Zertifiziertes QM-System
DIN EN ISO 9001
Zertifikat-Nr. 01017

Guided Wave Radar Level Transmitter (TDR)

measuring • monitoring • analysing

NGR

- For liquids
- Independent of density, temperature, pressure, humidity and conductivity
- Probe length: max. 2000 mm for monoprobe and coaxialtube max. 4000mm for wire rope
- Temperature range: -20 ... + 100 °C
- Pressure range: -1 ... + 10 bar
- Output: 4 - 20 mA / 0 - 10 V switching output PNP or NPN

N2

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1/07-2022

Description

The NGR is a level sensor that uses TDR technology (time domain reflectometry) and thus can be used in oil- and water-based liquids without calibration. The NGR's guided radar uses time-offlight technology to measure electromagnetic pulses. The time difference between the sent pulse and the reflected pulse is used to calculate the level, both as a continuous value (analogue output) and a freely positionable switching point (switching output).

Due to its flexible probe that can be changed or cut, it is possible to integrate the sensor quickly into any application. The NGR can work in deposit-forming and foaming liquids. The sensor's intuitive setup uses four buttons and a display to ensure quick and easy adaptation to the application.

Your Benefits

- No mechanical moving parts
- Manually cutable and exchangeable monoprobe with lengths from 200 mm up to 2000 mm
- Also manually cutable and exchangeable wire rope with lengths from 1000mm up tp 4000mm
- Immune to deposit formation
- Process temperature up to 100 °C; process pressure up to 10 bar
- Small inactive areas, ideal for small containers
- Accurate measurement, even when liquid type changes
- 3-in-1: combined display, analogue output (acc. NAMUR NE 43) and binary output
- High enclosure rating of IP 67, rotatable housing
- Rugged design increases service life
- High flexibility due to cutable and exchangable monoprobe and wire probe
- Cost savings due to multiple output signals: one system for both level detection and continuous level monitoring
- Time and cost savings due to low maintenance and quick commissioning
- No calibration or recalibration required for commissioning, thus saving time and costs
- Compact and rotatable housing ensures flexible installation
- No crosstalk when several sensors are mounted next to each other
- Advanced technology enables adjustment-free measurement of oil and water-based liquids
- Coaxial version for plastic tanks or DK ≥1.8

Technical Details

Medium:	fluids
Measurement:	switch, continuous
Probe length:	200 mm ... 2000 mm (Standard = 2000 mm, standard = 4000 mm wire rope, shortening possible by customer)
Process pressure:	-1 bar ... 10 bar
Process temperature:	-20 °C ... +100 °C
RoHS certificate:	yes
Accuracy of sensor element[1]:	±5 mm
Repeatability:	≤2 mm
Resolution:	<2 mm
Response time:	<400 ms
Dielectric constant:	≥5 for mono probe and wire probe ≥1.8 with coaxial tube
Conductivity:	no limitation
Max. level change:	≤500 mm/s
Inactive area at probe end[1]:	10 mm
Inactive area at process connector[2]:	25 mm

[1] With water under reference conditions
[2] With parameterized tank with water under reference conditions, otherwise 40 mm.

Wetted parts:	1.4404, PTFE
Process connection:	G¾ A, ¾" NPT
Housing material:	plastic PBT
Max. probe load:	≤6 Nm
Supply voltage[3]:	12 V_{DC} ... 30 V_{DC}
Power consumption:	≤100 mA at 24 V_{DC} without output load
Initialisation time:	≤2 s
Protection class:	III
Electrical connection:	M12x1, 5-pin M12x1, 8-pin

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Technical Details (continuation)

Output signal[3]: analogue output 4 mA … 20 mA / 0 V … 10 V automatic switching to a current or voltage output depending on the load.
1 PNP-transistor output and
1 PNP/NPN-transistor output switchable (Option 2) or
1 PNP-transistor output and
3 PNP/NPN-transistor output switchable (Option 4)

Output load: 4 mA … 20 mA < 500 Ω at Uv > 15 V,
4 mA … 20 mA < 350 Ω at Uv > 12 V,
0 V … 10 V > 750 Ω at Uv >= 14 V

