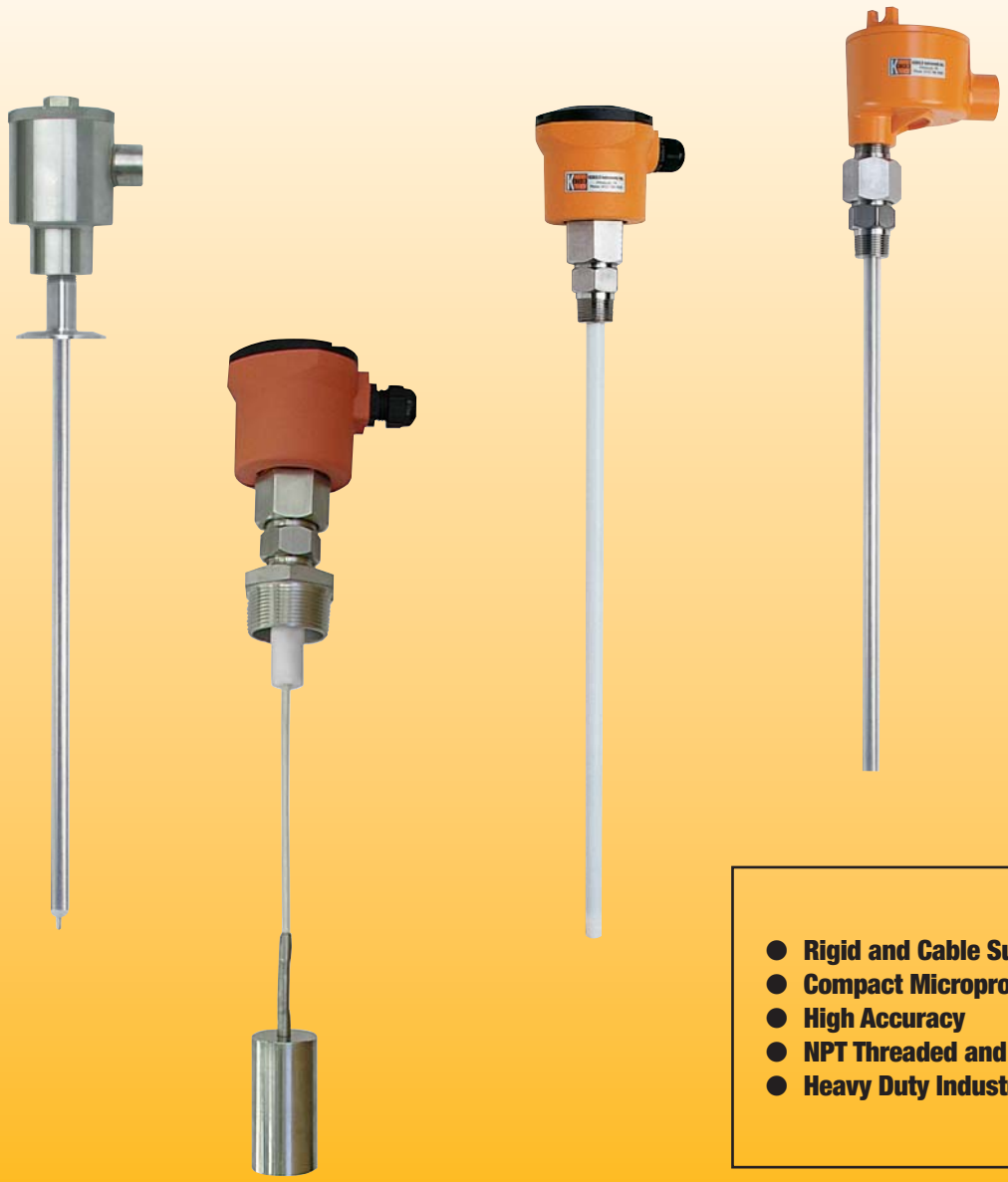
# NRF
# CAPACITANCE LEVEL TRANSMITTER

**Flow**
**Pressure**
**Level**
**Temperature**
measurement
monitoring
control

N2



- **Rigid and Cable Suspended Designs**
- **Compact Microprocessor Based Designs**
- **High Accuracy**
- **NPT Threaded and Tri-Clamp® Mountings**
- **Heavy Duty Industrial Designs**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Visit KOBOLD Online at
www.kobold.com

Model:
NRF

## 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 with acids in non-metallic tanks
- Concentric probe design for oils or water-based liquids in non-metallic tanks
- 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

## 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 or 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. High sensitivity versions for fuels and solvents are also available. Consult the NRF product line overview for details on other models.

