

SOR Ultrasonic Switches

Form 1145

Why use an ultrasonic switch 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.

Ultrasonic switches 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.



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.

Ultrasonic switches 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

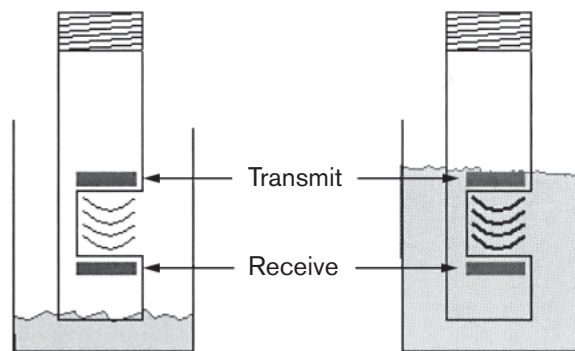
An ultrasonic switch is a device that uses inaudible high-frequency sound (ultrasound) to detect the presence or absence of a liquid at a designated point. The device consists of an electronic control unit and a sensor.

Ultrasonic level switches 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 switch a relay accordingly.

Ultrasonic switch 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 switch 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 switches 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 switch for your application.

- Liquids only - the process media must be a liquid. The ultrasonic level switch 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 switches will provide trouble-free operation without any calibration or periodic adjustment.

The **Series 701 tip-sensitive ultrasonic switch** 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 switch is also available. The standard unit is set to High-level Failsafe (HLFS).



701 Single Point

Features

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

Product Specifications

Input Power		Maximum Current Draw (Line Power)	
Line	120 VAC, 50/60 Hz	24 VDC	100 mA
	240 VAC, 50/60 Hz	120 VAC	35 mA
	24 VDC	240 VAC	18 mA
Loop	11-36 VDC Intrinsically Safe		
Fuses	Field replaceable (line power only)	Response Time	
		On	0 second
		Off	1 second
Output Type		Enclosure Environmental Rating	NEMA 4X; IP65
Line	10A DPDT, 250 VAC	Conduit Connection	3/4" NPT
	10A DPDT, 30 VDC	Maximum Remote Distance from Sensor	50 feet (15.2 meters)
	DC rating shown for resistive loads	Ambient Temperature Range	-40 to 160°F (-40 to 71°C)
Loop	8mA (dry), 16 mA (Wet)-Standard	Process Temperature Range	-40 to 250°F (-40 to 121°C)
Loop Resistance	765 ohms maximum @ 24 VDC	Maximum Process Pressure	2000 psig (138 bar)
Repeatability	0.078" (2mm)		
Failsafe	HLFS-Standard; field selectable is optional		

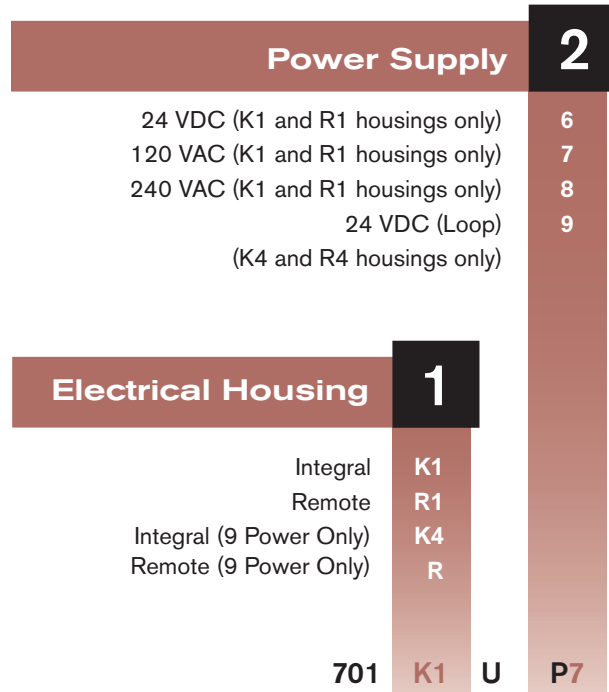
* See page 22 for sensor shipping weights.

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 pages 18 & 19 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

CS	CSA Certified Explosion Proof*
AI	CSA Certified Intrinsically Safe* (9 power only) (K4 housings only)
FM	FM Approved Explosion Proof*
FI	FM Approved Intrinsically Safe* (9 power only) (K4 housings only)
BK	Remote electronics flat surface mounting bracket (R housings only) (see pages 14 & 15)
FS	Field selectable Failsafe switch (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 pages 14 & 15)
RG	Gold-contact relay (6, 7, 8 power only)
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
VV	Fungicidal varnish applied to housing exterior
PY	Powder coat epoxy coating applied to housing exterior
YY	Epoxy coating applied to housing exterior (200 hours - salt spray)

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 switch** 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	120 VAC, 50/60 Hz	Response Time	On	250 mSec
	240 VAC, 50/60 Hz		Off	250 mSec
	24 VDC			
Output Type	10A DPDT, 250 VAC	Enclosure Environmental Rating	NEMA 4X; IP65	
	10A DPDT, 30 VDC		Conduit Connection	3/4" NPT
	DC rating shown for resistive loads			
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)		Process Temperature Range	-40 to 250°F (-40 to 121°C)	
	24 VDC		2000 psig (138 bar)	
	120 VAC			
	240 VAC			

*See page 22 for sensor shipping 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 pages 18 & 19 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		4		5	
		Power Supply		Sensor Material		Accessories	
		24 VDC	6	C	Metal	CS	CSA Certified Explosion Proof*
		120 VAC	7	G	Teflon (N Probe Only)	FM	FM Approved Explosion Proof*
		240 VAC	8			BK	Remote electronics flat surface mounting bracket (R housing only) (see pages 14 & 15)
		2				PK	Pipe mounting kit, BK accessory required (R housing only) (see pages 14 & 15)
		Probe Type				RG	Gold-contact relay (6, 7, 8 power only)
		Notch	N			PP	Fiber tag with customer specified tag information
		Viscous	V			RR	SS nameplate wired to the unit with customer specified tag information
		1				TT	SS nameplate permanently affixed to housing with customer specified tag information
		Electrical Housing				VV	Fungicidal varnish applied to housing exterior
		Integral	K			PY	Powder coat epoxy coating applied to housing exterior
		Remote	R			YY	Epoxy coating applied to housing exterior (200 hours - salt spray)
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 Switches

