



KOBOLD Instruments Inc.
1801 Parkway View Drive
Pittsburgh, PA 15205
Ph: (412)788-2830
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NAE & NNE ATTITUDE SENSITIVE LEVEL SWITCH

LIQUID LEVEL SENSING CONTROL

The KOBOLD NAE and NNE level switches provide mercury-free switching for tank applications requiring high AC current capability. Both units are constructed of industrial quality polypropylene. The NNE may be purchased with an optional Hypalon® coating for superior chemical resistance.

The NAE has the higher capacity switch of these two. It is rated to 8 amps steady state and 10 amps transient current. With such capacities, pumps may be directly controlled in most applications.

The NNE has a five isolated chamber design making it almost impossible to sink. The NNE comes with its own ballast weight, which makes it very economical indeed.

Specifications

Wetted Parts

NAE: Polypropylene (PP)
NNE: PP or Hypalon

Cable

NAE: 16" PVC
NAE-U: 10 ft PVC
NNE: 16 ft PEC
(HY model with Hypalon coating)

Media Density Range

NAE: > 0.7 gm/ml
NNE: 0.7-1.05 gm/ml
NNE-HY: 0.7-1.4 gm/ml

Maximum Pressure

NAE: 15 PSIG
NNE: 5.5 PSIG

Maximum Temperature

NAE: 140 °F
NNE: 150 °F
NNE-HY: 200 °F

Mechanical Switch Characteristics

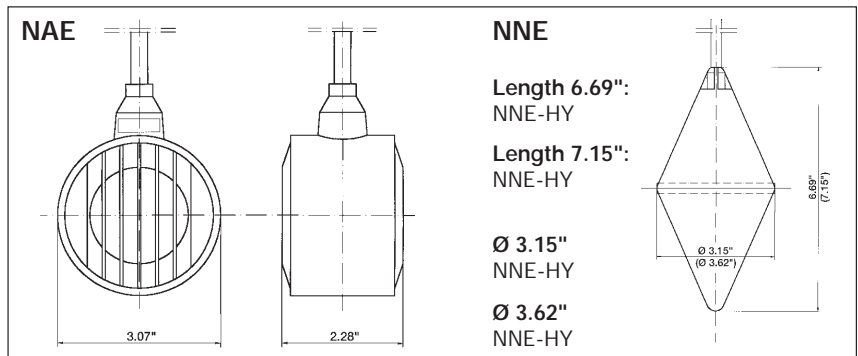
Electrical

NAE: SPST or SPDT
250 VAC max
10(8) A max
NNE: SPDT
250 VAC max
8(4) A max

Switching Angle: ± 15° of horizontal

Cable Glands

Wetted Parts: Nylon, Buna-N
Maximum Pressure/Temp. per the Switch specification



NAE and NNE Ordering Information

Model Number	Switch Function	Float Material	Cable Cladding
NAE-9120	N/O	Polypropylene	PVC
NAE-9120-U	SPDT	Polypropylene	PVC
NNE-9130 ¹	SPDT	Polypropylene	PEC ³
NNE-9130-HY ¹	SPDT	Hypalon ^{®2} coated Polypropylene	Hypalon ^{®2} coated PEC ³
CG-CD 13 NRBK	1/2" NPT Cable Gland Tank Connection		

¹ All NNE models come supplied with a ballast cable weight.

² HYPALON is a registered trademark of E.I. Dupont de Nemours.

³ PEC is polyethylene chloride. Hypalon[®] is a polyethylene chloride.

NBK BYPASS LEVEL GAUGES

Model
NBK



OEM  TARGET PRODUCT

- Kobold Circular Magnet System Effective from all Sides
- 1450 PSIG Maximum Pressure
- Temperatures to 750 °F
- Remote Transmission Capability
- Limit Switches Available
- Industrial Ruggedness



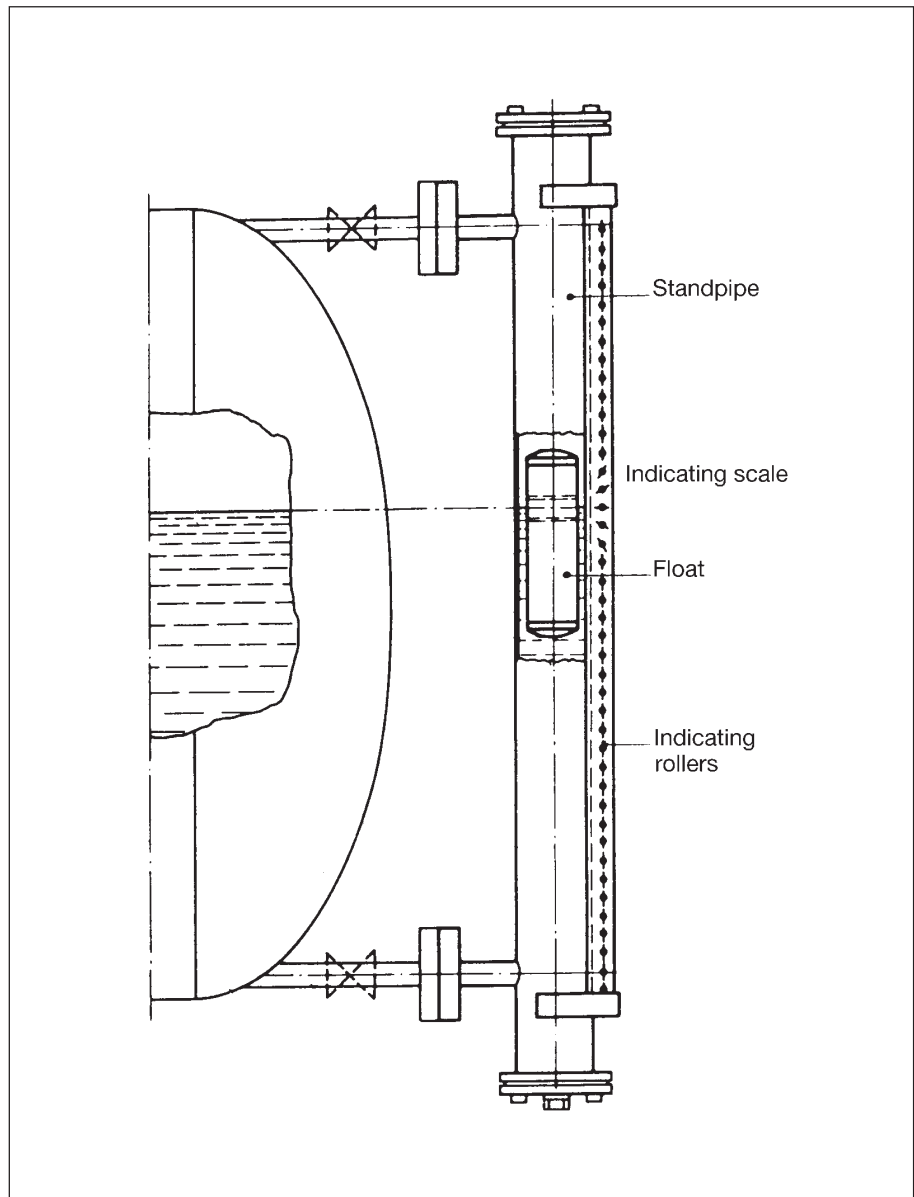
NBK BYPASS LEVEL GAUGES

KOBOLD bypass level gauges are used in applications requiring continuous measurement, indication and control of liquid levels. Any medium with viscosity less than 200 cPs is a candidate.

KOBOLD's bypass design relies on the hydrostatic pressure principle to display tank level in a side mounted measuring chamber. A float, containing a ring magnet, rises and falls with the liquid level in the bypass tube. This approach allows an all metal construction which eliminates the breakage and leakage problems frequently experienced with glass tube designs. Transmission, visual indication, or switching may be achieved by mounting magnetically sensitive devices on the exterior of the bypass's body. These devices track, or are activated by, the magnet inside the float.

The following devices are available with KOBOLD's bypass level gauges:

- **Magnetic Indicators.** An assembly of rollers may be mounted on the side of the gauge body. These rollers contain small bar magnets and are free to rotate about their axes. Passage of the level following float causes them to be rotated 180°. Since the indicators are white on one side, and red on the other, the location of the gauge's internal float is clearly shown by the red to white transition area of the indicator assembly.
- **Level Transducer.** If data transmission is required, a signal can be generated with the aid of a resistive reed contact chain mounted on the outside of the bypass pipe. Using a separately mounted control element, a continuous 0–20 mA, 4–20 mA or 0–10VDC signal is produced. Additionally, an integrally mounted 4–20 mA transmitter is available.
- **Switches.** Reed contacts may be mounted on the bypass pipe to monitor or control liquid levels. The magnet inside the float serves as the switch actuator.

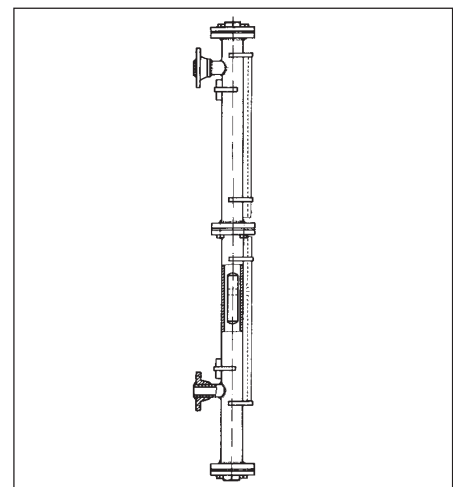


Bypass Pipe

The bypass pipe (sometimes called the standpipe) is constructed of 316-Ti stainless steel. Depending on local conditions, the bypass pipe will be connected to the side of the tank with either flanges or NPT fittings.

Individual bypass gauges are available in single unit lengths to 19.7 feet (6 meters.) Longer versions are possible by delivering the gauge in two or more sections.

Max. Pressure: 1450 PSIG
Temperature Range: – 58 °F to + 750 °F
(– 50 °C to + 400 °C)



Specifications subject to change without notice.



Cylindrical Floats

The unique float design developed for the KOBOLD NBK series is the key to this level indicating system's versatility. The float contains a permanent magnet which is specially designed to project a uniform magnetic field 360° around the float. This means that the magnetic roller indicators, switches and analog transducers can be placed anywhere on the periphery of the bypass pipe.

For the NBK-0300 series and NBK-0600 series, the standard floats are made of 316-Ti stainless steel. Optional floats are available in titanium for low specific gravity liquids. All floats for the high pressure NBK-0700 and NBK-1000 series are made of titanium.

Stainless Steel Floats

The standard floats for the NBK-0300 and NBK-0600 series are made of 316-Ti stainless steel and used with liquid specific gravities down to 0.8. They are hermetically sealed and completely liquid and gas tight.

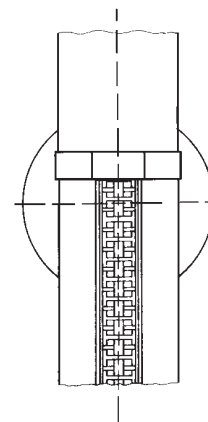
Titanium Floats

An optional titanium float is available for NBK-0300 and NBK-0600 series to be used with liquids which have a specific gravity lower than 0.8. The titanium float can be used with liquid specific gravities between 0.54 and 0.79. Titanium floats are standard for the high pressure NBK-0700 and NBK-1000 series and can be used with liquid specific gravities above 0.54.

Magnetic Indicators

For local level indications, a magnetic roller indicator can be mounted on the bypass pipe. As the float rises past the indicator assembly, its ring shaped magnetic field rotates the individual indicator elements from their white, to their red sides. The large contrast produced by use of these two colors allows easy reading of the level even from a distance.

The standard polypropylene rollers may be used with media temperatures to 212°F. For applications to 750°F, ceramic roller assemblies are used. The entire assembly is highly resistant to vibration due to the stabilizing effect of the individual magnets in each indicator element. This makes the KOBOLD bypass gauge a good choice for a wide variety of level indicating applications.



Float Type	Maximum Pressure	Diameter (inches)	Length (inches)	Minimum Liquid Specific Gravity
Standard Stainless Steel for NBK-03 & NBK-06	580 PSIG	2.05	10.67	0.8
Titanium Float for NBK-03, Option-T3	230 PSIG	2.05	11.81	0.54
Standard Titanium Float for NBK-06 & NBK-07	930 PSIG	2.05	8.85	0.8
Low Specific Gravity Titanium Float for NBK-06 & NBK-07, Option-T7	930 PSIG	2.05	18.50	0.54
Standard Titanium Float for NBK-10	1450 PSIG	2.05	12.80	0.8
Low Specific Gravity Titanium Float for NBK-10, Option-T10	1450 PSIG	2.05	28.35	0.54

NBK BYPASS LEVEL GAUGES

Transducer

Level transmission can be provided in addition to, or in place of, visual local indication. This is done by locating a reed chain transducer outside the bypass pipe (NBK Option W or WHT).

The transducer is located inside a stainless steel pipe which is clamped to the bypass pipe. It is composed of a series of reed switches connected by resistors. As the float in the bypass tube moves, reed contacts near its location are closed, altering the resistance seen on the chain's terminals. This system allows continuous level measurement in 0.4" (10mm) increments.

A separate electronics module converts the resistance to an analog milliampere, voltage, or relay output. The three-wire bridge resistance design of the transducer allows separation of the electronics and the transducer by distances exceeding one mile. See the DFM, DST, DFA or DDA series for details.

Additionally, an integrally mounted, 2-wire 4-20 mA transmitter can be provided in lieu of the external controllers (NBK Option RT).

Construction:	316-Ti SS
Resolution:	0.4" (10mm)
Wiring:	3-wire, any length
Terminal Box:	Aluminum 64×58×35 mm NEMA 4

Remote Level Indication

For operation of the remote level transducer, one of the following Indicators/Controllers is required:

- **Model DFM**
Output: 0(4)-20 mA,
0-10 VDC
- **Model DST**
Output: 0(4)-20 mA,
0-10 VDC
Two adjustable limit switches
- **Model DFA**
Output: 0(4)-20 mA,
0-10 VDC
Analog Gauge: 0-100%
Two adjustable limit switches
- **Model DDA**
Output: 0(4)-20 mA,
0-10 VDC
Digital Gauge: Fully Scalable
Two adjustable limit switches

Limit Switches

Bistable limit switches may be clamped to the exterior of the bypass pipe to provide alarm functions. These switches are SPDT reed switches, so they can be wired in either normally-open or normally-closed configurations.

The switches work as follows: As the float passes the reed switch, its magnet actuates the reed switch. The switch remains actuated until the float returns and passes it a second time (traveling in the reverse direction as previously.)

As many switches as desired may be used. Switches may be placed anywhere

on the exterior of the bypass tube. The minimum distance between switches is approximately 1 inch.

Switch:	SPDT, bistable 220 VAC max. 0.5 A max. 60 VA max.
Hysteresis:	0.6"
Housing:	Nylon or aluminum

Environment

Max. Temperature:	up to 750 °F
Protection:	NEMA 4

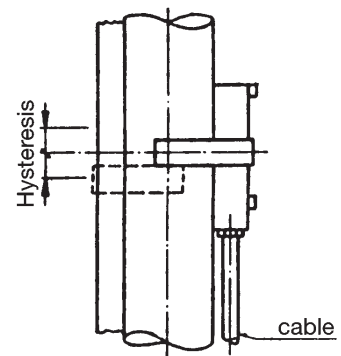
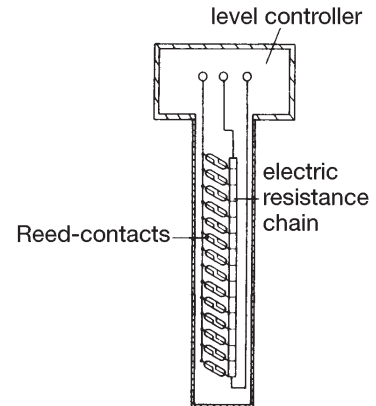
Max. Temperature:

Switch R:	250°F
Switch RH:	392°F
Switch RHH:	750°F

Hazardous Zone Protection

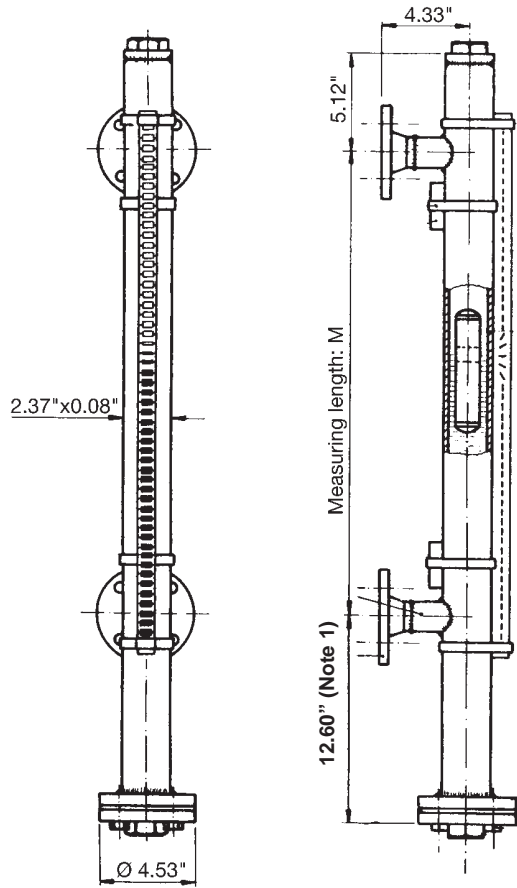
All metal Kobold bypass level indicators are suitable for application in hazardous areas. To operate the level transducer or the limit switches in a hazardous area, intrinsically safe barriers must be used.

If unsure of your requirements, call your KOBOLD representative.



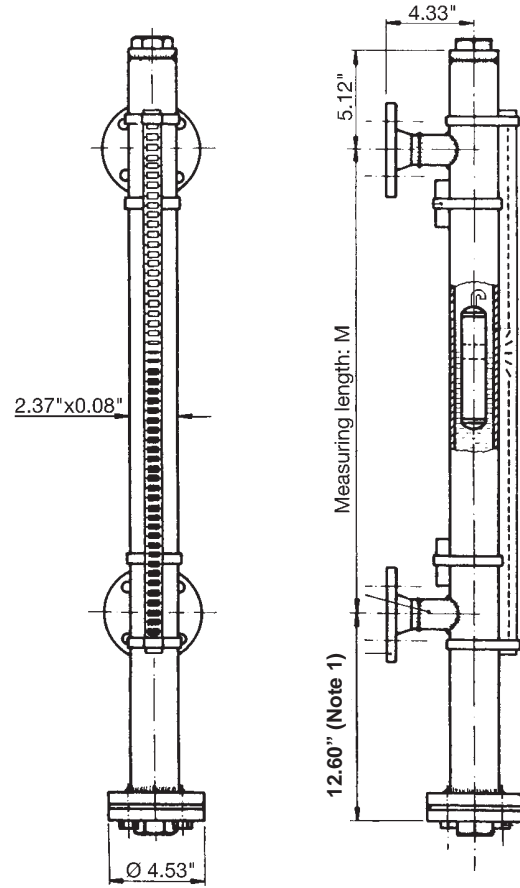
NBK BYPASS LEVEL GAUGES

Note 1: Dimension is for specific gravity = 1.0.
Floats for lighter liquids can increase this dimension.



NBK-0300

Note 1: Dimension is for specific gravity = 1.0.
Floats for lighter liquids can increase this dimension.



NBK-0600

Technical Data

Bypass Pipe:	316-Ti SS,
Gasket:	PTFE
Fittings	
Flanges:	
NBK-0300:	150LB ANSI, 316 SS
NBK-0600:	300LB ANSI, 316 SS
Threads:	NPT Male
Length	
Single Section:	19.7 feet max.
Multiple Sections:	As desired

Maximum Pressure

NBK-0300	
NPT Threaded:	230 PSIG
Flanged:	Per ANSI B16.5 for class 150 to 230 PSIG Max.