## Applications

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

**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
* 316 Stainless Steel probe only for non-conductive liquids

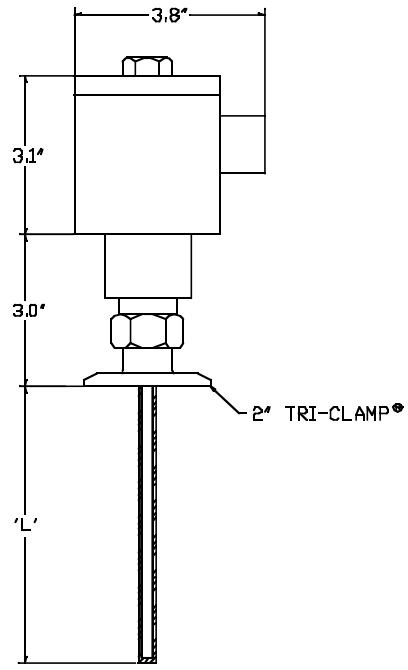
**Temperature Range**
**Process:** –100 to 350°F
**Ambient:** –58 to 140°F

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

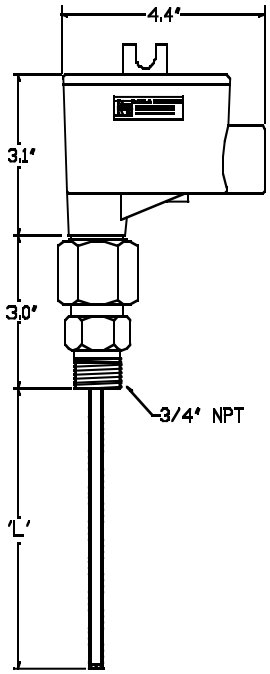
**Enclosures:** NEMA 4 nylon, aluminum or stainless steel

**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

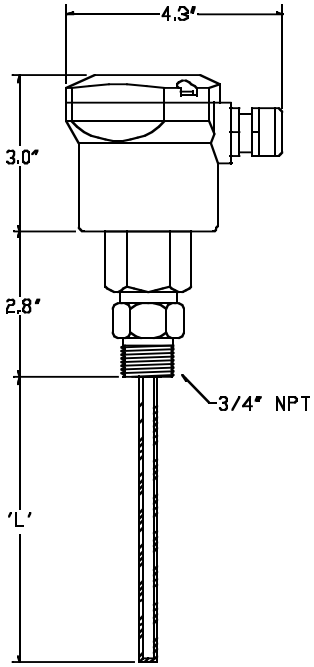
## Dimensions




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** = ¾" NPT Stainless Steel **Fitting** | | | |
| | | **-2** = ¾" NPT Teflon | | | |
| | | **-3** = 1½" 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.

