Sensall® Accu-Cap™

CAPACITANCE POINT LEVEL SENSING SYSTEM

Introduction

Compliance with growing government regulations mandates tighter level controls with advanced diagnostics to avoid releases, over-spills, and costly environmental clean-ups. Using anything but the most reliable and dependable point level switch for high level alarms and spill prevention has become unacceptable.

Advancements in capacitance design and utilization of state-of-the-art manufacturing have produced the most reliable and technically advanced capacitance level switch in the market. Sensall Accu-Cap performs exceptionally well in aerated, attenuative, viscous, and even more severe applications.

Sensall Accu-Cap systems carry a wide range of hazardous location approvals from Factory Mutual Research Corporation (FMRC) and Canadian Standards Association (CSA) including NEMA 4X, intrinsically safe, explosion-proof, non-incendive, and dust/ignition-proof ratings. Installation and life cycle costs are reduced significantly with the use of loop-powered intrinsically-safe outputs, elimination of poured seals at the electronics in Division 1 areas, and elimination of rigid conduit and poured seals in Division 2 areas. Sensall Accu-Cap's unique design truly differentiates it as the world's premiere point level capacitance product and Thermo MeasureTech as the world's leading supplier of reliable point level measurement solutions.

Sensall Accu-Cap's dual compartment housing provides quick and easy access to field wiring connections while protecting the electronics from exposure to harsh environments, damage, or leaky connections. During system installation, electronics do not require removal and are safely protected when pulling wire and making field terminations.

Continuous Self-Test

Sensall Accu-Cap also incorporates a unique self-test function which is performed continuously and automatically. It verifies electronic system integrity.

System Qualification Time

The System Qualification Time is the amount of time that process liquid must be continuously present on the measurement probe (in high-level operation) or absent from the measurement probe (in low-level operation) before the process alarm will be indicated.



Features and Benefits

- Unmatched Reliability
- Easy-to-Use Field Calibration Features
- Superior Self-Testing Capabilities
- Variable System Qualification Time
- Manual Loop Test
- Dual Compartment Housing
- Low Total Installed Cost
- Patented Coating Rejection Circuitry
- Broader Hazardous Location Approvals
- Two-Year Product Warranty
- Liquids or Solids

Sensall's Accu-Cap "qualifies" that the new level condition is continuously present instead of a momentary occurrence. This assures that the actual material level has reached the measurement probe, instead of fluctuation due to agitation, turbulence, or falling material.

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Manual Loop Test

Sensall Accu-Cap's Manual Loop Test is standard for users to verify field wiring, control integrity, and operation of spill prevention systems without the need for filling tanks or costly system removal for testing. Manual Loop Test will change the outputs to the opposite state when Sensall Accu-Cap systems are not in the self-test or fault condition. Sensall Accu-Cap's Manual Loop Test is momentarily activated as long as the Sensall supplied magnet is placed over the housing next to the location marked "Loop Test".

Materials and Mounting

Probes are available in 316 stainless steel or Hastelloy C with PFA Teflon insulators. Thermo MeasureTech also offers unique fully Teflon PFA Jacketed probes with a Teflon 3/4" NPT or SS Teflon Faced flange process connection.

Accu-Cap systems are available with either 3/4" NPT mounting, various flange sizes integral or remotely mounted electronics.

Sensor Style	3/4" NPT / Flanged		3/4"NPT	
Materials of Construction	316 SS	Hastelloy C	316 SS PFA Teflon Jacketed	Mini Shield
Sensor Length Minimum	3/4" NPT = 8" Flanged = 14"	3/4" NPT = 8" Flanged = 14"	3/4" NPT = 4" Flanged = 5"	3/4" NPT = 1" to 17" Flanged = N/A
Sensor Length Maximum	3/4 " NPT = 72" Flanged = 72"	3/4 " NPT = 72" Flanged = 72"	3/4 " NPT = 48" Flanged = 48"	3/4 " NPT = 17"
Sensor Operating Temperature[1] and Pressure[2]	-40° to 350° F (-40° to 177°C) @ -10 to 300 psig (-69 to 2,066 KPa) 70° to 500° F (21° to 260° C) @ -10 to 500 psi (-69 to 3,447 KPa)	-20°F to 350°F -10 to 300 psi -69 to 2066 KPa	-13°F to 300°F -10 to 150 psi -69 to 1000 KPa	-40°F to 350°F (-40°C to 177°C @ 300 psi 70°F to 500°F (21°C to 260°C @ 500 psi
Proof Pressure[2]	500psig (3,447 KPa)	300 psi	150 psi	500 psig (3,447 kPa)