Maximum Pressure (continued)...

NBK-0600	
NPT Threaded:	580 PSIG
Flanged:	Per ANSI B16.5 for class 300 to 580 PSIG Max.

Allowable Media Temperature

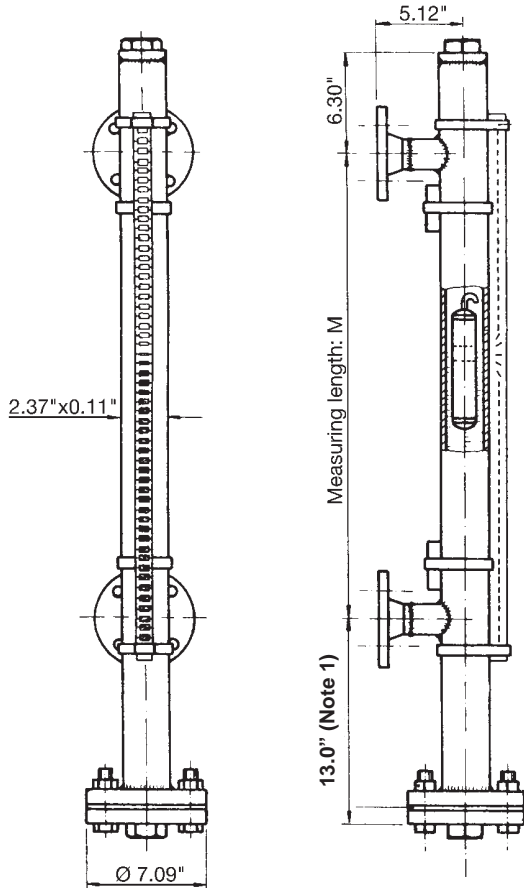
Standard:	-58 °F to +750 °F
With Options ...	
Ri:	-58 °F to +250°F
RHi:	-58 °F to +392°F
RHHi:	-58 °F to +750°F
RP:	-58 °F to +212°F
RK:	-50 °F to +750°F
W:	-58 °F to +390°F
WHT:	-58 °F to +750°F

Cylindrical Float

Material:	316-Ti stainless steel or titanium see Table 1 for float material and dimensions
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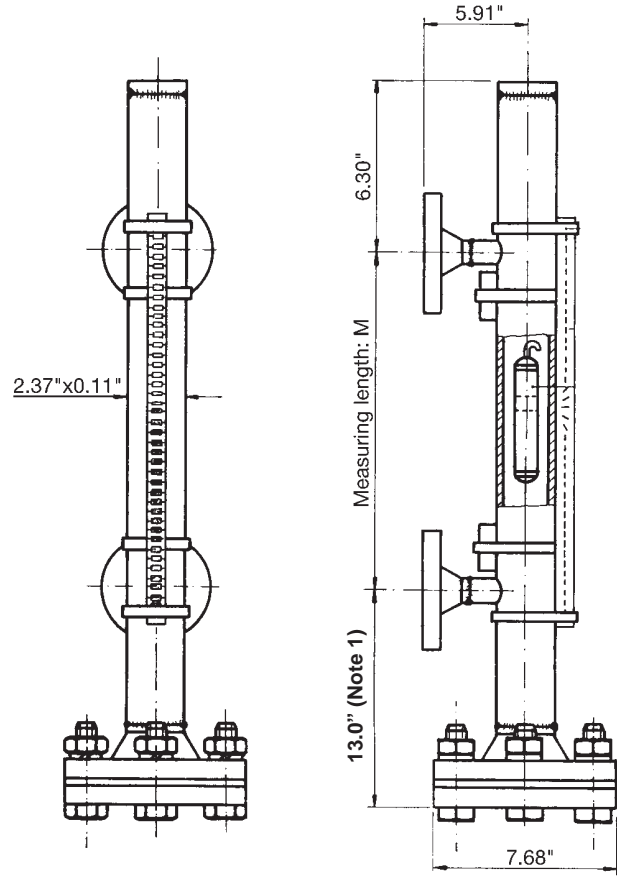
NBK BYPASS LEVEL GAUGES

Note 1: Dimension is for specific gravity = 1.0.
Floats for lighter liquids can increase this dimension.



NBK-0700

Note 1: Dimension is for specific gravity = 1.0.
Floats for lighter liquids can increase this dimension.



NBK-1000

Technical Data

Bypass Pipe:	316-Ti SS,
Gasket:	PTFE
Fittings	
Flanges:	
NBK-0700:	600LB ANSI, 316 SS
NBK-1000:	900LB ANSI, 316 SS
Threads:	NPT Male
Length:	19.7 feet max.

Maximum Pressure

NBK-0700	
NPT Threaded:	930 PSIG
Flanged:	Per ANSI B16.5 for class 600 to 930 PSIG Max.

NBK-1000	
NPT Threaded:	1450 PSIG
Flanged:	Per ANSI B16.5 for class 900 to 1450 PSIG Max.

Allowable Media Temperature

Standard:	- 58 °F to + 750 °F
With Options ...	
Ri:	- 58 °F to + 250°F
RHi:	- 58 °F to + 392°F
RHHi:	- 58 °F to + 750°F
RP:	- 58 °F to + 212°F
RK:	- 50 °F to + 750°F
W:	- 58 °F to + 390°F
WHT:	- 58 °F to + 750°F

Cylindrical Float

Material: Titanium see Table 1 for float material and dimensions

NBK Ordering Information

NBK-	XX = Pressure Rating	Y = Fitting Style	Z = Fitting Size
	XX = 03: 230 PSIG Max. XX = 06: 580 PSIG Max. XX = 07: 930 PSIG Max. XX = 10: 1450 PSIG Max.	Y = 1: Stainless Steel DIN Flange Y = 3: bsp Threads Y = 4: Stainless Steel ANSI Flange Y = 6: NPT Threads	Z = 1: 1/2" (DIN: 15 mm) Z = 2: 3/4" (DIN: 20 mm) Z = 3: 1" (DIN: 25 mm) Z = 4: 1 1/4" (DIN 32 mm) Z = 5: 1 1/2" (DIN 40 mm) Z = 6: 2" (DIN 50 mm)

NBK Option Information

Part Number Suffix	Description
-RP	Polypropylene Magnetic Indicating Roller Assembly. Operating Temperature Range: – 58 °F to + 212 °F
-RK	Ceramic Magnetic Indicating Roller Assembly. Operating Temperature Range: – 58 °F to + 750 °F
-Ri	Adjustable Reed Contact Limit Switch. Process Temperature: – 10 to 250 °F. Ambient Temperature: – 10 to 160 °F i = number of switches desired. Example: Two reed switches = »-R2«.
-RHi	High Temperature Reed Switch. Process Temperature: – 10 to 392 °F. Ambient Temperature: – 10 to 160 °F
-RHHi	Very High Temperature Reed Switch. Process Temperature: – 10 to 750 °F. Ambient Temperature: – 10 to 160 °F
-W	Analog Level Transducer. Kobold Transmitter must be used to produce 0(4)–20 mA signal. Process Temp.: – 58 to 390 °F
-WHT	High temperature analog level transducer. Process Temperature: – 58 to 750 °F
-RT	2-wire 4-20 mA Integral Transmitter, Requires Option W or WHT
-A	Connecting Flanges for two part design (Models NBK-0300 & NBK-0600 only).
-F	Drain Valve. 1/2" NPT. 316-Ti Stainless Steel. 400 °F Max. at atmospheric pressure
-J	Top and Bottom Cleanout Flanges
-S	Level Measuring Scale
-T3	Upgrade to Titanium Float for NBK-0300, 0.54–0.79 Specific gravity
-T7	Upgrade to Titanium Float for NBK-0600 & NBK-0700, 0.54-0.79 Specific gravity
-T10	Low Specific Gravity Titanium Float for NBK-1000 , 0.54-0.79 Specific gravity

Example Order

Kobold's bypass level gauges are customized to your specific application. Our part numbering system is designed to make the process of specifying a gauge as easy as possible. To help you create the part number for the bypass gauge you need, an example is given below:

Assume you want a level gauge to meter the liquid in a tank. The tank has 3/4" NPT fittings, spaced 4 feet apart. The maximum operating pressure and temperature are 20 PSIG and 90 °F respectively. You want an analog output to be sent to a Kobold Transmitter (purchased separately) and a 1/2" NPT drain valve. You do not need any local level indication.

Use the NBK Application Datasheet to document all required process information.

The part number for the main component (the bypass element) can be assembled from the data in the »Ordering Information« table at the top of this page. The part numbers for the optional accessory products are found in the left hand column of the »NBK Options Table.«

The complete part number is assembled as follows:

1. A 230 PSIG bypass tube with 3/4" NPT fittings is an NBK-XXYZ, where:
 XX = 03 (230 PSIG)
 Y = 6 (NPT threads)
 Z = 2 (3/4" thread size)

The complete order number is:

NBK-0362

2. Drain Valve: **-F**
3. Analog Transducer: **-W**
4. Length: **-Length = 4 ft.**

The ordering information for the above item must include the part number, the measuring length and the process information listed above:

NBK-0362-F-W
Length = 4 ft.

NBK APPLICATION DATA SHEET

* To ensure fast order processing, please retain the completed application data sheet and send it along with your purchase.

Process Conditions

Accurate process information is essential to ensure the proper operation of your level indicator. Please fill out accurately and completely.



FAX to:
KOBOLD Instruments Inc.
412-788-4890 (USA)
514-428-8899 (Canada)

Customer Name: _____

Company Name: _____

Phone: _____

Fax: _____

E-Mail : _____

Date: _____

Material

- 316 Stainless Steel (PVC Polypropylene and PVDF available upon request)
- Teflon Lined 316 Stainless Steel

1. Pressure: Normal _____ PSIG Maximum _____ PSIG

2. Temperature: Normal _____ °F Maximum _____ °F

3. Liquid Type: _____

4. Liquid Specific Gravity at Normal Operating Temp: _____

5. Liquid Viscosity: _____ Centistoke

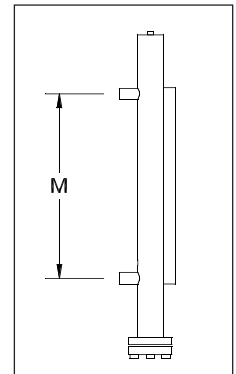
Mounting Configuration

1. Measuring Length M: _____ Inches (M=center to center length between fittings)

2. Fitting Size: 1/2" 3/4" 1" 1-1/4" 1-1/2" 2"

3. Fitting Type:

- NPT Thread 150 LB ANSI Flange 300 LB ANSI Flange
- Other (specify): _____



Indicator Type

- Polypropylene (212°F Max. Temp.) Suffix-RP
- Ceramic (750°F Max. Temp.) Suffix-RK

Options

1. Switches (SPDT): Quantity _____ (See catalog for switch specifications)

- Standard Switch (250°F Max. Temp.) Suffix -R Hi-Temp Switch (392°F Max. Temp.) Suffix -RH
- Very Hi-Temp (750°F) Suffix -RHH

2. Analog Transducer and Signal Conditioner:

- Power Requirement _____ VAC VDC
- Transducer w/ integral 4-20 mA transmitter (2-wire, 16-32 VDC)
- Transducer only. For use w/ remote mounted signal conditioner/transmitter. (signal conditioner/transmitter sold separately. See catalog for DFM, DST or DDA series.

3. Drain Valve Suffix -F

4. Level Measuring Scale

Suffix -S (Scale in inches)

- Scale mounted on left
- Scale mounted on right

5. Top and Bottom Cleanout Flanges

Suffix -Z

3. Other Options/ Custom Configurations / Special Requirements (specify): _____

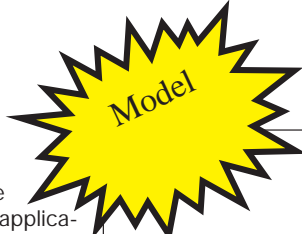
NC

MAGNETIC FLOAT SWITCHES FOR LIQUIDS



KOBOLD Instruments Inc.
1801 Parkway View Drive
Pittsburgh, PA 15205
Ph: (412)788-2830
Fax: (412)788-4890

HIGH QUALITY LEVEL SWITCHES FOR EVERY APPLICATION



Versatile Design

KOBOLD level switch products are designed to meet a wide range of application requirements by addressing such design considerations as:

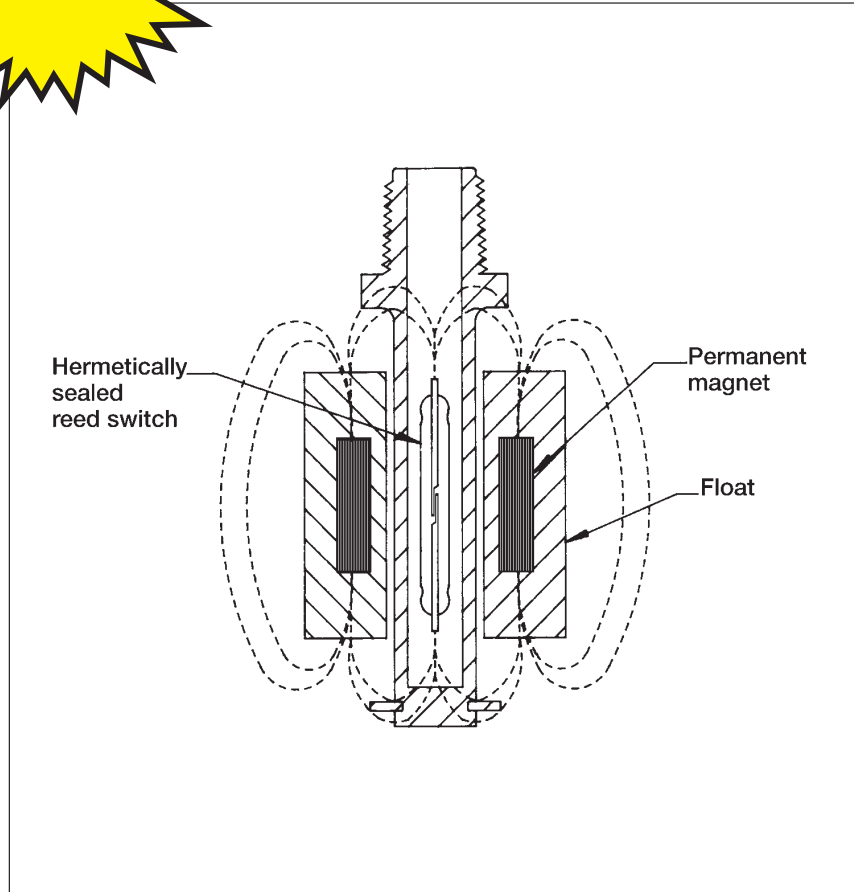
- Pressure and Temperature
- Mounting Orientation
- Termination
- Media Characteristics such as Density, Viscosity and Corrosivity
- Materials of Construction
- Switch Load

Operation

All KOBOLD level switches use a hermetically sealed reed contact actuated by a magnet in the float. As the float rises and falls, the magnetic field causes the switch inside the stem to open or close.

KOBOLD level switches can be mounted in the tank top or bottom, or can be adapted for side mounting. Switches will operate normally with up to a 30 degree tilt from vertical.

All single point switches (except the NCT-1134) are field set for normally open (N/O) or normally closed (N/C) switch operation.



Electrical Data

Design Flexibility

KOBOLD level switches can be provided to detect the interface between two dissimilar liquids such as water and oil.

KOBOLD level switches can be provided with other mounting styles such as with flanges, bent stem, different NPT, straight threads, and metric size mounting plugs.

KOBOLD level switches can be made intrinsically safe for hazardous applications by the use of Zener barriers such as the EX-3001. Contact protection relays like the RL-6000 or RL-6100 should always be considered to protect switches from overload.

Switch Ratings – Resistive Loads			
Contact Rating	Switch Type	Maximum Voltage	Maximum Current
50 W	SPST	200 VDC	1.0 A
20 VA		150 VAC	0.7 A
20 W	SPST	200 VDC	1.0 A
10 VA	SPST	200 VDC/VAC	0.5 A
			3.0 A inrush
100 W	SPST	400 VDC	3.0 A
3 VA	SPDT	30 VDC	0.2 A
20 W	SPDT	200 VDC	1.0 A

NOTE: Above ratings are for resistive loads only.

Specifications subject to change without notice.



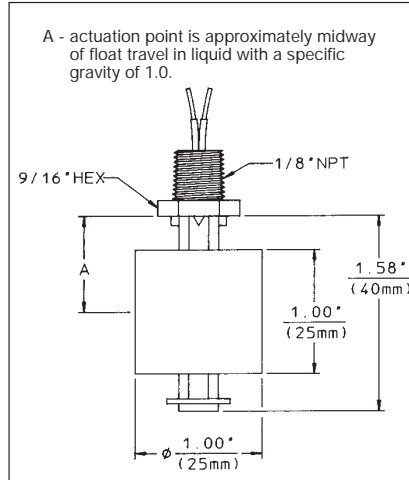
KOBOLD Instruments Inc.
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NC

MAGNETIC FLOAT SWITCHES FOR LIQUIDS

NCP SMALL POLYPROPYLENE SWITCHES

Top Mount NCP-2554



Top Mount Model NCP-2554

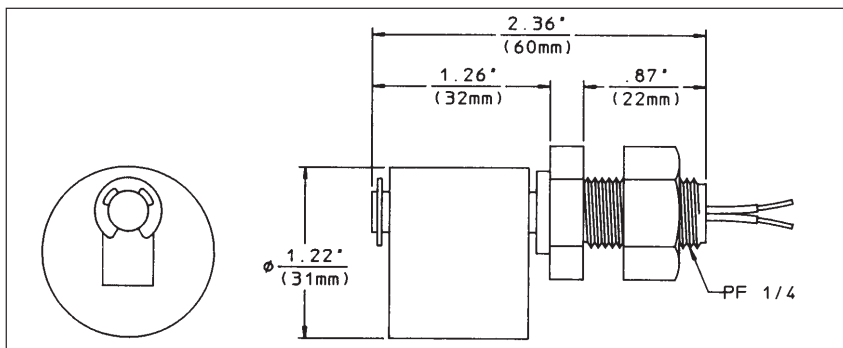
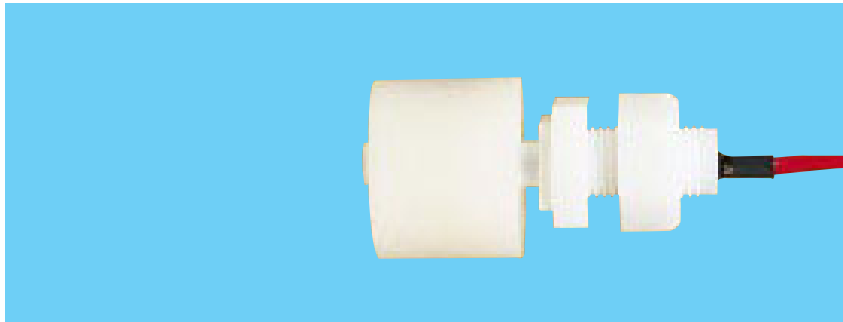
Features

- Small, compact size with small displacement
- Highly reliable, yet inexpensive
- Seamless cellular construction
- Excellent chemical resistance
- Available in FDA approved polypropylene

Specifications

Max. Pressure: 150 PSIG
 Temperature Range
 Operating: - 40 °F to 150 °F
 Fittings: 1/8" NPT
 Leads: 22 AWG x 24"
 Liquid Specific Gravity
 Minimum: 0.72

Side Mount NCP-5094



Side Mount Model NCP-5094

Features

- Side mount design fits small vessels
- Minimal float travel and displacement
- Highly chemical resistant

Specifications

Max. Pressure: 40 PSIG
 Temperature Range: - 40 °F to 176 °F
 Fittings: PF 1/4
 Leads: 22 AWG x 24"
 Liquid Specific Gravity
 Minimum: 0.80

NCP Ordering Information

Type	Part No.	Stem/Float Material	Switch
Top Mount	NCP-2554	Polypro/Polypro	20 VA, SPST
Side Mount	NCP-5094	Polypro/Polypro	20 VA, SPST

Specifications subject to change without notice.