## 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

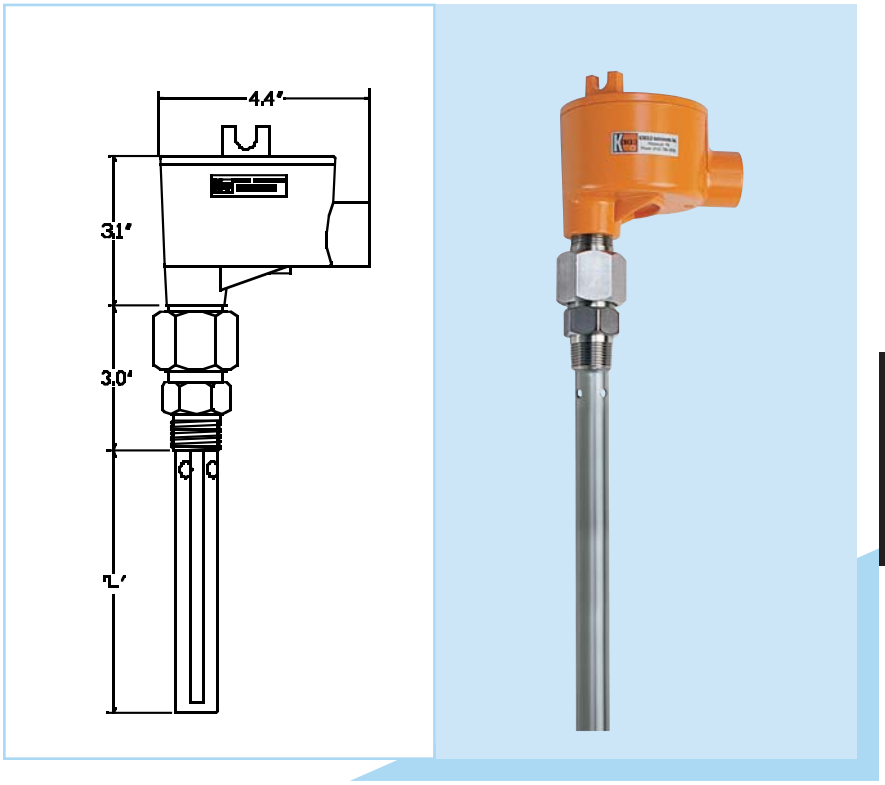
**Wetted Materials**
**Standard Fitting:** 3/4” NPT 316 SS
**Probe:** 316 Stainless Steel
**Spacers:** Teflon®

**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 | PROCESS CONNECTION | STAINLESS STEEL PROBE | PROBE LENGTH “L” (10 ft. Max.) |
| NRF-1F | - | _____ | - __ | - 2 | - _ _ _ (in inches) |

| 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.

## 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.

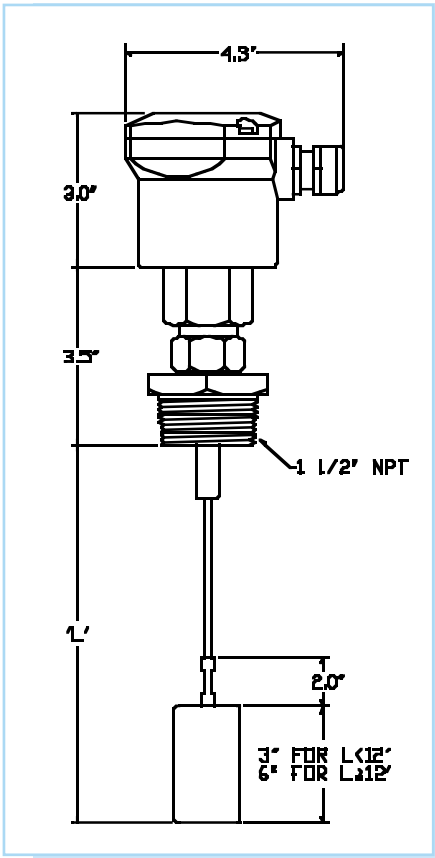
## Specifications

**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 | PROCESS CONNECTION | CABLE TYPE | CABLE MATERIAL | CABLE LENGTH "L" (200 ft. Max.) |
|---|---|---|---|---|---|
| NRF-1C | - _____ | - _____ | - _____ | - _____ | - _ _ _ (in inches) |

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

| CODE | Process Connection |
|---|---|
| 5 | 1-1/2" NPT 316 SS |
| 6 | 1-1/2" NPT CPVC |

| CODE | Cable Type |
|---|---|
| 2 | Single Cable |
| 4 | Dual Cable |

| CODE | Cable Material |
|---|---|
| 1 | Teflon Cable |
| 2 | 316 SS * Cable |

* 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.