Series 721 Single Point

The Series 721 ultrasonic switch is an advanced single-point device designed to meet your needs for overflow 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	120 VAC, 50/60 Hz	24 VDC	220 mA
	240 VAC, 50/60 Hz	120 VAC	60 mA
	24 VDC	240 VAC	30 mA
Loop	11-36 VDC (Intrinsically safe)	Response Time (Line Power)	
		On	250 mSec
		Off	250 mSec
Output Type		Response Time (Loop Power)	
Line		On	0.5 seconds
Alarm	10A DPDT, 250 VAC	Off	5 seconds
	10A DPDT, 30 VDC		
	DC rating shown		
	for resistive loads	Time Delay	0-30 seconds
Sensor Monitor	10A DPDT, 250 VAC	Enclosure Environmental Rating	NEMA 4X; IP65
	10A DPDT, 30 VDC	Conduit Connection	3/4" NPT
	DC rating shown	Maximum Remote Distance from Sensor	50 ft. (15.2 m)
	for resistive loads	Ambient Temperature Range	-40 to 160°F (-40 to 71°C)
Loop		Process Temperature Range	-40 to 250°F (-40 to 121°C)
Alarm	8 mA (Dry), 16 mA (Wet)	Maximum Process Pressure	2000 psig (138 bar)
Sensor Monitor	5 mA or 19 mA; Field selectable		
Loop Resistance	650 ohms maximum @ 24 VDC		
Repeatability	0.078" (2mm)		
Failsafe	Field-selectable		

*See page 22 for sensor shipping 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	
								CS CSA Certified Explosion Proof* AI CSA Certified Intrinsically Safe” (9 power only) (N probe only) (K housing only) FM FM Approved Explosion Proof* FI FM Approved Intrinsically Safe* (9 power only)(N Probe only) (K housing only)	
						4			
						Sensor Material			
						Metal Teflon		C G	
						3			
						Power Supply			
						24 VDC 6 120 VAC 7 240 VAC 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



The **Series 712 ultrasonic switch** 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	120 VAC, 50/60 Hz	Conduit Connection	1" NPT
	240 VAC, 50/60 Hz	Maximum Remote Distance from Sensor	50 ft. (15.2 m)
	24 VDC	Ambient Temperature Range	-40 to 160°F (-40 to 71°C)
Output Type	(2) 10A DPDT, 250VAC	Process Temperature Range	-40 to 250°F (-40 to 121°C)
	(2) 10A DPDT, 30VDC	Maximum Process Pressure	2000 psig (138 bar)
	DC rating shown for resistive loads	Shipping Weight*	7 lbs. (3.2 kg) + 10.5 lbs. (4.8 kg) for cast iron housing + 2 lbs. (1 kg) for remote
Repeatability	0.078" (2mm)		
Failsafe	Field-selectable		
Maximum Current Draw			
24 VDC	280 mA		
120 VAC	120 mA		
240 VAC	60 mA		
Response Time (Line Power)			
On	250 mSec		
Off	250 mSec		

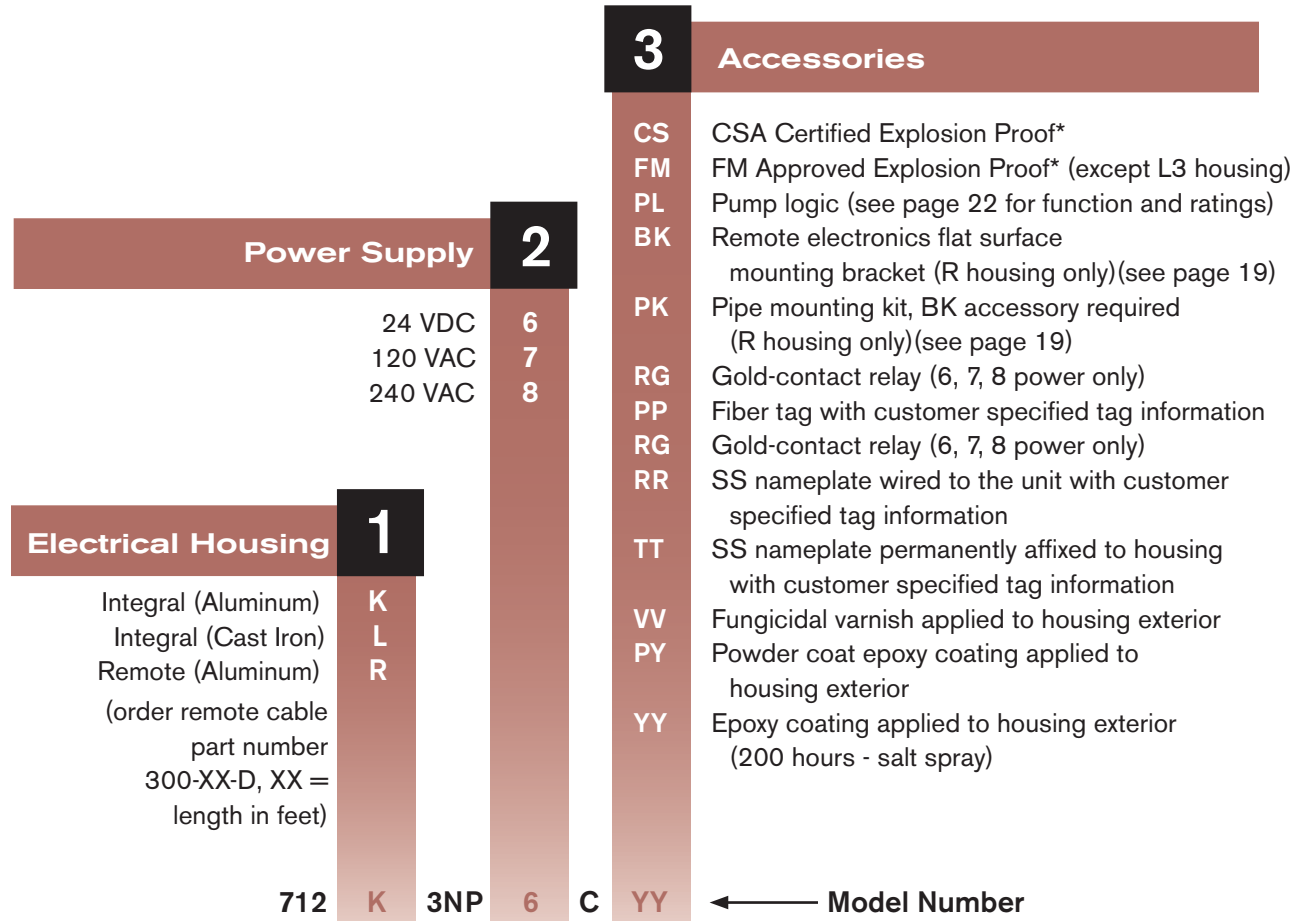
*See page 22 for sensor shipping weights.

Model Number System

712K3-N-P6-C-YY

712 ultrasonic switch with integral housing, 240VAC 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.



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



The Series 722 ultrasonic switch 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.



