# Ultrasonic Detectors

**Ultrasonic Detectors** are a cost-effective solution for your applications. Installation requires mounting the sensor (threaded or flanged) to the vessel, connecting the power and control wires, and applying power. There is no additional set-up or calibration required. Since it is an electronic instrument with no moving parts, preventive maintenance is limited to an annual visual inspection. The only recommended spare part is the "board" at a quantity of one board for every 10 units. A technician with basic electrical skills (wiring) can service the instrument.

Why use an ultrasonic detector over other level technologies? Depending upon your application, there may be three or four technologies equally suited for your application; however; only one will be the best choice when considering its features and benefits.

## Features & Benefits

### Cost

- In addition to the price of the instrument, you must consider the cost of installation, set-up and calibration.

### Maintenance

- You need to factor in the frequency of preventative maintenance. Also, consider the cost of keeping key "spare parts" on the shelf.

### Skill

- What "skill" level is required of your maintenance personnel to service the instrument.

**701 Single Point**

**711 Single Point**

**712 Dual Point**

Ultrasonic detectors are simple to apply and use. There are only a few limitations to their use:

- The media must be liquid
- Process temperature between -40 and 250°F (-40 to 121°C)
- The media must have less than 5% suspended solids
- No aeration in fluids with a viscosity of 100cP (30W motor oil) or greater

The following chart will assist you in selecting the right product for your application.

| Single-Point Sensing | Line Power | | Loop Power |
|---|---|---|---|
| Integral Mount Electronics | 701 Pages 4-5 | 711 Pages 6-7 | 701 Pages 4-5 |
| Integral Mount Electronics with Sensor Monitor (Self-Test) | 721 Pages 8-9 | | 721 Pages 8-9 |
| Remote Mount Electronics | 701 Pages 4-5 | 711 Pages 6-7 | 701 Pages 4-5 |
| Remote Mount Electronics with Sensor Monitor (Self-Test) | 721 Pages 8-9 | | 721 Pages 8-9 |

| Dual-Point Sensing | Line Power | Loop Power |
|---|---|---|
| Alarm or Pump Control | 712 Pages 10-11 | N/A |
| Alarm or Pump Control with Sensor Monitor (Self-Test) | 722 Pages 12-13 | N/A |

## Principle

An ultrasonic detector is a device that uses inaudible high-frequency sound (ultrasound) to detect the presence or absence of a liquid at a designated point. The device consists of an electronic control unit and a sensor.

Ultrasonic level detectors use the properties of sound transmission in vapor and liquids to detect liquid level. When sound travels in air, it loses a great deal of signal strength. When traveling in liquid, sound retains almost all of its signal strength.

To detect liquid level, we must determine if there is a liquid or gas (air) in the gap. Since liquids have a higher density than gasses, it is easier to transmit sound through them. One side of the sensor gap transmits sound, the other side detects it. When liquid is present, a high amount of sound is received at the detection side. When gas (air) is present, a small amount of sound is received. The electronics detect this difference and detector a relay accordingly.

Ultrasonic detector sensors contain two piezoelectric crystals, one transmits sound and one receives sound. Each crystal is mounted on one side of a gap in the metal sensor. The transmit crystal generates high frequency sound (1MHz to 3 MHz) that is directed across the gap to the receiver crystal. The receiver crystal converts the sound energy received into an electric signal, which is processed by the electronics to determine if the gap has liquid or air in it.

The drawing below shows the basic construction of an ultrasonic level detector sensor. An electrical signal is sent to the "transmit" crystal, which causes it to vibrate and produce high frequency sound. The "receive" crystal converts the high frequency sound that strikes it to another electrical signal, which is sent back to the electronics for processing. The sound energy that makes it across the sensor gap is very weak in air, and becomes very strong in liquid.
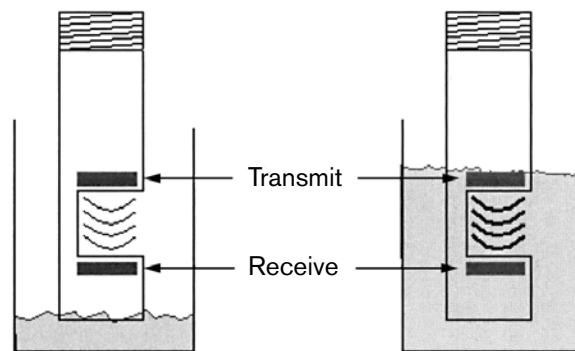


## Application Conditions

Ultrasonic level detectors can be used in a wide variety of applications without any calibration or setup. However, there are limitations to the types of process they will work in. The factors below must be taken into consideration before selecting an ultrasonic level detector for your application.

•  Liquids only - the process media must be a liquid. The ultrasonic level detector cannot detect the difference between two gases or a gas and a solid. The even density of a liquid is required for proper detection.

•  Clean liquids only - a liquid that has too high a percentage of solids will not transmit sound well enough to allow detection. Typically 5% suspended solids are the maximum amount allowed.

•  The liquid must flow - an application where the liquid cannot drain out of the sensor gap will cause false alarms. If a liquid is too viscous to flow out of a 3/4" gap then the unit will not operate properly. Sometimes this can be solved by different mounting, but some liquids are just too viscous.

•  No (or few) bubbles - especially in fluids with a viscosity higher than 100cP (30W motor oil). Large bubbles in thick fluids will block the sound signal from crossing the gap. Low viscosity fluids can have a fairly large amounts of bubbles as they tend to be very small (Alka-Seltzer in water).

If these guidelines are properly observed, the ultrasonic level detectors will provide trouble-free operation without any calibration or periodic adjustment.

# Ultrasonic Detectors

**The Series 701 tip-sensitive ultrasonic detector** is a single-point device designed for economical detection of clean liquids. There are no moving parts and no calibration. The 701 is available either integral or remote mounted. An optional time delay can be used to eliminate false alarms due to turbulence in the process. An optional field selectable fail-safe detector is also available. The standard unit is set to High-level Failsafe (HLFS).

## Features

- No calibration required
- 10A DPDT relay output
- FM Approved or CSA Certified for hazardous locations
- Line and loop powered versions

**701 Single Point**

## Product Specifications

| Input Power | | Maximum Current Draw (Line Power) | |
|---|---|---|---|
| Line | 24 volt, 50/60 Hz | 24 VDC | 100 mA |
| | 24 volt, 50/60 Hz | 120 VAC | 35 mA |
| | 24 VDC | 240 VAC | 18 mA |
| Loop | 11-24 VDC Intrinsically Safe | | |
| | | **Response Time** | |
| Fuses | Field replaceable (line power only) | On | 0 second |
| | | Off | 1 second |
| **Output Type** | | | |
| Line | 10A DPDT, 24 volt | **Enclosure Environmental Rating** | NEMA 4X; IP65 |
| | 10A DPDT, 24 volt | | |
| | DC rating shown for resistive loads | **Conduit Connection** | 3/4" NPT |
| Loop | 8mA (dry), | | |
| | 16 mA (Wet)-Standard | **Maximum Remote Distance from Sensor** | 50 feet (15.2 meters) |
| **Loop Resistance** | 765 ohms maximum @ 24 VDC | | |
| | | **Ambient Temperature Range** | -40 to 160°F |
| **Repeatability** | 0.078" (2mm) | | (-40 to 71°C) |
| **Failsafe** | HLFS-Standard; field selectable is optional | **Process Temperature Range** | -40 to 250°F |
| | | | (-40 to 121°C) |
| | | **Maximum Process Pressure** | 2000 psig (138 bar) |
| | | **Weight*** | 2.5 lbs. (1.2 kg) |

\* See page 23 for sensor weights.

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913-888-2630

## Model Number System

# 701-K1-U-P7-C-FS

The Series 701 is comprised of two parts. The first is the electronics and housing; the second is the sensor. Select the electronics and housings on this page and refer to page 18 for the sensor model number. The housing dimensions can be seen on pages 14 & 15. When ordering a remote housing, order remote cable part number 300-XX-S (XX = length in feet). Orders must have complete model numbers, i.e. each component must have a designator.

\* Match sensor approvals to electronics approvals to maintain the agency listing integrity.

| **3** | **Accessories** |
|---|---|
| AI | CSA Certified Intrinsically Safe* (9 power only) (K4 housings only) |
| BK | Remote electronics flat surface mounting bracket (R housings only) (see pages 14 & 15) |
| CS | CSA Certified Explosion Proof* |
| FI | FM Approved Intrinsically Safe* (9 power only) (K4 housings only) |
| FM | FM Approved Explosion Proof* |
| FS | Field selectable Failsafe detector (6, 7, 8 power only) |
| OD | On delay time (6, 7, 8 power only) (specify time from chart on page 16) |
| OF | Off delay timer (6, 7, 8 power only) (specify time from chart on page 16) |
| PK | Pipe mounting kit, BK accessory required (R housing only) (see page 17) |
| PP | Fiber tag with customer specified tag information |
| PY | Powder coat epoxy coating applied to housing exterior |
| RG | Gold-contact relay (6, 7, 8 power only) |
| RR | SS nameplate wired to the unit with customer specified tag information |
| TT | SS nameplate permanently affixed to housing with customer specified tag information |
| VV | Fungicidal varnish applied to housing exterior |
| YY | Epoxy coating applied to housing exterior (200 hours - salt spray) |

| **Power Supply** | **2** |
|---|---|
| 24 VDC (K1 and R1 housings only) | 6 |
| 24 volt (K1 and R1 housings only) | 7 |
| 24 volt (K1 and R1 housings only) | 8 |
| 24 VDC (Loop) (K4 and R4 housings only) | 9 |

| **Electrical Housing** | **1** |
|---|---|
| Integral | K1 |
| Remote | R1 |
| Integral (9 Power Only) | K4 |
| Remote (9 Power Only) | R |

| 701 | K1 | U | P7 | C | FS | ← Model Number |

## Agency Approval

| Agency | Safety Method | Approval | Model(s) |
|---|---|---|---|
| FM | Explosion Proof | Class I, Groups C, D; Class II, Groups E, F, G; Class III, Division 1 | 701xx-U-Px-FM |
| | Intrinsically Safe | Class I, Groups C, D; Class II, Groups E, F, G; Class III, Division 1 | 701K4-U-P9-FI |
| CSA | Explosion Proof | Class I, Groups C, D Class II, Groups E, F, G; Class III, Division 1 | 701xx-U-Px-CS |
| | Intrinsically Safe | Class I, Groups C, D Class II, Groups E, F, G; Class III, Division 1 | 701K4-U-P9-AI |

**The Series 711 ultrasonic detector** is a versatile single-point device designed for the detection of clean liquids. The 711 is available with a variety of sensor types to meet most process conditions. It is available integral or remote mounted and comes standard with field-selectable failsafe.

