



## Model 702A Probes

### General Description

The Model 702A probes are special purpose rigid rod electrodes available in lengths up to 20 feet. They are available with Teflon insulation or bare (uninsulated) rods in both the standard and high gain versions. The vessel entrance gland is fitted with 3/4 inch NPT; material is 316 stainless steel. ANSI raised face flanges are optionally available in either carbon steel or 316 stainless steel and rated either Class 150 or Class 300.

Except for probes with a concentric shield or knife-blade, the 702A probe is primarily intended for those applications requiring a bent probe and obstacles within the vessel prevent the probe rod from rotating during installation or when a bent probe rod must be oriented after installation. The probe compression plug may be loosened during installation allowing the probe gland to rotate and be tightened while the rod is held stationary. The rod may then be oriented as required and the compression plug tightened. It should be noted that a bent 702A probe cannot withstand a lot of side loading. It is recommended that, whenever possible, a 740A general purpose probe or 741A high gain probe be considered in lieu of a 702A probe.

The concentric shield option is only available with a bare (uninsulated) high gain rod. It is intended for low dielectric liquids in cryogenic applications (such as liquid nitrogen).

The knife-blade (paddle type) probe is intended for use in flow applications of granular products. When oriented correctly it provides a low profile in the direction of flow. This probe is well suited for "Flow – No Flow" detection.

On an insulated probe, the Teflon insulation has a wall thickness of 1/16" for the standard gain version (Designation B, Table 1). This probe is recommended for use on low viscosity liquids and low to medium density granular materials. For the high gain version (Designation D, Table 1) the Teflon insulation has a wall thickness of 1/32". This probe is recommended for use only on liquids or light, fluffy (low density) non-abrasive granular materials.



### Features and Benefits:

- **Extra Tight Fitting Insulation**
- **Many Options Available to Tailor Probe to Customer's Needs**
- **Lengths up to 20 Feet**
- **No Moving Parts**

## Principle of Operation

The probe used with a Robertshaw instrument serves as one plate of a capacitor. In non-conductive materials, the wall of the tank or vessel normally serves as the second plate; while in conductive materials (such as water) the material surrounding the insulated probe serves as the second plate.

Low values of DC voltage are impressed on the probe by a capacitance sensitive circuit in the detector unit. Whenever the material in the vessel immerses the probe, the capacitance existing between the probe and the second capacitance plate (vessel wall or the conductive material) changes value. This change in capacitance is sensed by the instrument. Instruments are available for both ON-OFF level control or continuously proportional outputs for recording and control of level.

## Application Data

Typically these probes are used with Robertshaw RF and microprocessor based ON/OFF or continuous level controls for measuring applications involving liquids or granular materials. When the probe is used with an ON/OFF (fixed level point) type, it may be installed in the vessel in either a vertical or horizontal position. If, however, the probe is to be used on a continuous level measuring application or on an application with a differential (such as Pump On/Pump Off), then it must be installed into the vessel in a vertical position. Bent probes are available to allow the active length of the probe to be different from the installation direction. See "Bending Specifications."

When the process is a conductive liquid (such as water or sulfuric acid) and the vessel is non-metallic or non-metallic lined, a probe with a ground wire may be employed to provide a ground path to the liquid (second plate). The liquid must be clean and free of foreign materials and be no more viscous than water.

The Robertshaw Level Measuring instruments have been designed so that they attach directly to the 1/2" NPT fitting on the top of the probe. Typically, these are either the complete transmitter housing or a conduit outlet box with a coaxial cable to the instrument. The 6-32 threaded fitting in the end of the probe rod accepts either a contact pin or a machine screw as required.

