelzővel / with display, ATEX (Ex ia IIB)
15	kijelzővel / with display, ATEX (Ex ia IIIC)*
16	kijelzővel / with display, ATEX (Ex ta/tb IIIC)*
HA	kijelző nélkül, magas hőmérséklet / without display, high temperature, ATEX (Ex ia IIB)
H5	kijelző nélkül, magas hőmérséklet / without display, high temperature, ATEX (Ex ia IIIC)*
H6	kijelző nélkül, magas hőmérséklet / without display, high temperature, ATEX (Ex ta/tb IIIC)*
DA	kijelzővel, magas hőmérséklet / with display, high temperature, ATEX (Ex ia IIB)
D5	kijelzővel, magas hőmérséklet / with display, high temperature, ATEX (Ex ia IIIC)*
D6	kijelzővel, magas hőmérséklet / with display, high temperature, ATEX (Ex ta/tb IIIC)*
PA	kijelző nélkül, integrált / without display, integrated, ATEX (Ex ia IIB)

Technológiai csatlakozó / Process connection

R80	BSP (DN40)	ABB	3" RF, PP
R90	BSP (DN50)	ACP	4" RF, PP
FBE	DN 80 PN25, 1.4571	ADP	5" RF, PP
FCE	DN 100 PN25, 1.4571	AEP	6"RF, PP
FDE	DN 125 PN25, 1.4571	JBE	JIS 10K80A, 1.4571
FEE	DN 150 PN25, 1.4571	JCE	JIS 10K100A, 1.4571
FBP	DN 80, PP	JDE	JIS 10K125A, 1.4571
FCP	DN 100, PP	JEE	JIS 10K150A, 1.4571
FDP	DN 125, PP	N80	NPT, DN40
FEP	DN 150, PP	N90	NPT, DN50
ABE	3" RF 150 psi, 1.4571	JBP	JIS 80A , PP
ACE	4" RF 150 psi, 1.4571	JCP	JIS 100A, PP
ADE	5" RF 150 psi, 1.4571	JDP	JIS 125A, PP
AEE	6" RF 150 psi, 1.4571	JEP	JIS 150A, PP

Antenna , ház anyaga / Antenna, housing material

M	1.4571; Műanyag ház / Plastic housing (PBT)
S	1.4571; Alumínium ház / Aluminium housing
K	1.4571; Rozsdamentes acél ház / Stainless steel housing

Antenna, átmérő / Antenna, diameter

A	DN40 / 1½"
B	DN50 / 2"
C	DN80 / 3"
D	DN150 / 6"
E	DN250 / 10"
F	Planár / 2" Planar / 2" **
G	Planár / 122 mm / Planar / 122 mm **

Típus / Type (4, 7)

4	kompakt változat / compact version
7	integrált változat / integrated version

*csak aluminium vagy rozsdamentes acél házzal / only with aluminium or stainless steel housing
**csak müanyag házas k vitelben / only with plastic housing

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15.3 Műszaki adatok / Technical data
Villamos adatok / Electrical data

- Ex ta/tb védelmű berendezés / Ex ta/tb protected equipment:
  tápfeszültség / power supply U_{max} = 20 … 30 VDC
  áramerősség / current I_{max} = 100 mA vagy 32 mA az alkalmazott biztosítótól függően / depending on the used fuse
- Gyújtószikramentes áramköri típus: (+ és – csatlakozók) Intrinsically safe type: (+ and – terminals)
  csak tanúsított gyújtószikramentes [Ex ia Ga] IIB védelmi módú áramkörhöz csatlakoztatható a következő maximális értékekkel: / only for connection to a certified intrinsically safe circuit [Ex ia Ga] IIB with following maximum values:
  U_i = 30 V
  I_i = 140 mA
  P_i = 1 W
  C_i ≤ 16 nF (kábellel / with cable : 30 nF)
  L_i ≤ 200 µH
- Kimenet / Output:
  - analóg / analogue: 4 - 20 mA (3.9 – 20.5 mA)
  - digitalis kommunikáció / digital communication: HART (minimális lezáró ellenállás / minimal terminal resistor: 250 Ohm)