## Features

- No calibration required
- Can be used with notch, epoxy and viscous type sensors
- FM Approved and CSA Certified, for hazardous locations
- Field-selectable failsafe

**711 Single Point**

## Product Specifications

| | | | |
|---|---|---|---|
| **Input Power** | 24 volt, 50/60 Hz | **Response Time** | |
| | 24 volt, 50/60 Hz | On | 250 mSec |
| | 24 VDC | Off | 250 mSec |
| **Output Type** | 10A DPDT, 24 volt | **Enclosure Environmental Rating** | NEMA 4X; IP65 |
| | 10A DPDT, 24 volt | | |
| | DC rating shown for resistive loads | **Conduit Connection** | 3/4" NPT |
| **Repeatability** | 0.078" (2mm) | **Maximum Remote Distance from Sensor** | 50 ft. (15.2 m) |
| **Failsafe** | Field-selectable | **Ambient Temperature Range** | -40 to 160°F (-40 to 71°C) |
| **Maximum Current Draw (Line Power)** | | | |
| 24 VDC | 140 mA | **Process Temperature Range** | -40 to 250°F (-40 to 121°C) |
| 24 volt | 60 mA | | |
| 24 volt | 30 mA | **Maximum Process Pressure** | 2000 psig (138 bar) |
| | | **Weight*** | 2.5 lbs. (1.2 kg) |

*See page 23 for sensor weights.

## Model Number System

# 711-K1-N-P6-C-PP

The Series 711 is comprised of two parts. The first is the electronics and housing; the second is the sensor. Select the electronics and housings on this page and refer to page 18 for the sensor model number. The housing dimensions can be seen on pages 14 & 15. When ordering a remote housing, order remote cable part number 300-XX-S (XX = length in feet). Orders must have complete model numbers, i.e. each component must have a designator.

**4** **Sensor Material**

| | |
|---|---|
| C | Metal |
| G | Teflon (N Probe Only) |

\* Match sensor approvals to electronics approvals to maintain the agency listing integrity.

**5** **Accessories**

| | |
|---|---|
| BK | Remote electronics flat surface mounting bracket (R housing only) (see pages 14 & 15) |
| CS | CSA Certified Explosion Proof\* |
| FM | FM Approved Explosion Proof\* |
| PK | Pipe mounting kit, BK accessory required (R housing only) (see page 17) |
| PP | Fiber tag with customer specified tag information |
| PY | Powder coat epoxy coating applied to housing exterior |
| RG | Gold-contact relay (6, 7, 8 power only) |
| RR | SS nameplate wired to the unit with customer specified tag information |
| TT | SS nameplate permanently affixed to housing with customer specified tag information |
| VV | Fungicidal varnish applied to housing exterior |
| YY | Epoxy coating applied to housing exterior (200 hours - salt spray) |

**Power Supply** **3**

| | |
|---|---|
| 24 VDC | 6 |
| 24 volt | 7 |
| 24 volt | 8 |

**Probe Type** **2**

| | |
|---|---|
| Notch | N |
| Viscous | V |

**Electrical Housing** **1**

| | |
|---|---|
| Integral | K |
| Remote | R |

**711  K1  N  P  6  C  PP**  ← **Model Number**

## Agency Approvals

| Agency | Safety Method | Approval | Model(s) |
|---|---|---|---|
| FM | Explosion Proof | Class I, Groups C, D; Class II, Groups E, F, G; Class III, Division 1 | 711x1-N-Px-FM |
| CSA | Explosion Proof | Class I, Groups C, D Class II, Groups E, F, G; Class III, Division 1 | 711x1-N-Px-CS |

# Ultrasonic Detectors

**The Series 721 ultrasonic detector** is an advanced single-point device designed to meet your needs for overfill protection. In addition to the features of the 711, the 721 includes a "Sensor Monitor." This circuit continuously tests the functionality of the electronics and sensor. The "Sensor Monitor Relay" de-energizes if a fault is detected. The 721 is available with a variety of sensor types to meet most process conditions. It is available integral or remote mounted and comes standard with field-selectable failsafe.

## Features

- No calibration required
- Continuous self-test (sensor monitor) verifies operation
- FM or CSA Certified for hazardous locations
- Field-selectable failsafe
- On/Off time delay is standard

**721 Single Point**

## Product Specifications

| | | | | |
|---|---|---|---|---|
| **Input Power** | | | **Maximum Current Draw (Line Power)** | |
| Line | 24 volt, 50/60 Hz | | 24 VDC | 220 mA |
| | 24 volt, 50/60 Hz | | 24 volt | 60 mA |
| | 24 VDC | | 24 volt | 30 mA |
| Loop | 11-36 VDC | | **Response Time (Line Power)** | |
| | (Intrinsically safe) | | On | 250 mSec |
| | | | Off | 250 mSec |
| **Output Type** | | | **Response Time (Loop Power)** | |
| Line | | | On | 0.5 seconds |
| Alarm | 10A DPDT, 24 volt | | Off | 5 seconds |
| | 10A DPDT, 24 volt | | | |
| | DC rating shown | | **Time Delay** | 0-30 seconds |
| | for resistive loads | | | |
| Sensor Monitor | 10A DPDT, 24 volt | | **Enclosure Environmental Rating** | NEMA 4X; IP65 |
| | 10A DPDT, 24 volt | | | |
| | DC rating shown | | **Conduit Connection** | 3/4" NPT |
| | for resistive loads | | | |
| Loop | | | **Maximum Remote Distance** | 50 ft. (15.2 m) |
| Alarm | 8 mA (Dry), 16 mA (Wet) | | **from Sensor** | |
| Sensor Monitor | 5 mA or 19 mA; | | **Ambient Temperature Range** | -40 to 160°F |
| | Field selectable | | | (-40 to 71°C) |
| **Loop Resistance** | 650 ohms maximum @ 24 VDC | | **Process Temperature Range** | -40 to 250°F |
| | | | | (-40 to 121°C) |
| **Repeatability** | 0.078" (2mm) | | | |
| | | | **Maximum Process Pressure** | 2000 psig (138 bar) |
| **Failsafe** | Field-selectable | | | |
| | | | **Weight*** | 3 lbs. (1.4 kg) |

*See page 23 for sensor weights.

**Model Number System**

## 721R2-N-P7-C-FM

The Series 721 is comprised of two parts. The first is the electronics and housing; the second is the sensor. Select the electronics and housings on this page and refer to page 18 for the sensor model number. The housing dimensions can be seen on pages 14 & 15. When ordering a remote housing, order remote cable part number 300-XX-S (XX = length in feet). Orders must have complete model numbers, i.e. each component must have a designator.

### 5 Accessories

| | |
|---|---|
| **AI** | CSA Certified Intrinsically Safe" (9 power only) (N probe only) (K housing only) |
| **BK** | Remote electronics flat surface mounting bracket (R housing only) (see pages 14 & 15) |
| **CS** | CSA Certified Explosion Proof* |
| **FI** | FM Approved Intrinsically Safe* (9 power only) (N Probe only) (K housing only) |
| **FM** | FM Approved Explosion Proof* |
| **PK** | Pipe mounting kit, BK accessory required (R housing only) (see page 17) |
| **PP** | Fiber tag with customer specified tag information |
| **PY** | Powder coat epoxy coating applied to housing exterior |
| **RG** | Gold-contact relay (6, 7, 8 power only) |
| **RR** | SS nameplate wired to the unit with customer specified tag information |
| **TT** | SS nameplate permanently affixed to housing with customer specified tag information |
| **VV** | Fungicidal varnish applied to housing exterior |
| **YY** | Epoxy coating applied to housing exterior (200 hours - salt spray) |

### 4 Sensor Material

| | |
|---|---|
| Metal | **C** |
| Teflon | **G** |

### 3 Power Supply

| | |
|---|---|
| 24 VDC | **6** |
| 24 volt | **7** |
| 24 volt | **8** |
| 24 VDC (Loop) | **9** |

### 2 Probe Type

| | |
|---|---|
| Notch | **N** |
| Viscous | **V** |

### 1 Electrical Housing

| | |
|---|---|
| Integral | **K** |
| Remote | **R** |

**721** | **R** | **2** | **N** | **P** | **7** | **C** | **FM** ← Model Number

## Agency Approvals

| Agency | Safety Method | Approval | Model(s) |
|---|---|---|---|
| FM | Explosion Proof | Class I, Groups C, D; Class II, Groups E, F, G; Class III, Division 1 | 721x2-N-Px-FM |
| | Intrinsically Safe | Class I, Groups C, D; Class II, Groups E, F, G; Class III, Division 1 | 721K2-N-P9-FI |
| CSA | Explosion Proof | Class I, Groups C, D Class II, Groups E, F, G; Class III, Division 1 | 721x2-N-Px-CS |
| | Intrinsically Safe | Class I, Groups C, D Class II, Groups E, F, G; Class III, Division 1 | 721K2-N-P9-AI |

# Ultrasonic Detectors

**The Series 712 ultrasonic detector** is a versatile dual-point designed for the detection of clean liquids. The dual-output can be used as independent alarm points or used in tandem to provide pump control. It is available integral or remote mounted and comes standard with field-selectable failsafe.