722 Dual Point

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

Product Specifications

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

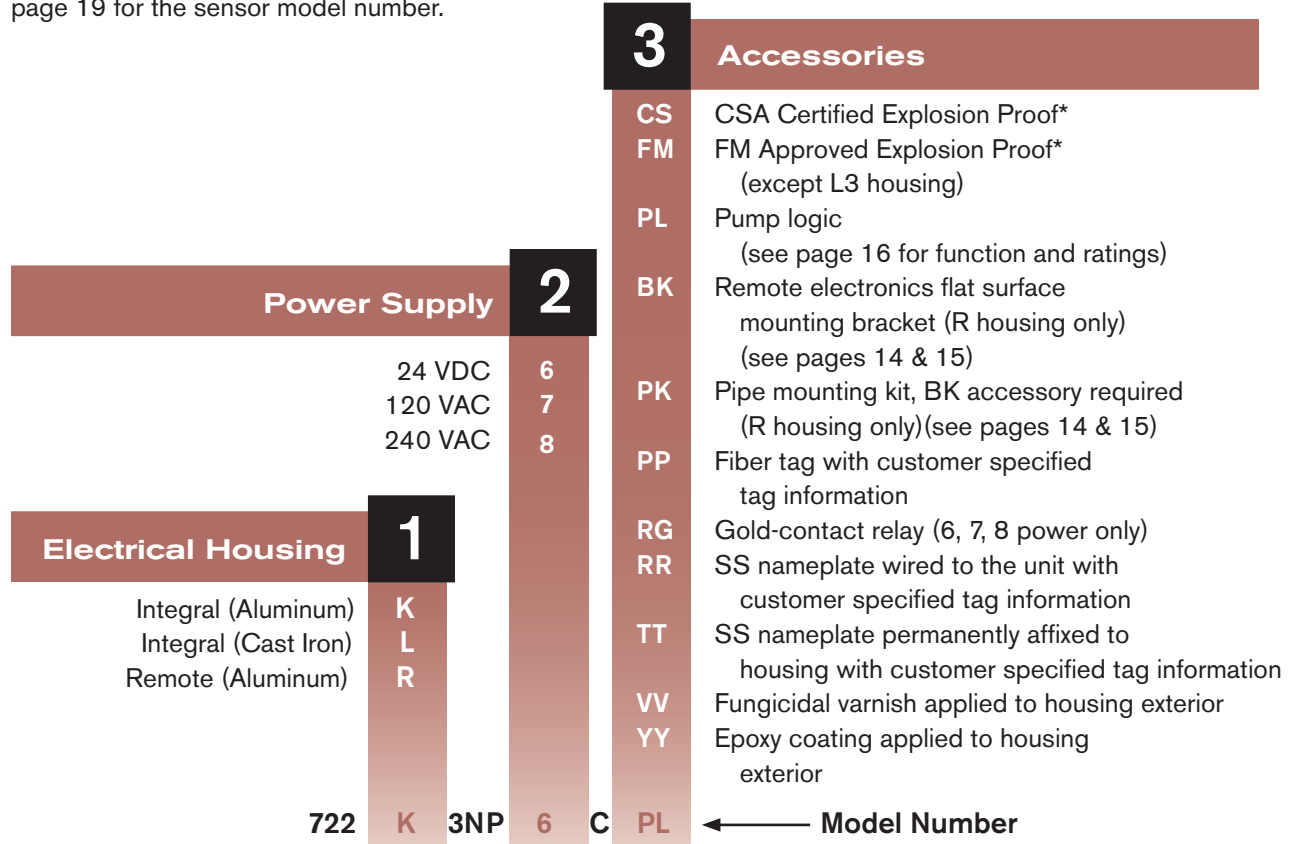
*See page 22 for sensor shipping weights.

Model Number System

722K3-N-P6-C-PL

722 ultrasonic switch 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.