NC

MAGNETIC FLOAT SWITCHES FOR LIQUIDS



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NCB SMALL BUNA-N SWITCHES

General Purpose
NCB-1054 & NCB-1064

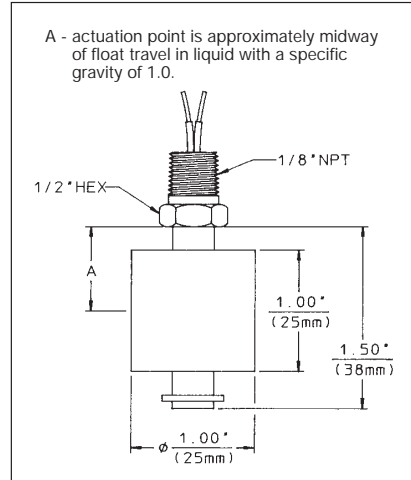
Features

- Small, compact size, 1" dia. float
- Precise repeatability
- Reliable, long-life performance
- Highly resistant to shock and vibration
- Buna-N float
- Stems available in 316 SS or Brass

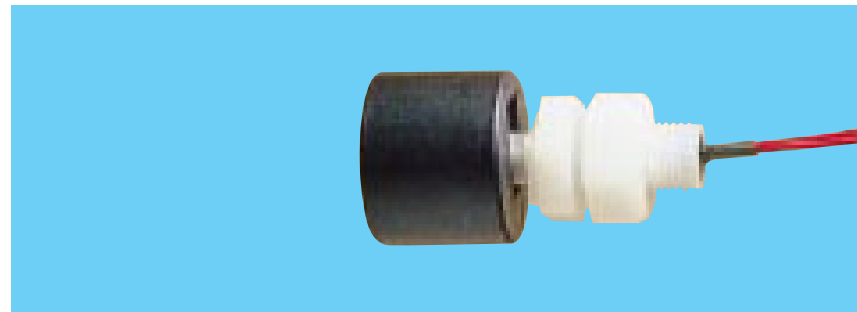
Specifications

Max. Pressure: 150 PSIG
 Operating Temperature Range
 In Oil: -40 °F to 225 °F
 In Water: -40 °F to 180 °F
 Fittings: 1/8" NPT
 Leads: 22 AWG x 24"
 Liquid Specific Gravity
 Minimum: 0.50

General Purpose NCB-1054 & NCB-1064



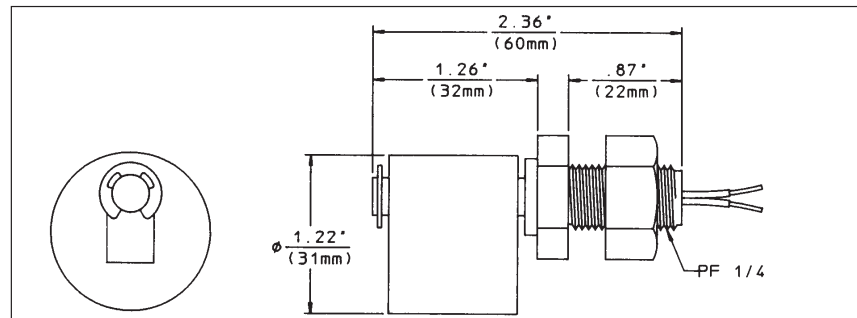
Side Mount NCB-5084



Side Mount Model
NCB-5084

Features

- Side mount design fits small vessels
- Minimal float travel and displacement
- Highly chemical resistant
- Buna-N float with Polyacetal stem



NCB Ordering Information

Specifications

Max. Pressure: 70 PSIG
 Temperature Range: -40 °F to 176 °F
 Fittings: PF 1/4
 Leads: 22 AWG x 24"
 Liquid Specific Gravity
 Minimum: 0.60

Type	Part No.	Stem/Float Material	Switch
Top Mount	NCB-1054	316 SS/Buna-N	20 VA, SPST
Top Mount	NCB-1064	Brass/Buna-N	20 VA, SPST
Side Mount	NCB-5084	Polyacetal/Buna-N	20 VA, SPST



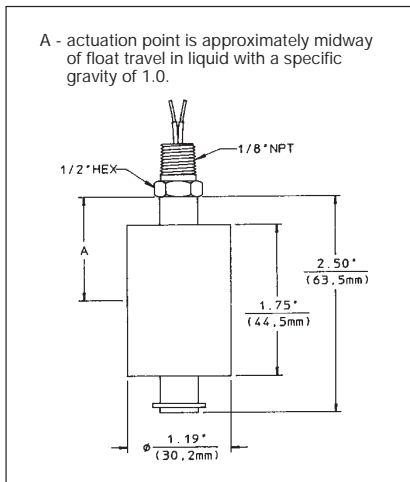
KOBOLD Instruments Inc.
1801 Parkway View Drive
Pittsburgh, PA 15205
Ph: (412)788-2830
Fax: (412)788-4890

NC

MAGNETIC FLOAT SWITCHES FOR LIQUIDS

NCB GENERAL PURPOSE BUNA-N SWITCHES

Intermediate Size NCB-1000



NCB-1000 Intermediate Size

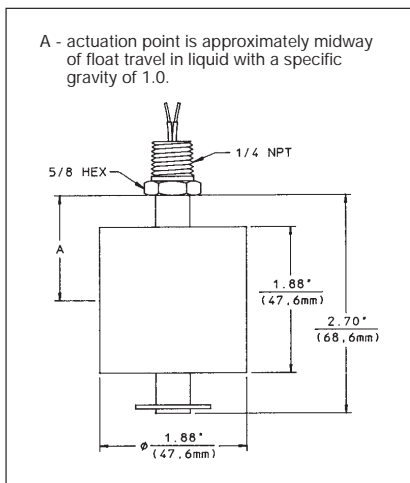
Features

- Highly reliable, yet inexpensive
- Compact, narrow displacement
- Stem available in 316 SS or Brass
- Long operating life

Specifications

Max. Pressure: 150 PSIG
 Operating Temperature Range
 In Oil: - 40 °F to 225 °F
 In Water: - 40 °F to 180 °F
 Fittings: 1/8 NPT
 Leads: 18 AWG x 24
 Liquid Specific Gravity
 Minimum: 0.58

Large Size NCB-4000/5000



NCB-4000/5000 Large Size

Features

- Large float provides maximum displacement in high viscosity fluids
- Rugged design for heavy duty service

Specifications

Max. Pressure: 150 PSIG
 Operating Temperature Range
 In Oil: - 40 °F to 225 °F
 In Water: - 40 °F to 180 °F
 Fittings: 1/4 NPT
 Leads: 18 AWG x 24
 Liquid Specific Gravity
 Minimum: 0.58

NCB Ordering Information

Type	Float Size	Part No.	Stem/Float Material	Switch
Top Mount	Intermediate	NCB-1084	316 SS/Buna-N	100 VA, SPST
Top Mount	Intermediate	NCB-1094	Brass/Buna-N	100 VA, SPST
Top Mount	Large	NCB-5124	316 SS/Buna-N	100 VA, SPST
Top Mount	Large	NCB-5134	Brass/Buna-N	100 VA, SPST
Top Mount	Large	NCB-5144	316 SS/Buna-N	20 VA, SPST
Top Mount	Large	NCB-5154	Brass/Buna-N	20 VA, SPST
Waterproof	Large	NCB-4181	Brass/Buna-N	20 VA, SPST

Specifications subject to change without notice.

NC

MAGNETIC FLOAT SWITCHES FOR LIQUIDS



KOBOLD Instruments Inc.
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NCS ALL STAINLESS STEEL SWITCHES
For High Corrosive, High Temperature Applications

Model NCS-1074
Small Size

Features

- Compact size, 1.1" dia. float
- Long operating life
- Highly resistant to shock and vibration
- All wetted parts 316 SS
- Explosion proof version available

Specifications

Max. Pressure: 150 PSIG
Temperature Range: - 40 °F to 300 °F
Fittings: 1/8" NPT
Leads: 22 AWG x 24"

Liquid Specific Gravity

Minimum: 0.80

Hazardous Area Classification

NCS 7203: UL Approved
CLI Div I Gr. C & D
CLII Div II Gr. A, B, C & D

Large NCS Models

Features

- All wetted parts 316 stainless steel
- High resistance to corrosive chemicals
- Operates in high temperatures
- High pressure capable
- Explosion proof version available

Specifications

Max. Pressure: 400 PSIG
Temperature Range: - 40 °F to 300 °F
Fittings

Typical: 1/4" NPT or
NCS-7202: 1/2"-13 UNF

Leads

Standard: 18 AWG x 2 feet
Waterproof: 18 AWG x 10 feet

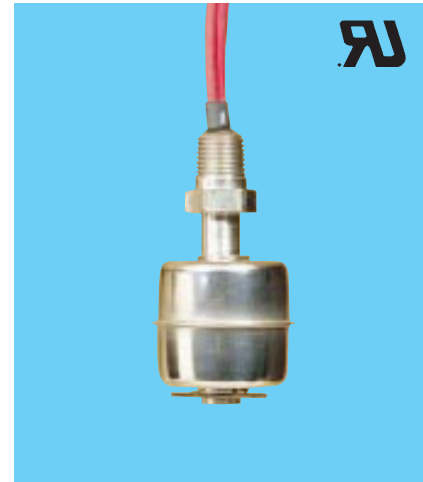
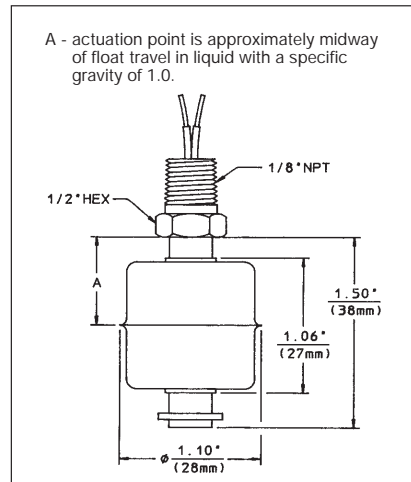
Liquid Specific Gravity

Minimum: 0.73

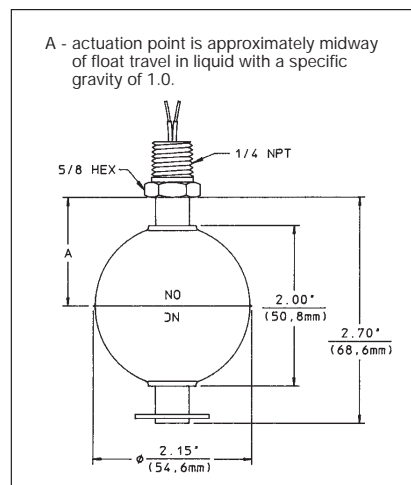
Hazardous Area Classification

NCS 7203: UL Approved
CLI Div I Gr. C & D
CLII Div II Gr. A, B, C & D

Model NCS-1074 Small Size



Model NCS Large Size



NCS Ordering Information

Size	Type	Part No.	Stem/Float Material	Switch
Small	Standard	NCS-1074	316 SS/316 SS	20 VA, SPST
Large	Standard	NCS-1104	316 SS/316 SS	100 VA, SPST
Large	Standard	NCS-5214	316 SS/316 SS	20 VA, SPST
Large	Waterproof - NPT	NCS-7201	316 SS/316 SS	20 VA, SPST
Large	Waterproof - UNF	NCS-7202	316 SS/316 SS	20 VA, SPST
Large	Explosion proof - NPT	NCS-7203	316 SS/316 SS	20 VA, SPST



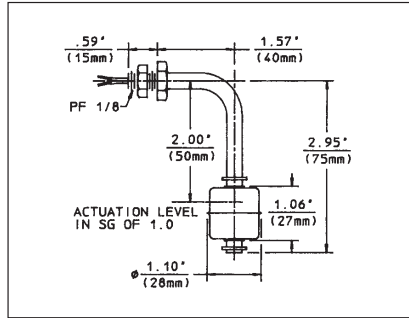
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1801 Parkway View Drive
Pittsburgh, PA 15205
Ph: (412)788-2830
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NC

MAGNETIC FLOAT SWITCHES FOR LIQUIDS

NC BENT STEM SIDEMOUNT AND PVC SWITCHES

NCS-5161 and NCB-5171 Sidemount Switches



SS NCS-5161 and BUNA-N NCB-5171 Sidemount Switches

Features

- 90° bend allows mounting where access to tank top or bottom is restricted
- 316 SS stem standard
- Floats available in SS or Buna-N
- Long operating life

Specifications

Maximum Pressure

SS: 275 PSIG
Buna: 150 PSIG

Operating Temperature Range

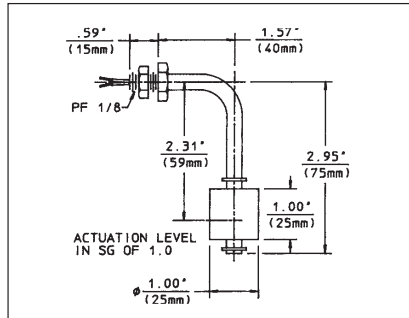
SS: - 40 °F to 300 °F
Buna: In Oil: - 40 °F to 225 °F
In Water: - 40 °F to 180 °F

Fittings: PF 1/8"

Leads: 22 AWG×11"

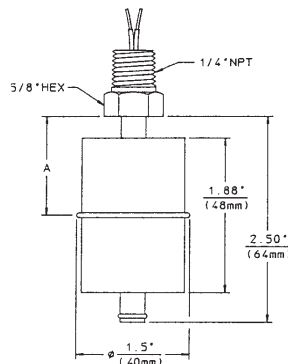
Minimum Liquid Specific Gravity

SS: 0.80
Buna: 0.50



NCP-1401 PVC Switches

A - actuation point is approximately midway of float travel in liquid with a specific gravity of 1.0.



Series NCP-1401 PVC Switches

Features

- All PVC wetted surfaces
- PVC float for greater resistance to corrosives
- Low particulate generation

Specifications

Max. Pressure: 100 PSIG
Temperature Range: - 40 °F to 140 °F
Fittings: 1/4" NPT
Leads: 22 AWG×24"
Liquid Specific Gravity Minimum: 0.85

Ordering Information

Type	Part No.	Stem/Float Material	Switch
Side Mount	NCS-5161	316 SS/316 SS	10 VA, SPST
Side Mount	NCB-5171	316 SS/Buna-N	10 VA, SPST
PVC	NCP-1401	PVC	20 VA, SPST

Specifications subject to change without notice.

NCG CUSTOM LEVEL SWITCHES FOR LIQUIDS



KOBOLD Instruments Inc.
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NCG STANDARD MULTIPOINT LEVEL SWITCHES



The KOBOLD Standard Multipoint Level Switches are available in lengths to 72 inches, with switches located as per your instructions.

Stem Choices

Maximum Length: 72"
Wetted Parts
Stem/Fittings: 316 SS or Brass
Electrical Ratings: SPST, 50 VA

- Special units available to 20 feet.
- Up to 6 control points per unit.

Float Choices

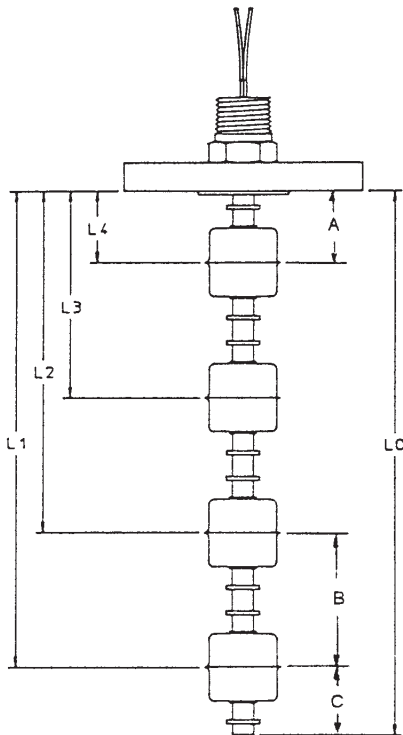
Wetted Parts: Buna-N
Stainless Steel

Maximum Pressure
Buna-N: 150 PSIG
Stainless Steel: 750 PSIG
PVC: 100 PSIG

Operating Temperature
Buna-N: In Oil: - 40 °F to 225 °F
In Water: - 40 °F to 180 °F
Stainless Steel: - 40 °F to 300 °F
PVC: - 40 °F to 140 °F

Minimum Liquid Specific Gravity
Type 1 Float: 0.73
Type 2 Float: 0.58
Type 3 Float: 0.55
Type 4 Float: 0.85

Switch Geometry



A = 1/2" minimum distance to highest level
B = 3" minimum distance between levels
C = 2" minimum distance from end of unit to lowest level

Fitting Choice Selection Table

Stem Choices	Type 1	Type 2	Type 3	Type 4	Type 5
Fitting	1/2" NPT	1 1/4" NPT	2" NPT	3" ANSI Flange	1/2" Tubing

Float Choice Selection Table

Type 1 Float 316 SS	Type 2 Float Buna-N	Type 3 Float Buna-N	Type 4 Float PVC



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NCG

CUSTOM LEVEL SWITCHES FOR LIQUIDS

NCG STANDARD MULTIPOINT LEVEL SWITCHES

NCG Ordering Information

NCG-	W = Fitting Type	X = Fitting/ Stem Material	Y = Number of Switch Levels	Z = Float Type & Material	Options
	W = 1: 1/2" NPT Male	X = 1: Brass/Brass	Y = 1-6	Z = 1: Stainless Steel (Fitting Types 3, 4 and 5)	-A: Adjustable Fitting (Stem Types 2, 3, and 4)
	W = 2: 1 1/4" NPT with 1/2" NPT Conduit	X = 2: SS/SS	Specify Number of Levels	Z = 2: Small Buna-N	-B: Weighted Buna-N floats for interface detection (Specify desired S. G.)
	W = 3: 2" NPT with 1/2" NPT Conduit	X = 3: PVC/PVC (Stem Type 1, 3 and 4 only)		Z = 3: Large Buna-N (Fitting Types 3, 4 and 5)	-D4: Group IV Wiring 20 VA, SPDT (Not UL recognized)
	W = 4: 3" ANSI Flange SS & PVC only			Z = 4: PVC (For PVC Stem only)	-H: 100 VA SPST Reed Switch (Not UL recognized)
	W = 5: 1/2" Tube End				-N: Junction Box NEMA 4 -EX: Junction Box Explosion Proof

How to Order

Before ordering, it is important to thoroughly define your level switch requirements. Simply follow the instructions given in this section, paying special attention to steps 1-4. Note that:

- Switch operation is defined as »normal« when the float is dry, and the container is empty.
- Standard lead wires are 24 inches long, 22 AWG.
- Standard wiring is Group II.

1. Select the stem type.
2. Select the stem material.
3. Specify the number of switch levels needed and define their operation by completing the »Actuation Point Location and Logic« section below.
4. Choose the type of float desired and complete the »Application Information« section below to assure suitability.
5. Determine voltage and current to be switched. If necessary, order the

- optional high power 100 VA reed switch or an isolation relay such as the RL-6100.
6. Specify all other options desired.
7. Determine the number of complete units required.
8. Make a copy of the completed »Actuation Point Location and Logic« and »Application Information« tables below, and include with your order.

Actuation Point Location and Logic

Distance (inches)	SPST Switch Operation	
L0: = (L1 + 2")		
L1: _____	NO Dry: _____	NC Dry: _____
L2: _____	NO Dry: _____	NC Dry: _____
L3: _____	NO Dry: _____	NC Dry: _____
L4: _____	NO Dry: _____	NC Dry: _____
L5: _____	NO Dry: _____	NC Dry: _____
L6: _____	NO Dry: _____	NC Dry: _____

NOTE: 3" minimum distance between levels.