## Features

- No calibration required
- Optional pump control logic available
- FM and CSA Certified for hazardous locations
- Field-selectable failsafe

**712 Dual Point**

## Product Specifications

| Input Power | | Enclosure Environmental Rating | NEMA 4X; IP65 |
|---|---|---|---|
| Line | 24 volt, 50/60 Hz | | |
| | 24 volt, 50/60 Hz | Conduit Connection | 1" NPT |
| | 24 VDC | | |
| | | Maximum Remote Distance | 50 ft. (15.2 m) |
| Output Type | (2) 10A DPDT, 24 volt | from Sensor | |
| | (2) 10A DPDT, 24 volt | | |
| | DC rating shown for resistive loads | Ambient Temperature Range | -40 to 160°F |
| | | | (-40 to 71°C) |
| Repeatability | 0.078" (2mm) | | |
| | | Process Temperature Range | -40 to 250°F |
| Failsafe | Field-selectable | | (-40 to 121°C) |
| | | | |
| Maximum Current Draw | | Maximum Process Pressure | 2000 psig (138 bar) |
| 24 VDC | 280 mA | | |
| 24 volt | 120 mA | Weight* | 7 lbs. (3.2 kg) + 10.5 lbs. (4.8 kg) |
| 24 volt | 60 mA | | for cast iron housing |
| | | | + 2 lbs. (1 kg) for remote |
| Response Time (Line Power) | | | |
| On | 250 mSec | | |
| Off | 250 mSec | | |

*See page 23 for sensor weights.

**Model Number System**

## 712K3-N-P6-C-YY

712 ultrasonic detector with integral housing, 24 volt power supply, with optional epoxy coating.

The 712 is comprised of two parts. The first is the electronics and housing; the second is the sensor. Refer to page 19 for the sensor model number.

| **3** | **Accessories** |
|---|---|
| BK | Remote electronics flat surface mounting bracket (R housing only)(see page 19) |
| CS | CSA Certified Explosion Proof* |
| FM | FM Approved Explosion Proof* (except L3 housing) |
| PK | Pipe mounting kit, BK accessory required (R housing only)(see page 17) |
| PL | Pump logic (see page 16 for function and ratings) |
| PP | Fiber tag with customer specified tag information |
| PY | Powder coat epoxy coating applied to housing exterior |
| RG | Gold-contact relay (6, 7, 8 power only) |
| RR | SS nameplate wired to the unit with customer specified tag information |
| TT | SS nameplate permanently affixed to housing with customer specified tag information |
| VV | Fungicidal varnish applied to housing exterior |
| YY | Epoxy coating applied to housing exterior (200 hours - salt spray) |

**Power Supply** — **2**

| | |
|---|---|
| 24 VDC | 6 |
| 24 volt | 7 |
| 24 volt | 8 |

**Electrical Housing** — **1**

| | |
|---|---|
| Integral (Aluminum) | K |
| Integral (Cast Iron) | L |
| Remote (Aluminum) | R |

(order remote cable part number 300-XX-D, XX = length in feet)

| 712 | K | 3NP | 6 | C | YY | ← Model Number |

## Agency Approvals

| Agency | Safety Method | Approval | Model(s) |
|---|---|---|---|
| FM | Explosion Proof | Class I, Groups B, C, D; Class II, Groups E, F, G; Class III, Division 1 | 712K3-N-Px-FM |
| | | Class I, Groups C, D; Class II, Groups E, F, G; Class III, Division 1 | 712R3-N-Px-FM |
| CSA | Explosion Proof | Class I, Groups C, D Class II, Groups E, F, G; Class III, Division 1 | 712K3-N-Px-CS 712L3-N-Px-CS |
| | | Class I, Groups C, D Class II, Groups E, F, G; Class III, Division 1 | 712R3-N-Px-CS |

# Ultrasonic Detectors

**The Series 722 ultrasonic detector** is an advanced dual-point device designed to meet your needs for sump/pump control. In addition to the features of the 712, the 722 includes a "Sensor Monitor." This circuit continuously tests the functionality of the electronics and sensor (both gaps). The "Sensor Monitor Relay" de-energizes if a fault is detected. It is available integral or remote mounted and comes standard with field-selectable failsafe and time delay.

## Features

- No calibration required
- Continuous self-test (sensor monitor) verifies operation of the unit
- FM and CSA Certified for hazardous locations
- Field-selectable failsafe
- On/Off time delay is standard

**722 Dual Point**

## Product Specifications

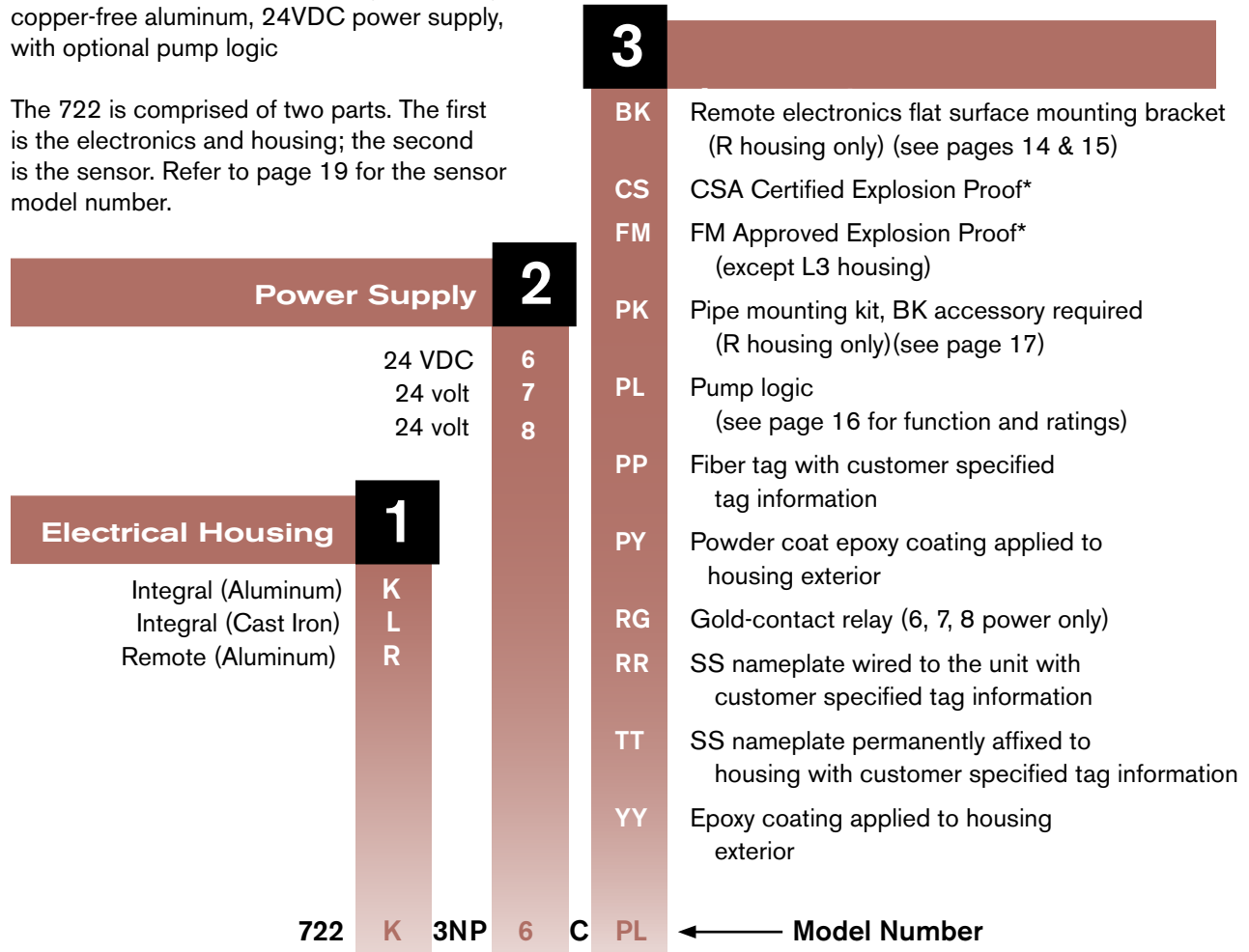| | | | | |
|---|---|---|---|---|
| **Input Power** | | | **Response Time** | |
| Line | 24 volt, 50/60 Hz | | On | 250 mSec |
| | 24 volt, 50/60 Hz | | Off | 250 mSec |
| | 24 VDC | | | |
| **Output Type** | | | **Time Delay** | 0-30 seconds |
| Alarm | (2) 10A DPDT, 24 volt | | | |
| | (2) 10A DPDT, 24 volt | | **Enclosure Environmental Rating** | NEMA 4X; IP65 |
| | DC rating shown | | | |
| | for resistive loads | | **Conduit Connection** | 1" NPT |
| Sensor Monitor | (2) 10A DPDT, 24 volt | | | |
| | (2) 10A DPDT, 24 volt | | **Maximum Remote Distance** | 50 ft. (15.2 m) |
| | DC rating shown | | **from Sensor** | |
| | for resistive loads | | | |
| | | | **Ambient Temperature Range** | -40 to 160°F |
| **Repeatability** | 0.078" (2mm) | | | (-40 to 71°C) |
| | | | | |
| **Failsafe** | Field-selectable | | **Process Temperature Range** | -40 to 250°F |
| | | | | (-40 to 121°C) |
| **Maximum Current Draw (Line Power)** | | | | |
| 24 VDC | 440 mA | | **Maximum Process Pressure** | 2000 psig (138 bar) |
| 24 volt | 120 mA | | | |
| 24 volt | 60 mA | | **Weight*** | 7 lbs. (3.2 kg) + 10.5 lbs. (4.8 kg) |
| | | | | for cast iron housing |
| | | | | + 2 lbs. (1 kg) for remote. |

*See page 23 for sensor weights.