15.4 Hőmérséklet-tartomány / Temperature range

HŐMÉRSÉKLET ADATOK / TEMPERATURE DATA	ÉGHETŐ GÁZ KÖRNYEZET / EXPLOSIVE GAS ATMOSPHERES							ÉGHETŐ POR KÖRNYEZET / COMBUSTIBLE DUST ATMOSPHERES			
	MŰANYAG HÁZ / PLASTIC HOUSING		FÉM HÁZ / METAL HOUSING					FÉM HÁZ / METAL HOUSING			
						MAGAS HŐMÉRS. / HIGH TEMP.					MAGAS HŐMÉRS. / HIGH TEMP.
	Ex ia IIB		Ex ia IIB					Ex ia IIIC, Ex ta/tb IIIC			
maximálisan megengedett közeghőmérséklet / maximum permissible medium temperature	+80°C	+95°C	+80°C	+95°C	+100°C	+130°C	+180°C	+80°C	+95°C	+100°C	+180°C
maximálisan megengedett környezeti hőmérséklet / maximum permissible ambient temperature	+60°C										
maximálisan létrejövő felületi hőmérséklet / maximum created surface temperature	+80°C	+95°C	+80°C	+95°C	+100°C	+130°C	+133°C	+80°C	+95°C	+100°C	+133°C
hőmérsékleti osztály / temperature class	T6	T5	T6	T5	T4	T4	T3	T85°C	T100°C	T110°C	T180°C

15.5 Védettség / Ingress protection: IP 67

15.6 Érintésvédelem / Electric shock protection:

Ex ta/tb védelmű berendezések / Ex ta/tb protected equipment: IEC 60364-4-41 szerinti FELV rendszer / FELV system according to IEC 60364-4-41

Gyújtószikramentes berendezések / Intrinsically safe equipmen : IEC 60364-4-41 szerinti SELV rendszernek / SELV system according to IEC 60364-4-41

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(16) Jegyzőkönyv / Report N°

R-012-17 ATEX Értékelő Jelentés / ATEX Assessment Report 2017.08.28.

(17) Biztonságos üzemeltetés feltételei / Special conditions of Use

17.1 "Ex ta/tb" védelmű berendezések: a készülékeket a védelmi módjuknak megfelelő, min. Ex tb IIIC védelmi jelű tanúsított kábelbevezetővel kell szerelni. /
Equipment with type of protection "Ex ta/tb": the equipment must be assembled with use of min. Ex tb IIIC protected certified cable glands, adequate of their protection modes.

17.2 "Ex ia" védelmű, IIB alkalmazási alcsoportú berendezés műanyag házzal:
Mivel a tokozat műanyagból készült, a felületet csak nedves ruhával lehet tisztítani az elektrosztatikus töltődés megelőzése céljából. /
Type "Ex ia" protected equipment for IIB gas sub-group, with plastic housing:
Because the enclosure of electronic circuits is made of plastic, the surface can be cleaned only with damp cloth to avoid electrostatic charge.

17.3 "Ex ia" védelmű, IIB alkalmazási alcsoportú berendezés alumínium házzal:
Mivel az elektronika tokozata alumíniumból készült, ezért ha olyan helyen szerelik fel, ahol a készüléknek Ga védelmi szinttel kell rendelkeznie, akkor úgy kell telepíteni, hogy elkerülhetők legyenek még a ritka esetben előforduló ütődési és súrlódási szikrákból eredő gyújtóforrások. /
Type "Ex ia" protected equipment for IIB gas sub-group, with aluminium housing:
Because the enclosure of electronic circuits is made of aluminium, if it is mounted in an area where the apparatus has an equipment protection level Ga, it must be installed to avoid the event of rare incidents, ignition sources due to impact and friction sparks.

17.4 "Ex ta/tb" védelmű berendezések: A tokozatot feszültség alatti állapotban tilos kinyitni! /
Equipment with type of protection "Ex ta/tb": The enclosure must not open while it is energized!