Hysteresis: min. 2 mm, freely adjustable

Signal voltage HIGH: V_S - 2 V

Signal voltage LOW: ≤ 2 V

Output current: < 100 mA

Inductive load: < 1 H

Capacitive load: 100 nF

Enclosure rating: IP 67: EN 60529

Temperature drift: < 0.1 mm/K

Lower signal level: 3.8 mA ... 4 mA

Upper signal level: 20 mA ... 20.5 mA

EMC: EN 61326-1:2006, 2004/108/EG

Ambient operating temperature: -20 °C ... +60 °C

Ambient storage temperature: -40 °C ... +80 °C

[3] All connections are polarity protected. All outputs are overload and short-circuit protected

Ordering Code Guided Wave Radar Level Transmitter Model NGR

Order Details (Example: **NGR 1 2 4 2 G5 B**)

Model	Version	Material	Signal Output	Contact	Connection	Probe length
NGR	**1** = probe **2**[2] = coaxial	**2** = stainless steel/ PTFE	**4** = 4-20 mA/ 0-10 V switchable	**2** = 1xPNP+1xPNP/NPN **4** = 1xPNP+3xPNP/NPN	**G5** = G¾ male **N5** = ¾" NPT male	**0**[1] = probe length 2000 mm (standard) **L/0000** = without probe (L = 0 mm) **L/xxxx**[3] = probe length xxxx mm (4-digit number 0200 ... 2000 mm rounded off to 10 mm) **B**[1] = mounted on bypass
	4 = wire	**2** = stainless steel	**4** = 4-20 mA/ 0-10 V switchable	**2** = 1xPNP+1xPNP/NPN	**G5** = G¾ male **N5** = ¾" NPT male	**4** = probe length 4000 mm (standard) **S** = Length 1000 ... 4000 mm (specify in clear text)

[1] Only possible with NGR 1. Bypass-specification, see NBK-M data sheet
[2] Using a coaxial tube improves signal detection, particularly in media with low DK values (e.g., oil)
[3] L/2000 only possible for NGR 2. For NGR 1… and L = 2000 mm probe length code „0“ must be selected.

Note: *Standard probe length «L» = 2000 mm (NGR 1242G50 on stock). Probe length «L» available in steps of 10 mm. Example: 200, 210, 220, 230 ... 2000 mm.*
Standard wire length «L» = 4000 mm (NGR 4242G50 on stock). Probe length «L» available in steps of 100 mm. Example: 1000, 1100, 1200, 1300 ... 4000 mm. Please specify in clear text while ordering

Plug Connectors and Cables

Model	Brief description
ZUB-KAB-12K502	Cable, M12, 5-pin, straight connector female with molded cable, 2 m, PUR/PVC
ZUB-KAB-12K802	Cable, M12, 8-pin, straight connector female with molded cable, 2 m, PUR/PVC

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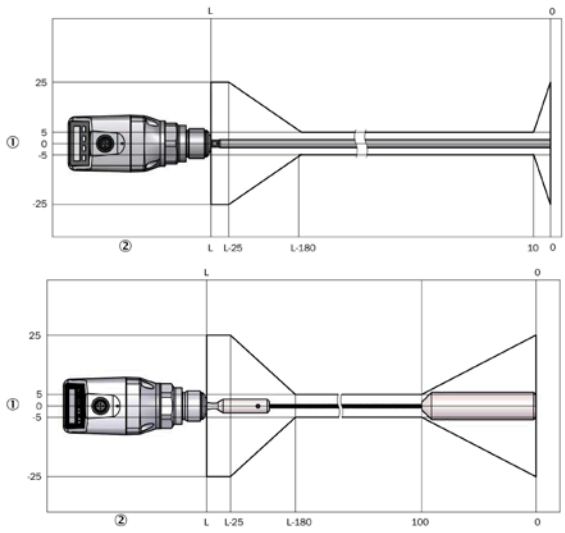
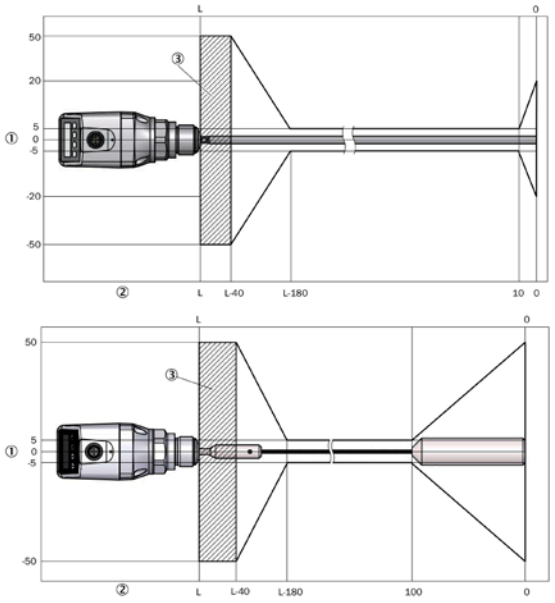
Accuracy Diagrams [mm]

