Ultrasonic Level Meter
for liquids and solids

KOBOLD

NUS-4

HART
COMMUNICATION FOUNDATION

● Measuring range:
  liquids: up to 25 m
  solids: up to 10 m

● Accuracy:
  ±0.2 % of reading
  +0.05 % of full scale

● p_{max}: 3 bar abs. t_{max}: 90 °C

● Connection:
  G 1½, G 2, 1½" NPT, 2" NPT
  DIN-flange
  DN 80, DN 125, DN 150
  ANSI-flange 3", 5", 6"

● Housing material: aluminium
  sensor material: PP, PVDF

● Output:
  4…20 mA, HART®, relay or
  programming unit with
  LCD display

N2

KOBOLD companies worldwide:

AUSTRALIA, AUSTRIA, BELGIUM, BULGARIA, CANADA, CHINA, CZECHIA, FRANCE, GERMANY, GREAT BRITAIN, HUNGARY, INDIA, INDONESIA, ITALY, MALAYSIA, MEXICO, NETHERLANDS, PERU, POLAND, REPUBLIC OF KOREA, SPAIN, SWITZERLAND, THAILAND, TUNISIA, TURKEY, USA, VIETNAM

Description

The Kobold ultrasonic level meter, model NUS-4, is used for non-contact, continuous level and volume measurement in vessels or for flow measurement in open channels.

Level measurement technology based on the non-contacting ultrasonic principle is especially suited for applications where, for any reason, no physical contact can be established to the surface of the material to be measured.

Such reasons may include corrosive attack by the process medium against the measuring device material (acids), possible contamination (sewage) or particles of the process medium adhering to the measuring device (adhesive materials).The ultrasonic level metering technology is based on the principle of measuring the time required for the ultrasound pulses to make a round trip from the sensor to the level to be measured and back. The sensor emits an ultrasonic pulse train and receives the echoes reflected. The electronic evaluates the echo time of the pulses and determines the level. The evaluating electronics is mounted compact on the unit.

For remote transmission, a norm signal output and for monitoring purposes, a relay contact is available. For programming and for local display, the units may be delivered with an optional pluggable programming unit with LCD display.

The sensors have a total beam angle of 5°-7° at -3 dB. This ensures a reliable measurement in narrow silos with uneven side walls as well as in process tanks with various protruding objects. Furthermore, as a result of the narrow beam angle - the emitted ultrasonic signals have an outstanding focusing - deep penetration through gases, vapour and foam is ensured.
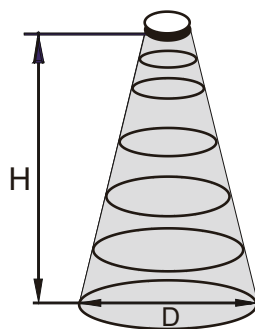
Conical beam diameter D (m)

H	NUS-4x04	NUS-4x06	NUS-4x08	NUS-4x10	NUS-4x15	NUS-4x25
1 m	0.15 m	0.14 m	0.18 m	0.16 m	0.21 m	0.27 m
2 m	0.25 m	0.23 m	0.30 m	0.25 m	0.30 m	0.39 m
4 m	0.46 m	0.40 m	0.54 m	0.42 m	0.47 m	0.64 m
6 m	-	0.58 m	0.79 m	0.60 m	0.65 m	0.88 m
8 m	-	-	-	0.77 m	0.82 m	1.13 m
10 m	-	-	-	0.95 m	1.00 m	1.37 m
15 m	-	-	-	-	1.43 m	1.98 m
25 m	-	-	-	-	-	3.21 m

Technical Details

|	
Measuring principle:	ultrasonic principle, echo time measurement
Frequency:	see order table
Beam cone:	NUS-4x04: 6°, NUS-4x06, -4x10, -4x15: 5° NUS-4x08, NUS-4x25: 7°
Delay time:	10, 30, 60 seconds; programmable
Meas. accuracy (at 20 °C):	±0.2 % of reading +0.05 % of full scale
Resolution:	depending on measuring distance <2 m: 1 mm 2…5 m: 2 mm 6…10 m: 5 mm >10 m: 10 mm
Mounting position:	vertical to the product surface
Process temperature:	-30…+90 °C
Ambient temperature:	-30…+70 °C -25…+70 °C (with programming unit)
Operating pressure:	0.5…3 bar abs. (<1 bar abs. on request)