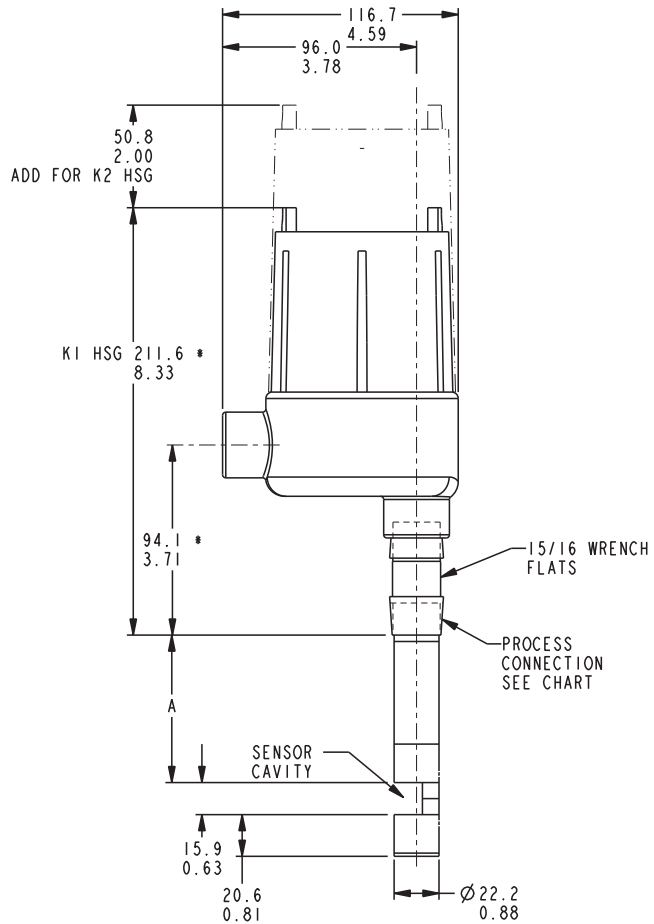


Agency Approvals

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

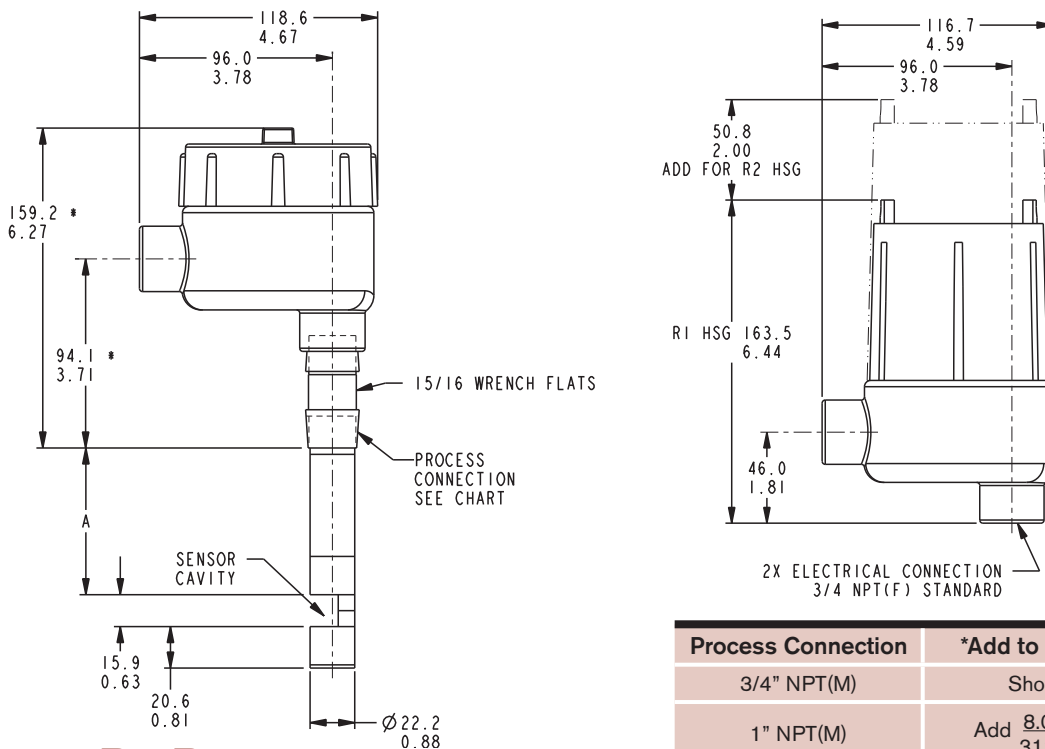


Dimensions in this catalog are for reference only. They may be changed without notice. Contact the factory for certified drawings for a particular model number. Dimensions are expressed as millimeter over inches (Linear = mm/in.).



Housing: K1, K2

Drawing 0390000



Housing: R1, R2

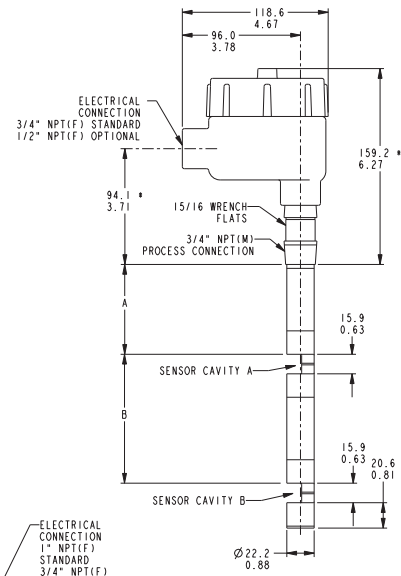
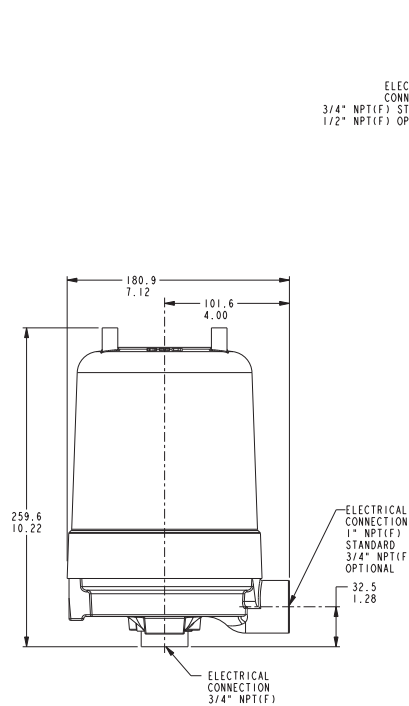
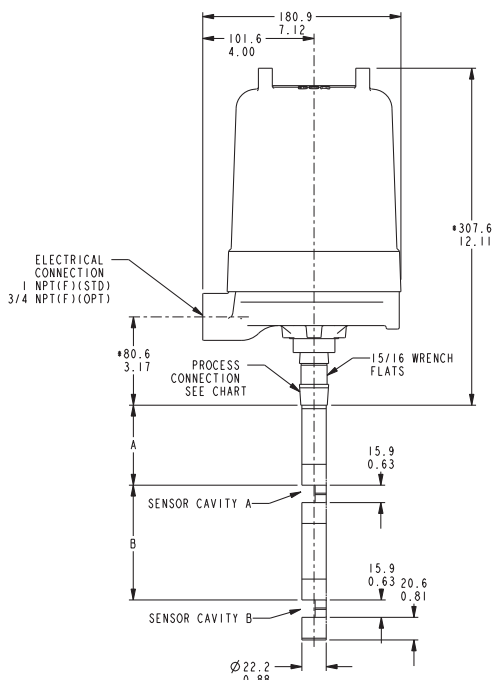
Drawing 0390034

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

Ultrasonic Switches

Dimensions

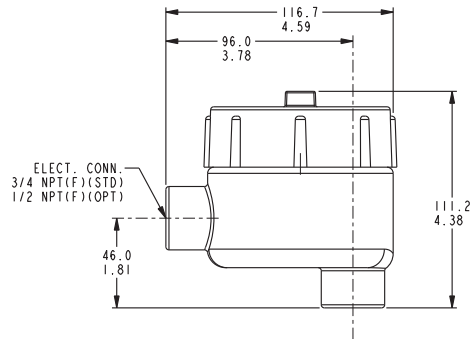
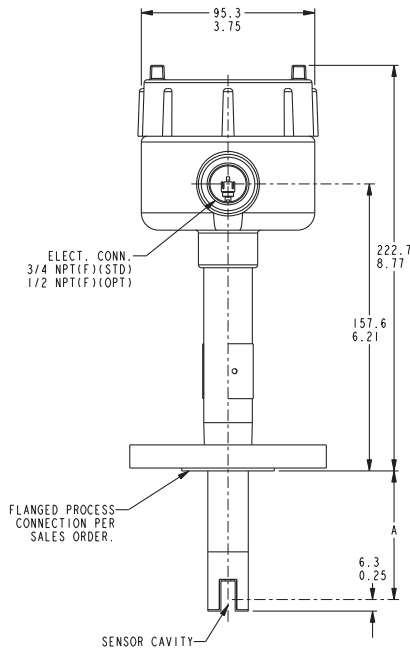
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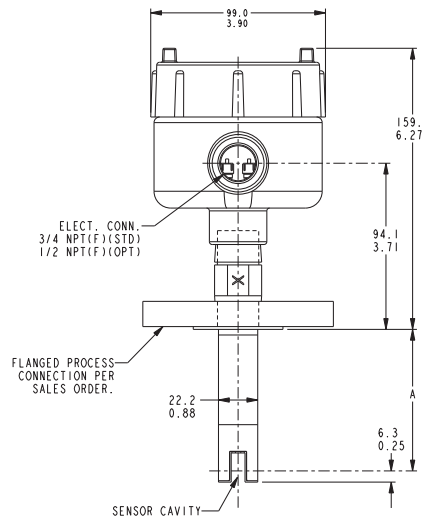
Housing: R3
Drawing 0390040

Housing: K3, L3
Drawing 0390029

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

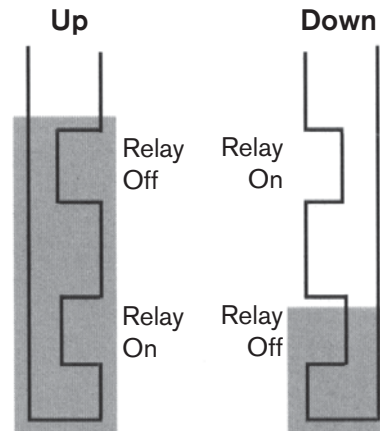


Housing: R4
Drawing 0390529

Two point ultrasonic level switches can be supplied with an on-board DPDT relay for pump control. The relay is rated 10 amp, 250 VAC; 10 amp, 30 VDC (resistive) and it can be field 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:

Supply Voltage	Maximum Current Draw
24 VDC	350 mA
120 VAC	120 mA
240 VAC	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 Shipping 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.

