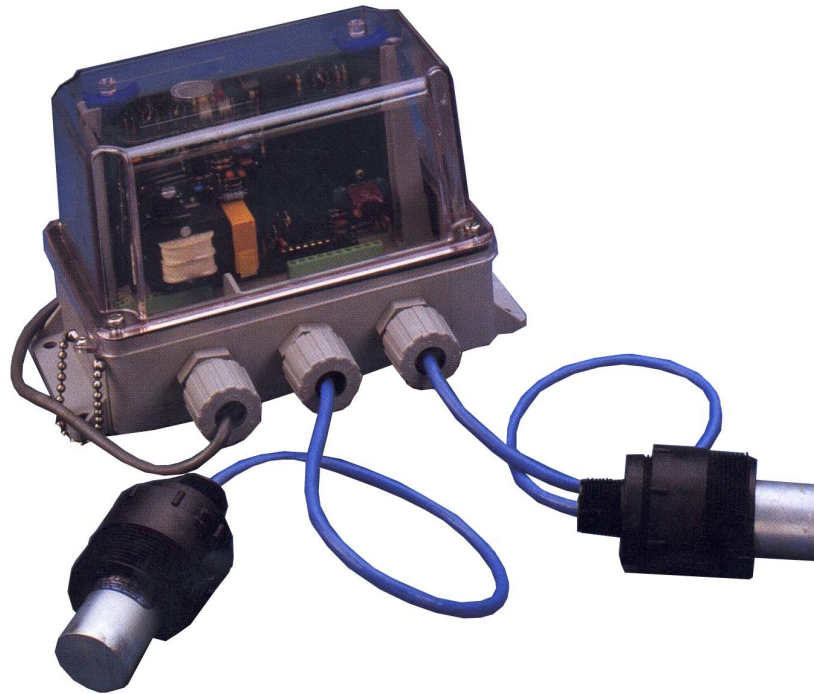




SONAC®/220

Motion & Position Bulk Level



Function

Single Point Switch for On-Off Control of Bulk Solids.
ON-OFF Switch presence/absence, indication of objects.

Typical Uses

High Level Alarm or Control. Web Break Detection.
Plugged Chute Detection. Truck and R. R. Position.
Conveyor Control. Low Level Alarm or Control.
Flow/No Flow Detection.

Primary Areas of Application

Where material to be sensed constantly changes physical properties; Eg: Municipal Solid Waste. Reliable sensing does not depend on any specific physical or electrical characteristics of the material.

Low bulk density materials

Eg: Textile fibers, onion skins, popcorn, styrofoam pellets, puffed cereals. This sensing technique permits sensing products which are so light that they cannot be reliably sensed by other means. Reliably senses products with bulk densities of less than 1/4 lb./cubic foot.

Stringy, fibrous materials

Eg: Yarn, chipped fibers, waste paper, trash. Sensor is mounted flush with bin wall to prevent material build-up at sensing point. No moving parts to catch fibers.

Delicate materials

Eg: Puffed cereals, potato chips. Nothing projects into falling product to crush it, no motion of sensor to fracture fragile products.

Abrasive Materials

Eg: Crushed coal, sand, ore. Rugged construction. No moving parts. Hermetically sealed sensors do not protrude into flow stream.

Hot materials

Series 14 sensors are designed for continuous operation at 400°F (+205°C).

Small hoppers

Nothing protrudes into hopper to obstruct flow.

Features

Vibration resistant

The rugged magnetostrictive sensors are designed to tolerate sustained severe shock and vibration. The control unit is designed for remote mounting away from the vibrating equipment.

Independent time delays

Delay on make or delay on break contact adjustments are non-interacting and independent.

Corrosion resistant, watertight enclosure

Glass-reinforced polyester enclosure features captive hardware and stainless steel trim to endure the most corrosive environments.

Versatile power supply

The standard units accepts 115 VAC, 230 VAC or low voltage 24 DC input power.