Accuracy diagram with parameterized tank



① Accuracy in mm
② Level in mm

Accuracy diagram without parameterized tank



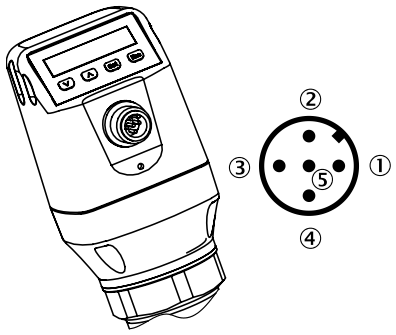
① Accuracy in mm
② Level in mm
③ Inactive area

Reference conditions:

Container with a diameter of 1 m
Central installation of the sensor
Minimum distance to built-in components >300 mm
Distance from the end of probe to tank bottom >15 mm
Air humidity: 65% +/- 20%
Temperature: +20 °C +/- 5 °C
Pressure: 1013 mbar abs. +/- 20 mbar.
Container parameterization undertaken
Medium: water, DK = 80

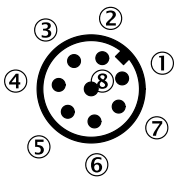
Connection Type

5-pin



1 L^+: supply voltage, brown
2 Q_A: analogue current-/voltage output, white
3 M: ground, reference ground for current-/voltage output, blue
4 Q_1: switching output 1, PNP, black
5 Q_2: switching output 2, PNP/NPN, grey

8-pin



1 L^+: supply voltage
2 Q_2: switching output 2, PNP/NPN
3 M: ground, reference ground for current-/voltage output
4 Q_1: switching output 1, PNP
5 Q_3: switching output 3, PNP/NPN
6 Q_4: switching output 4, PNP/NPN
7 Q_A: analogue current-/voltage output
8: no function
The wire colors in 8-pin cables are not standardized. Please note the wiring of the sensor.

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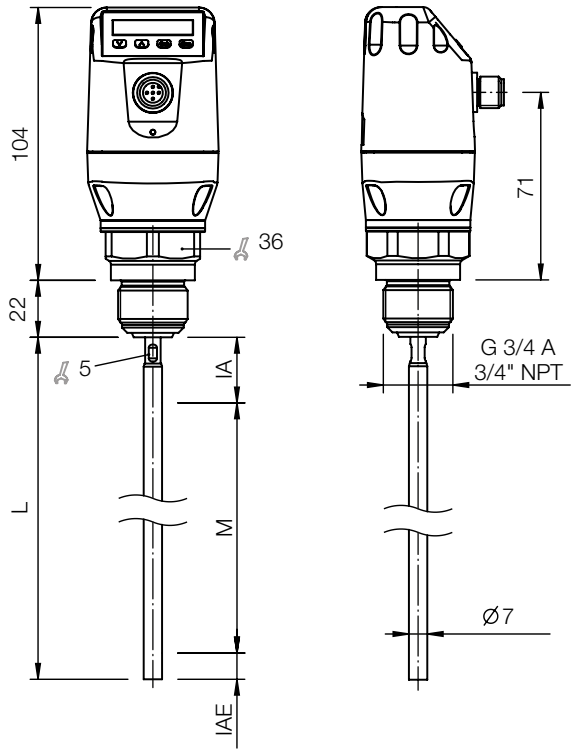
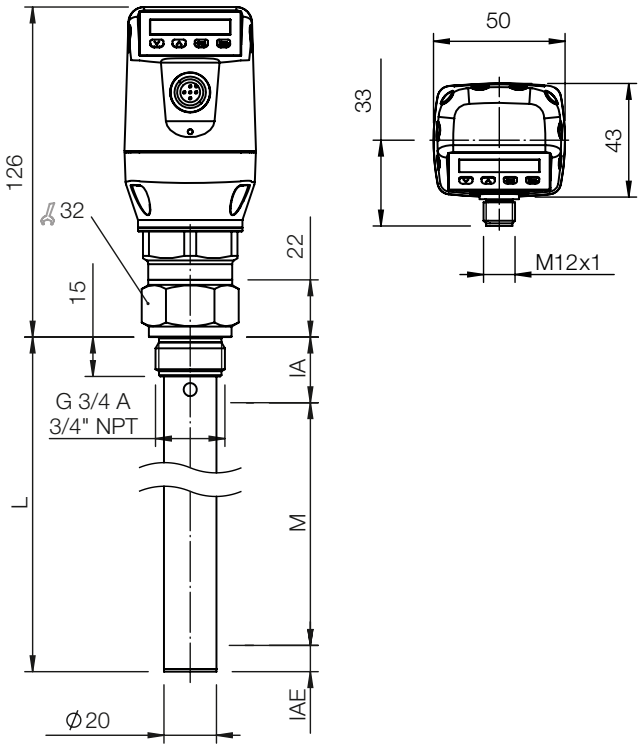
Dimensions [mm]