Application Information

Process Liquid: Name: _____

Specific Gravity: _____

Viscosity: _____

Temperature: Operating: _____

Maximum: _____

Minimum: _____

Pressure: Operating: _____

Maximum: _____

Tank Material: _____

NCM CUSTOM LEVEL SWITCHES FOR LIQUIDS



KOBOLD Instruments Inc.
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Ph: (412)788-2830
Fax: (412)788-4890

NCM MINIATURE LEVEL SWITCHES



The KOBOLD Miniature Multipoint Level Switches are available in lengths to 48 inches. Up to four switches may be located as per your instructions.

Stem Choices

Maximum Length: 48"
Wetted Parts
Stem/Fittings: 316 SS, Brass
Polypropylene or
PVC up to 24" long

Float Stops
Brass Units: Beryllium Copper
SS Units: PH 15-7 MO
(ARMCO)

Electrical Ratings: SPST, 10 VA, 50 W

- Up to 48" overall length
- Up to 4 control points

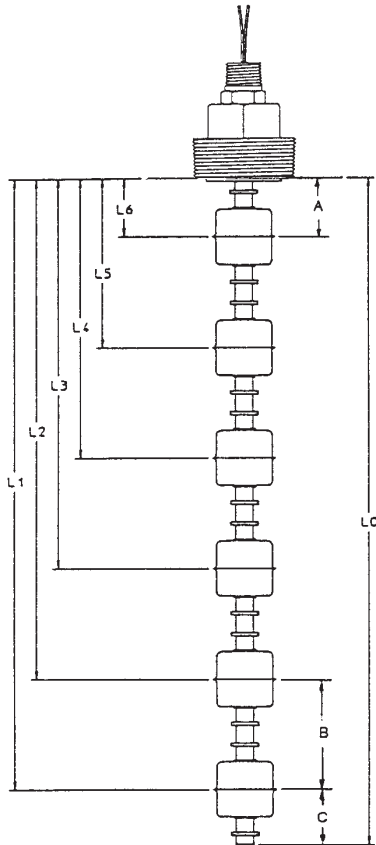
Float Choices

Maximum Pressure:
Buna-N, Polypro: 150 PSIG
Stainless Steel: 270 or 400 PSIG

Operating Temperature
Buna-N: In Oil: - 40 °F to 225 °F
In Water: - 40 °F to 180 °F
Polypropylene: - 40 °F to 150 °F
Stainless Steel: - 40 °F to 300 °F

Minimum Liquid Specific Gravity
Type 1 Float: 0.85
Type 2 Float: 0.50
Type 3 Float: 0.72
Type 4 Float: 0.95

Switch Geometry



A = 3/4" minimum distance to highest level
B = 1 1/2" minimum distance between levels
C = 1" minimum distance from end of unit to lowest level

Fitting Choice Selection Table

Stem Choices	Type 1	Type 2	Type 3	Type 4	Type 5
Fitting	1/8" NPT	1/4" NPT	1" NPT	3/4" NPT	5/16" Tubing

Float Choice Selection Table

Type 1 Float 316 SS/270 PSIG	Type 2 Float Buna-N	Type 3 Float Polypropylene	Type 4 Float 304 SS/400 PSIG
1.06" (27mm) 1.10" (28mm)	1.00" (25mm) 1.00" (25mm)	1.00" (25mm) 1.00" (25mm)	1.50" (38mm) 0.90" (23mm)



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NCM CUSTOM LEVEL SWITCHES FOR LIQUIDS

NCM MINIATURE MULTIPOINT LEVEL SWITCHES

NCM Ordering Information

NCM-	W = Fitting Type	X = Fitting & Stem Material	Y = Number of Switch Levels	Z = Float Type & Material	Options
	W = 1: 1/8" NPT Male	X = 1: Brass/Brass	Y = 1-6	Z = 1: 316 Stainless Steel	-D1: Group I Wiring 50 VA, SPST
	W = 2: 1/4" NPT Male	X = 2: Stainless Steel/ Stainless Steel	Specify Number of Levels	Z = 2: Buna-N	-E: 1/2" Conduit Fitting (Stem Type 3 only)
	W = 3: 1" NPT Male			Z = 3: Polypropylene	-N: Junction Box NEMA 4
	W = 4: 3/4" NPT Male			Z = 4: 304 Stainless Steel	
	W = 5: 5/16" Tube End				

How to Order

Before ordering, it is important to thoroughly define your level switch requirements. Simply follow the instructions given in this section, paying special attention to steps 1-4. Note that:

- Switch operation is defined as »normal« when the float is dry, and the container is empty.
- Standard lead wires are 24 inches long, 22 AWG.
- Standard wiring is Group II.

1. Select the stem type.
2. Select the stem material.
3. Specify the number of switch levels needed and define their operation by completing the »Actuation Point Location and Logic« section below.
4. Choose the type of float desired and complete the »Application Information« section below to assure suitability.
5. Determine voltage and current to be switched. If necessary, order the

- optional high power 50 VA reed switch or an isolation relay such as the RL-6100.
6. Specify all other options desired.
7. Determine the number of complete units required.
8. Make a copy of the completed »Actuation Point Location and Logic« and »Application Information« tables below, and include with your order.

Actuation Point Location and Logic

Distance (inches)	SPST Switch Operation
L0: = (L1 + 1")	
L1: _____	NO Dry: _____ NC Dry: _____
L2: _____	NO Dry: _____ NC Dry: _____
L3: _____	NO Dry: _____ NC Dry: _____
L4: _____	NO Dry: _____ NC Dry: _____
L5: _____	NO Dry: _____ NC Dry: _____
L6: _____	NO Dry: _____ NC Dry: _____

NOTE: 1 1/2" minimum distance between levels.

Application Information

Process Liquid: Name: _____

Specific Gravity: _____

Viscosity: _____

Temperature: Operating: _____

Maximum: _____

Minimum: _____

Pressure: Operating: _____

Maximum: _____

Tank Material: _____

NDT STATIC PRESSURE LEVEL SWITCH

FOR LIQUIDS IN OPEN TANKS

The KOBOLD NDT level switch is especially suitable for level monitoring of liquids in open tanks.

The NDT uses a differential pressure cell to measure the height of the liquid above the bottom of its user supplied sensing tube. Operation of the NDT is simple. Install a pipe on the NDT such that the bottom of the pipe reaches to four (4) inches below the desired switchpoint. When the liquid level reaches the pipe it will seal off access to the pipe end. As the level continues to rise, the static pressure of the liquid outside the hose will exert a pressure on the air pocket trapped in the pipe (corresponding to the height of the medium above the pipe end.) The NDT's pressure switch is connected to the air pocket and factory adjusted to trip at four inches of water column pressure. The switching can thereby take place without the NDT's moving mechanisms ever contacting the medium.



Specifications

Wetted Parts

Exposed to Liquid: User supplied pipe

Exposed to Air Pocket:

Buna-N, Nylon®

Housing:

Nylon®

Media:

Any free-flowing liquid

Fittings:

1 1/2" hose barb

Switchpoint:

4 inches above end of user supplied pipe

Switch Error:

± 10%

Temperature Range:

15 to 185 °F

Electrical Characteristics

Switch Type: SPDT

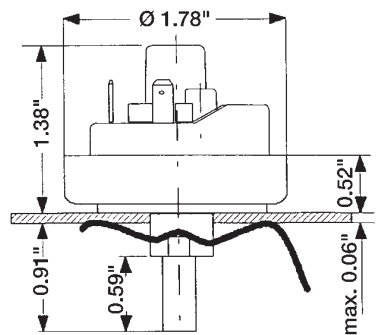
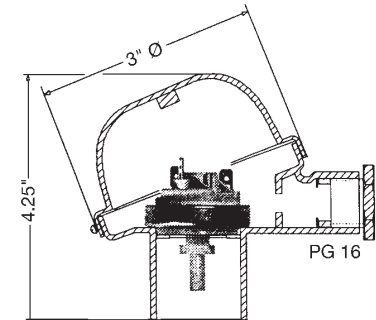
Maximum Rating: 250 VAC @

8 A resistive load

Protection:

NEMA 4

Dimensions



NDT Ordering Information

Model Number	Sensing Tube Fitting
NDT-2020	1/2" BSP Threaded Connection
NDT-2080	1/2" Hose Connection

NEK
COMPACT CONDUCTIVE LEVEL SWITCH

Model
NEK



- Compact Design
- No Moving Parts
- Excellent for Dirty, Low Viscosity or Aggressive Liquids
- Transistor Switch or Relay Outputs Available
- Ryton or Polypropylene Bodies



NEK COMPACT CONDUCTIVE LEVEL SWITCH

Features

- Compact Design
- No Moving Parts
- Excellent For Dirty, Low Viscosity or Aggressive Liquids
- Transistor Switch or Relay Outputs Available
- Ryton or Polypropylene Bodies

The NEK series compact conductive level switch is an excellent choice for monitoring the level of conductive liquids in tanks. The NEK series conductive level switch senses liquid level by applying a low AC voltage to a set of stainless steel electrodes. When a conductive liquid is present a small current will flow between the electrodes, resulting in switch activation. The NEK compact level switch is available with either a ryton or polypropylene body with 316-Ti stainless steel electrodes standard. This makes the NEK suitable for many chemicals and aggressive media. The solid state design has no moving parts so the NEK is also a sure bet for dirty liquids as well as those with high solids content.

Specifications

Wetted Materials:

Housing: Ryton or polypropylene
Electrodes: 316-Ti SS

Maximum Pressure:

Ryton: 290 PSIG
Polypropylene: 85 PSIG

Temperature Range:

Ryton: -10 to 176°F
Polypropylene: -10 to 140°F

Minimum Liquid

Conductivity: 32µS/cm

Switching Delay: 0.5 sec

Power

Requirements: 18-32 VDC

Switch Characteristics

Open Collector: Normally open (dry), PNP or NPN depending on model number, 30 VDC, 100 mA, short circuit protected

SPDT Relay: 1 Amp max. @ 24 VDC

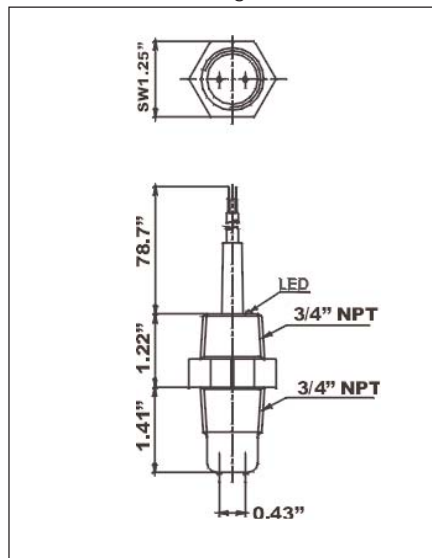
Electrical

Protection: NEMA 6

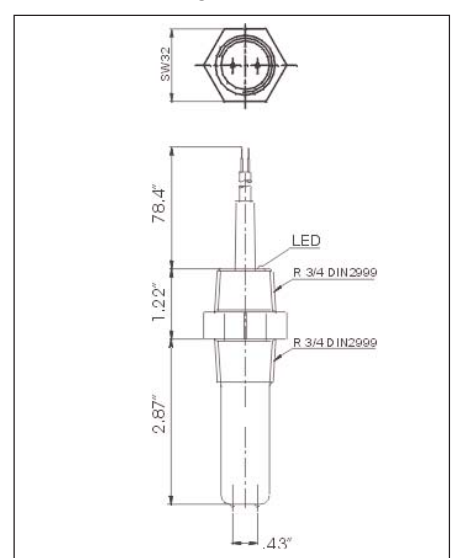


NEK Series Compact Conductive Level Switch

1-1/2" Immersion Length



3" Immersion Length



Ordering Information

Immersion Length	Switch Type	Body Material		Fitting	Electrical Connection
		Ryton	Polypropylene		
1-1/2"	NPN open collector	NEK-1136	NEK-1236	N20=3/4"NPT	C = 6 ft. PVC Cable
	PNP open collector	NEK-2136	NEK-2236		
	SPDT Relay	NEK-3136	NEK-3236		
3"	NPN open collector	NEK-1173	NEK-1273		
	PNP open collector	NEK-2173	NEK-2273		
	SPDT Relay	NEK-3173	NEK-3273		

Specifications subject to change without notice.

NEO

ECHOKING ULTRASONIC LEVEL TRANSMITTER



KOBOLD Instruments Inc.
1801 Parkway View Drive
Pittsburgh, PA 15205
Ph: (412)788-2830
Fax: (412)788-4890

Features

- Capable of monitoring tanks and bins up to 24.5 feet deep
- Compact and easily installed
- Automatic temperature compensation
- Non-contact sensor
- Compatible with viscous, sticky or chemically aggressive media
- Provides a 4–20 mA transmitter capable of operating in a three wire, or four wire mode
- On-board LED display for easy calibration
- SPDT relay which can be configured as a level alarm or for auto tank fill/empty
- All the above are STANDARD!



The KOBOLD EchoKing ultrasonic transmitter is a full featured level sensing system suitable for monitoring levels of liquids and some dry-bulk materials. The unit's sophisticated signal processing delivers an accuracy and dependability not possible with older technology.

The EchoKing's enhanced abilities are made possible by a powerful internal microprocessor. The system uses a form of artificial intelligence to learn about its surroundings. An on-going learning process is used to help the EchoKing distinguish between real echos, reflections and just plain old background noise. At the same time, the sensor constantly adapts to changes in the on-site conditions. In air environments, the NEO adjusts for temperature variations through use of an internal thermal sensor and compensating table.

A built-in relay may be used to control tank fill/empty operations, as an alarm for level detection, or for fault detection. Span, setpoint limits and all necessary information is stored digitally in the EchoKing's non-volatile memory – there are no sensitive analog potentiometers to adjust.

Despite its technical complexity, the system is easily programmable via an on-board touch-pad. All process parameters can be easily entered into the system at the installation site.

KOBOLD EchoKing® Level Transmitter

Specifications

Range:	24.5 feet from sensor face
Dead Band:	0.5 feet (6 inches)
Span:	24 feet
Accuracy:	±0.25% of F.S.
Repeatability:	±0.125"
Fitting:	2" NPT
Materials of Construction	
Probe:	PVDF
Enclosure:	PP (UL 94VO)
Max. Temp. Range:	-10 to 140°F
Pressure Rating:	30 PSI @ 75°F
Beam Angle:	±8° off vertical
Sensor Frequency:	50 KHz
Supply Voltage:	14 to 36 VDC
Current Draw:	200 mA max.
Signal Output:	4-20 mA DC into 350 W max.
Relay:	SPDT 12 amps @ 240 VAC/120 VDC
Protection:	NEMA 4X

Ordering Information

Output Type	Order Number
Sourcing	NEO-5003
Sinking	NEO-5004
Option: T4: 4" Tri-Clamp (PVDF)	



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NEO

ECHOKING ULTRASONIC LEVEL TRANSMITTER

Features

- Same adaptive features as the standard EchoKing®
- Capable of monitoring tanks and bins up to 18 feet deep
- Compact and easily installed
- Automatic temperature compensation
- Non-contact sensor
- Compatible with viscous, sticky or chemically aggressive media
- Provides a 4–20 mA transmitter capable of operating in a loop powered two wire mode
- On-board LCD display for easy calibration



KOBOLD NEO-5001 Level Transmitter

The 2-wire, loop powered version of the NEO features the same artificial intelligence circuitry as the 3-wire/4-wire version. Echo error correction, short dead band at the sensor face, and adaptability to changing environment are implemented in both a non-hazardous and intrinsically safe version of state-of-the-art EchoKing® ultrasonic level transmitter.

The NEO-5001 provides a 4–20 mA output over a 0.5 to 18 foot measuring range. The current span is fully user adjustable within that 18 foot measuring range. To allow use in hazardous locations, an intrinsically safe (IS) version of this transmitter is available. With the IS version, all applications conforming to the requirements of Classes I, II, III, Divisions I and II, and Groups A through G are suitable candidates for the easy, reliable level measurement afforded by the NEO EchoKing®.

Specifications

Range: 18 feet from sensor face
Dead Band: 0.5 feet (6 inches)
Span: 17.5 feet
Accuracy: ±0.25% of span
Repeatability: ±0.125"
Fitting: 2" NPT
Display
Type: 4 digit LCD
Units: inch / cm
Materials of Construction
Probe: PVDF
Enclosure: PP (UL 94VO)
Max. Temp. Range: -4 to 140°F
Compensation: over entire range
Pressure Rating: 30 PSI @ 75°F
Beam Angle: ±8° off vertical
Sensor Frequency: 50 KHz
Supply Voltage: 14 to 36 VDC
Current Draw: 200 mA max.
Signal Output: 4–20 mA DC into 350 ohms max.

Intrinsic Safety Rating (NEO-5001IS Only)
CSA/NRTL/C: Class I, II & III
 Division 1 & 2
 Groups A-G
Vmax: 32.0 VDC
I_{max}: 130 mA
Ca: < 0.1 microFarads
La: < 0.1 microHenries
Protection: NEMA 4X case

Ordering Information

Output Type	Order Number
Standard	NEO-5001
Intrinsically Safe	NEO-5001IS
Option: -T4: 4" Tri-Clamp (PVDF)	

NEO

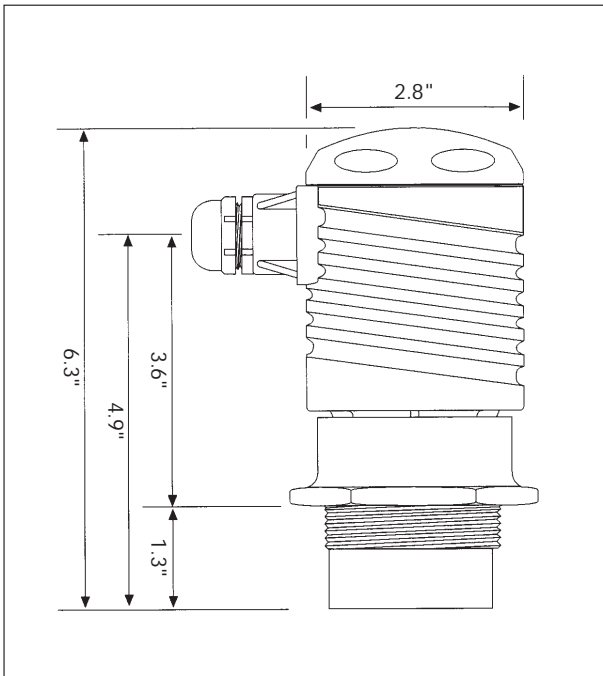
ECHOKING ULTRASONIC LEVEL TRANSMITTER



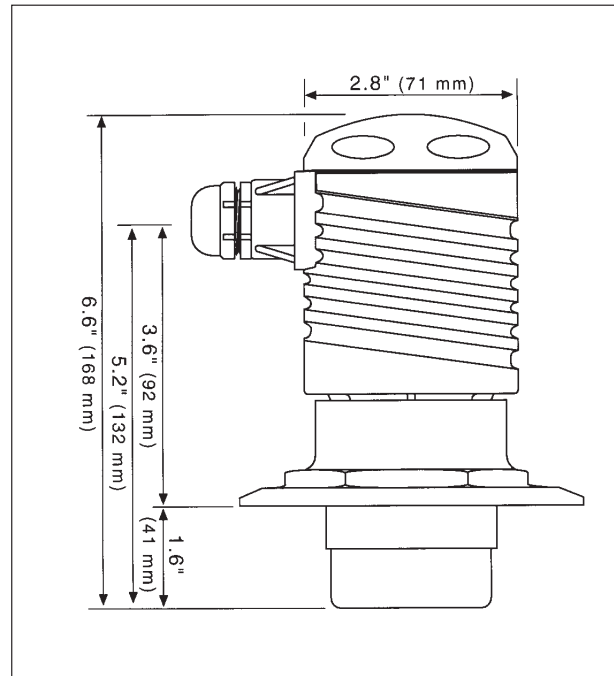
KOBOLD Instruments Inc.
 1801 Parkway View Drive
 Pittsburgh, PA 15205
 Ph: (412)788-2830
 Fax: (412)788-4890