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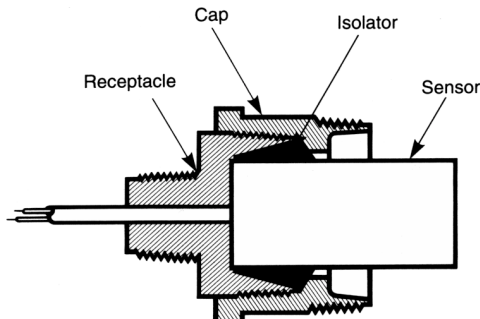
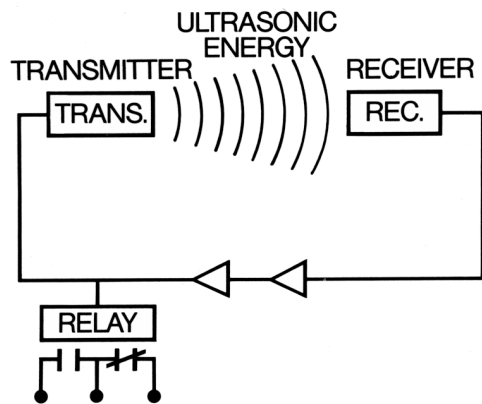
Principle of Operation

A pair of matched sensors is connected to an amplifier as a receiver (microphone) and a transmitter (loudspeaker). When the amplifier gain is increased to the point where its gain exceeds the loss in the acoustic path between the sensors, oscillation (feedback) occurs. An object entering the acoustic path increases the loss and the oscillation decreases.

In the **SONAC**® system, one sensor is connected to the **SONAC**® amplifier and operates essentially as a loudspeaker. This transmitting sensor will produce ultrasonic sound waves of the frequency dictated by the sensors themselves. The other sensor which we will call the receiving sensor is connected to the amplifier as a microphone and will deliver to the amplifier electrical energy from ultrasonic sounds reaching its diaphragm. The amplifier itself is capable of amplifying the weak sounds received by the receiving sensor more than 1,000,000 times.

The **SONAC**® sensors are by design quite directional in their response to sound waves. If the transmitting and receiving sensors are positioned facing each other and the path between the two sensors is unobstructed and the electrical gain in the amplifier is sufficient to overcome the losses in sound energy across the path between the two sensors, acoustic feedback will occur. This, of course, cannot be heard, as **SONAC**® is designed to operate near 38,000 Hertz. This is well above the range of human hearing.

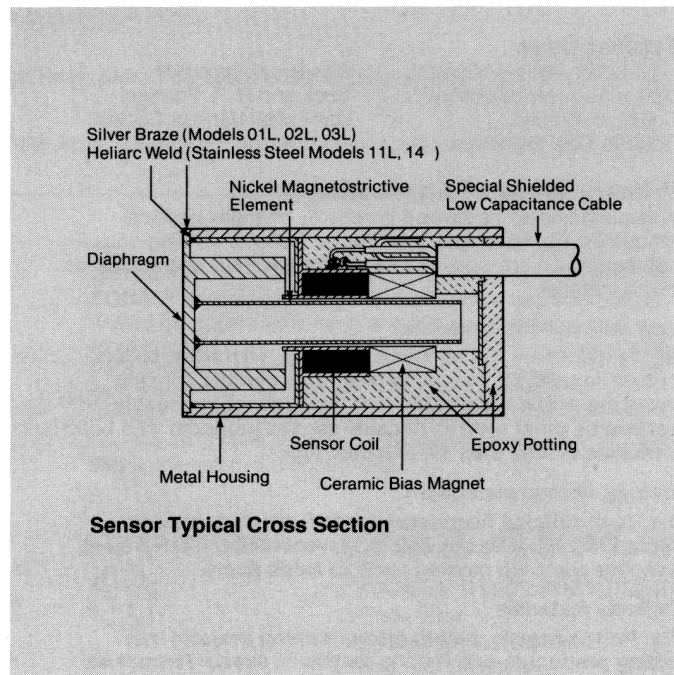
When the acoustic characteristics of the air path are changed by variations in temperature, relative humidity, or standing wave conditions, then the **SONAC**® system merely adjusts itself to some new frequency which is optimum for the present path conditions. In every case the actual frequency of the acoustic feedback in the **SONAC**® path is whatever frequency will produce the least loss across the path. In actual operation, this change in frequency is limited by the electrical characteristics of the amplifier and the acoustic properties of the sensors.



