

SONAC[®] 110

DATA SHEET
Liquid Level



FUNCTION

Single Point Switch for on-off control of liquids

TYPICAL USES

High Level Alarm or Control
Pump Control or Inlet Starvation Alarm
Flow/No Flow Indication
Low Level Alarm or Control

PRIMARY AREAS OF APPLICATION

The Sonac[®] 110 provides the most reliable overflow alarm or control available.

Where liquids to be sensed constantly change physical or electrical properties. The Sonac[®] 110 principle of measurement is used with extremely small vessels or pipes and when little or no intrusion into the process is required.

Non-dedicated vessels - liquids

The device senses virtually any liquid and does not need adjustment when the density or dielectric constants are changed.

High temperature, High pressure service

The welded, all stainless steel sensor body is designed for service at temperatures to 220°F (+104°C) and pressures to 2,000 psig.

Fluids with foam blankets

The control ignores foam to indicate the true liquid level.

FEATURES

- Auto test self-checking
The unique self-checking feedback loop constantly "proves" that the control is working properly and offers superior reliability in critical applications.
- Really Fail-safe
The Sonac[®] 110 is designed so that any electrical or mechanical failure of sensor or component will cause a change of state to the Fail Mode. Redundant circuit components are used in critical locations.
- Stable, dependable performance
This sensing technique provides a wet/dry ratio of 100:1 to provide dependable performance year in and out, without periodic adjustment.
- No false trips due to surge or splashing liquids
- Compact
The electronic amplifier is located in an integral explosion proof housing threaded to the rear of the sensor.
- Versatile power supply
The standard units are designed to accept 115 Volts AC, 230 Volts AC or low voltage DC input power.
- Non-intrusive
The sensor need not extend into the vessel beyond 1/4". This feature minimizes the possibility of product bridging.
- Rugged
The all stainless steel, heavy duty sensor resists damage from product abrasion or corrosion. No packing glands are used.



PRINCIPLE OF OPERATION

The sensor is a magnetostrictive device consisting of a diaphragm, nickel tube, magnet, drive coil and pickup coil. (See sensor typical cross section).

When 40 kHz energy is applied to the drive coil, it causes the diaphragm to vibrate at a frequency determined by the mechanical resonant system of the sensor. Electrical energy is transferred to the pickup coil when the diaphragm is free to move in gas. When the diaphragm motion is loaded by a process material, less energy is transferred to the pickup coil.

The pickup coil of the sensor is connected to the input of an amplifier and the output of the amplifier to the drive coil to form a feedback loop circuit. Any energy appearing in the output of the sensor will be fed to the amplifier, amplified and returned to the input of the sensor. This causes vibrations at 40 kHz to occur in the diaphragm and furnish a signal back to the amplifier for reamplification. When the gain of the amplifier is adjusted so as to exceed the losses within the sensor, continuous oscillations are produced.

If the diaphragm of the sensor is exposed to a process liquid product which offers greater mechanical resistance to the motion of the diaphragm, the transfer of energy to the pickup coil decreases. This results in a decrease in the signal feedback into the amplifier and a corresponding decrease in the signal available from the output of the amplifier. The decreased signal triggers a voltage sensitive network that controls the output relay.

A unique AUTO TEST self-checking circuit constantly verifies the integrity of the sensor circuits. The RED LED is illuminated when the product is absent at the sensor and the system is oscillating at approximately 40 kHz. If the amplitude or the frequency of the sensor circuits changes, the RED LED will go out. If the change of state occurs due to a level change, the relay will follow and change its state. However, if the change of state is due to a sensor failure or some other component failure, the relay will immediately transfer to the alarm condition. This foolproof feature protects the system for loss of power, major component failure or damaged sensor conditions. The Sonac® 110 system will fail-safe for all sensor or component failures except for open sensor in the low level fail-safe mode.

SPECIFICATIONS

Input Voltage	NOMINAL	ABSOLUTE LIMITS
	115 Volts AC	90-135 Volts AC
	230 Volts AC	180-270 Volts AC
	24 Volts DC	±4 Volts
Frequency, AC Power	50-60 Hz	
Delay Time Range	50 milliseconds min. to 10 seconds nom. Long Delay @ 30 seconds max.	
Fail-Safe	Switch Selectable - High Level or Low Level High Level Fail-safe Position: Relay is de-energized when product is present (wet) Low Level Fail-safe Position: Relay is de-energized when product is not present (dry)	
Indicators	Two, light emitting diodes (LED) YELLOW - illuminated when relay is energized RED - illuminated when product is present at sensor	
Amplifier Temperature Rating	Ambient -40°F to +160°F (-40°C to +71°C)	
Output	Relay, DPDT 2 Form C Contacts	
Ratings	5 amp @ 120 Volts AC non-inductive 3 amp @ 240 Volts AC non-inductive 3 amp @ 24 Volts DC non-inductive	
Housing	Cast Aluminum with Fused Polyester Finish	
	Meets NEMA 4, 5, 7, 9, 12; NEC Class I — Groups C, D; NEC Class II — Groups E, F, G	