## Model Number System

# 722K3-N-P6-C-PL

722 ultrasonic detector with integral housing copper-free aluminum, 24VDC power supply, with optional pump logic

The 722 is comprised of two parts. The first is the electronics and housing; the second is the sensor. Refer to page 19 for the sensor model number.

**Power Supply** | **2**

| | |
|---|---|
| 24 VDC | 6 |
| 24 volt | 7 |
| 24 volt | 8 |

**Electrical Housing** | **1**

| | |
|---|---|
| Integral (Aluminum) | K |
| Integral (Cast Iron) | L |
| Remote (Aluminum) | R |

**3**

| | |
|---|---|
| BK | Remote electronics flat surface mounting bracket (R housing only) (see pages 14 & 15) |
| CS | CSA Certified Explosion Proof* |
| FM | FM Approved Explosion Proof* (except L3 housing) |
| PK | Pipe mounting kit, BK accessory required (R housing only)(see page 17) |
| PL | Pump logic (see page 16 for function and ratings) |
| PP | Fiber tag with customer specified tag information |
| PY | Powder coat epoxy coating applied to housing exterior |
| RG | Gold-contact relay (6, 7, 8 power only) |
| RR | SS nameplate wired to the unit with customer specified tag information |
| TT | SS nameplate permanently affixed to housing with customer specified tag information |
| YY | Epoxy coating applied to housing exterior |

**722 K 3NP 6 C PL** ← **Model Number**

## Agency Approvals

| Agency | Safety Method | Approval | Model(s) |
|---|---|---|---|
| FM | Explosion Proof | Class I, Groups B, C, D; Class II, Groups E, F, G; Class III, Division 1 | 722K3-N-Px-FM |
| | | Class I, Groups C, D; Class II, Groups E, F, G; Class III, Division 1 | 722R3-N-Px-FM |
| CSA | Explosion Proof | Class I, Groups B, C, D Class II, Groups E, F, G; Class III, Division 1 | 722K3-N-Px-CS 722L3-N-Px-CS |
| | | Class I, Groups C, D Class II, Groups E, F, G; Class III, Division 1 | 722R3-N-Px-CS |

Dimensions in this catalog are for reference only. They may be changed without notice. Contact the factory for certified drawings for a particular model number. Dimensions are expressed as millimeter over inches (Linear = mm/in.).
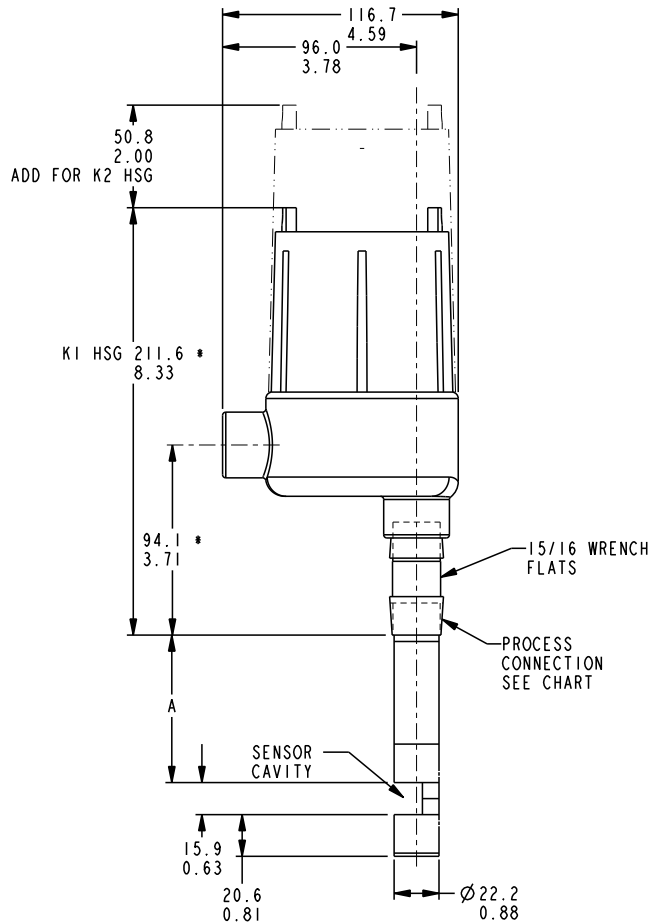


## Housing: K1, K2

**Drawing 0390000**



## Housing: R1, R2

**Drawing 0390034**

| Process Connection | *Add to Length |
|---|---|
| 3/4" NPT(M) | Shown |
| 1" NPT(M) | Add $\frac{8.0}{.313}$ |
| 1-1/2" NPT(M)<br>2" NPT(M) | Add $\frac{9.5}{.375}$ |

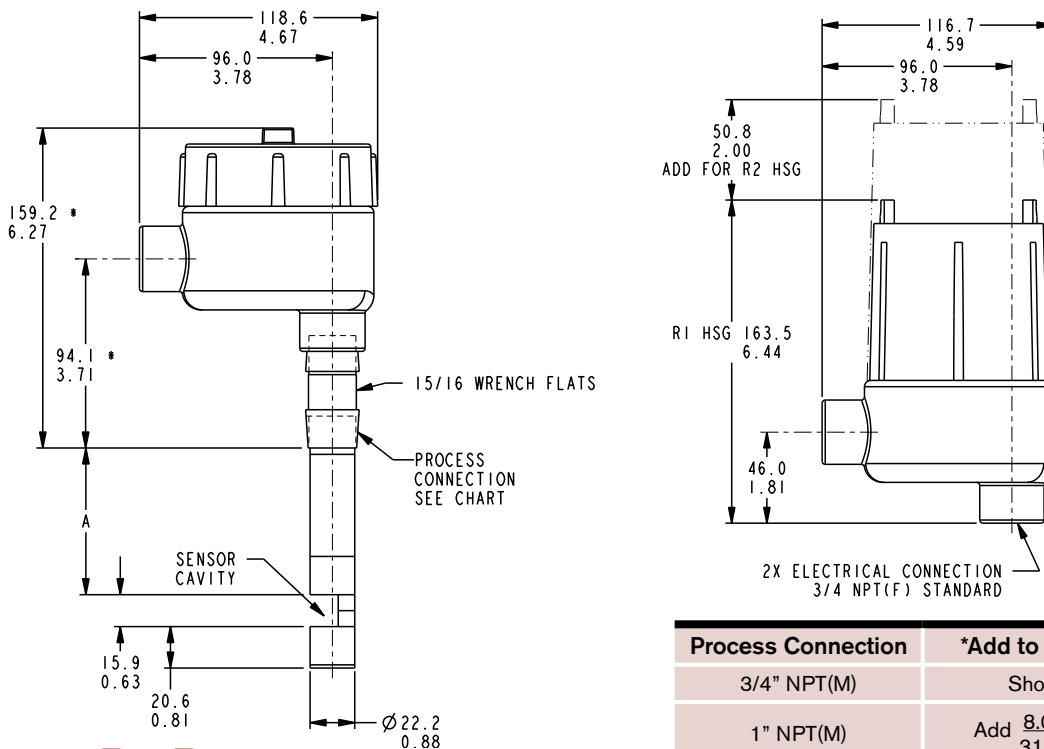913-888-2630

# Ultrasonic Detectors

Dimensions in this catalog are for reference only. They may be changed without notice. Contact the factory for certified drawings for a particular model number. Dimensions are expressed as millimeter over inches (Linear = mm/in.).