Cutaway Showing Sensor In Mounting Fittings

Specifications

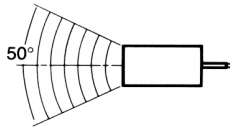
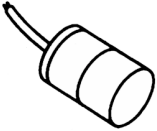
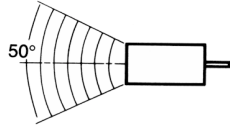
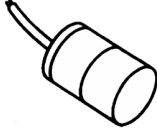
Input Voltage	NOMINAL	ABSOLUTE LIMITS
	115 VAC	95-135 VAC
	230 VAC	180-270 VAC
	24 VDC	±4V
Power	3 VA	
Frequency, AC Power	50-60 Hz	
Time Delay	Independent with Auto Reset on make, on break	
Delay Time Range	50 ms Min. - 10 Sec. Nominal 30 Sec. Max	
Failsafe	<ul style="list-style-type: none"> • Switch selectable - High Level or Low Level. • High Level Failsafe Position: Relay is de-energized when material is present. • Low Level Failsafe Position: Relay is de-energized when product is <i>not</i> present. 	
Indicators	Two light emitting diodes (LED). YELLOW - illuminated when relay is energized. RED - illuminated when material is present at sensor.	
Operating Temperature	-40°F to +160°F (-40° to +71°C)	
Output	Relay, 2 Form C contacts DPDT	
Ratings	5 A @ 120 VAC Non-Inductive 3 A @ 240 VAC Non-Inductive 3 A @ 24 VDC Non-Inductive	
Maximum Cable Length	PVC 50 feet (15.24M) Teflon 30 feet (9.14M)	
Shipping Weight	Control Unit	5 Pounds (2.25 kilograms)
	Sensor	1.5 Pounds (0.68 kilogram)
	Cable	0.5 pounds (0.45 kilogram)



Sensor Typical Cross Section

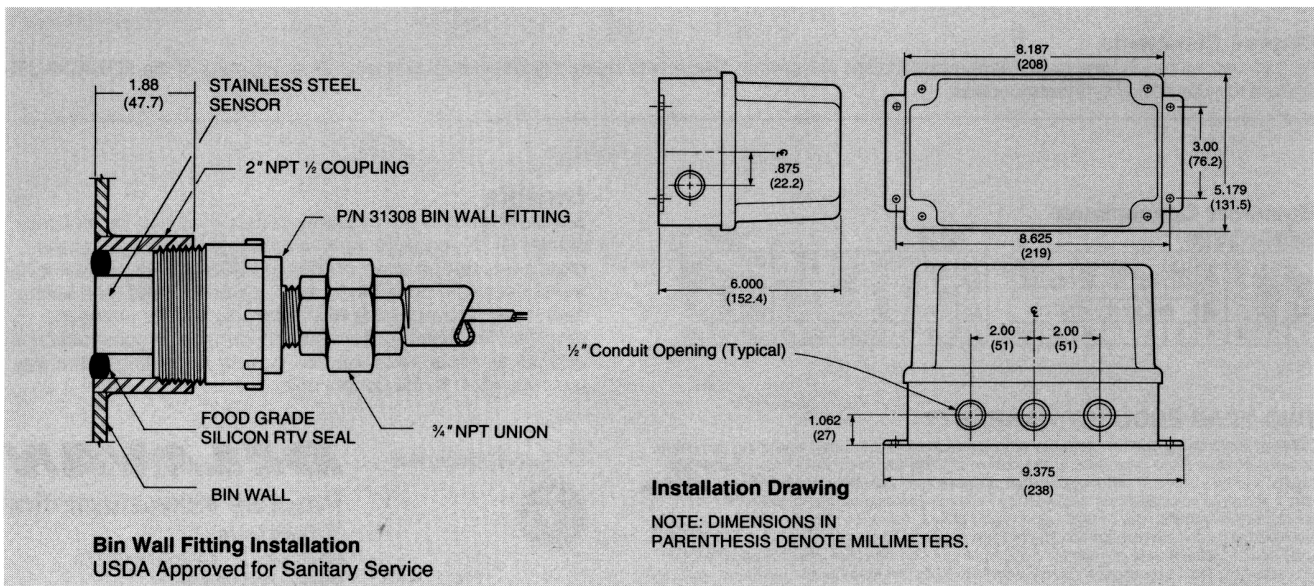
Sensors Transmitters and Receivers

Sensors are supplied as matched pairs.