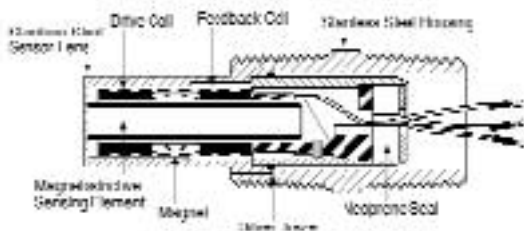
Liquid Level

Any liquid within the temperature and pressure limitations of the sensors. All systems are factory calibrated for liquid service. Liquids that are in the process of outgassing should be avoided.

Operating temperatures sensor

See table, page 9

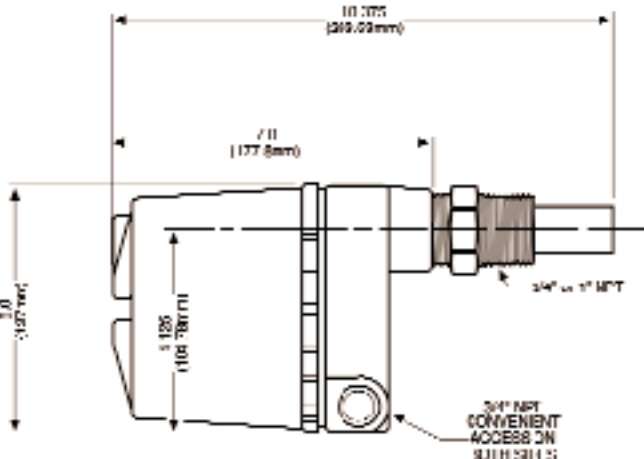
Sensor Typical Cross Section



Patented Closed Loop Self-Testing Circuit



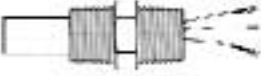

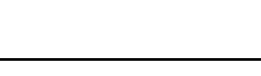
Installation Drawing



NOTE: DIMENSIONS IN PARENTHESES DENOTE MILLIMETERS



■ SINGLE SENSORS (Side Mounted Horizontal) Liquids

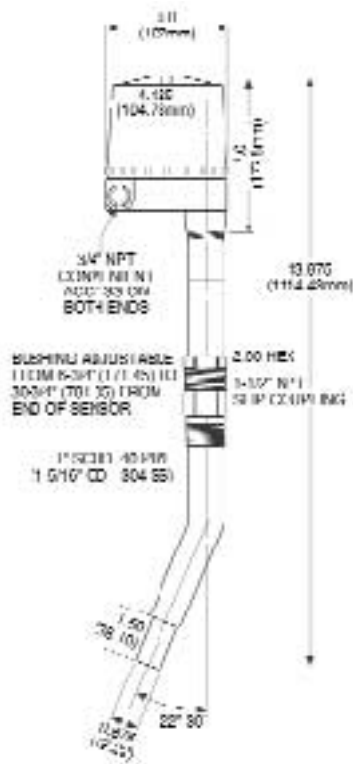
Sensor	Model No.	Type	Description
	94	General Purpose —	316 Stainless Steel Temp. Range: -65°F to +220°F (-54°C to +104°C) Pressure: 2,000 psi
	95	General Purpose — Sensor Sintered Teflon Coated for non-stick	316 Stainless Steel Temp. Range: -65°F to +220°F (-54°C to +104°C) Pressure: 2,000 psi
	93	Sanitary - Ladish Fitting (USDA Approval for AAA Sanitary Service)	316 Stainless Steel Temp. Range: -65°F to +220°F (-54°C to +104°C)
	99		Hastelloy "C" Temp. Range: -65°F to +220°F (-54°C to +104°C)

Type Analysis	C	Mn	P	S	Si	Cr	Ni	Other Elements
316 Stainless Steel	0.08%	2.00%	0.045%	0.030%	1.00%	16.00/18.00%	10.00/14.00%	—