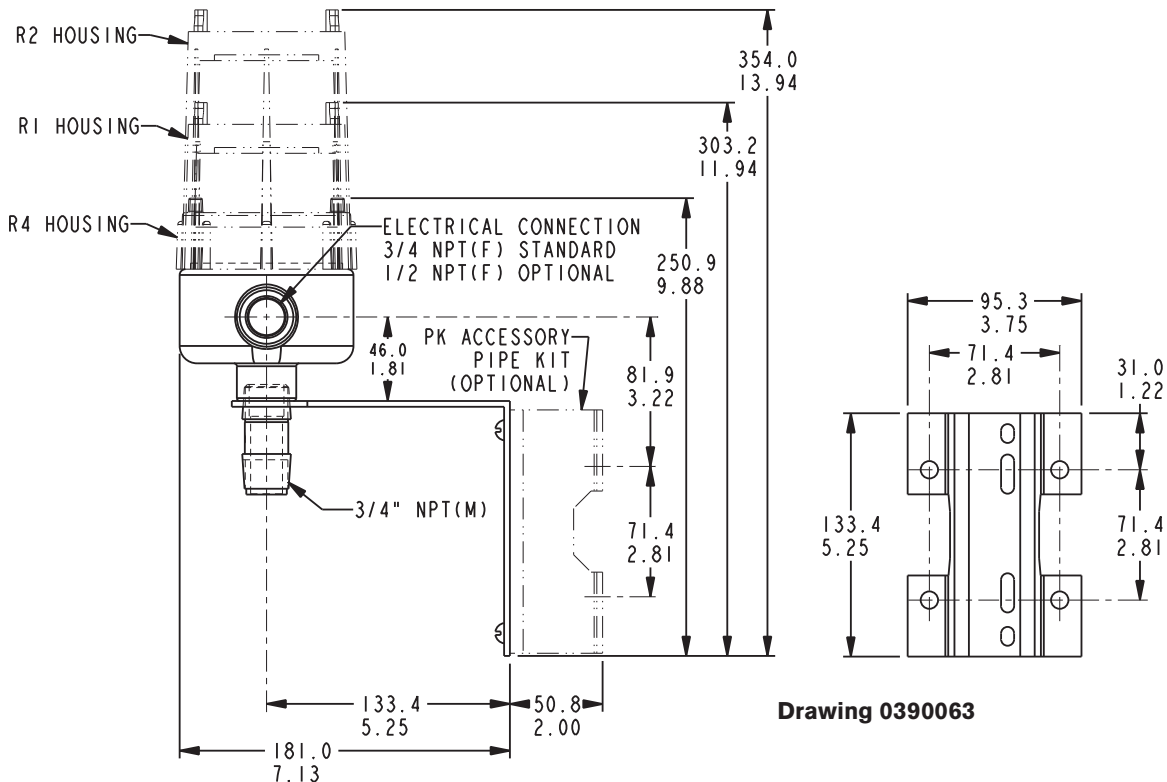
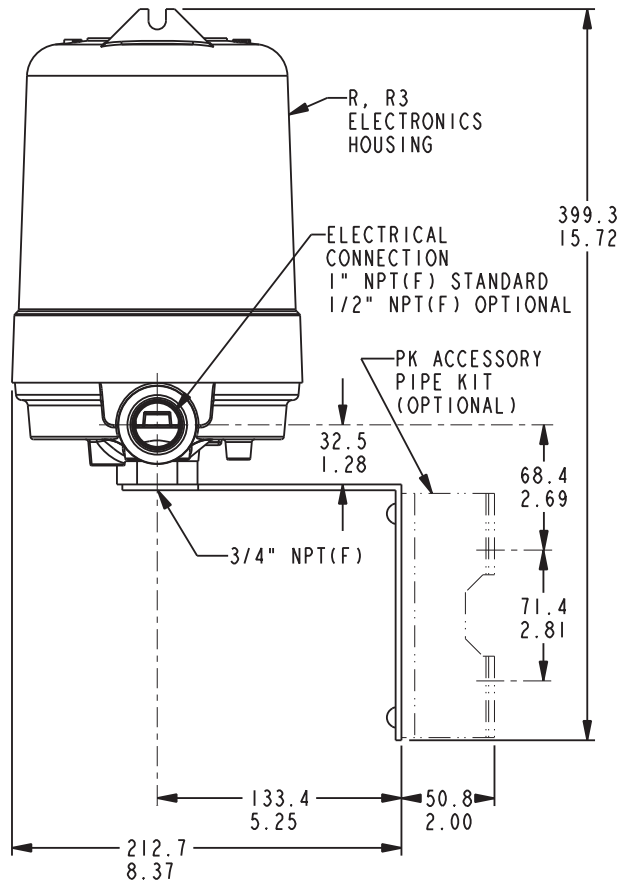
Ultrasonic Series	Weight (lbs.)	(kgs)	Additional Weights
701, 711	2.5	1.2	---
721	3	1.4	---
712, 722	7	3.2	10.5 lbs. (4.8 kg) for cast iron housing

Drawing 0390062

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.