## Specifications

**Gland Capacitance** ..... 12 pF

### **Sheath Capacitance:**

**Model 702A-A & 702A-B** ..... 60 pF/ft.

**Model 702A-C & 702A-D** ..... 250 pF/ft.

### **Probe Gain:**

*(insulated probe in conductive liquid)*

**Model 702A-B** ..... 60 pF/ft

**Model 702A-D** ..... 250 pF/ft

### **Temperature/Pressure Rating:**

-30 Hg to 1000 PSI @ 120 F

Derated to 100 PSI @ 350° F

(-762 mm Hg to 6.89 mPa @ 49° C

Derated to 689 kPa @ 177° C)

## Engineering Data

**Probe Rod Material** ..... 316 stainless steel

**Probe Gland Material** ..... 316 stainless steel

**Sheath Material** ..... 316 stainless steel

### **Probe length (maximum):**

**Rigid Rod** ..... 20 feet (6.1 m)

**Knife Blade** ..... 24 inches (61 cm)

**Gland Connection Size** ..... 3/4 NPT

## Ordering Information

702A - A xxx - N 0

Key Model Number ————  
 Probe Rod – See Table 1 ————  
 Probe Active Length – See Table 2 ————  
 Flange Options – See Table 3 ————  
 Additional Options – See Table 4 ————

### Key Model Number

Designation	Description
702A	A rigid rod type probe, bare or Teflon insulated with two-piece gland. The two-piece gland allows alignment of the bent probe or knife-blade probe within the vessel.

Table 1 – Probe Rod

Designation	Description
A	Standard bare rod, 7/32" diameter
B	Standard gain Teflon insulated rod, 3/8" outside diameter
C	High gain bare rod, 7/16" diameter
D	High gain Teflon insulated rod, 1/2" outside diameter
E	Knife-Blade bare probe rod, 4" Minimum length, 24" maximum length

Table 2 – Probe Active Length

Designation	Description
xxx	Specify active length in inches. Maximum length is 240" except for knife-blade which is 24" maximum. On Teflon insulated probes the insertion length is 1" longer than the active length due to the Teflon plug seal at the probe tip.

Table 3 – Flange Options

Designation	Description
N	No flange
A	*Flange screwed onto probe gland
B	*Flange welded to probe gland

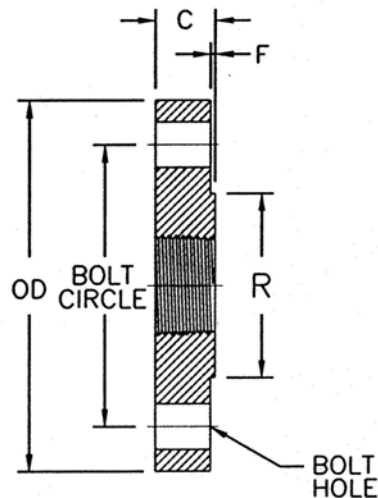
\* Specify size, class and material

Table 4 – Additional Options

Designation	Description
0	None
1	Bent probe. Specify bending dimensions, see page 4
2	Sheath. Specify sheath length
3	Combination of 1 & 2 above
4	Ground wire. Specify material. Available only with Designations B & D in Table 1
5	Concentric shield. Available only with Designation C in Table 1

## Standard Flanges

CLASS	SIZE	OD	C	F	R	BOLT CIRCLE	BOLT HOLES
150	1"	4.25	.56	.06	2.00	3.12	4X Ø.62
150	1-1/2"	5.00	.69	.06	2.88	3.88	4X Ø.62
150	2"	6.00	.75	.06	3.62	4.75	4X Ø.75
150	3"	7.50	.94	.06	5.00	6.00	4X Ø.75
150	4"	9.00	.94	.06	6.19	7.50	8X Ø.75
300	1"	4.88	.69	.06	2.00	3.50	4X Ø.75
300	1-1/2"	6.12	.81	.06	2.88	4.50	4X Ø.88
300	2"	6.50	.88	.06	3.62	5.00	8X Ø.75
300	3"	8.25	1.12	.06	5.00	6.62	8X Ø.88
300	4"	10.00	1.25	.06	6.19	7.88	8X Ø.88