NEO Dimensions

Standard 2" NPT Fittings

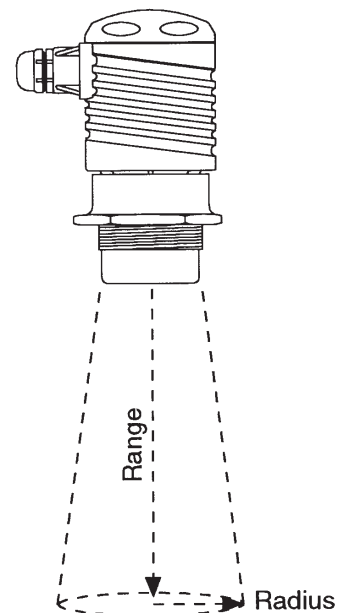


4" Sanitary Tri-Clamp Fittings

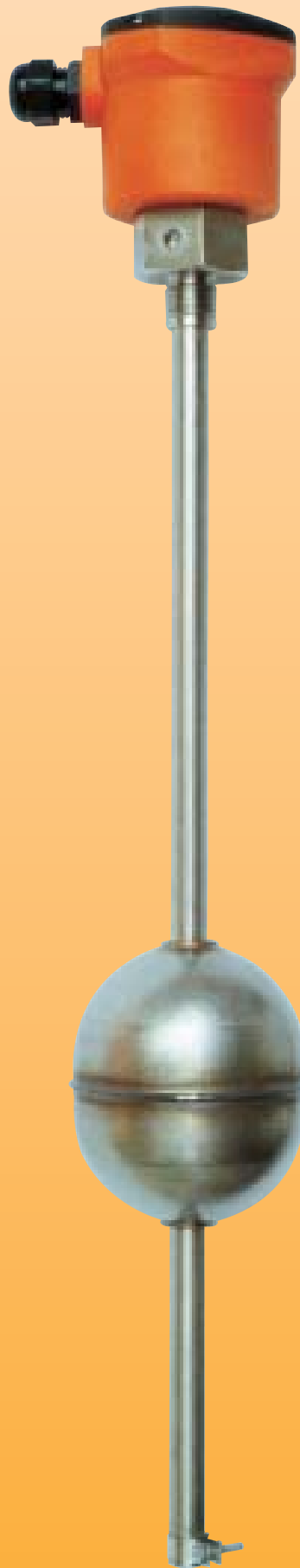


NEO Beam Divergence

Range (feet)	Radius (inches)	Range (feet)	Radius (inches)
1	2.6	13	21.5
2	4.2	14	23.1
3	5.7	15	24.7
4	7.3	16	26.3
5	8.9	17	27.8
6	10.5	18	29.4
7	12.1	19	31.0
8	13.6	20	32.6
9	15.2	21	34.2
10	16.8	22	35.7
11	18.4	23	37.3
12	20.0	24	38.8
		25	40.5



NM LIQUID LEVEL TRANSDUCER



Model
NM

- **Continuous Level Measurement**
- **Undisturbed by Foam**
- **Vapor Insensitive**
- **Liquid Interface Detection**
- **Range of Wetted Parts**



KOBOLD Instruments Inc.
1801 Parkway View Drive
Pittsburgh, PA 15205
Phone: (412)788-2830
Fax: (412)788-4890
www.koboldusa.com

NM LIQUID LEVEL TRANSDUCER

The NM series of level transducers is applicable to a wide variety of industrial level gauging applications. A reed chain and travelling float design allow the system to function independently of liquid electrical properties, temperature, pressure, foaming or the presence of vapors. With proper float weighting, the system can be constructed to detect the interface level of two liquids with dissimilar specific gravities. A selection of materials ranging from stainless steel, to plastic, to Teflon®, provide compatibility with a large variety of process liquids.

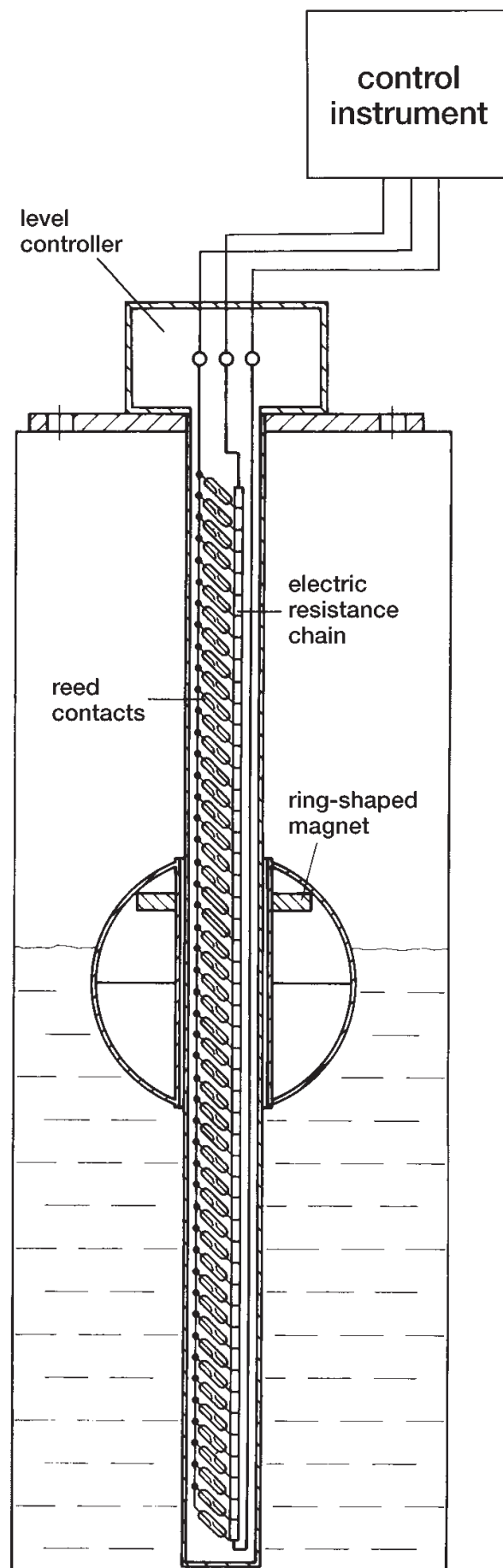
Typical NM applications include waste water and sewage treatment plants, charging and mixing bins, containers for chemicals, beverages or vegetable oils, remote level indication for rivers or reservoirs. High reliability is assured by keeping the moving part count down to a single, non-friction component (the float.)

Function

The transducer consists of a guide tube onto which a float is inserted. A magnet inside the float actuates a series of reed switches inside the tube. One contact of the reed switches is connected to a resistance chain every fraction of an inch, and the other contact to a common terminal. The entire system functions as a three-tap potentiometer whose resistance is determined by the location of the float on the guide tube. An external electronic controller (also available from KOBOLD) uses this variable resistance as part of a Wheatstone Bridge circuit and converts the resistance to an analog signal (0/4–20 mA, voltage), or presents the level information on a display.

The accuracy of the system is a function of the reed switch spacing. This spacing varies from 10 mm (0.4 inches) to 20 mm (0.8 inches) depending on transducer model and overall length. The magnet closes either one or two switches at all times. Interpolation allows accuracies of $\frac{1}{2}$ the switch spacing.

NM Series Level Gauge



NM LIQUID LEVEL TRANSDUCER

Models NM-298 and NM-299: Stainless Steel

The NM-298 and NM-299 are stainless steel level transducers which are installed upwards into a threaded fitting. This arrangement requires access to the interior of the vessel into which the units are installed.

Each transducer comes standard with 3.3 feet (1 meter) of pigtail cable. Extra cable lengths are available.

The NM-298 is ideal for installations 6.6 feet (2 meters) and shorter. The NM-299 can be obtained in lengths to 20 feet (6 meters).

Specifications

Maximum Length

NM-298:	6.5 feet
NM-299:	20 feet

Fittings

NM-298:	3/8" NPT male
NM-299:	1/2" NPT male

Wetted Parts: 316-Ti SS

Accuracy: ± 15 mm (0.6 in.)

Minimum Liquid Specific Gravity

Standard:	0.8
Optional:	0.7

Temperature Range: - 4 to 250 °F

Max. Pressure

NM-298:	210 PSIG
NM-299:	290 PSIG

Electrical Data

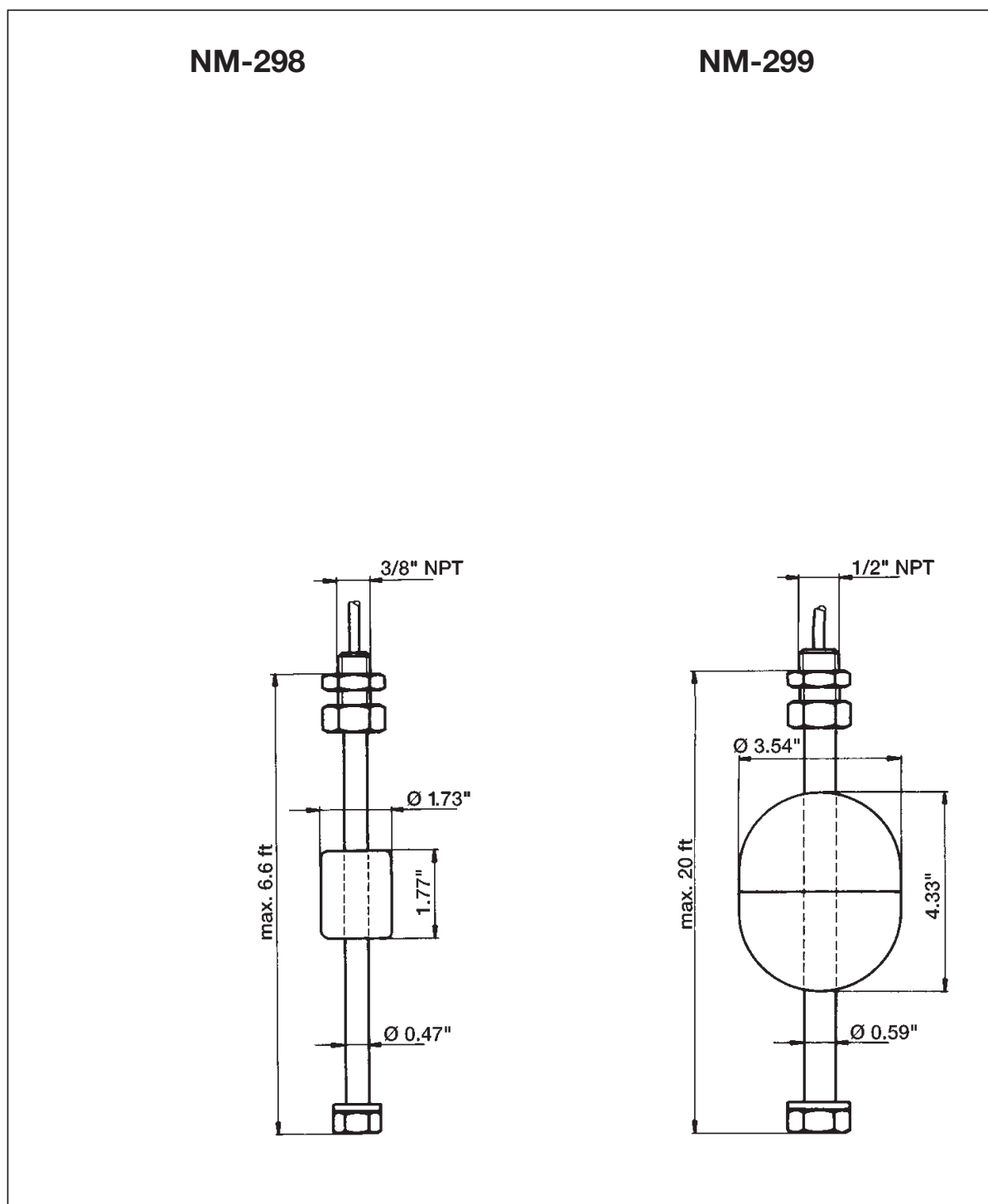
Sensing Voltage: 20 VDC max.

Total Resistance

Standard:	Approx. 5,000 Ω
EX Version:	Approx. 40,000 Ω

Cable Length: 3.3 feet standard (longer available)

Protection: NEMA 4



NM-298 and NM-299 Ordering Information

Model Number		
Series Number	Fittings	Length
NM-298	-N 3/8": 3/8" NPT -R 3/8": 3/8" bsp	-L =: Specify Length
NM-299	-N 1/2": 1/2" NPT -R 1/2": 1/2" bsp	

Example: NM-298-N 3/8"-L 40"

NM LIQUID LEVEL TRANSDUCER

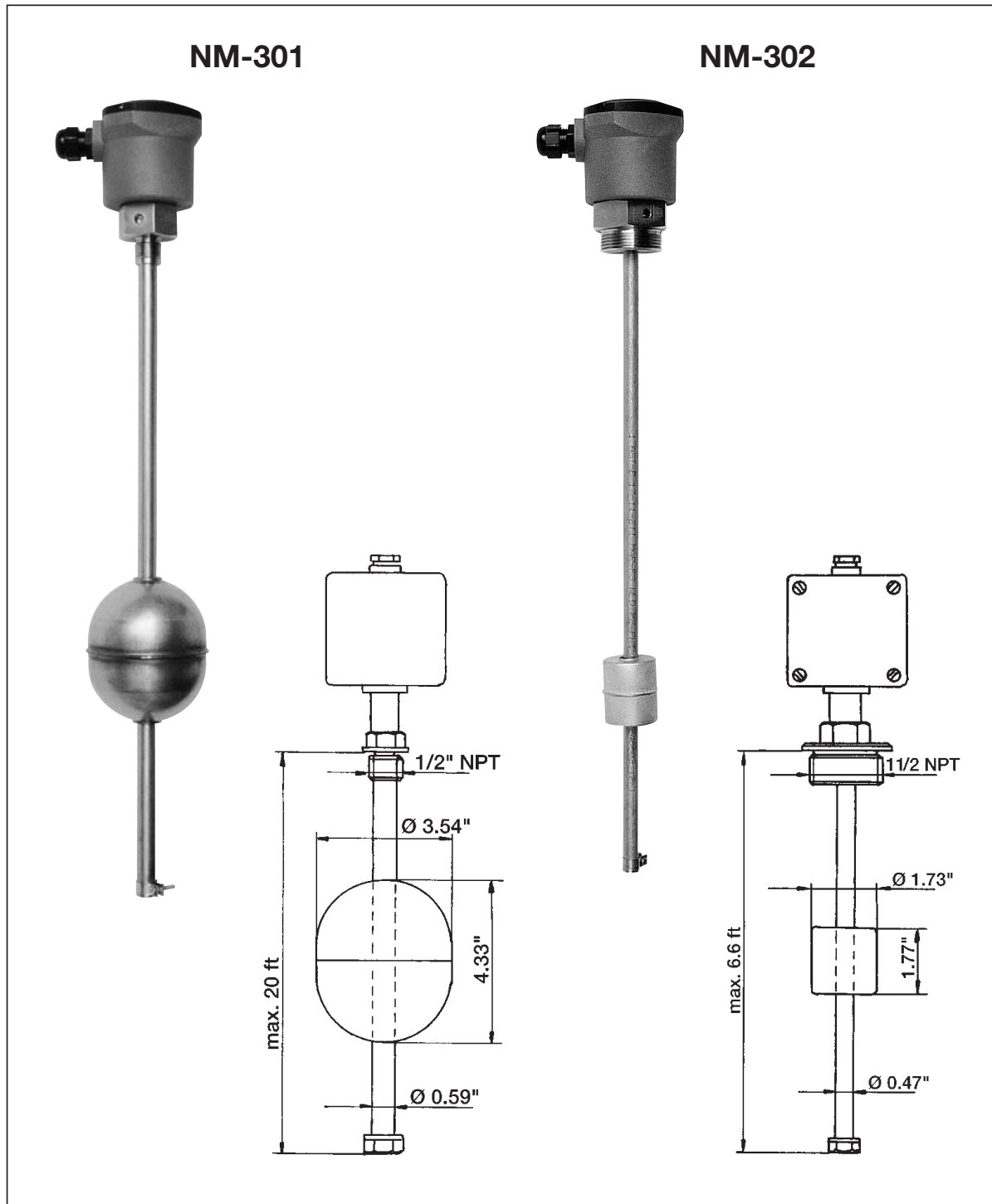
Models NM-301 and NM-302: Stainless Steel

The NM-301 and NM-302 are stainless steel level transducers with flanged or threaded fittings. Use of the 1½" NPT fitting or flange allows the units to be installed from the top of your vessel or mounting bracket. These larger fittings will accommodate the floats with which the transducers are equipped. Each transducer comes standard with a NEMA 4 terminal box.

The NM-302 is intended for installations 6.6 feet (2 meters) and shorter. The NM-301 can be obtained in lengths to 19.8 feet (6 meters.)

Specifications

Minimum Length:	12 inches
Maximum Length	
NM-301:	19.8 feet
NM-302:	6.6 feet
Fittings	
NM 301:	½" NPT male 4" ANSI flange
NM-302:	1½" NPT male, 2", 2½" 3" or 4" ANSI flange
Wetted Parts:	316-Ti SS
Accuracy	
NM-302:	± 10 mm (0.6 in.)
NM-301	
Below 6.6 feet:	± 10 mm (0.4 in.)
Above 6.6 feet:	± 20 mm (0.8 in.)
Minimum Liquid Specific Gravity	
Standard:	0.8
Optional:	0.7
Temperature Range:	- 4 to 250 °F
Max. Pressure	
NPT Threads	
NM-301:	290 PSIG
NM-302:	210 PSIG
ANSI Flanges:	215 PSIG
Electrical Data	
Sensing Voltage:	20 VDC max.
Total Resistance	
Standard:	Approx. 5,000 Ω
EX Version:	Approx. 40,000 Ω
Terminal Box:	Polyester
Protection:	NEMA 4



NM-301 and NM-302 Ordering Information

Model Number		
Series Number	Fittings	Length
NM-301	-N ½": ½" NPT -FL 4": 4" 150 lb ANSI flange	-L =: Specify Length
NM-302	-N 1½": 1½" NPT -FL 2": 2" 150 lb ANSI flange -FL 2½": 2½" 150 lb ANSI flange -FL 3": 3" 150 lb ANSI flange -FL 4": 4" 150 lb ANSI flange	

Example: NM-302-FL 3"-L 128"

NM LIQUID LEVEL TRANSDUCER

Models NM-300 and NM-308: Synthetic

The NM-300 and NM-308 are PVC, polypropylene (PP) or PTFE (Teflon®) level transducers with flanged or threaded fittings. PVC floats and flanges are unavailable. Polyethylene (PE) floats and polypropylene (PP) flanges will be provided with PVC units. PVC threaded fittings are available.

Each transducer comes with a NEMA 4 terminal box.

Specifications

Maximum Length

NM-300:	3.3 feet
NM-308:	19.6 feet

Fittings

NM-300:	2 NPT male 2½ ANSI flange
NM-308:	1" NPT male 3" ANSI flange

Wetted Parts

NM-300:	PVC (PE float) or Polypro (PP)
Flanges:	PP only
NM-308:	PVC (PE float), PP, or PTFE
Flanges:	PTFE or PP only

Accuracy

NM-300:	± 10 mm (0.4 in.)
NM-308	
Below 6.6 feet:	± 10 mm (0.4 in.)
Above 6.6 feet:	± 20 mm (0.8 in.)