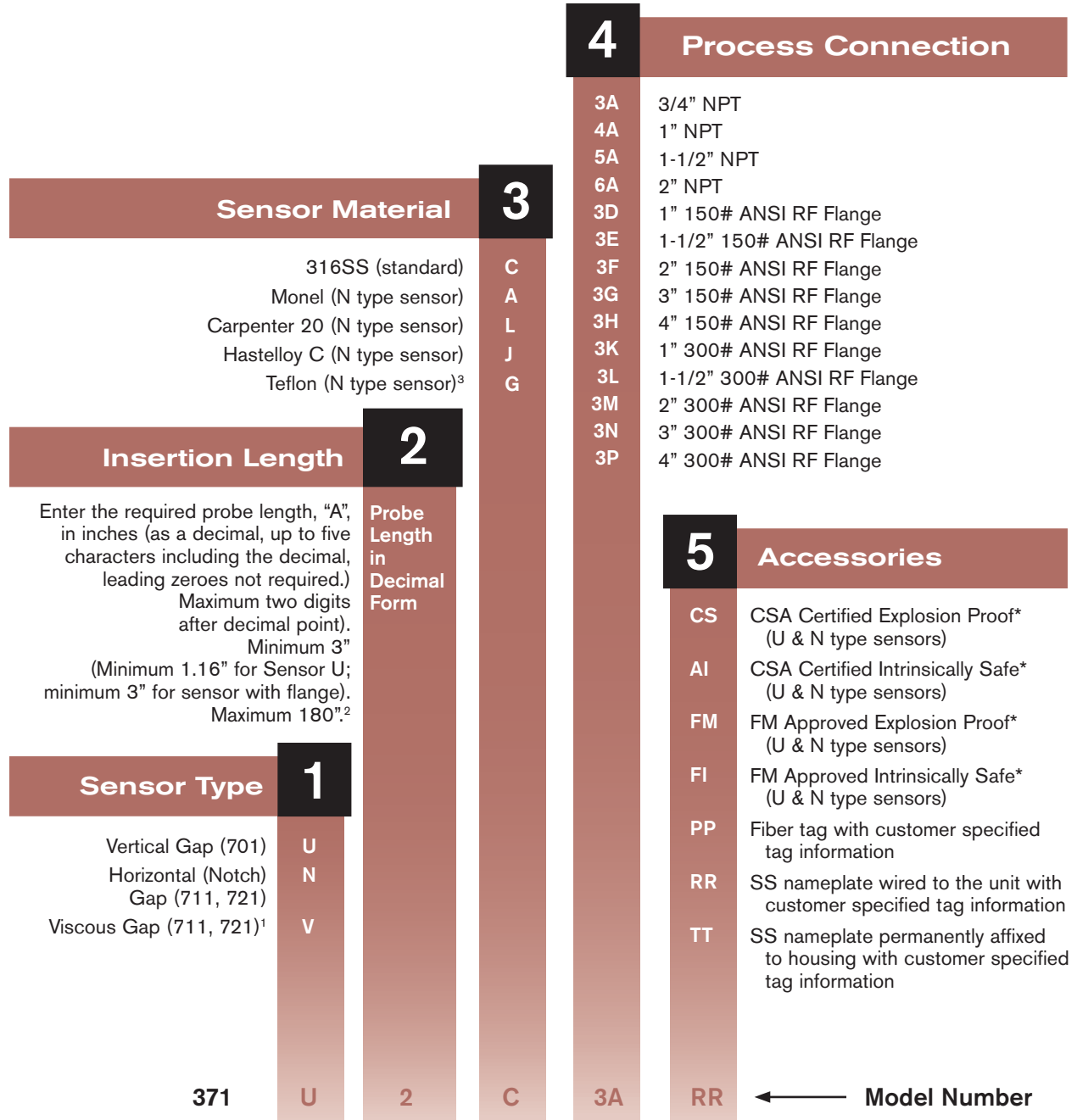


Drawing 0390063

Model Number System

371-U-2-C-3A-RR

The 371 sensor is designed for use with all signal-point ultrasonic electronic unit.



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

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

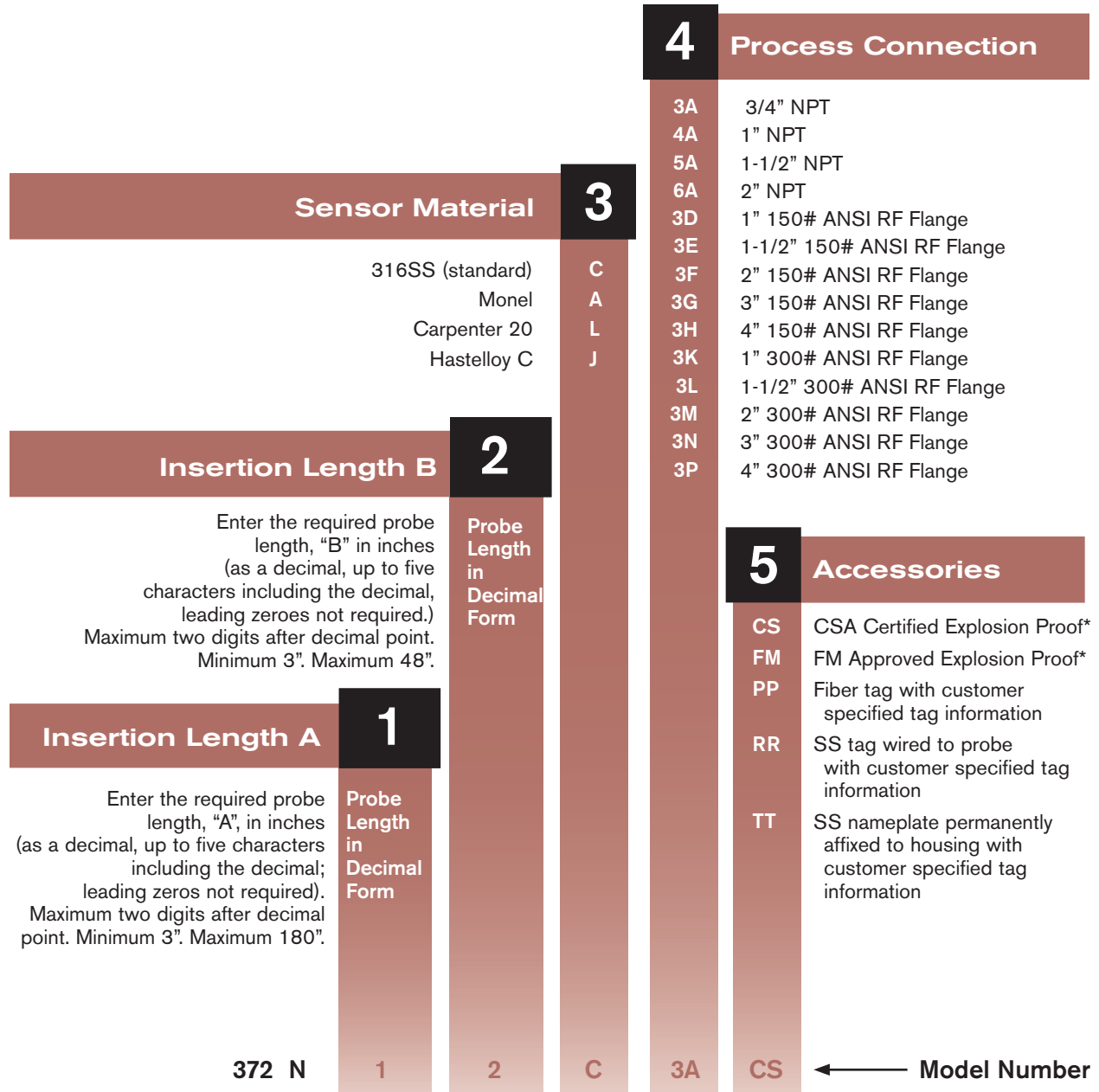
³ "G" Sensor material is only available with 3/4" process connection.

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

Model Number System

372-N-12-C3A-CS

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



See page 22 for flange shipping weights.