■ SINGLE SENSOR (Top Mounted Vertical) Liquid Service Only

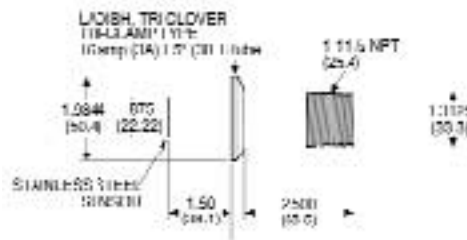
Model No.	Type	Description
94TA	General Purpose	304 Stainless Steel Field Adjustable Temp. Range: -65°F to +220°F (-54°C to +104°C) Pressure: 2,000 psi
95TA	General Purpose Sensor Sintered Teflon Coated for non-stick	304 Stainless Steel Temp. Range: -65°F to +220°F (-54°C to +104°C) Pressure: 2,000 psi

Single Sensor Top Mount
Model No. 94 TA & 95 TA

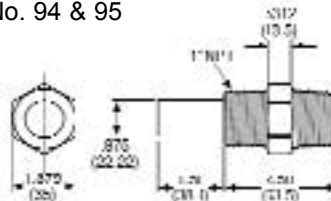


Sensor is designed to fit through 1-1/2" pipe coupling and nozzle 3 inches (76.2mm) long or a 2" pipe coupling and nozzle 7" (177.8mm) long. A 3" pipe nozzle will permit entrance straight through.

Single Sensor, Sanitary Ladish Fitting
(USDA Approved for AAA Sanitary Service)
Model No. 93



Single Sensor, Standard Hex Fitting
Model No. 94 & 95

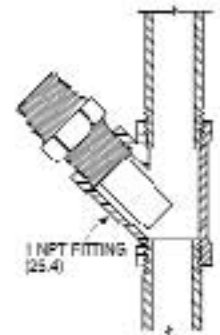


NOTE: DIMENSIONS IN PARENTHESES DENOTE MILLIMETERS

Agency Approved



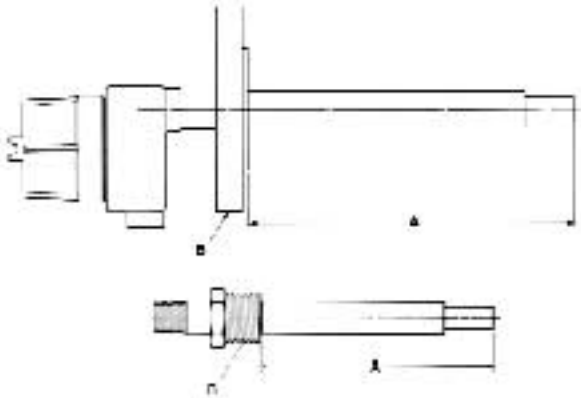
Vertical Installation



Installation for small



SPECIAL OPTIONS — Extended Sensors



LAGGING FOR TEMPERATURE
ALWAYS IDENTIFY THESE DETAILS

Dimension "A"

Process Connection "B" Minimum size is
1-1/2 inch Wetted Metals, 316 Stainless Steel,
304 Stainless Steel, Others

ORDERING INFORMATION SONAC®

110- - - -

- Process Mounting
 NPT = 3/4" or 1" NPT Threaded Connection
 F = Raised Face 150# ANSI Flange,
 316 Stainless Steel
 T = As "F" with Teflon Wetted Parts
 S = As "F" with Sanitary Tri-Clover Connection
 X = As "S" with Teflon Wetted Parts
 00 = None

- Special Mounting Configuration
 ES = Extension, Side Mount, 316 Stainless Steel,
 1" NPT (12" max)
 TS = Top Mount, 316 Stainless Steel, 1-1/2" NPT
 (6"—12" max)
 EH = Extension, Side Mount, Hastelloy C,
 1" NPT (12" max)
 TH = Top Mount, Hastelloy C, 1 1/2" NPT
 (6"—120" max)
 TA = Top Adjustable, 1 1/2" NPT (6"—72" max)
 00 = None

- Sensor Type
 94 = Standard, 316 Stainless Steel, 1" NPT (220°F max)
 94H = 94 Sensor w/High Temp 6" Lagging Ext. (400° F max)
 93 = Sanitary, 316 Stainless Steel with 316 1 1/2" Tri-Clover
 99 = Hastelloy C, 1" NPT (220 °F max)

Model Sonac® 110 Magnetostrictive Liquid Level Sensor

CUSTOMER CONNECTIONS

SONAC® 110

GND.	NEUT	115 VAC	230 VAC	VAC	NG	C	NO	NC	C	NO	+	-
						RELAY CONTACTS					LOW VOLT	INPUT
1	2	3	4	5	6	7	8	9	10	11	12	



AGENCY APPROVED FOR
 Class I — Groups C, D;
 Class II — Groups E, F, G;
 Divisions 1 & 2 when used
 with standard sensors

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