Notes:
1. For integral units with a Driven Shield, standard probe, or PFA jacketed probe, the Thermal Isolator is required for 3/4" NPT units when process temperatures exceed 275° F (135° C). Flanged and remote mounted units do not require the use of the Thermal Isolator.
2. Remote mounting is required when temperature is over 320°F.
3. Pressure ratings are for 3/4" NPT units.
4. SS or Hastelloy C probes can be cut off per needed length. On-site calibration is required. Consult factory.

Accu-Cap™ Relay Operation

The Sensall Accu-Cap relay models provide one Process relay for process level indication and a second auxiliary relay for self-test fault indication. Both relays utilize gold plated contacts for reliable switching of lower current and voltage levels eliminating the need for DCS users to install interposing relays.

Sensall Accu-Cap systems can be field selected for either high-level or low-level fail-safe operation. When high-level operation is selected, the Process relay is energized when the sensor is dry and de-energized when wet (e.g. in alarm for liquid measurements). When low-level operation is selected, the Process relay is energized when the sensor is wet and de-energized when dry (e.g. in alarm for liquid measurements). In both cases, the Process relay is always de-energized upon process alarm, self-test fault, or power loss.

The Auxiliary relay always de-energizes on self-test fault or power loss. The Auxiliary relay can be field selected to mimic the Process relay. When Mimic is selected, the Auxiliary relay will de-energize when a process alarm exists, on self-test fault or power loss. In addition, the SPST Auxiliary relay output is field selectable for either NC or NO operation.

Sensall Accu-Cap™ Two-Wire Operation

The Sensall Accu-Cap two-wire, 4-20 mA DC model provides loop-powered, intrinsically-safe operation and lower installed costs to users with two-wire instrumentation. Two-wire systems use a fixed milliamp output to indicate process level (wet or dry sensor) and self-test fault. The wet and dry conditions can be indicated with either an 8 or 16 mA DC output. A self-test fault is indicated by an output of either 19 or 5 mA DC, depending on whether the field is selected for high-level or low-level operation, respectively.

Performance Specifications for Electronics

Supply Voltage
Relay Version:
15-35 VDC (Electronics Model D)
115 VAC, ±10%, 50/60 Hz (Model E)
230 VAC, ±10%, 50/60 Hz (Model T)
Two-wire (4/20 mA) version
12-55 VDC (Model C)

Power Consumption
Relay: 4 Watts Maximum
I.S. : 1.1 Watts Maximum

Current Loop Loads for I.S. unit
0 Ohms with 12 VDC power source
<600 Ohms with 24 VDC power source
<1,200 Ohms with 36 VDC power source
R (load) maximum < (Vsupply - 12)/ .02

Process Relay
SPDT relay with gold plated contacts, Hermetically sealed
Maximum Contact Rating
115/250 VAC or 5 amps at 30 VDC
Minimum Contact Rating
100 mA at 5 VDC or 15 mA at 24 VDC

Auxiliary Relay
SPST (either NC or NO, NC Factory Supplied, customer selectable) relay with gold plated contacts, Hermetically sealed
Maximum Contact Rating
5 amps at 115/250 VAC or 5 amps at 30 VDC
Minimum Contact Rating
100 mA at 5 VDC or 15 mA at 24 VDC

De-energizes on self-test, failure, power loss (and process alarm when mimic operation is field selectable)

I.S.
5 or 19 mA +/- 1 mA Self-Test Fault
8 or 16 mA +/- 1 mA Dry Condition
16 or 8 mA +/-1 mA Wet Condition

EMI / RFI Effects
Meets Severity Level A, ENV 50 140 and Severity Level 2, IEC 801-3.

Self Test Feature
Continuous. Checks operation of electronics.

Manual Loop Test
Local activation by placing magnets at designated location on electronics housing.

System Qualification Time
0.3 to 15.0 seconds, field adjustable.

Repeatability
±0.1 inches (2.54mm)

Vibration
No affect at IEC 770.6.2.14 5 from 5 to 2000 Hz

Enclosure
Dual-compartment NEMA 4X / Enclosure 4 housing.
Low-copper aluminum; polyurethane paint; Buna-N O-rings.