## Housing: K3, L3

**Drawing 0390029**



## Housing: R3

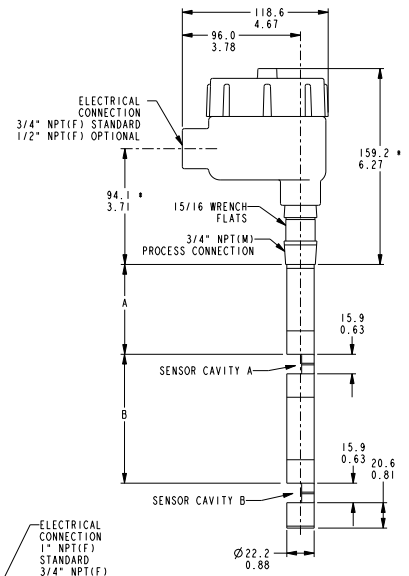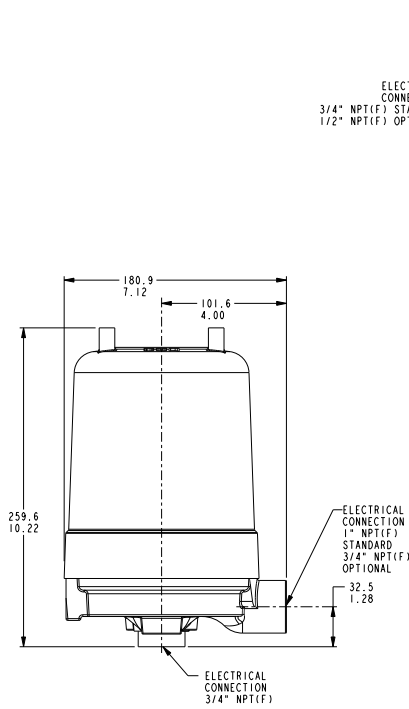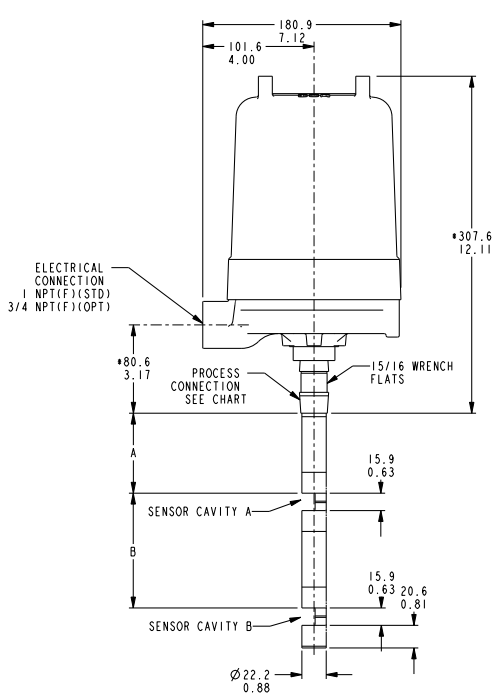**Drawing 0390040**

| Process Connection | *Add to Length |
|---|---|
| 3/4" NPT(M) | Shown |
| 1" NPT(M) | Add 8.0 / .313 |
| 1-1/2" NPT(M) 2" NPT(M) | Add 9.5 / .375 |
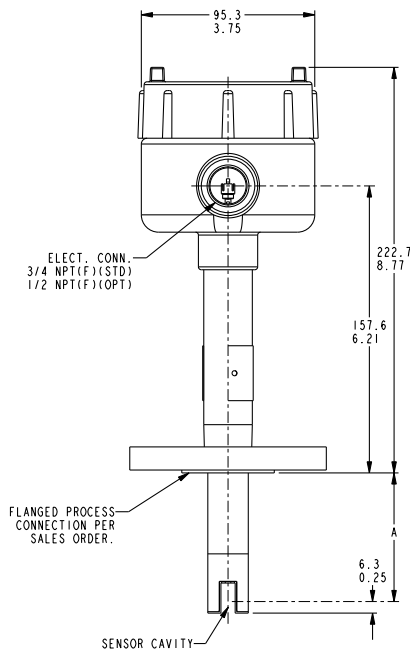


## Housing: K4

**Drawing 0390530**
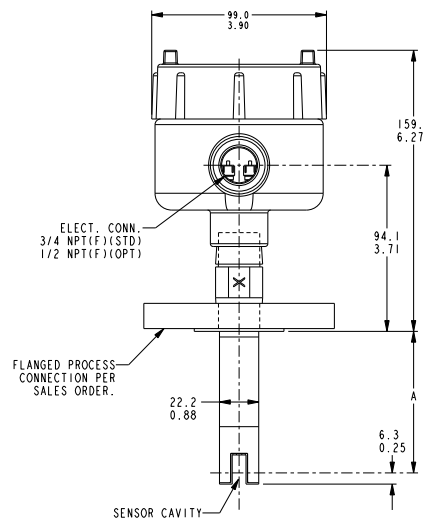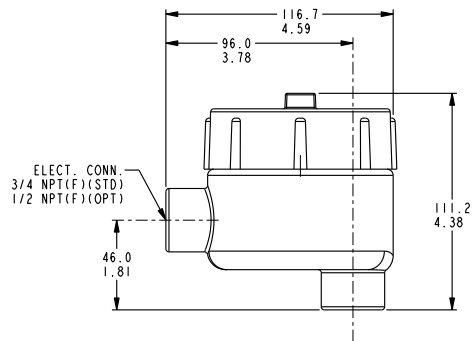


## Housing: R4

**Drawing 0390529**

# Ultrasonic Detectors

## Pump Logic Accessory

Two point ultrasonic level detectors can be supplied with an on-board DPDT relay for pump control. The relay is rated 10 amp, 24 volt; 10 amp, 24 volt (resistive) and it can be feld wet to pump up (left diagram) or pump down (right diagram).

Adding the pump logic (PL) accessory to the end of a model number changes level indication relays to SPDT and changes current requirements according to the table shown:

**Up**  **Down**

Relay Off — Relay On

Relay On — Relay Off

| Supply Voltage | Maximum Current Draw |
|---|---|
| 24 VDC | 350 mA |
| 24 volt | 120 mA |
| 24 volt | 50 mA |
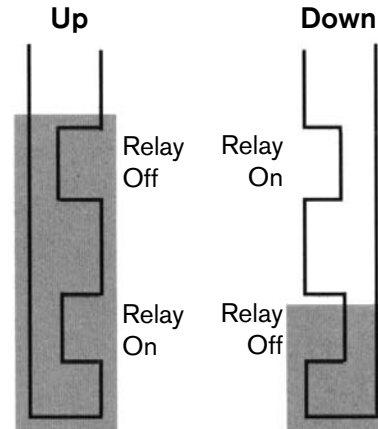
## Time Delay

When using time delay accessory OD or OF, choose a standard time delay from the chart below. Include the time delay after the model number. For example: 701K1-U-P6-C-OD
        OD = 60 seconds.

| Time Delay in Seconds (choose one) | | |
|---|---|---|
| 1 | 35 | 100 |
| 5 | 50 | 120 |
| 15 | 60 | 150 |
| 25 | 70 | 190 |

## Approximate Weights*

Actual shipping weights may vary from charted values because of product material, configurations and packaging requirements. For remote electrical housing add 2 lbs. (1kg) to total weight.

| Ultrasonic Series | Weight (lbs.) | (kgs) | Additional Weights |
|---|---|---|---|
| 701, 711 | 2.5 | 1.2 | --- |
| 721 | 3 | 1.4 | --- |
| 712, 722 | 7 | 3.2 | 10.5 lbs. (4.8 kg) for cast iron housing |

*See page 23 for sensor weights.

# Ultrasonic Detectors

## Mounting Bracket Accessory

Remote electronic housings are supplied for line mounting as a standard. Optional brackets are available for flat surface or pipe mounting.

The basic BK bracket can be adapted for mounting onto 1-1/2" to 2" pipe or stanchion by adding designator PK after BK.

For the basic flat surface mounting bracket, add designator BK to the end of any model number from the controls section in the front of this catalog. Linear = mm/in.



R, R3 ELECTRONICS HOUSING

ELECTRICAL CONNECTION
1" NPT(F) STANDARD
1/2" NPT(F) OPTIONAL

PK ACCESSORY PIPE KIT (OPTIONAL)

3/4" NPT(F)

399.3
15.72

32.5
1.28

68.4
2.69

71.4
2.81

133.4
5.25

50.8
2.00

212.7
8.37



R2 HOUSING

R1 HOUSING

R4 HOUSING

ELECTRICAL CONNECTION
3/4 NPT(F) STANDARD
1/2 NPT(F) OPTIONAL

PK ACCESSORY PIPE KIT (OPTIONAL)

3/4" NPT(M)

46.0
1.81

354.0
13.94

303.2
11.94

250.9
9.88

81.9
3.22

71.4
2.81

133.4
5.25

50.8
2.00

181.0
7.13

95.3
3.75

71.4
2.81

31.0
1.22

133.4
5.25

71.4
2.81

**Drawing 0390063**

**Model Number System**

## 371-U-2-C-3A-RR
The 371 sensor is designed for use with all signal-point ultrasonic electronic unit.

| **4** | **Process Connection** |
|---|---|
| 3A | 3/4" NPT |
| 4A | 1" NPT |
| 5A | 1-1/2" NPT |
| 6A | 2" NPT |
| 3D | 1" 150# ANSI RF Flange |
| 3E | 1-1/2" 150# ANSI RF Flange |
| 3F | 2" 150# ANSI RF Flange |
| 3G | 3" 150# ANSI RF Flange |
| 3H | 4" 150# ANSI RF Flange |
| 3K | 1" 300# ANSI RF Flange |
| 3L | 1-1/2" 300# ANSI RF Flange |
| 3M | 2" 300# ANSI RF Flange |
| 3N | 3" 300# ANSI RF Flange |
| 3P | 4" 300# ANSI RF Flange |

| **3** | **Sensor Material** | |
|---|---|---|
| C | 316SS (standard) | |
| A | Monel (N type sensor) | |
| L | Carpenter 20 (N type sensor) | |
| J | Hastelloy C (N type sensor) | |
| G | Teflon (N type sensor)[3] | |

| **2** | **Insertion Length** |
|---|---|
| Probe Length in Decimal Form | Enter the required probe length, "A", in inches (as a decimal, up to five characters including the decimal, leading zeroes not required.) Maximum two digits after decimal point). Minimum 3" (Minimum 1.16" for Sensor U; minimum 3" for sensor with flange). Maximum 180".[2] |

| **1** | **Sensor Type** |
|---|---|
| U | Vertical Gap (701) |
| N | Horizontal (Notch) Gap (711, 721) |
| V | Viscous Gap (711, 721)[1] |

| **5** | **Accessories** |
|---|---|
| AI | CSA Certified Intrinsically Safe* (U & N type sensors) |
| CS | CSA Certified Explosion Proof* (U & N type sensors) |
| FI | FM Approved Intrinsically Safe* (U & N type sensors) |
| FM | FM Approved Explosion Proof* (U & N type sensors) |
| PP | Fiber tag with customer specified tag information |
| RR | SS nameplate wired to the unit with customer specified tag information |
| TT | SS nameplate permanently affixed to housing with customer specified tag information |

| 371 | U | 2 | C | 3A | RR | ← Model Number |
|---|---|---|---|---|---|---|

[1] "V" type sensor requires a 3" or larger flange connection.