(18) Alapvető egészségügyi és biztonsági követelmények / Essential Health and Safety Requirements

Amellett, hogy az alapvető egészségügyi és biztonsági követelményeknek való megfelelést a 9. pontban felsorolt szabványok biztosítják, a következő megfontolások vonatkoznak a gyártmányra, melyek megfelelősége jegyzőkönyvben bizonyított:/
In addition to the Essential Health and Safety Requirements (EHSRs) covered by the standards listed at item 9, the following are considered relevant to this product, and conformity is demonstrated in the report:

Záradék / Clause	Tárgy / Subject
N/A	N/A

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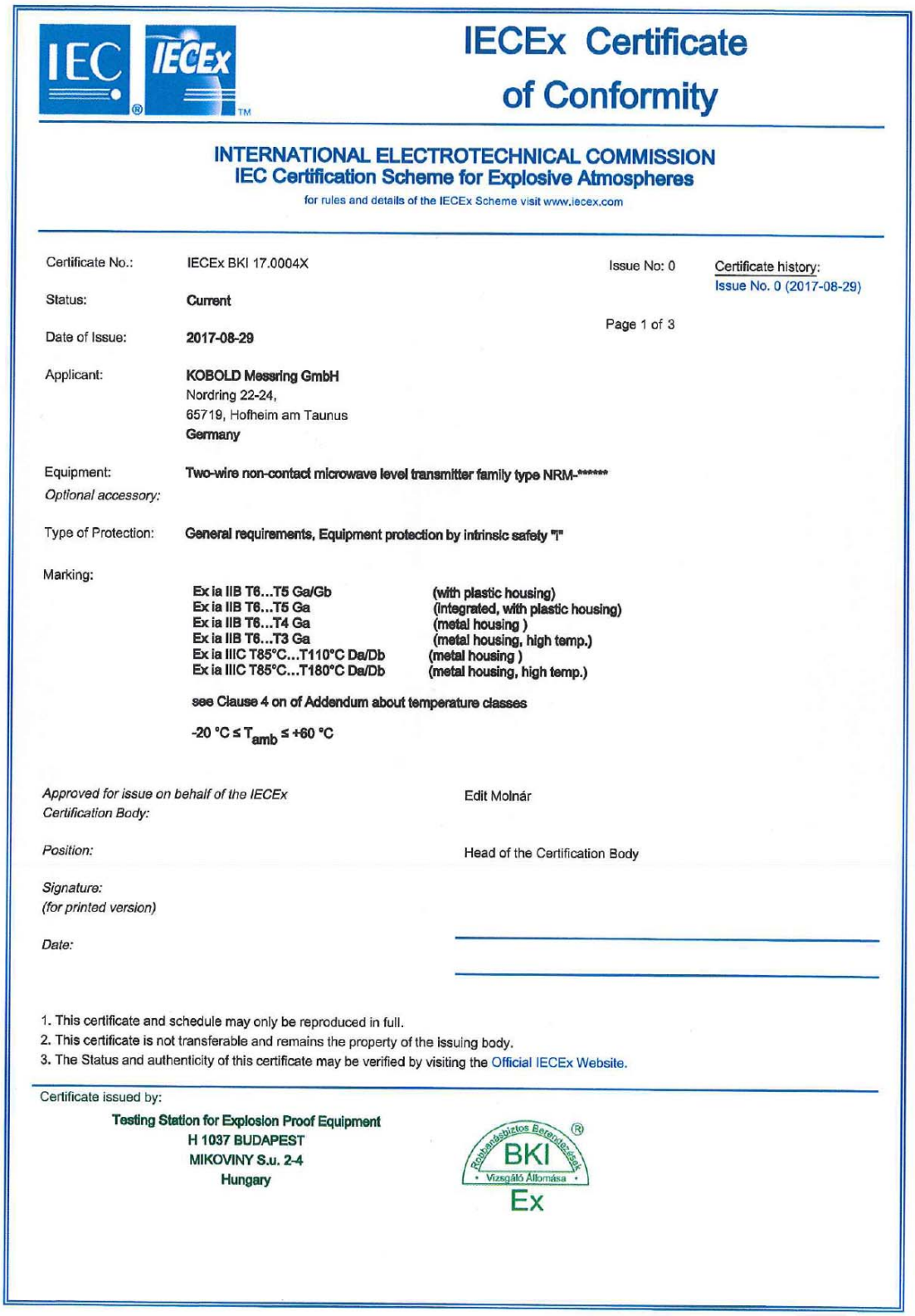
(19) **Rajzok és dokumentációk / Drawings and Documents**