Materials

Housing:	aluminium, powder-coated
Sensor and connection:	polypropylene, PVDF
Process connection:	
NUS-4x04:	G 1½*, 1½ NPT
NUS-4x06, NUS-4x08:	G 2*, 2 NPT
NUS-4x10:	flange DN 80, ANSI 3"
NUS-4x15:	flange DN 125, ANSI 5"
NUS-4x25:	flange DN 150, ANSI 6"

* G-thread with counter nut and EPDM-gasket

Electrical connection:	2 x M20 x 1,5 cable gland cable diameter 6…12 mm and 2 x ½" NPT wire cross section: 0.5…1.5 mm^2
Switching output:	relay (SPDT) 30 V_{DC}, 1A
Analogue output:	4…20 mA (3.9…20.5 mA) galvanically isolated, protection against surge transients
Load:	max. (Us – 11.4 V) / 0.02 A,
Power supply:	12 - 36 V_{DC}, 2-wire (reverse polarity protected)
Display (pluggable):	6-digit LCD-display, symbols and bar graph, PBT, glass fibre reinforced, flame proof (DuPont®)
Protection:	sensor IP 68, Housing: IP 67
Weight:	with thread: approx. 1.1 kg with flange: approx. 2.5 kg

Electrical Connection

reverse polarity protected
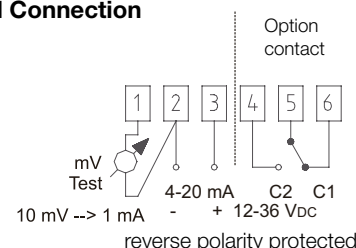
Analogue Output

The standard version is delivered with 4 - 20 mA signal output.

Output: 4-20 mA max. 600 Ω, HART® (optional)

The following can be programmed with keys:

- Assignment of the 4 or 20 mA signals to the required levels
- Error indication by the current output (3.8 mA, 22 mA or hold the last value)
- Damping of analogue output (10, 30, 60 s)

Factory default:

- 4 mA: assigned to the maximum level 0 %
- 20 mA: assigned to the minimum level 100 %
- Error indication by the current output: hold last value
- Damping: 60 s.

Relay Output:

The units may be optionally delivered with a relay output. Following functions may be programmed with help of programming unit:

- 2-point switching for monitoring of level
- Error signal in case of Echo Loss
- Pulse output for volume counting when used as a flow meter

When shipped without programming unit, the NUS-4 is delivered in a 2-point switching state (tank empty – relay energised, tank full – relay de-energised).

Programming unit with LCD-Display:

The pluggable programming unit can be used to display the measured values during measurement and to change the program functions during programming.
2 individual accessable programming modes may be chosen:
a) Quickset, for quick programming of important parameters
b) Full programming

NUS-4 in Systems with PC

Using a PC and HART® modem (e.g. model HARTCOM), it is possible to create your own multi-drop HART® network, where the PC displays all NUS-4 measurement data and also allows reprogramming of the units as necessary. In this way the outputs derived from the displayed data can be programmed via the PC, which acts as the master. A maximum of 15 transmitters can be connected to one HART® modem and KOBOLD's NUS-NTB-NRM-SW software can be used for configuration.

Adjustable Functions with Programming Unit

- Engineering units for the display (metric or US)
- Maximum measuring distance
- Value for 4 mA output signal
- Value for 20 mA output signal
- Error type indication of analogue output
- Damping time
- Selection distance measurement, level measurement, volume measurement, weight (when density is known), flow measurement in open channels
- Optimisation of measurement
- Linearisation
- Close-end-blocking
- Far-end-blocking
- Direction of level change
- Selection of pre-programmed 11 vessel forms for volume measurement
- Selection of pre-programmed 21 measuring channels for flow measurement in open channels
- Total flow amount resettable
- Total flow amount non-resettable
- Bar graph assigned to analogue output or echo
- Keyword protection
- Simulation mode
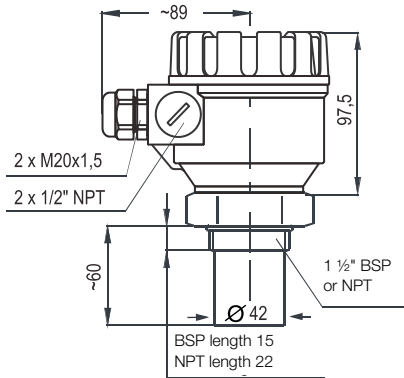
Order Details (Example: **NUS-4x04 R8 340**)