[2] "N" types sensor with "G" material has a maximum length of 48".

[3] "G" Sensor material is only available with 3/4" process connection.

*Match sensor approvals to electronics approvals to maintain the agency listing integrity.

913-888-2630
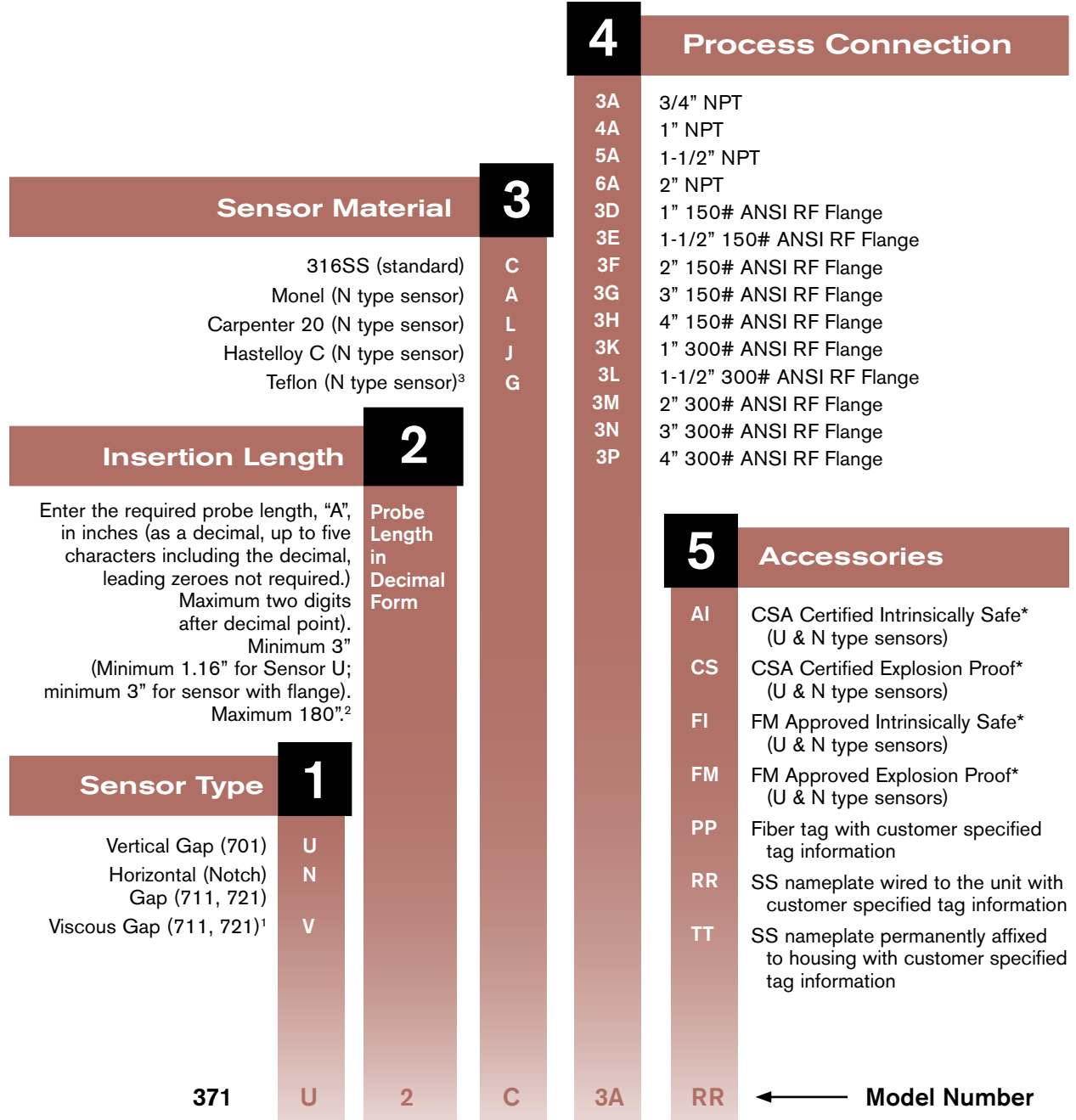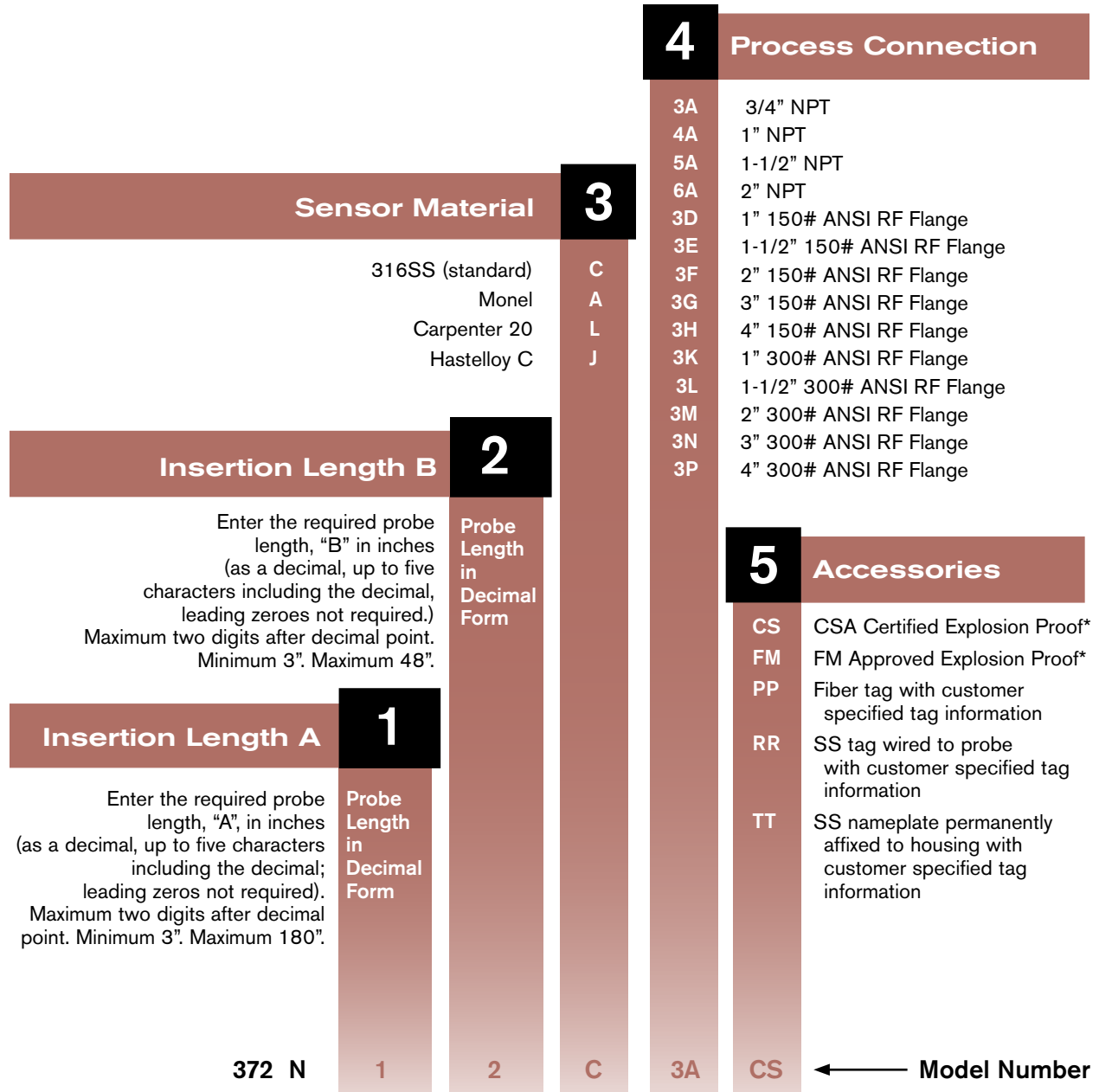
## Model Number System

## 372-N-12-C3A-CS

The 372 sensor in designed for use with all dual-point ultrasonic electronic units.

**4** **Process Connection**

| | |
|---|---|
| 3A | 3/4" NPT |
| 4A | 1" NPT |
| 5A | 1-1/2" NPT |
| 6A | 2" NPT |
| 3D | 1" 150# ANSI RF Flange |
| 3E | 1-1/2" 150# ANSI RF Flange |
| 3F | 2" 150# ANSI RF Flange |
| 3G | 3" 150# ANSI RF Flange |
| 3H | 4" 150# ANSI RF Flange |
| 3K | 1" 300# ANSI RF Flange |
| 3L | 1-1/2" 300# ANSI RF Flange |
| 3M | 2" 300# ANSI RF Flange |
| 3N | 3" 300# ANSI RF Flange |
| 3P | 4" 300# ANSI RF Flange |

**3** **Sensor Material**

| | |
|---|---|
| 316SS (standard) | C |
| Monel | A |
| Carpenter 20 | L |
| Hastelloy C | J |

**2** **Insertion Length B**

Enter the required probe length, "B" in inches (as a decimal, up to five characters including the decimal, leading zeroes not required.) Maximum two digits after decimal point. Minimum 3". Maximum 48".