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

Ultrasonic Switches

Electronics

Sensors

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

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 Switches

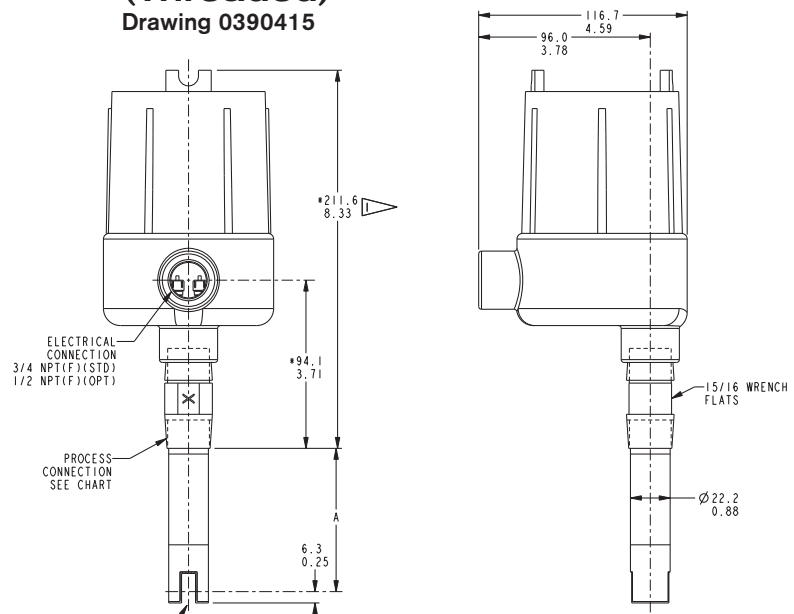
Sensor Dimensions

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

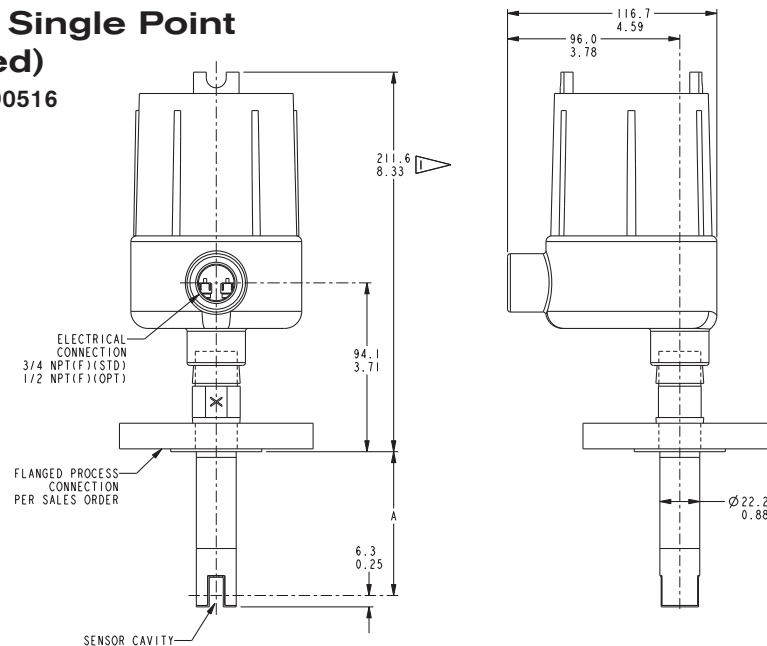
Linear = mm/in.

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



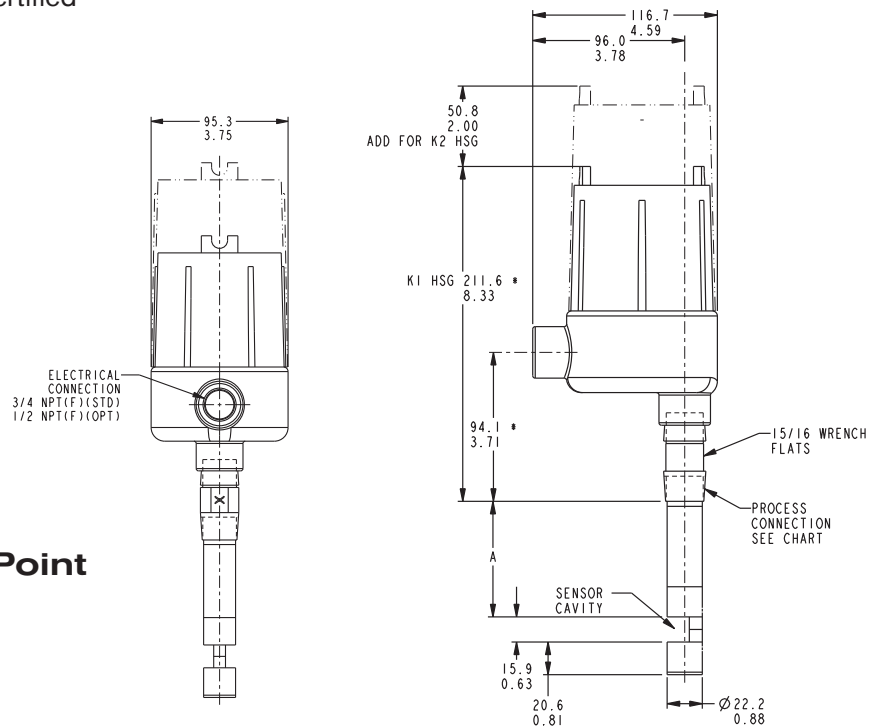
**Type U Single Point
(Flanged)**
Drawing 0390516



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

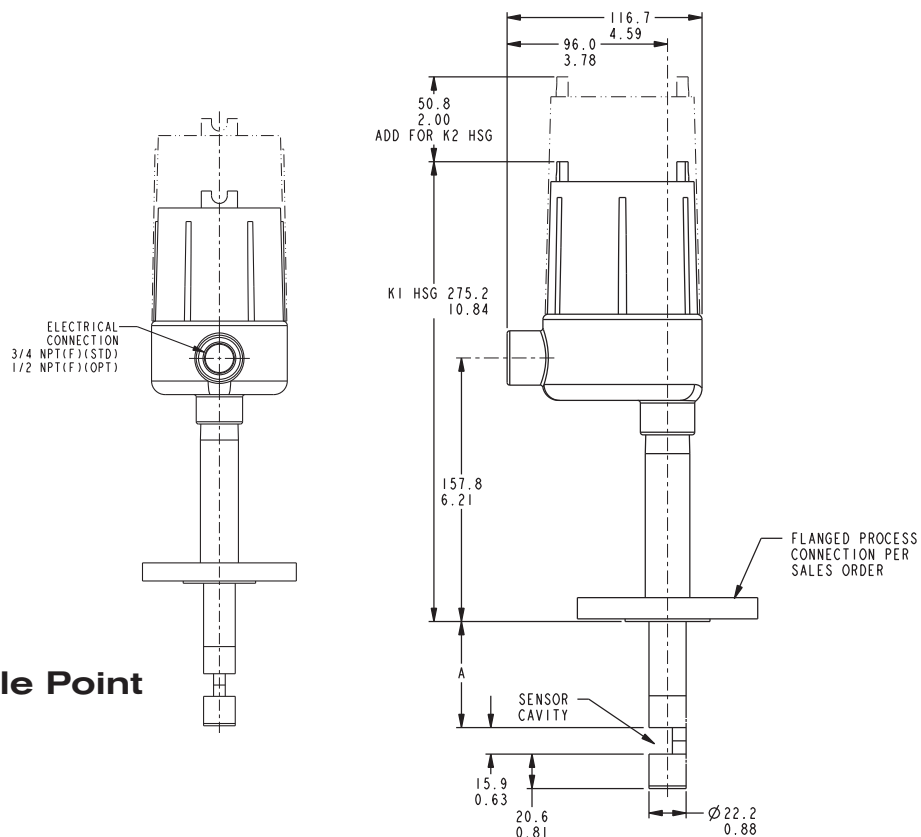
Linear = mm/in.