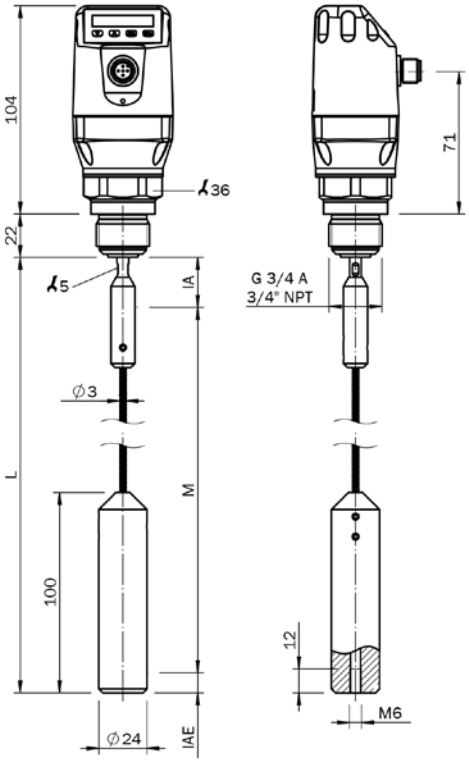
Monoprobe



with coax tube



Wire probe



M: measuring range

L: probe length

IA: inactive area at process connection 25 mm

IAE: Inactive area at probe end 10 mm

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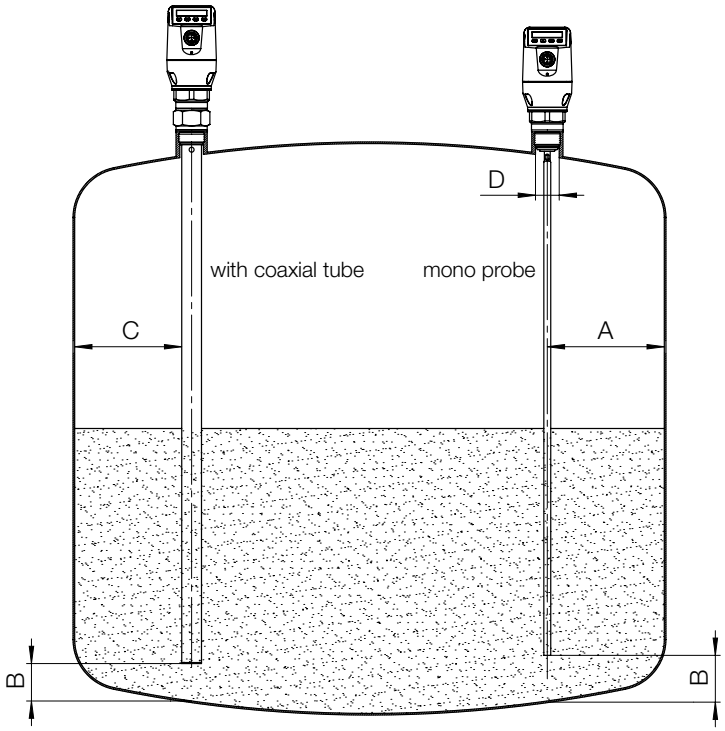
Installation Instructions