## Features

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

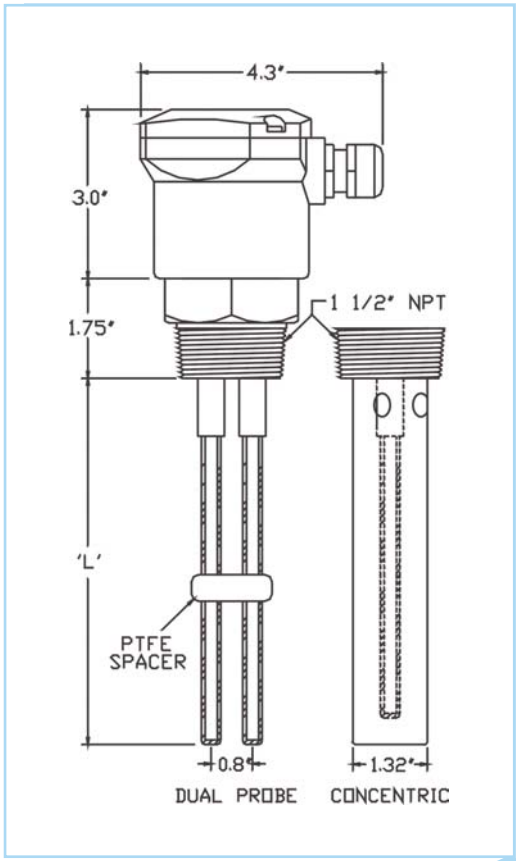
The KOBOLD series NRF dual probe design allows for measurement of liquids in non-metallic tanks. The probe measures level by measuring the change in capacitance as level changes in the tank.

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.

**Probe Selection Criteria**
Two probe styles are available, probe type 3 is a dual rigid probe, fully teflon clad. This probe is best for acids and highly aggressive media in plastic tanks. Probe type 5 is a teflon clad inner probe with a concentric 316 stainless steel outer probe. This probe type is suited for oil and water-based liquids, compatible with 316 stainless steel.

## Specifications

**Accuracy:** ±1% of span (constant liquid dielectric)
**Repeatability:** ±0.1% of span
**Maximum Length:** 12 feet
**Wetted Materials**
**Fitting** 316 SS or CPVC
**Probe**
**Dual:** Teflon
**Concentric:** Teflon, 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 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-1D Capacitance Level Probe

| | ENCLOSURE | PROCESS CONNECTION | PROBE TYPE | PROBE LENGTH "L" (12 ft. Max.) |
|---|---|---|---|---|
| NRF-1D | - _____ | - _____ | - _____ | - _ _ _ (in inches) |

| Enclosure | CODE |
|---|---|
| Nylon® | 1 |
| Stainless Steel | 2 |

| CODE | Process Connection |
|---|---|
| 5 | 1-1/2" NPT 316 SS |
| 6 | 1-1/2" NPT CPVC* |

| CODE | Process Connection |
|---|---|
| 3 | Dual Probe Teflon Clad |
| 5 | Concentric Probe Teflon & 316SS |

* Probe type 3 only
** Example: NRF-1D253-L=72 inches

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

## 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

# KOBOLD NRF-2 Series Capacitance Level & Temperature Probe

## Mechanical Specifications

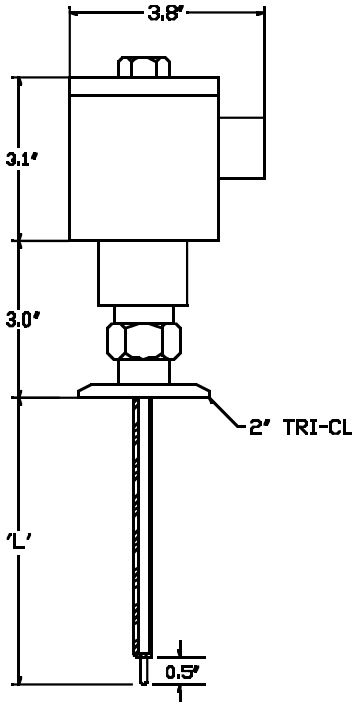
**Enclosure:** NEMA 4, nylon, stainless steel or aluminum