Szám / Number	Lap / Sheet	Kiadás / Issue	Dátum / Date	Leírás / Description
-	2	-	2017.08.15	EU-Megfelelőségi Nyilatkozat / EU-Declaration of Conformity
WPM-140-8V-050-01	1	Version 0	2017.08.10.	KOBOLD ATEX (NRM-7) Adattábla / Ex data plate
WES-140-8V-050-01	1	Version 0	2017.08.10.	KOBOLD ATEX (NRM-4) Adattábla / Ex data plate
NRM K01/0617	42	Rev 3	2017 August	Használati utasítás / Operating instructions
-	1	324.001_0	2017.07.10	rendelési jelölés / cross reference codes
-	1	-	2017.05.23	Jóváhagyó levél / Letter of Consent

ExVÁ Robbanásbiztos Berendezések Vizsgáló Állomása Kft.

Molnár Edit
Tanúsító Szervezet Vezető /
Head of Certification Body

21. IECEx certificate



IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: IECEx BKI 17.0004X
Issue No: 0
Certificate history:
Issue No. 0 (2017-08-29)

Status: **Current**

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Date of Issue: **2017-08-29**

Applicant: **KOBOLD Messring GmbH**
Nordring 22-24,
65719, Hofheim am Taunus
Germany

Equipment: **Two-wire non-contact microwave level transmitter family type NRM-******
Optional accessory:

Type of Protection: **General requirements, Equipment protection by intrinsic safety "i"**

Marking:

Ex ia IIB T6...T5 Ga/Gb	**(with plastic housing)**
Ex ia IIB T6...T5 Ga	**(integrated, with plastic housing)**
Ex ia IIB T6...T4 Ga	**(metal housing)**
Ex ia IIB T6...T3 Ga	**(metal housing, high temp.)**
Ex ia IIIC T85°C...T110°C Da/Db	**(metal housing)**
Ex ia IIIC T85°C...T180°C Da/Db	**(metal housing, high temp.)**

see Clause 4 on of Addendum about temperature classes

-20 °C ≤ T_{amb} ≤ +60 °C

Approved for issue on behalf of the IECEx Certification Body: Edit Molnár

Position: Head of the Certification Body

Signature:
(for printed version)

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

Testing Station for Explosion Proof Equipment
H 1037 BUDAPEST
MIKOVINY S.u. 2-4
Hungary

Robbanásbiztos Berendezések BKI Vizsgáló Állomása Ex

IECEx Certificate of Conformity

Certificate No:	IECEx BKI 17.0004X	Issue No: 0
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Manufacturer:	**KOBOLD Messring GmbH** Nordring 22-24, 65719, Hofheim am Taunus **Germany**	

Additional Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:

The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2011 Edition:6.0	Explosive atmospheres - Part 0: General requirements
IEC 60079-11 : 2011 Edition:6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:

HU/BKI/ExTR17.0003/00

Quality Assessment Report:

DE/BVS/QAR09.0001/08

IECEx Certificate of Conformity

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Schedule

EQUIPMENT:

Equipment and systems covered by this certificate are as follows:

The level transmitter type NRM-****** is a Pulse Burst Radar operating at 24 GHz (K-band) microwave frequency. The instruments are designed for high precision level measurement in large storage tanks containing bulk solids or liquids.
The equipment is available in two different type of protection: "Ex ia IIB" for explosive gas atmospheres and "Ex ia IIIC" for combustible dust atmospheres.

See details in Addendum to IECEx BKI 17.0004X.

SPECIFIC CONDITIONS OF USE: YES as shown below:

Type "Ex ia" protected equipment for IIB gas sub-group, with plastic housing:
Because the enclosure of electronic circuits is made of plastic, the surface can be cleaned only with damp cloth to avoid electrostatic charge.

Type "Ex ia" protected equipment for IIB gas sub-group, with aluminium housing:
Because the enclosure of electronic circuits is made of aluminium, if it is mounted in an area where the apparatus has an equipment protection level Ga, it must be installed to avoid the event of rare incidents, ignition sources due to impact and friction sparks.

Annex:

Addendum to IECEx BKI 17.0004X.pdf