Installation in a tank



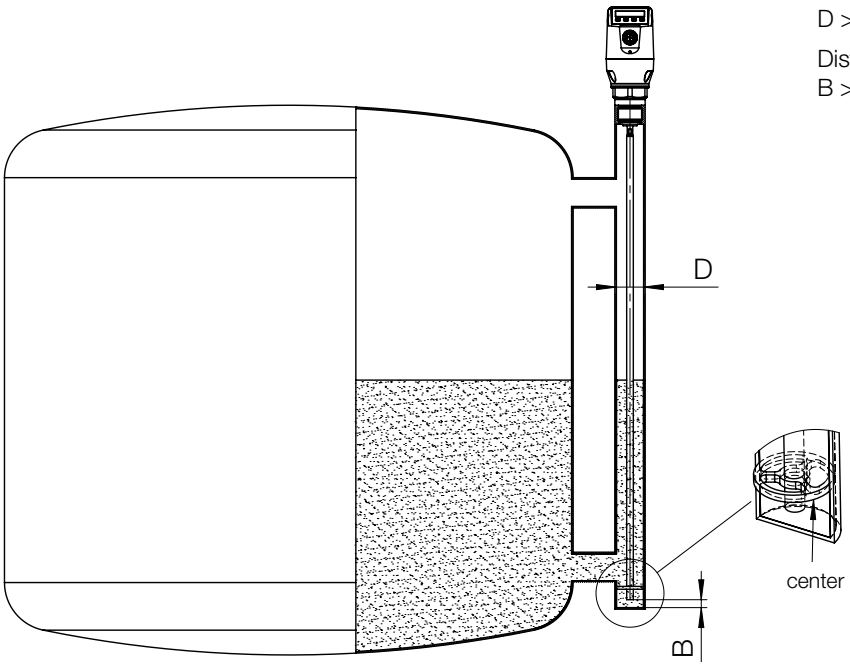
Unit with mono probe mounted in metal tank

Installation in nozzle:
D >= DN 25
Distance tank wall/tank bottom:
A >= 50 mm
B >= 10 mm
Distance to other tank fittings:
>= 100 mm

Unit with coaxial tube for metal and non metal tank

C = with a coaxial tube there are no minimum distances to the tank wall or to other tank fittings required

Installation of a mono probe in a metal immersion tube or metal bypass



D >= DN 40

Distance tank wall/tank bottom:
B >= 10 mm

Centering: To prevent contact between the probe and the by-pass pipe during oscillations, the probe should be centered according to its length and depending on the diameter of the bypass pipe. To do this, it is necessary to insert one or two centering pieces.

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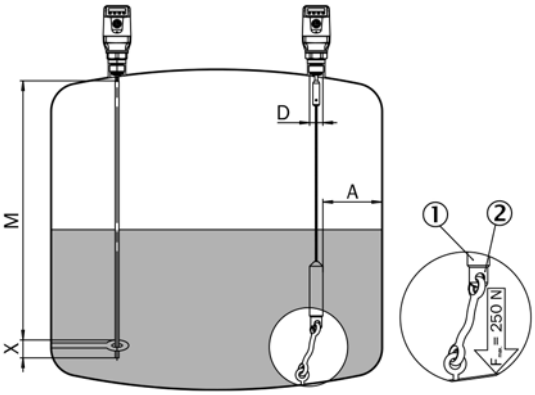
Rope probe in the metallic container



① Roper weight

② Bracket rope tension

Installation in nozzle:
D >= DN 25
Container wall / container bottom distance:
A >= 50 mm
Distance from components built into container:
>= 100 mm

Mounting the mono-probe

M = Measuring range
X = No measurement is possible in this area

Container welding seams may affect the measurement accuracy.

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