## Standard Flange Materials

Carbon Steel  
 316 Stainless Steel

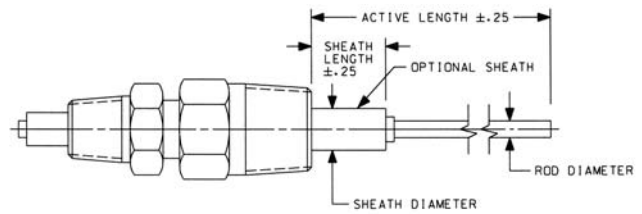
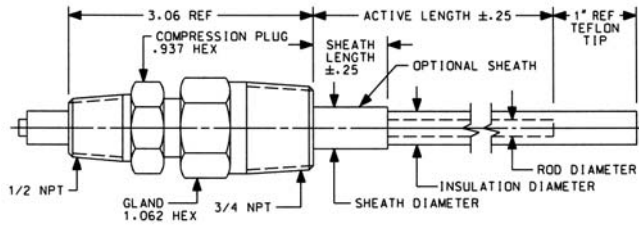
### NOTES:

- Probes may be supplied with flanges of different sizes, styles and materials than listed above by special order. Consult factory.
- Flanges conform to ANSI B16.5.
- The pressure/temperature ratings of probes supplied with a flange shall be that of the flange or as specified on page 1 for the probe, whichever is less.

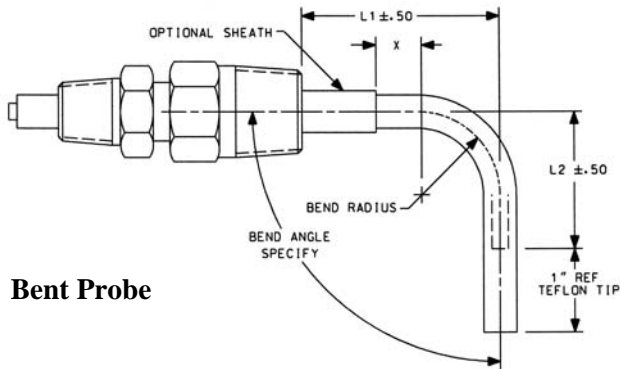
## Ground Wire Materials

316 Stainless Steel  
 Monel  
 Hastelloy B  
 Hastelloy C  
 Tantalum

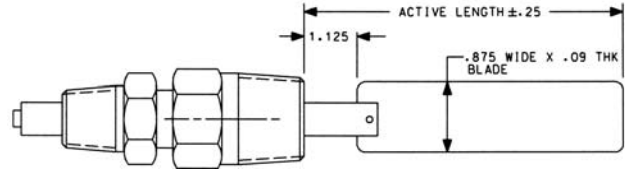
## Dimensions



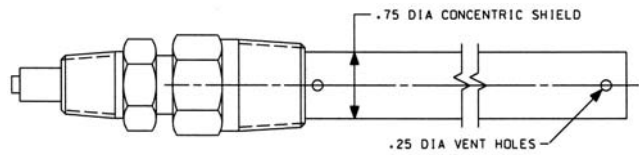
## Insulated Probe



## Bare Probe



## Probe with Knife Blade



## Probe with Concentric Shield

## Bent Probe

Probe Style	Rod Diameter	Insulation Diameter	Sheath Diameter	Dimension X	L1		L2	Bend Radius
					w/o Sheath	w/Sheath		
702A-A	.218		.50	1.00 min.	2.00 min.	3.50 min.	2.00 min.	1.12
702A-B	.218	.37	.50	1.00 min.	2.00 min.	3.50 min.	2.00 min.	1.12
702A-C	.438		.62	1.50 min.	3.50 min.	4.50 min.	3.50 min.	2.00
702A-D	.438	.50	.62	1.50 min.	3.50 min.	4.50 min.	3.50 min.	2.00



## U.S.A. & Canada

Robertshaw Industrial Products

1602 Mustang Drive

Maryville, Tennessee 37801

Phone: (865) 981-3100 Fax: (865) 981-3168

<http://www.robertshawindustrial.com>

## Exports

Invensys Controls

1701 Byrd Avenue

P.O. Box 26544

Richmond, Virginia 23261-6544

Phone: (804) 756-6500 Fax: (804) 756-6561

**invensys**

Q-4175 (12/05)

Printed in U.S.A.