Probe Length in Decimal Form

**5** **Accessories**

| | |
|---|---|
| CS | CSA Certified Explosion Proof* |
| FM | FM Approved Explosion Proof* |
| PP | Fiber tag with customer specified tag information |
| RR | SS tag wired to probe with customer specified tag information |
| TT | SS nameplate permanently affixed to housing with customer specified tag information |

**1** **Insertion Length A**

Enter the required probe length, "A", in inches (as a decimal, up to five characters including the decimal; leading zeros not required). Maximum two digits after decimal point. Minimum 3". Maximum 180".

Probe Length in Decimal Form

| 372 N | 1 | 2 | C | 3A | CS | ← Model Number |
|---|---|---|---|---|---|---|

See page 23 for flange weights.
*Match sensor approvals to electronics approvals to maintain the agency listing integrity.

# Ultrasonic Detectors

## Electronics

## Sensors

| | Certificates | C1 | C3 | C4 | | Certificates | C2 |
|---|---|---|---|---|---|---|---|
| Point Level Control 4-20 mA (P9) | Calibration | ◆ | | | Horizontal Single | Hydrostatic Pressure Test | ◆ |
| | Inspection Report | | ◆ | | Horizontal Dual | | |
| | Compliance / Conformance | | | ◆ | Series 701 Vertical | | |
| | | | | | Teflon, Epoxy, Viscous | | |

Note: The echOsonix™ Transmitter has only one available certificate; C4 - Compliance/Conformance.
The Point Level Control 4-20 mA (P9) is not available with C6 - Insulation Resistance
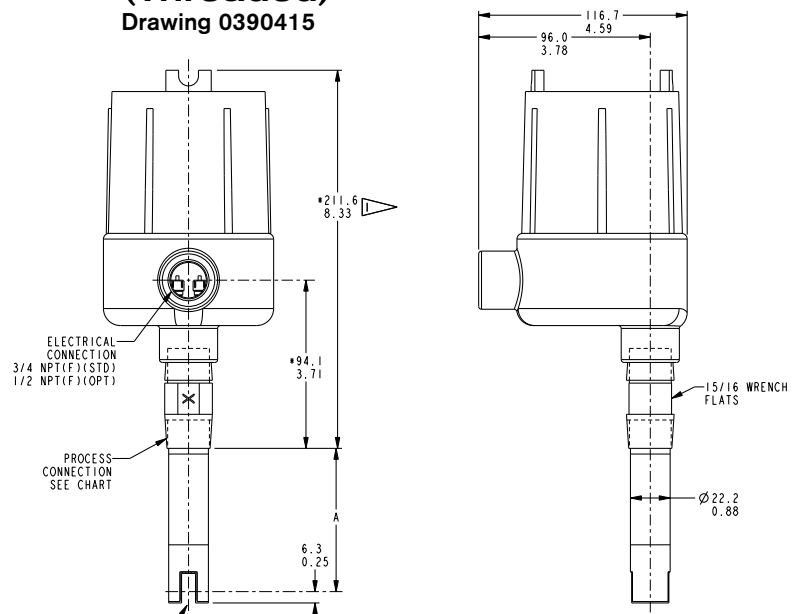
## Ultrasonic Detectors

## Sensor Dimensions

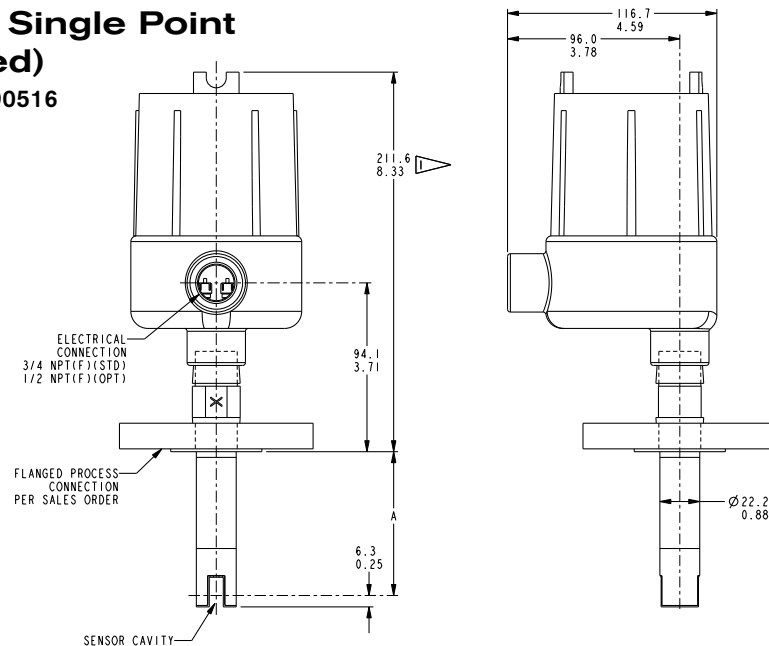Dimensions shown are for reference only. Contact the factory for certified dimension drawings.
Linear = mm/in.

| Process Connection | *Add to Length |
|---|---|
| 3/4" NPT(M) | Shown |
| 1" NPT(M) | Add $\frac{8.0}{.313}$ |
| 1-1/2" NPT(M) 2" NPT(M) | Add $\frac{9.5}{.375}$ |

### Type U Single Point (Threaded)
**Drawing 0390415**



ELECTRICAL CONNECTION
3/4 NPT(F)(STD)
1/2 NPT(F)(OPT)

PROCESS CONNECTION SEE CHART

### Type U Single Point (Flanged)
**Drawing 0390516**



ELECTRICAL CONNECTION
3/4 NPT(F)(STD)
1/2 NPT(F)(OPT)

FLANGED PROCESS CONNECTION PER SALES ORDER

SENSOR CAVITY

Registered Quality System to ISO 9001:2008

Dimensions shown are for reference
only. Contact the factory for certified
dimension drawings.

Linear = mm/in.

| Process Connection | *Add to Length |
|---|---|
| 3/4" NPT(M) | Shown |
| 1" NPT(M) | Add $\frac{8.0}{.313}$ |
| 1-1/2" NPT(M) 2" NPT(M) | Add $\frac{9.5}{.375}$ |
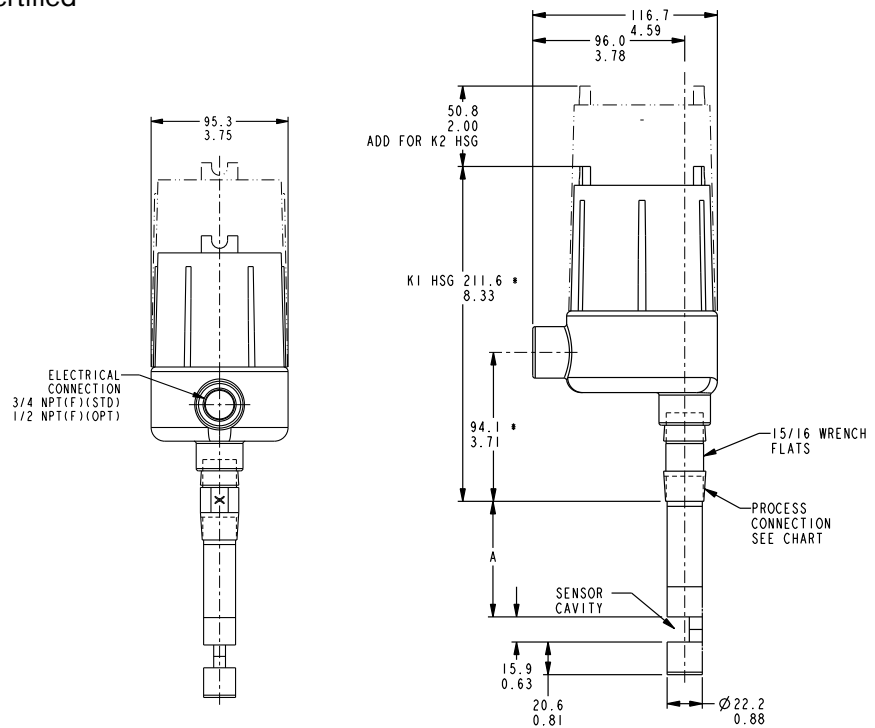
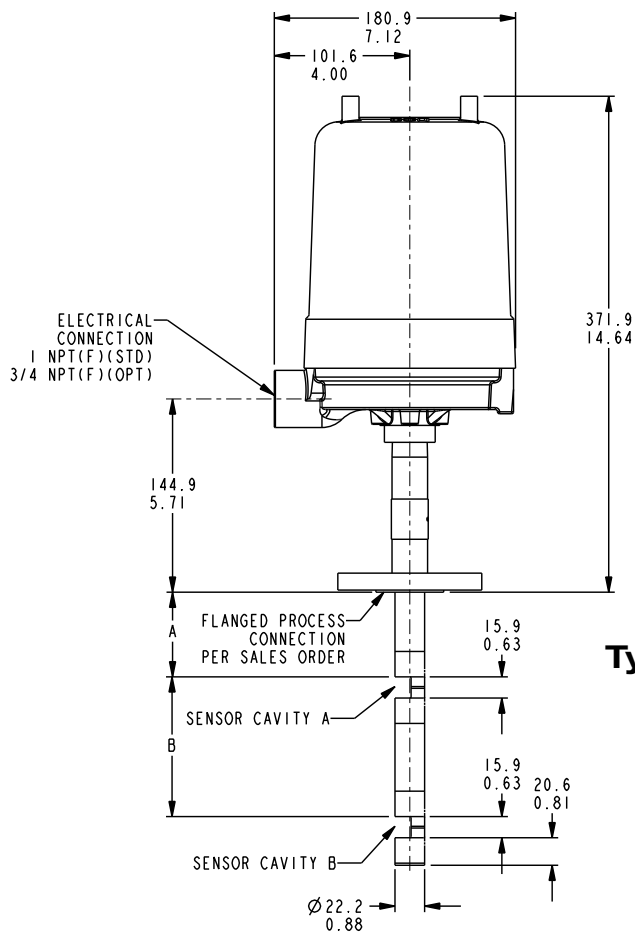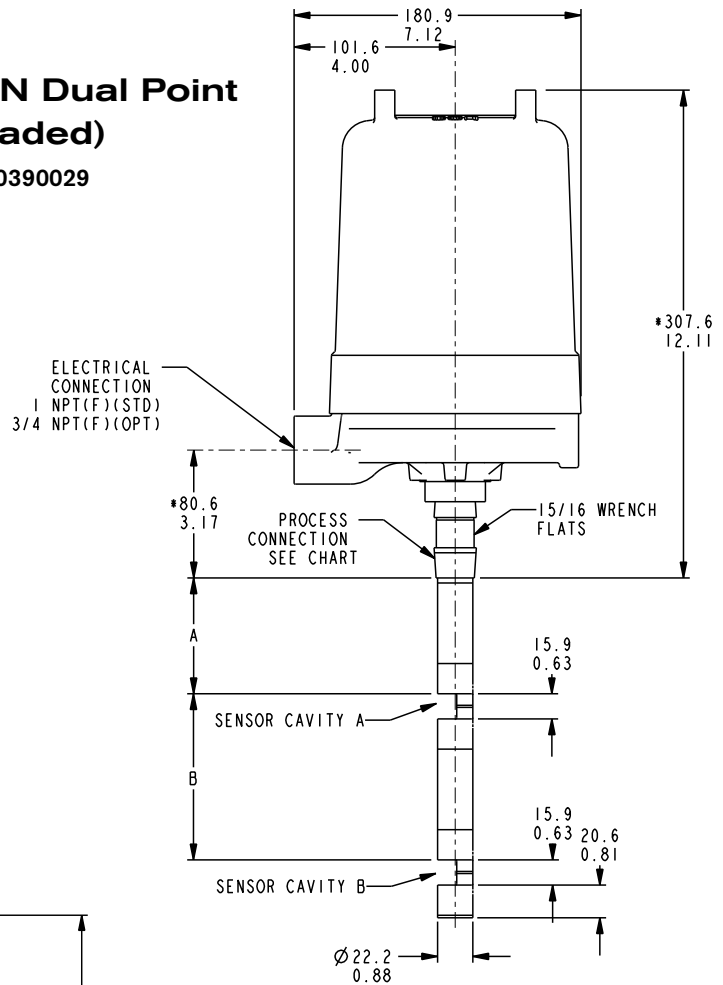## Type N Single Point (Threaded)