**Mounting Thread:** 3/4” NPT or Tri-Clamp®

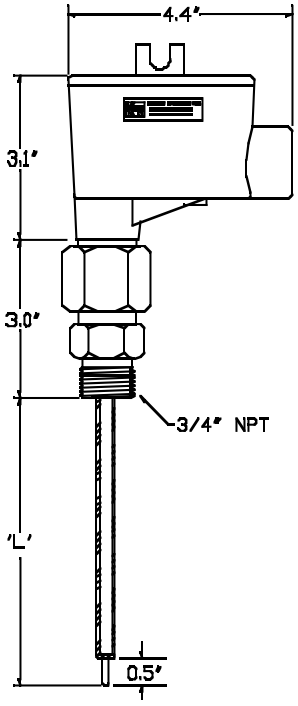
**Wetted Materials:** Teflon®, 316 SS

**Maximum Pressure:** 100 PSIG @ 70˚F
50 PSIG @ 300˚F
14.5 PSIG @ 392˚F

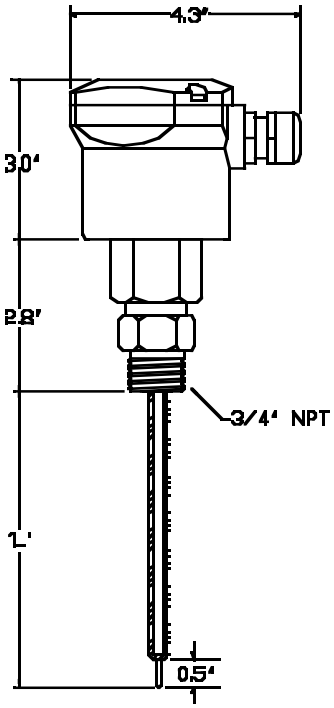
## Dimensions




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 Capacitance Level Transmitter Application Guide**
Form #NRF-001
Rev. 02/01/04

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

**Customer Name:** _____

**Company Name:** _____

**Phone:** _____

**Fax:** _____

Quote #: _____ Date: _____ Price: _____ Each Part Number: _____

**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)** _____

* To ensure fast order processing, please retain the completed quote form and send it along with your purchase order.

## Process Conditions

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

## Tank Information

Tank Material: _____

Does the tank have an internal liner? ☐ Yes ☐ No

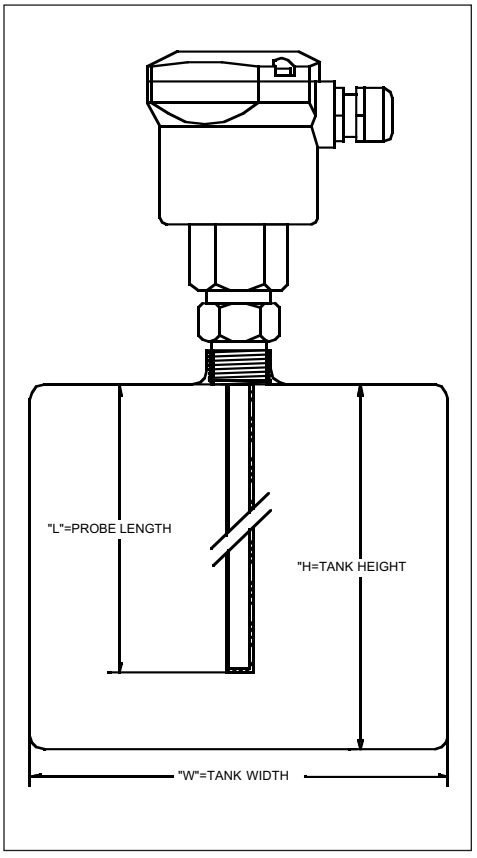
(If Yes, specify liner material) _____

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:**

_____

_____

**Quoted By:** _____