Minimum Liquid Specific Gravity

NM-300:	0.5
NM-308:	0.8

Operating Temperature Range

PVC/PE:	- 4 to 140 °F
Polypropylene:	- 4 to 190 °F
PTFE (Teflon®):	- 4 to 250 °F

Max. Pressure:

85 PSIG

Electrical Data

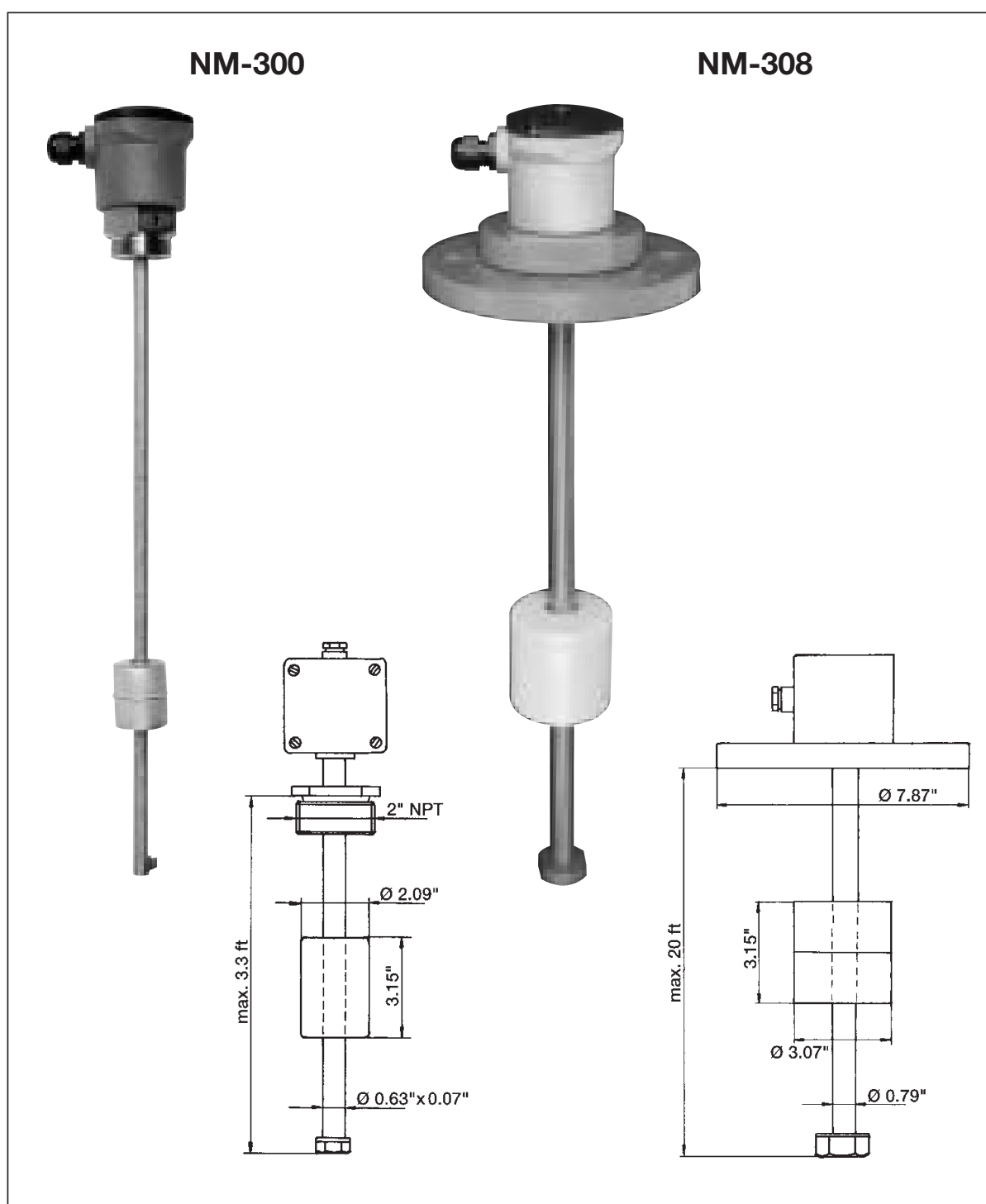
Sensing Voltage: 20 VDC max.

Total Resistance

Standard:	Approx. 5,000 Ω
EX Version:	Approx. 40,000 Ω

Terminal Box: Polyester

Protection: NEMA 4



NM-300 and NM-308 Ordering Information

Model Number			
Series Number	Fittings (PVC Units w. PP Flange)	Length	Tube & Float Material
NM-300 (PVC or PP)	-N 2": 2 NPT -FL 2½": 2½" 150 lb ANSI flange	-L =: Specify Length	-PVC: PVC (Poly- ethylene float) -PP: Polypropylene -PTFE: Teflon®
NM-308 (PVC, PP, or PTFE)	-N 1": 1" NPT -FL 3": 3" 150 lb ANSI flange		

Example: NM-300-FL 2½"-L 23" PVC

NM LIQUID LEVEL TRANSDUCER

Liquid Level Indicating and Control Instruments

To convert the output of the NM level transmitter into a more easily used form, a level indicating or level control instrument is recommended. These devices convert the output of the NM's resistance measuring chain to an analog signal or displayed value. The following instruments are available. More detailed information on these products can be found elsewhere in this catalog.

Controllers & Transmitters

Kobold offers four controller/transmitter options for use with the NM liquid level transducers. Choices range from the model DFM, a basic analog transmitter, to the DDA, which features two user adjustable alarms, an analog transmitter, and a fully scalable digital display.

Each device comes with an auxiliary scalable, low current output. This allows communication with a second control instrument.

Specifications

Available Outputs

Current or Voltage

Current: 0–20 or 4–20 mA
(500 Ω max. load)

Voltage: 0–5 or 0–10 VDC

Auxiliary: 0–1 mA

Power Requirements

Voltage: 24, 110 or 220
AC or DC

Power: Approx. 3 VA, 3 W

Sensor Excitation:

9 VDC

Accuracy

DDA: ± 0.6 % of Range

Others: ± 0.3 % of Range

Operating Temperature Range

0 to 140 °F

Allowable Cable Length to NM

As desired

Electrical Protection

Standard: NEMA 1

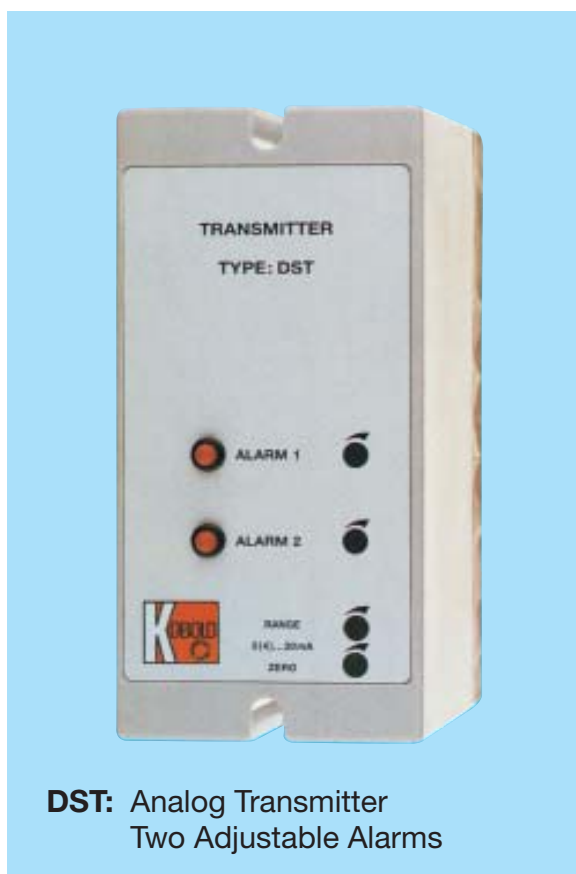
Optional: NEMA 4



DFA: Analog Transmitter
Two Adjustable Alarms
Fixed Analog Display reads
% of full scale



DDA: Analog Transmitter
Two Adjustable Alarms
Scalable Digital Display



DST: Analog Transmitter
Two Adjustable Alarms



DFM: Analog Transmitter

NRF **CAPACITANCE LEVEL TRANSMITTERS**

Model
NRF



- Rigid and cable suspended designs
- Compact microprocessor based designs
- High accuracy
- NPT threaded and Tri-Clamp® mountings
- Heavy duty industrial designs



NRF

CAPACITANCE LEVEL PROBE

Product Line Overview



- NRF-1 Series**
- **Single Rigid Capacitance Level Probe**
 - Designed for water-based liquids or oils in metal tanks
 - NPT threaded or Tri-Clamp fittings
 - Teflon clad stainless steel probe standard, up to 20 feet long
 - Un-clad stainless steel probes as an economical solution for non-conductive liquids



- NRF-1D Series**
- **Dual Rigid Capacitance Level Probe**
 - Dual probe design for use in non-metallic tanks
 - Water-based liquids or oils
 - NPT threaded fittings in stainless steel or PVC
 - Teflon clad stainless steel probes up to 12 feet long



- NRF-1C Series**
- **Cable Suspended Capacitance Level Probe**
 - Probe lengths up to 200 feet
 - Water-based liquids or oils
 - Single cable versions for metal tanks
 - Dual cable versions for non-metallic tanks



- NRF-1F Series**
- **High Sensitivity Fuel Level Probe**
 - Special high-gain design for fuels and solvents
 - Rigid stainless steel probe in lengths up to 12 feet
 - Special designs for taller tanks available on request



- NRF-2 Series**
- NRF-3 Series**
- **Capacitance Level Probe with Additional Temperature Output**
 - Two process measurements with one probe
 - Rigid teflon clad stainless steel probe in lengths up to 12 feet
 - NPT threaded or Tri-clamp fittings

NRF 1-RIGID CAPACITANCE LEVEL PROBE

Features

- Compact design for water-based liquids or oils in metal tanks
- Accuracy 1% of span in metal tanks
- NPT threads or Tri-Clamp®
- Heavy duty industrial design

The KOBOLD series NRF capacitance level transmitter is designed to measure water-based liquids or oils in metal tanks. The probe measures level by measuring the change in capacitance as level changes in the tank. The microprocessor-based electronics converts this capacitance change into a linear, highly accurate 4-20 mA signal.

The compact, microprocessor-based design makes installation and setup a simple task. The advanced signal conditioning circuitry greatly minimizes the adverse effects of coating media.

The NRF is available in rigid and flexible probe versions. An NPT threaded fitting and Tri-Clamp® sanitary fittings are available as standard items. The standard probes are Teflon® clad to stand up to aggressive media. The series NRF is truly designed with tough applications in mind.

Other versions of the NRF Series are available for applications in non-metallic tanks. High sensitivity versions for fuels and solvents are also available. Consult the NRF product line overview for details on other models.



KOBOLD NRF-1 Capacitance Level Probe

Specifications

Accuracy:	±1% of span (constant liquid dielectric)
Repeatability:	±0.1% of span
Maximum Length:	20 feet
Wetted Materials	
Fitting:	316 stainless steel or Teflon®
Probe:	Fully teflon clad or 316 stainless steel
	* 316 Stainless Steel probe only for non-conductive liquids

Temperature Range

Process:	-100 to 350°F
Ambient:	-58 to 140°F

Electrical Specifications

Input Power:	12-36 VDC
Output:	4-20 mA, 2-wire

Enclosures:	NEMA 4 nylon, aluminum or stainless steel
--------------------	---

Maximum Pressure

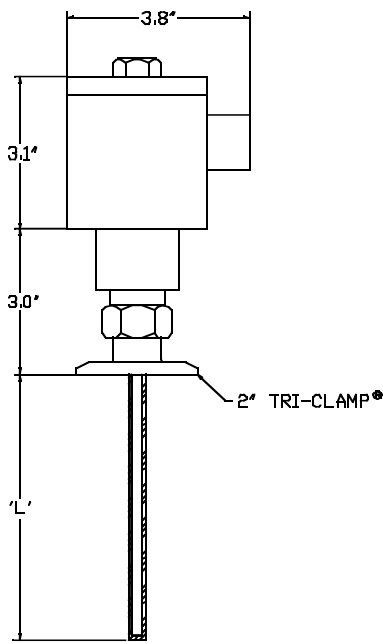
316 SS Fitting:	500 PSIG @ 70°F 250 PSIG @ 300°F 100 PSIG @ 350°F
Teflon® Fitting:	150 PSIG @ 70°F 0 PSIG @ 300°F
Tri-Clamp®:	Per the clamp rating

Applications

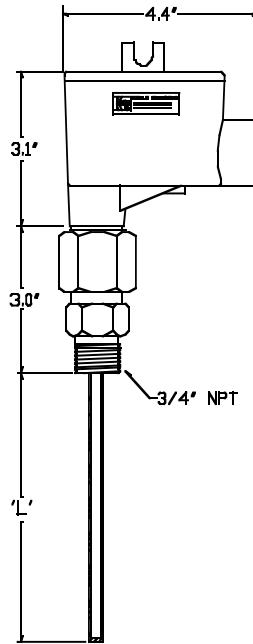
- Waste treatment plants
- Refineries
- Food and beverage industry
- Fire protection systems
- Water storage tanks
- Chemical holding tanks
- Many others

NRF-1 RIDGE CAPACITANCE LEVEL PROBE

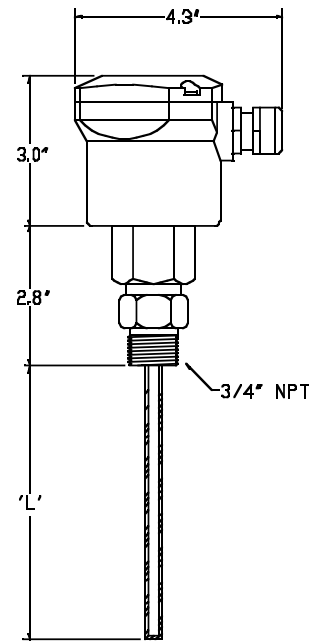
Dimensions



Tri-Clamp Connection
Stainless Steel Housing



Aluminum Housing



Nylon Housing

NRF Ordering Information

NRF-1	= Rigid Capacitance Level Probe				
	-1	= Nylon® (NEMA 4)	Housing		
	-2	= Stainless Steel			
	-3	= Epoxy Coated Aluminum (Not available with Tri-Clamp fittings)			
		-1	= 3/4" NPT Stainless Steel	Fitting	
		-2	= 3/4" NPT Teflon		
		-3	= 1 1/2" Tri-Clamp®		
		-4	= 2" Tri-Clamp®		
		-1	= Rigid Probe, Teflon Clad	Probe Style	
		-7	= Rigid Probe 316 Stainless Steel Un-clad (non-conductive liquid only.)		
			-L	= Probe Length	
NRF-1	-1	-2	-1	L=60"	Sample NRF Part Number

For each order or request for quotation, please complete the application datasheet at the end of this section.

NRF-1F FUEL CAPACITANCE LEVEL PROBE

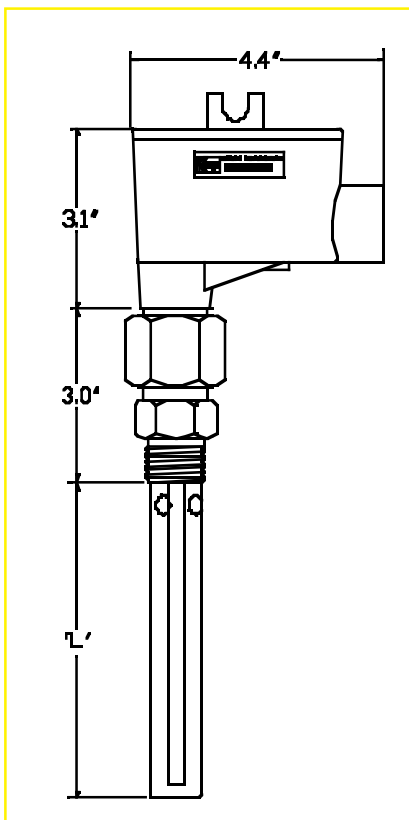
Features

- For fuel and solvents
- Compact tube design
- Accuracy 1% of span
- 3/4" NPT thread standard
- Heavy duty industrial design

The KOBOLD series NRF fuel capacitance level transmitter is designed to measure level of low dielectric liquids such as fuels and solvents in tanks. The probe measures level by measuring the change in capacitance as level changes in the tank.

The microprocessor-based electronics converts this capacitance change into a linear, highly accurate 4-20 mA signal. The compact, microprocessor-based design makes installation and setup a simple task. The advanced signal conditioning circuitry provides the high sensitivity required for measuring fuels, solvents and other low dielectric liquids.

The series NRF is truly designed with tough applications in mind.



Specifications

- Accuracy:** ±1% of span (at calibration conditions)
- Repeatability:** ±0.1% of span
- Maximum Length:** 12 feet

Wetted Materials

- Standard Fitting:** 3/4" NPT 316 SS
- Probe Spacers:** 316 Stainless Steel Teflon®

Temperature Range

- Process:** -100 to 350°F
- Ambient:** -58 to 140°F

Electrical Specifications

- Input Power:** 12-36 VDC
- Output:** 4-20 mA, 2-wire

Enclosures:

NEMA 4 nylon, aluminum or stainless steel

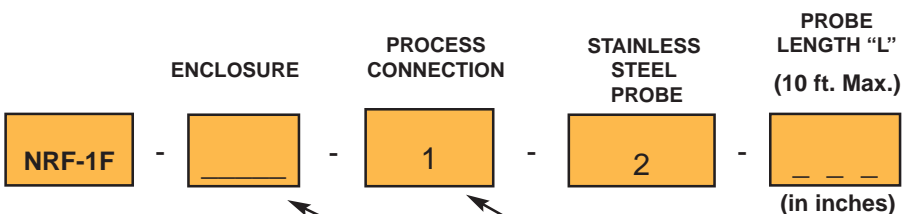
Maximum Pressure

- 316 SS Fitting:** 100 PSIG @ 70°F
- Teflon® Fitting:** 50 PSIG @ 300°F
14 PSIG @ 350°F

KOBOLD NRF-1F Fuel Capacitance Level Probe

Applications

- Diesel fuel tanks
- Refineries
- Vegetable oils
- Chemical holding tanks
- MEK and other solvents
- Many other, non-conductive liquids



Enclosure	CODE
Nylon® (NEMA 4)	1
Stainless Steel	2
Aluminum	3

CODE	Process Connection
1	3/4" NPT Stainless Steel
5	1-1/2" NPT Stainless Steel

** Example: NRF-1F212-L=72 inches
For each order or request for quotation, please complete the application datasheet at the end of this section.

NRF-1C

CABLE CAPACITANCE LEVEL PROBE

Features

- Lengths to 200 feet available
- Accuracy 1% of span
- Ease of installation in tall tanks
- Dual cable version available for non-metallic tanks
- Heavy duty industrial design

The KOBOLD series NRF cable capacitance level transmitter is designed to measure liquids in tall tanks. The probe measures level by measuring the change in capacitance as level changes in the tank.

The microprocessor-based electronics converts this capacitance change into a linear, highly accurate 4-20 mA signal. The compact, microprocessor-based design makes installation and setup a simple task. The advanced signal conditioning circuitry greatly minimizes the adverse effects of coating media.

Single cable versions for metal tanks and dual cable versions for non-metallic tanks are available. The series NRF is truly designed with tough applications in mind.