Model Number	Transmitting Angle	Description	Typical Applications
Corrosion Resistant Sensor Face - 316 S.S.		50 ft. PVC cable standard. 10 ft. max. sound path. Temp. range from -65°F to +220°F (-54°C to +104°C) Minimum Distance - 2 inches* Maximum Distance - 12 feet* *depending on process material Keep at least 18 inches (457.2 mm) Between Adjacent Sensors	Bin level control Food Products Corrosive Products
11L			
High Temperature Sensor Face - 316 S.S.		Sensor temperature range -65°F to +400°F (-54°C to +205°C). 15 ft. Teflon cables are standard. For high temperature applications use P/N 31308-3 fitting. Minimum Distance - 2 inches* Maximum Distance - 12 feet* *depending on process material Keep at least 18 inches (457.2 mm) Between Adjacent Sensors	Dry level control Webb Break
14			

Bin-Wall Fittings

P/N	Temperature Limit	Material	Mounting Thread	Conduit Thread	Description
Standard	220°F (+140°C)	Glass Filled Nylon®	2" NPTM	¾ NPTM	General Purpose
High-Temp.	400°F (+205°C)	Ryton®	2" NPTM	¾ NPTM	High Temperature
Food-Grade	220°F (+140°C)	316 S.S.		¾ NPTM	Food-Grade



ORDERING INFORMATION SONAC 220 POINT LEVEL SWITCH

**SONAC
220 -**

Special Options

X = No special options
C = NEMA 4X clear cover

Process Mounting (priced per pair)

S = Standard, Nylon 2 inch NPT 220°F. max.
H = High Temp. Ryton 2 inch NPT 400°F. max.
F = Food Grade, 304 S.S. sanitary coupling
R = Rear mount 3/4 inch NPT

Sensors (priced per pair)

11L = 316 S.S. Face w/50 ft. cable
per sensor
14 = High Temp. 316 S.S. Face w/15 ft.
cable per sensor, 400°F. max.

Enclosure Options

S = Standard, 110, 240VAC, or 24 VDC
w/ NEMA 4X enclosure
O = OEM, Electronic assembly
w/mounting hardware (no enclosure)

The Sonac model 220 is CSA approved for use in Class II. Groups E, F and G Division 1 Hazardous Locations.

NOTE: If multiple systems are used in the same vessel, please specify "Frequency Separation."

Model Sonac 220 Ultrasonic Bulk Level Switch

Time Delay Settings

Bin Level Control

Normally requires both time delays to insure that a turbulence upper level will not cause a false trip. Clockwise rotation of Beam Make and Beam Break increases time delay.

Plugged Chute Control

Applications will normally have delay on Beam Break so that falling material will not trip the control relay prematurely.

Starvation Control

Applications require a delay on Beam Make so that when product ceases to flow (starvation) the relay will not operate until some reasonable time period has elapsed. This prevents false signals due to temporary reduction in flow.

Object Detection Control

Such as vehicle washing equipment require about 1/2 second delay on Beam Make and Beam Break to prevent false signals.

General Comments

Always use as much time delay as the application will permit. These time delay adjustments permit custom application of the SONAC@/220 system to your specific process needs.

Customer Connections

SONAC/220

GND.	NEUT	115 VAC	230 VAC	NC	C	NO	NC	C	NO
1	2	3	4	5	6	7	8	9	10
RELAY CONTACTS									

SENSOR TRANS				SENSOR REC			
BLACK	WHITE	SHIELD	SPARE	SPARE	+	I	SHIELD
11	12	13	14	15	16	17	18
BLACK	WHITE	SHIELD			BLACK		
19	20	21			22		

Sensors

SONAC® sensors are ruggedly constructed and hermetically sealed for dependable service and unlimited life under the most adverse operating conditions. SONAC® magnetostrictive transducers are provided in matched pairs. Thus, one acting as a transmitter operates efficiently only with its matched receiver. The matched sensors are identical in construction and act as either transmitter or receiver according to the way they are wired to the control unit.

TWO-YEAR PRODUCT WARRANTY

Delavan Electronics control products will be replaced, put in good operating condition, or the purchase price refunded, at the option of Delavan Electronics, free of charges except transportation, if defective in their manufacture, labeling, packaging, or shipping, and if notice of said defect is received by Delavan Electronics within two years from the date of shipment. The cost of such replacement, repair or refund of purchase price shall be the exclusive remedy for any breach of any warranty, and Delavan Electronics shall not be liable to any person for consequential damages for injury or commercial loss resulting from any breach on any warranty. Delavan Electronics makes no warranty of fitness for a particular purpose, and makes no other warranty, express or implied, including implied warranty arising from course of dealing or usage of trade.

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