Model	Sensor material	Measuring range	Frequency [kHz]	Connection	Power supply	Output/ display
NUS-4...	**0** = polypropylene **9** = PVDF	**04** = 0.2 - 4 m liquids 0.2 - 1.6 m solids	80	**R8** = 1½ BSP **N8** = 1½ NPT	**3** = 12 - 36 V$_{DC}$	**40** = 4 - 20 mA **R0** = 4 - 20 mA and relay **4H** = 4-20 mA + HART® **RH** = 4-20 mA + HART® + relay **4P** = pluggable programming unit with LCD-display, 4 - 20 mA **RP** = pluggable programming unit with LCD-display, 4 - 20 mA, relay
		06 = 0.25 - 6 m liquids 0.25 - 2.4 m solids	80	**R9** = 2 BSP **N9** = 2 NPT		
		08 = 0.35 - 8 m liquids 0.35 - 3.2 m solids	60			
		10 = 0.35 - 10 m liquids 0.35 - 4 m solids	60	**FB** = flange DN 80 **AB** = ANSI-flange 3"		
		15 = 0.45 - 15 m liquids 0.45 - 6 m solids	40	**FD** = flange DN 125 **AD** = ANSI-flange 5"		
		25 = 0.6 - 25 m liquids 0.6 - 10 m solids	20	**FE** = flange DN 150 **AE** = ANSI-flange 6"		
NUS-400P	pluggable programming unit with LCD-Display					

Order code HART® modem: **HARTCOM-0** (Download of configuration software NUS-NTB-NRM-SW at www.kobold.com)
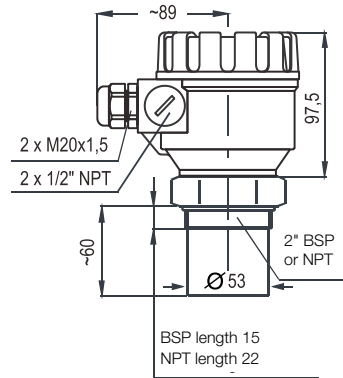
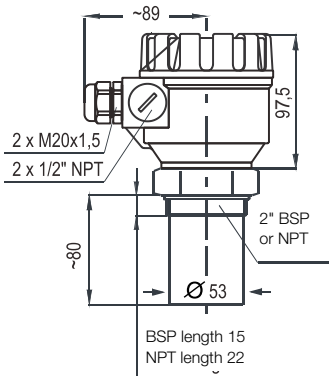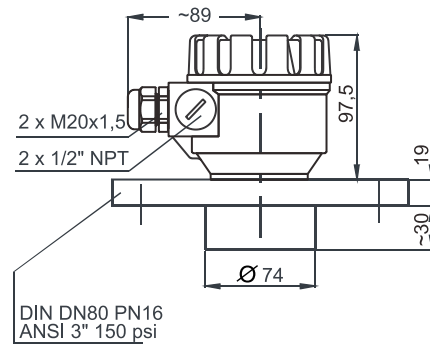1/06 - 2024

Dimensions [mm]

NUS-4x04...

~89
97,5
2 x M20x1,5
2 x 1/2" NPT
~60
1 ½" BSP or NPT
Ø 42
BSP length 15
NPT length 22

NUS-4x06...

~89
97,5
2 x M20x1,5
2 x 1/2" NPT
~60
2" BSP or NPT
Ø 53
BSP length 15
NPT length 22

NUS-4x08...

~89
97,5
2 x M20x1,5
2 x 1/2" NPT
~80
2" BSP or NPT
Ø 53
BSP length 15
NPT length 22

NUS-4x10...

~89
97,5
2 x M20x1,5
2 x 1/2" NPT
19
~30
Ø 74
DIN DN80 PN16
ANSI 3" 150 psi

NUS-4x15...

~89
97,5
2 x M20x1,5
2 x 1/2" NPT
19
~43
Ø 122
DIN DN125 PN16
ANSI 5" 150 psi

NUS-4x25...

~89
97,5
2 x M20x1,5
2 x 1/2" NPT
19
~62
Ø 148
DIN DN 150 PN16
ANSI 6" 150 psi

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No responsibility taken for errors; subject to change without prior notice.

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5