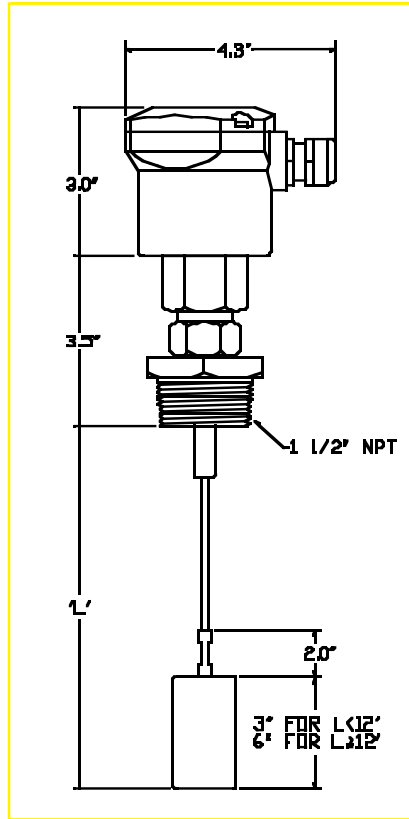
Specifications

- Accuracy:** ±1% of span (constant liquid dielectric)
- Repeatability:** ±0.1% of span
- Maximum Length:** 200 feet
- Wetted Materials**
- Standard Fitting:** 1-1/2" NPT
316 SS or CPVC
- Cable:** Teflon or 316 SS
(*Note: 316 SS cable not for use with conductive liquids)
- Cable Weight:** 316 SS
- Temperature Range**
- Process:**
- 316 SS fitting:** -100 to 350°F
- CPVC fitting:** -58 to 185°F
- Ambient:** -40 to 140°F

- Electrical Specifications**
- Input Power:** 12-36 VDC
- Output:** 4-20 mA, 2-wire

- Enclosures:** NEMA 4 (Nylon®)
Aluminum or 316 SS

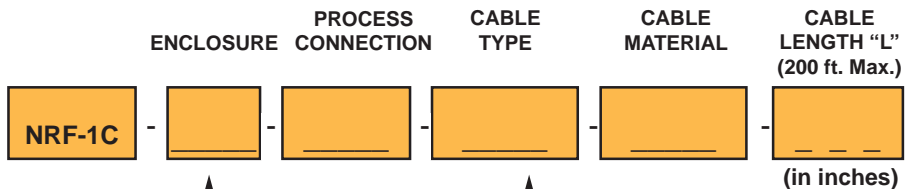
- Maximum Pressure**
- 316 SS Fitting:** 100 PSIG @ 70°F
50 PSIG @ 300°F
14 PSIG @ 350°F
- CPVC Fitting:** 50 PSIG @ 70°F
0 PSIG @ 185°F



KOBOLD NRF-1C Capacitance Level Probe

Applications

- Waste treatment plants
- Refineries
- Food and beverage industry
- Fire protection systems
- Water storage tanks
- Chemical holding tanks



Enclosure	CODE	CODE	Process Connection	CODE	Process Connection	CODE	Process Connection
Nylon® (NEMA 4)	1	5	1-1/2" NPT 316 SS	2	Single Cable	1	Teflon Cable
Stainless Steel	2	6	1-1/2" NPT CPVC	4	Dual Cable	2	316 SS * Cable
Aluminum	3						

* 316 SS Cable not for use with conductive liquids.
** Example: NRF-1C1521 L=72 inches
For each order or request for quotation, please complete the application datasheet at the end of this section.

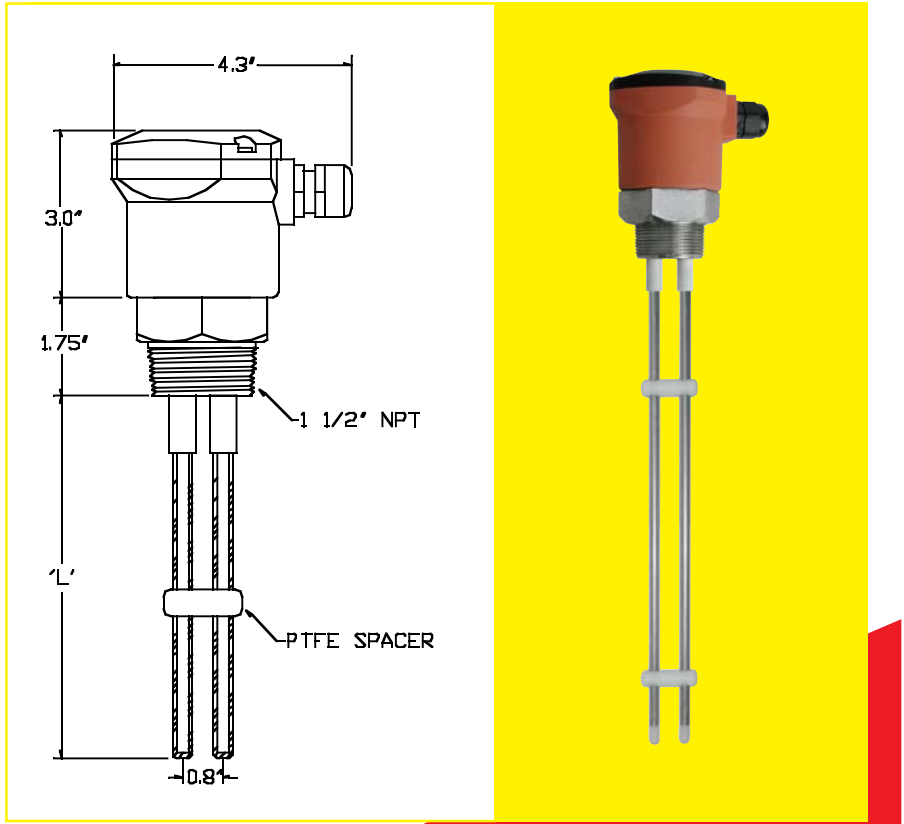
NRF-1D RIGID CAPACITANCE LEVEL PROBE

Features

- For non-metallic tanks
- Compact dual rod design
- Accuracy 1% of span
- 1-1/2" NPT thread standard
- Heavy duty industrial design

The KOBOLD series NRF dual rod design allows for measurement of liquids in non-metallic tanks. The probe measures level by measuring the change in capacitance as level changes in the tank.

The microprocessor-based electronics converts this capacitance change into a linear, highly accurate 4-20 mA signal. The compact, microprocessor-based design makes installation and setup a simple task. The advanced signal conditioning circuitry greatly minimizes the adverse effects of coating media.



Specifications

Accuracy: ±1% of span (constant liquid dielectric)

Repeatability: ±0.1% of span

Maximum Length: 12 feet

Wetted Materials

Fitting Probe: 316 SS or CPVC
Fully teflon
Clad 316 SS

Temperature Range

Process:
316 SS fitting: -100 to 350°F
CPVC fitting: -58 to 185°F
Ambient: -40 to 140°F

Electrical Specifications

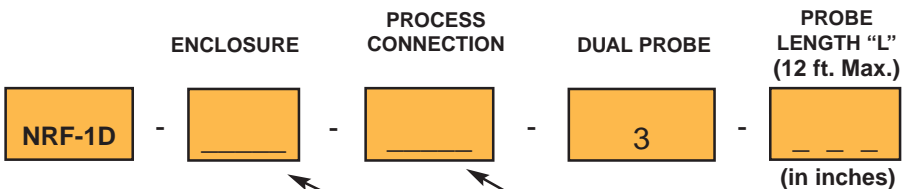
Input Power: 12-36 VDC
Output: 4-20 mA, 2-wire

Enclosures: NEMA 4 nylon or stainless steel

Maximum Pressure

316 SS Fitting: 100 PSIG @ 70°F
50 PSIG @ 300°F
14 PSIG @ 350°F
CPVC Fitting: 50 PSIG @ 70°F
0 PSIG @ 185°F

KOBOLD NRF-1D Capacitance Level Probe



Enclosure	CODE
Nylon®	1
Stainless Steel	2

CODE	Process Connection
5	1-1/2" NPT Stainless Steel
6	1-1/2" NPT CPVC

** Example: NRF-1D253-L=72 inches

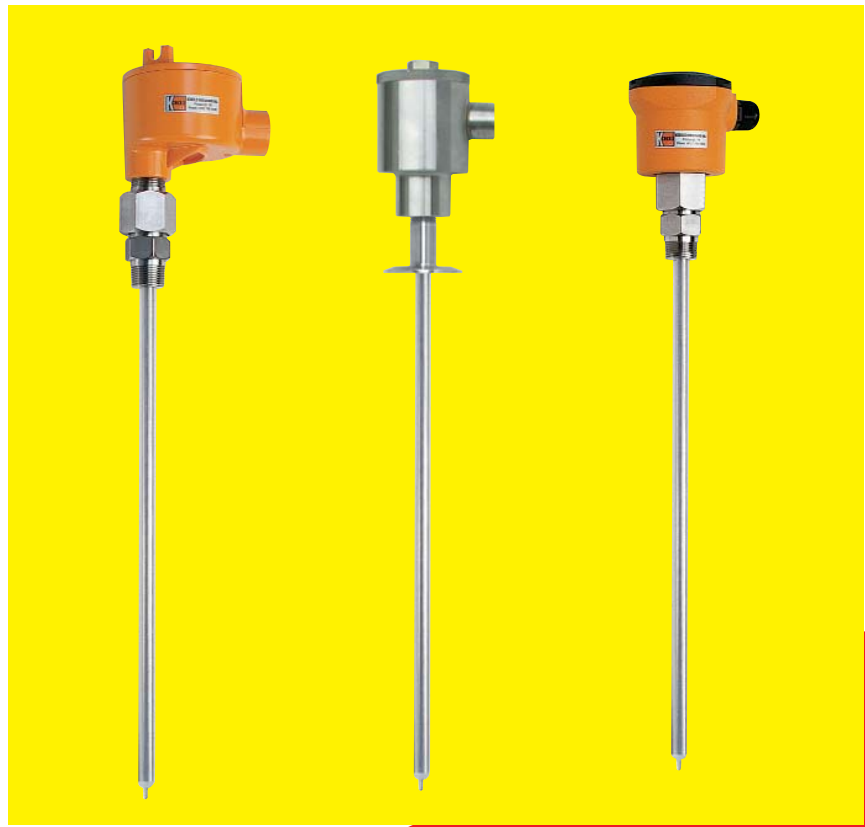
For each order or request for quotation, please complete the application datasheet at the end of this section.

NRF-2 AND NRF-3 CAPACITANCE LEVEL & TEMPERATURE PROBE

Features

- Level and temperature measurement in a single device
- Simple push-button setup
- Non-interacting zero & span
- Compact reliable design
- Probe lengths to 12 feet

The KOBOLD NRF-2 and NRF-3 series combination level and temperature transmitters are truly a unique product. These instruments employ a Teflon clad sensing probe for the level measurement which is tipped with a 316 stainless steel temperature sensor. The temperature sensor is electrically isolated from the level sensing probe. This feature allows them to be used in both conductive and non-conductive media. This innovative design provides a capacitance level measurement with a 4-20mA output and a temperature measurement with either a 4-20 mA or a 3-wire PT-100 RTD output. The NRF-2 and NRF-3 are available with NPT thread or Tri-Clamp.



Specifications

Accuracy:	±1% of span (at calibration conditions)
Repeatability:	±0.1% of span
Maximum Length:	12 feet

Temperature Range

Process:	-100 to 350°F
Ambient:	-58 to 140°F

Electrical Specifications

Input Power:	12-36 VDC
Output:	4-20 mA, 2-wire

Enclosures:	NEMA 4 nylon, aluminum or stainless steel
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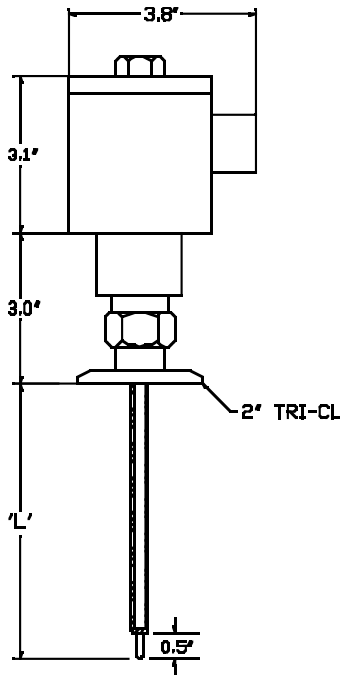
KOBOLD NRF-2 Series Capacitance Level & Temperature Probe

Mechanical Specifications

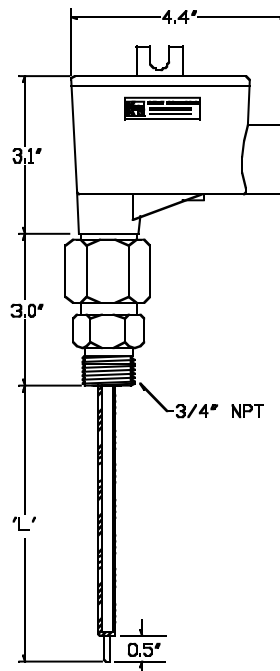
Enclosure:	NEMA 4, nylon, stainless steel or aluminum
Mounting Thread:	3/4" NPT or Tri-Clamp®
Wetted Materials:	Teflon®, 316 SS
Maximum Pressure:	100 PSIG @ 70°F 50 PSIG @ 300°F 14.5 PSIG @ 392°F

NRF-2 AND NRF-3 CAPACITANCE LEVEL & TEMPERATURE PROBE

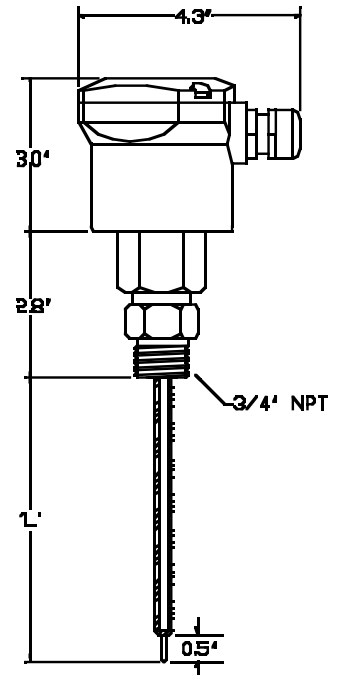
Dimensions



Tri-Clamp Connection
Stainless Steel Housing



Aluminum Housing



Nylon Housing

NRF Ordering Information

NRF-2	Probe Construction		
NRF-3	= 4-20mA output for level and temperature		
	= 4-20mA loop powered for level, RTD PT100 Ω DIN 43760 3-wire, for temperature		
	Temperature Measuring Range		
	05	= 0°C to 50°C (32°F to 122°F)	
	10	= 0°C to 100°C (32°F to 212°F)	
	20	= 0°C to 200°C (32°F to 392°F)	
	55	= -50°C to 50°C (-58°F to 122°F)	
	51	= -50°C to 150°C (-58°F to 302°F)	
		Process Connection	
	1	= 3/4" NPT Stainless Steel	
	2	= 3/4" NPT Teflon	
	3	= 1-1/2" Tri-Clamp	
	4	= 2" Tri-Clamp	
	8	= 2-1/2" Tri-Clamp	
	9	= 3" Tri-Clamp	
		Enclosure	
	1	= Nylon®	
	2	= Stainless Steel	
	3	= Aluminum (Not available with Tri-Clamp fitting)	
		Lxxx = Probe Length, specify in 0.1" increments (144.0" Maximum)	
NRF-2	51	1	3
L=120.0 Sample NRF Part Number			

NRF APPLICATION DATA SHEET

* To ensure fast order processing, please retain the completed application data sheet and send it along with your purchase.



Process Conditions

Accurate process information is essential to ensure the proper operation of your level indicator. Please fill out accurately and completely.

1. Pressure: Normal _____ PSIG Maximum _____ PSIG
2. Temperature: Normal _____ °F Maximum _____ °F
3. Is the liquid temperature constant under normal conditions:
 Yes No (If No, state normal operating range _____ °F)
4. Liquid Type: _____
5. Liquid Dielectric Constant (if known) _____

Tank Information

Tank Material: _____

Does the tank have an internal liner? Yes No

(If Yes, specify liner material) _____

Heavy buildup on tank walls? Yes No

Agitation: None Light Heavy

Does the tank have a mixer? Yes No

Tank Dimensions: Height(H): _____ Width(W): _____

Fitting Type:

- 3/4" NPT (NRF-1, NRF-1F, NRF-2, NRF-3 only)
- 1-1/2" NPT (NRF-1C and NRF-1D only)
- 1-1/2" Tri-Clamp
- 2" Tri-Clamp
- Other (specify): _____

Measuring Probe Length(L): _____ inches

Any additional comments or special requirements:

Customer Name: _____

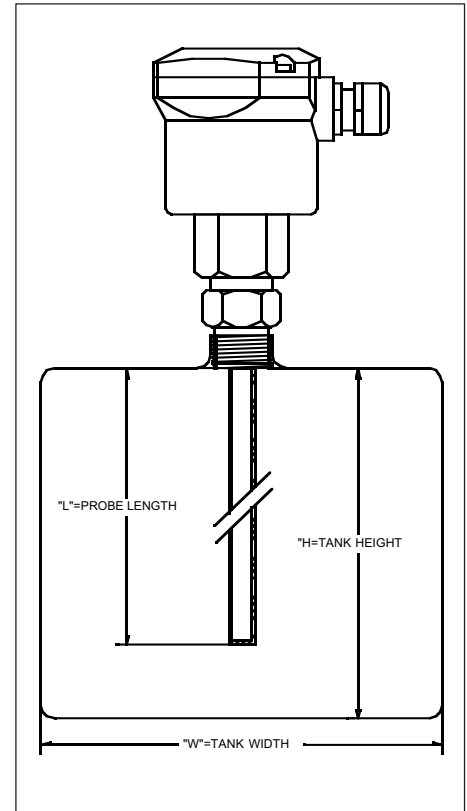
Company Name: _____

Phone: _____

Fax: _____

E-Mail : _____

Date: _____



FAX to
KOBOLD Instruments Inc.
412-788-4890 (USA)
514-428-8899 (Canada)

Visit KOBOLD Online at
www.kobold.com

NUS **ULTRASONIC LEVEL TRANSMITTER**

Model
NUS



- Measuring ranges to 23 feet in liquids, 11.5 feet in solids
- Narrow 5.5° beam angle
- PVDF wetted parts
- Accuracy 0.25% of full scale
- 2-wire and 4-wire versions



NUS ULTRASONIC LEVEL TRANSMITTER

Features

- Measuring ranges to 23 feet in liquids, 11.5 feet in solids
- Narrow 5.5° beam angle
- PVDF wetted parts
- Accuracy 0.25% of full scale
- 2-wire and 4-wire versions

The NUS series ultrasonic level transmitter is the ideal choice for continuous non-contact level measurement in liquids or coarse grained, or pelletized solids. This non-contact level measurement technique allows reliable measurement of dirty, viscous, and coating medium. The NUS series boasts an extremely narrow beam cone allowing for measurements in tall tanks while minimizing the chances of problems due to obstructions in the tank.

the NUS comes in DC powered 2-wire transmitter or an AC powered 4-wire transmitter version. A front panel mounted LED level indicator is standard.

Advanced Features

The NUS series offers many advanced features including 11 point linearization, fixed echo suppression, automatic stirrer echo suppression and output dampening. These features allow the NUS series to be used in applications which render most other ultrasonics useless. Calibration and setup is a simple task performed using a push-button driven menu.

Specifications

Maximum Pressure: 40 PSIG
Process Temperature: -40°F to 176°F
Measuring Ranges: See table

Accuracy: 0.25% of Max. Range

Resolution: ±0.12"
Fitting/Sensor Material: PVDF

Housing material: Epoxy coated aluminum, polycarbonate

Operating Frequency:
 1-1/2" NPT: 70 KHz
 2" NPT: 50 KHz

Beam Cone Angle: 5.5°
Output: 4-20mA 2-wire or 4-wire depending on model number



KOBOLD NUS Ultrasonic Level Transmitter

Maximum Loop Load:	600 ohms	Electric Connection:	1/2" NPT conduit
Power Requirements:	12-36 VDC (2-wire) or 90-127 VAC (4-wire) depending on model number	Electrical Protection:	NEMA 4X
		Display (optional):	4-digit LED

NUS Measuring Ranges

Model	Measuring Range	
	Liquids	Solids
NUS-XX60 & NUS-XX61 (2" NPT)	1.3 to 23.0 ft.	1.3 to 15ft.
NUS-XX51 & NUS-XX53 (1-1/2" NPT)	0.8 to 13.1 ft.	0.8 to 6.6 ft.