**Drawing 0390000**
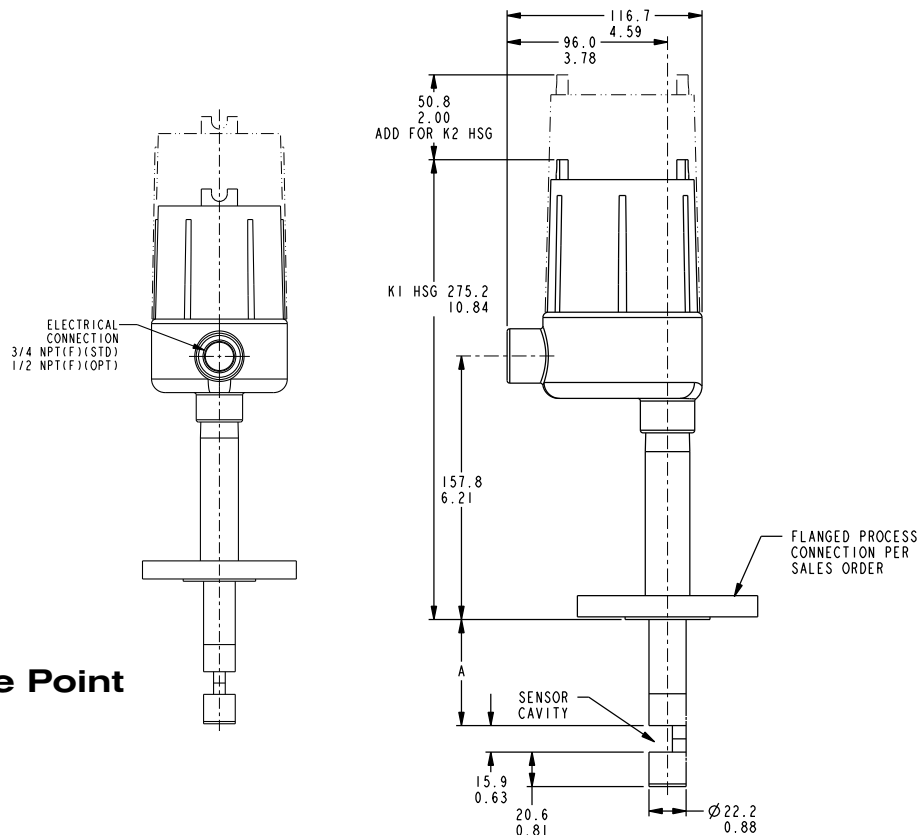
## Type N Single Point (Flanged)

**Drawing 0390025**

Dimensions shown are for reference only. Contact the factory for certified dimension drawings.

Linear = mm/in.
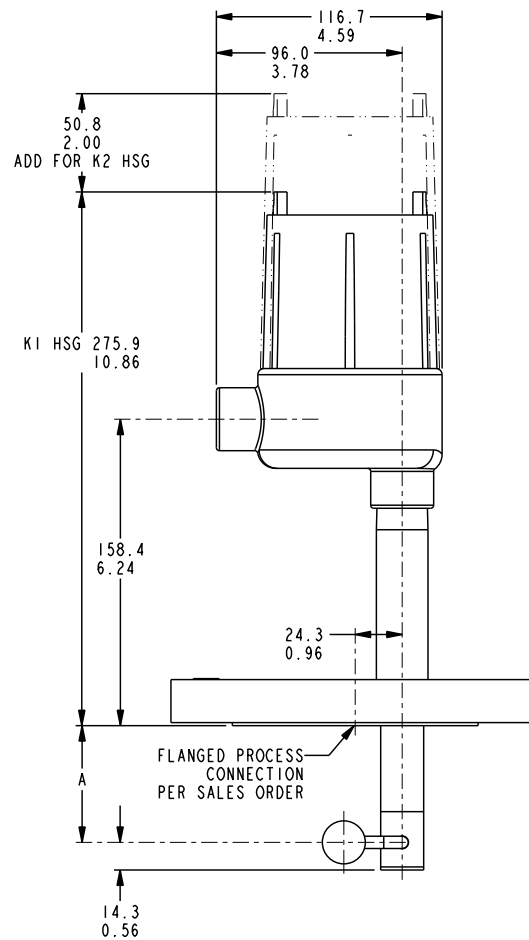
## Type N Dual Point (Threaded)

**Drawing 0390029**

180.9
7.12

101.6
4.00

ELECTRICAL
CONNECTION
I NPT(F)(STD)
3/4 NPT(F)(OPT)

*307.6
12.11

*80.6
3.17

PROCESS
CONNECTION
SEE CHART

15/16 WRENCH
FLATS

A

15.9
0.63

SENSOR CAVITY A

B

15.9
0.63  20.6
0.81

SENSOR CAVITY B

Ø 22.2
0.88

180.9
7.12

101.6
4.00

ELECTRICAL
CONNECTION
I NPT(F)(STD)
3/4 NPT(F)(OPT)

371.9
14.64

144.9
5.71

A

FLANGED PROCESS
CONNECTION
PER SALES ORDER

15.9
0.63

SENSOR CAVITY A

B

15.9
0.63  20.6
0.81

SENSOR CAVITY B

Ø 22.2
0.88

## Type N Dual Point (Flanged)

**Drawing 0390030**

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Dimensions shown are for reference only. Contact the factory for certified dimension drawings. (Linear = mm/in.)

### Type V Single Point (Flanged)

**Drawing 0390439**



116.7
4.59

96.0
3.78

50.8
2.00
ADD FOR K2 HSG

KI HSG 275.9
10.86

158.4
6.24

24.3
0.96

FLANGED PROCESS
CONNECTION
PER SALES ORDER

A

14.3
0.56

| Sensor Style | Weight |
|---|---|
| Types U & N | 0.5 lbs. for first 6"<br>1 lb. (0.5 kg) for each additional 12" |
| Type V | 11.5 lbs. (5.2 kg) for first 6" (includes flange)<br>1 lb. (0.5 kg) for each additional 12" |

### Flange Weight and Pressure Rating

| Process Connection | Add to Weight | | Maximum Pressure Rating |
|---|---|---|---|
| | lbs. | kg | |
| 3D | 2 | 1.0 | 275 psig (19 bar) |
| 3E | 4 | 1.8 | |
| 3F | 5 | 2.3 | |
| 3G | 9 | 4 | |
| 3H | 17 | 8 | |
| 3K | 3 | 1.5 | 720 psig (50 bar) |
| 3L | 6 | 2.7 | |
| 3M | 8 | 3.6 | |
| 3N | 16 | 7.5 | |
| 3P | 27 | 12.5 | |

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