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



Type N Single Point (Threaded)

Drawing 0390000



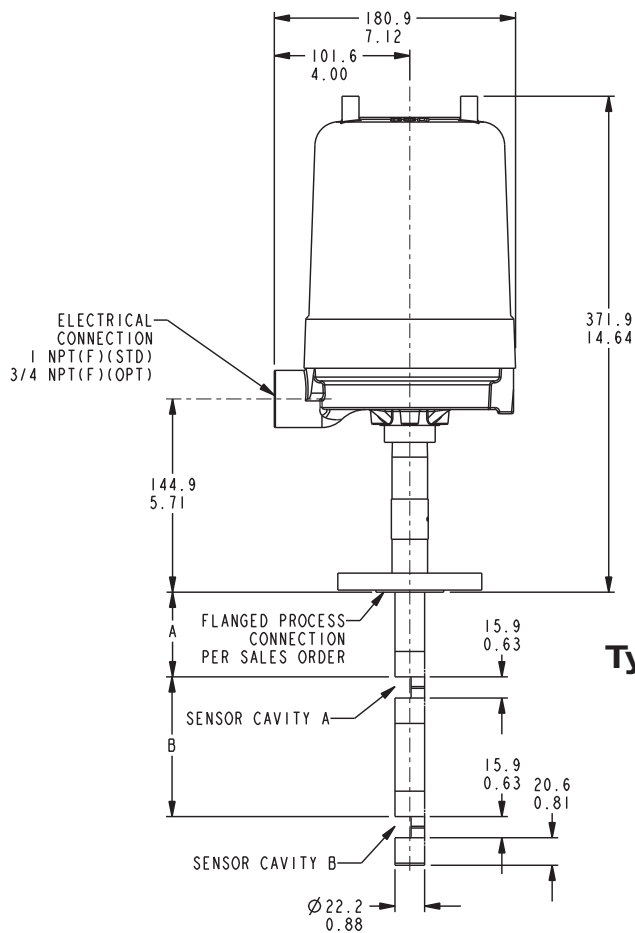
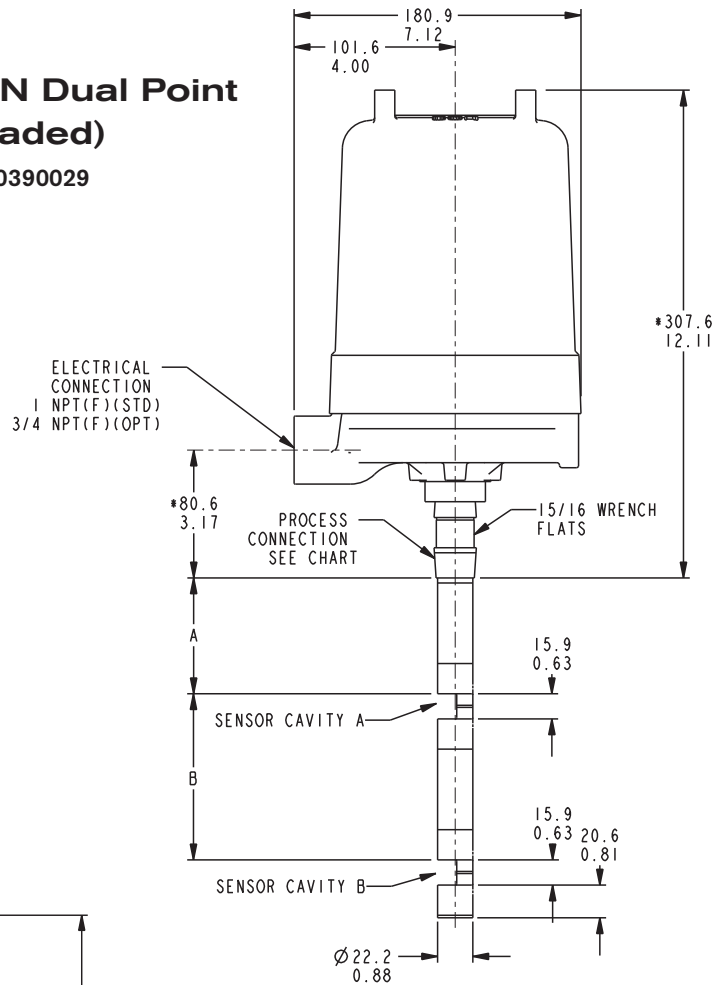
Type N Single Point (Flanged)

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



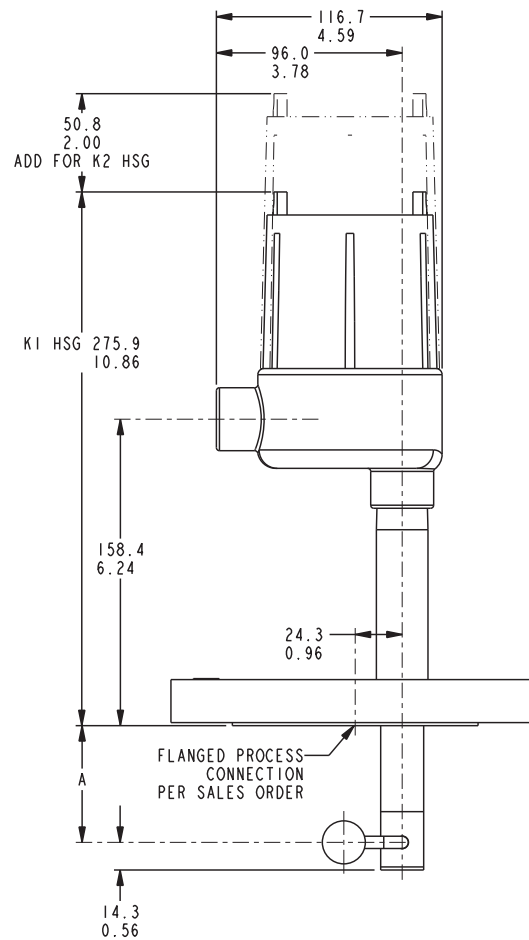
Type N Dual Point (Flanged)

Drawing 0390030

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

Type V Single Point (Flanged)

Drawing 0390439



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

Flange Weight and Pressure Rating

Process Connection	Add to Shipping 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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