NUS Ordering Information

Description	Fitting Size NPT	Model Number	
		w/ Display	w/out Display
12-36 VDC, 2-wire	1-1/2"	NUS-5053	NUS-6053
90-127 VAC, 4-wire	1-1/2"	NUS-5051	NUS-6051
12-36 VDC, 2-wire	2"	NUS-5060	NUS-6060
90-127 VAC, 4-wire	2"	NUS-5061	NUS-6061

NUS ULTRASONIC LEVEL TRANSMITTER

Installation Guidelines

Beam Cone Interference

The ultrasonic pulse propagates from the transducer face at a beam angle α of 5.5° . Any object (i.e. piping, nozzles etc.) which is within the radius, r of the beam cone can cause interference echo returns (see sketch). While it is the best practice to install the transducer such that there are no obstructions within the beam cone, the fixed target suppression function may eliminate false echoes caused by obstructions. The beam cone radius, r for any distance from the transducer face is given by:

$$r = L \times 0.048 \text{ where,}$$

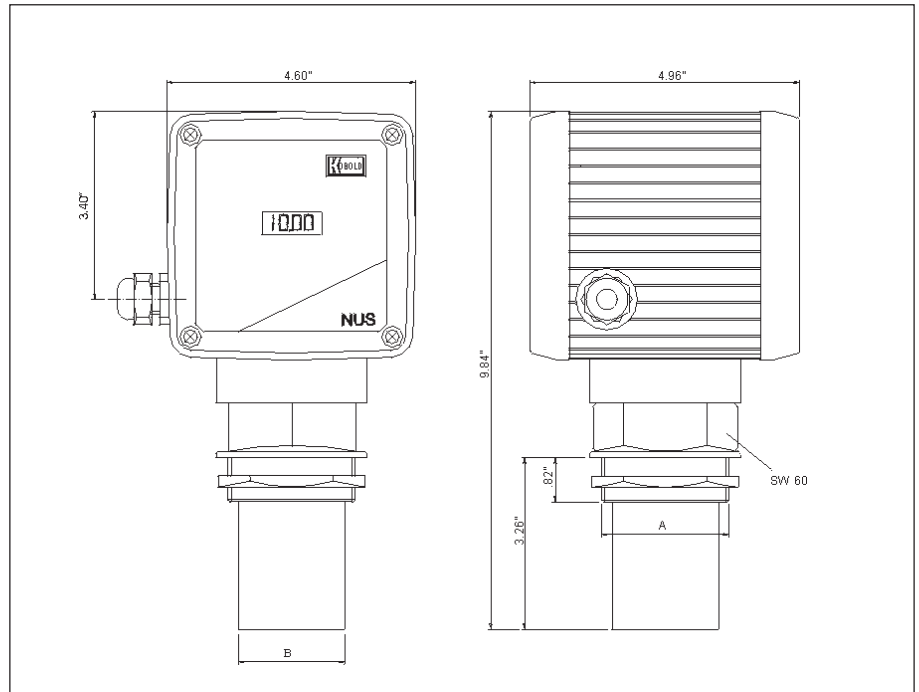
r = beam cone radius in inches
 L = distance from transducer face in inches

Transducer Deadband

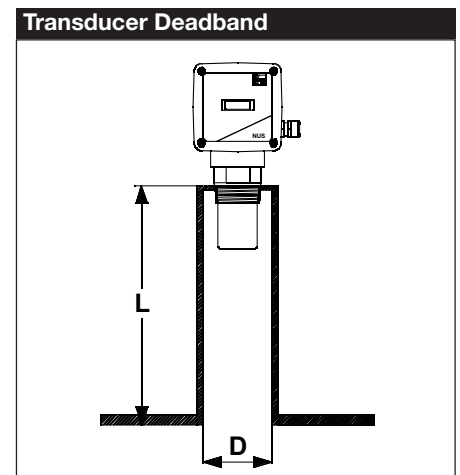
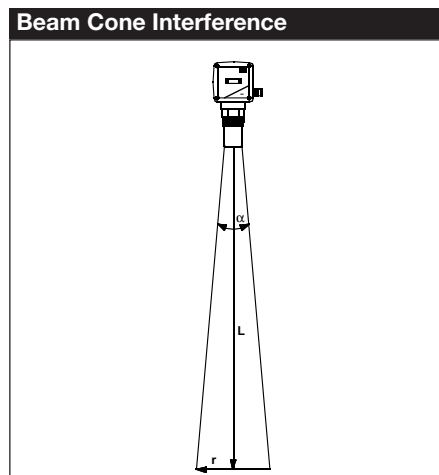
When an ultrasonic transducer pulses, there is a transition period between the time that the pulse is sent and the time that the transducer is able to receive returns. This period of time equates to a specific distance from the transducer face within which echoes cannot be heard. Within the deadband, level cannot be sensed. The deadband specifications for the NUS series are as follows:

Fitting Size	Deadband
2" NPT	1.3 feet
1-1/2" NPT	0.8 feet

If it is undesirable to lose this amount of measuring capability at the top of a tank, the NUS can be mounted in a nozzle to elevate the transducer above the tank and compensate for the level indicating capability lost by the deadband. The interior surfaces of the nozzle must be smooth and cannot have any edges, couplings, weld seams, etc. Ensure that material or condensation do not build up on the nozzle.



Model	A	B
NUS-XX60 & NUS-XX61	2" NPT	2"
NUS-XX51 & NUS-XX53	1-1/2" NPT	1-1/2"



Maximum Nozzle Length		
Fitting Size	D	Max. L
1-1/2" NPT	2"	6"
1-1/2" NPT	3"	9.5"
1-1/2" NPT	4"	15"
2" NPT	3"	9.5"
2" NPT	4"	15"

NWS VIBRATING LEVEL SWITCH



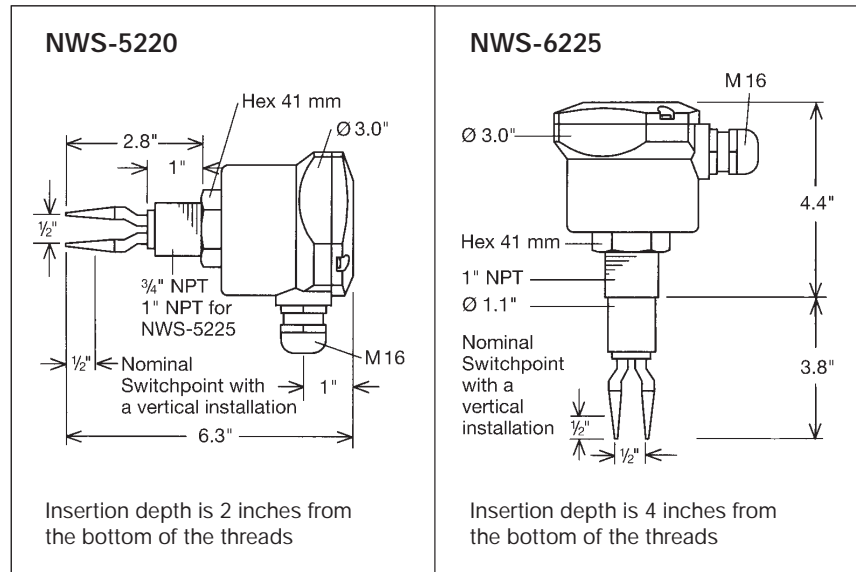
KOBOLD Instruments Inc.
1801 Parkway View Drive
Pittsburgh, PA 15205
Ph: (412)788-2830
Fax: (412)788-4890

KOBOLD's NWS level switch works on the vibrating tuning-fork principle. A piezoelectric crystal is matched to the frequency of a tuning fork in air, and used to set the fork vibrating. When the fork becomes immersed in a liquid, its resonant frequency changes. The piezoelectric crystal is then no longer matched to the tuning fork. This causes the vibration to stop. The NWS's internal electronics detects this change and signals an alarm condition.

The NWS is compatible with non-coating media whose viscosities can range up to 5000 cSt. In addition to the electrical switching control function, a LED signals the status of the switch and the presence of power at the NWS's terminals. The polarity of the NWS is easily toggled between N/O and N/C by an internal switch.

The NWS may be used in a 2-wire or 3-wire mode. The 2-wire configuration can switch loads up to 0.5 amps. The 3-wire system signals on a 24 V status line.

Dimensions



Technical Data

Media Characteristics

- Type:** Non-coating liquids
- Viscosity:** 0.5–5000 cSt (increases response time)
- Max. Pressure:** 650 PSIG @ 270 °F
- Max. Temperature:** 270 °F (medium)
- Response Time:** 1 second
- Repeatability:** ± 1 mm
- Hysteresis:** 4 mm vertical, 1 mm horizontal

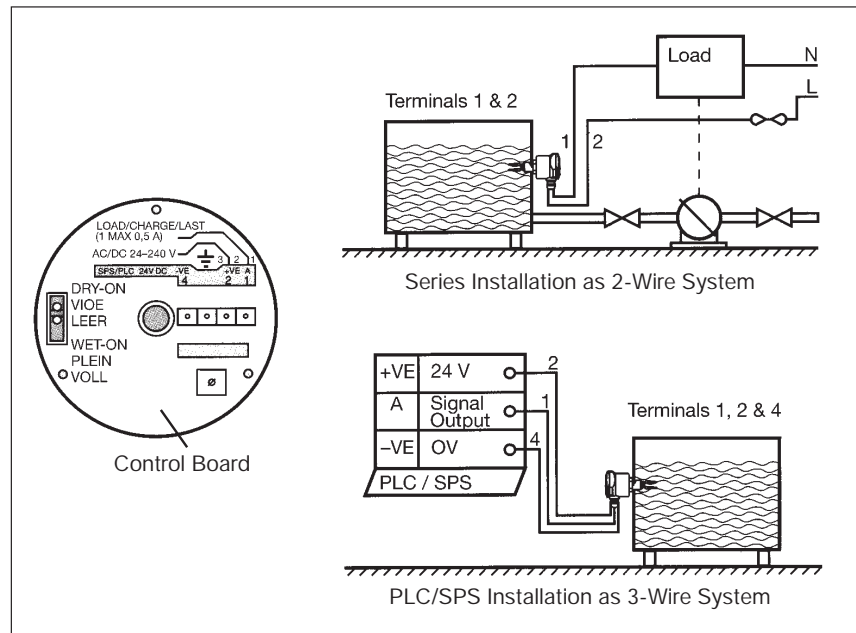
Materials of Construction

- Wetted Parts:** 316 SS
- Housing:** Nylon

Electrical Characteristics

- 2-wire Hook-up**
 - Supply/Switch:** 24–240 VDC/VAC
 - ON Current:** 500 mA max.
 - OFF Current:** 2–7.5 mA
- 3-wire Hook-up**
 - Supply:** 24 VDC/VAC
 - Signal:** 24 VDC/VAC
 - Voltage Drop:** 4.5 V @ 500 mA, 10 V @ 7.5 mA
- Minimum Current:** 2 mA (switch off)
- Protection:** NEMA 4

General NWS Usage



NWS Ordering Information

Insertion Depth	Fittings	Model Number
2"	3/4" NPT	NWS-5220
4"	1" NPT	NWS-6225
2"	1" NPT	NWS-5225

RL

CONTROL & CONTACT PROTECTIONS RELAYS



KOBOLD Instruments Inc.
1801 Parkway View Drive
Pittsburgh, PA 15205
Ph: (412)788-2830
Fax: (412)788-4890

RL-5900 Power Supply & Relay

Protect your level, flow, temperature or pressure switch investment with a Kobold power supply and relay. The RL-5900 can handle the large loads your primary switching device may not be able to handle. Additionally, it can act as a 12 or 24 VDC power supply. The ability to handle 10 amps at up to 240 VAC (resistive) gives the RL-5900 exceptional power switching capacity. Since excitation is built in, dry contacts, or 12/24 VDC devices, are equally compatible.

Specifications

Output: SPDT Relay
10 A @ 240 VAC
8 A 24 VDC

Input: Dry contacts
Open collectors

Excitation: 12 or 24 VDC
65 mA, regulated

Indicators: LED-Power On
LED-Relay Closed

Supply Voltage: 110, 230 ± 15 VAC
10–28 VAC/VDC

Physical Data Housing: Molded Polyamide
NEMA 1
DIN rail mountable

Operating Ranges
Temperature: 0 to 130 °F
Humidity: 0 to 95 % RH
Non-condensing

RL-6000 Latching Relay

The Kobold RL-6000 is a latching relay for start/stop applications such as pump or valve level control. Our standard 10 amp, 240 VAC max. relay is adequate for most pump control circuits and electrically driven valves. The unit is designed for use with dry contacts... a 4 mA current supply provides the switching signal for the contacts.

Specifications

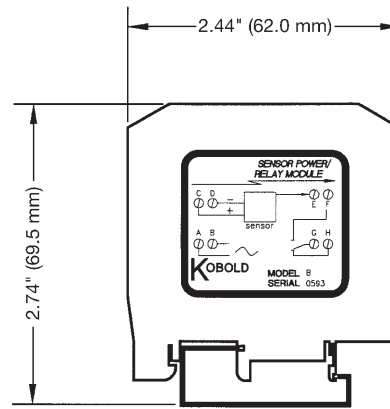
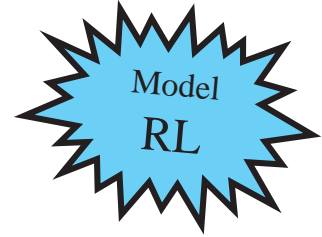
Output: SPST Relay
10 A @ 240 VAC
8 A @ 24 VDC
Dry contacts

Input: Dry contacts
Excitation: 4 mA maximum
load on contacts

Indicators: LED-Power On
LED-Relay Closed

Supply Voltage: 110, 230 ± 15 VAC
10–28 VAC/VDC

Physical Data: Same as RL-5900



Depth Dimension = 1.11" (28.0 mm)

RL-6100 Isolation Relay

Contact protection is the sole function of the RL-6100. Dry switch closure energizes the internal 10 amp, 240 VAC max. relay.

Specifications

Output: SPDT Relay
10 A @ 240 VAC
8 A @ 24 VDC

Input: Dry contacts

Supply Voltage: 110, 230 ± 15 VAC
10–28 VAC/VDC

Physical Data: Same as RL-5900

RL Ordering Information

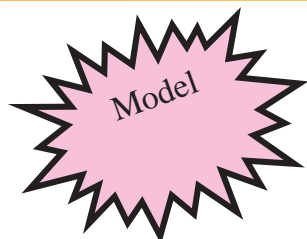
Supply Voltage	Part Number			
	Power Supply & Relay		Latching Relay	Isolation Relay
	Excitation			
12 VDC	24 VDC			
110 VAC	RL-5901	RL-5911	RL-6001	RL-6101
230 VAC	RL-5902	RL-5912	RL-6002	RL-6102
10–28 VAC/VDC	RL-5903	RL-5913	RL-6003	RL-6103

TED

OPTICAL LEVEL SENSOR FOR LIQUIDS



KOBOLD Instruments Inc.
1801 Parkway View Drive
Pittsburgh, PA 15205
Ph: (412)788-2830
Fax: (412)788-4890

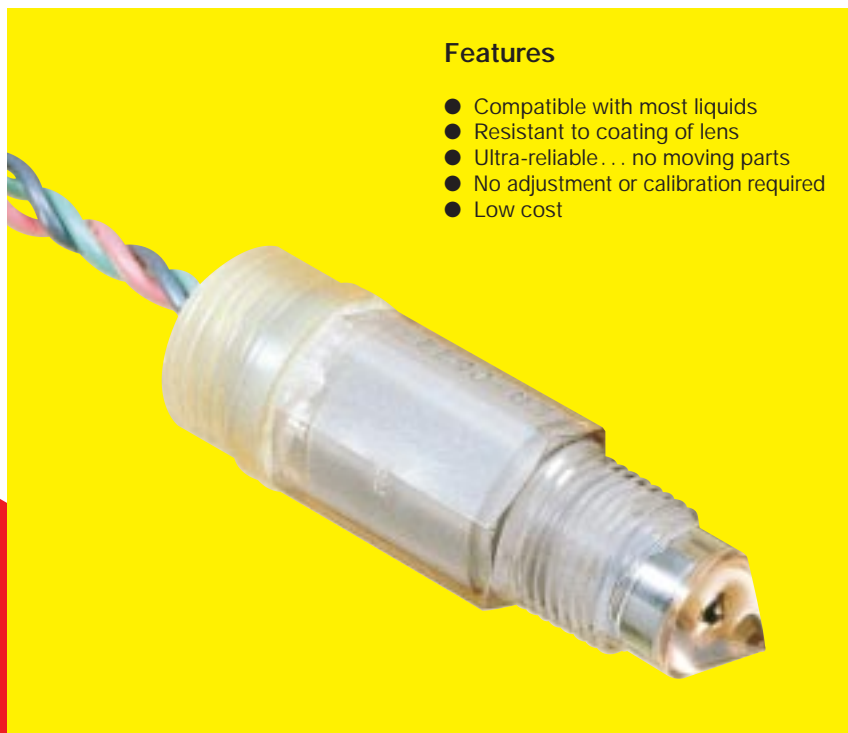


Ultra-Reliable Electro-Optic Level Switch

KOBOLD's TED electro-optic level switch is the solution to your difficult level switching needs. This device operates independently of liquid properties such as color, viscosity, dielectric constant, density, conductivity, contamination, and temperature. The TED is compact, self-contained and all solid state. With no moving parts to wear out, reliability is not just a TED design goal... it's a given.

Installing the TED is easy. Simply thread the body into a container, reservoir or pipe. Polysulfone construction insures compatibility with all metal or plastic containers. The TED's chemical resistance makes it ideal for many industrial applications.

Should your application require higher power switching capability, a 10 amp relay output is available through use of the RL-5900 power supply/relay module.



Features

- Compatible with most liquids
- Resistant to coating of lens
- Ultra-reliable... no moving parts
- No adjustment or calibration required
- Low cost

Specifications

Output: NPN transistor
Open-collector
25 mA max. load

Supply Voltage: 12 VDC

Supply Current: 33 mA (excluding load)

Leads: 24 inches

Wetted Parts

Polysulfone: Polysulfone

SS: 303 SS, Viton
Borosilicate Glass

Max. Pressure

Polysulfone: 200 PSIG

SS: 400 PSIG

Temperature Range

Operating: - 40 to 230 °F

Storage: - 67 to 257 °F

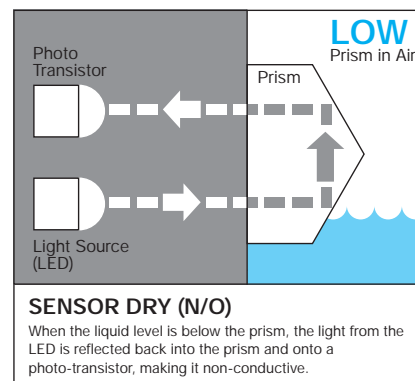
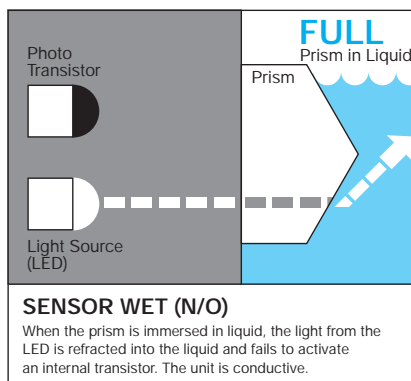
Fittings

Process

Polysulfone: 3/8" NPTM

SS: 1/2" NPTM

Conduit: 1/2" NPSH



TED Ordering Information

Material	Function	Model Number
Polysulfone	N/O	TED-2511-F
303 SS	N/O	TED-3212-A