Connections
Dual 1/2-inch NPT conduit connections. Wire range is 22 AWG to 12 AWG.

Operating Temperature Range
-40° to 158°F (-40° to 70°C).

Storage Temperature Range
-40° to 185°F (-40° to 85°C).

Humidity
10% - 95% RH, non-condensing.

Weight
4 lbs. (1.8 Kg)

FM and CSA approved for the following:

Explosion-proof
Class I, Division 1, Groups B (FM only), C & D.

Intrinsically Safe for Two-Wire Version Only
Class 1, Division 1, Groups A, B, C, D. T4 Temperature Code (135 ºC) when installed in accordance with intrinsically safe wiring diagram of the instruction manual.
Entity Parameters: Vmax = 55V, Imax= 102mA, Ci = .024µFd, Li = 0mH

Dust-Ignition proof
Class II, Division 1, Group G.
Class III, Hazardous Locations.

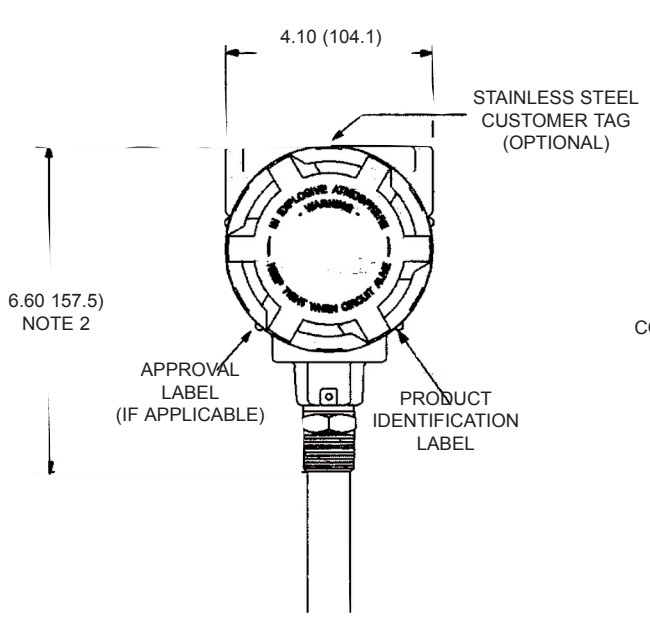
Non-Incendive
Class I, Division 2, Groups A, B, C, & D

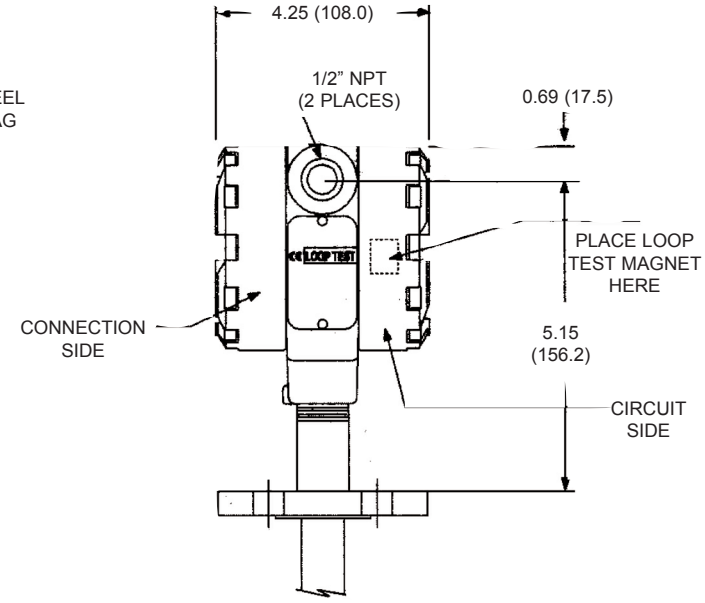
Indoor / Outdoor Use
NEMA 4X

STAINLESS STEEL TAGGING

Each Accu-Cap can be labeled with up to 15 characters of user-specified 1/16” text located on the product’s identification label. An optional stainless steel tag (part #620-00530), located on top of the electronics housing, can provide four lines of 1/8” text (two lines for remote systems) with a maximum of 24 characters per line.

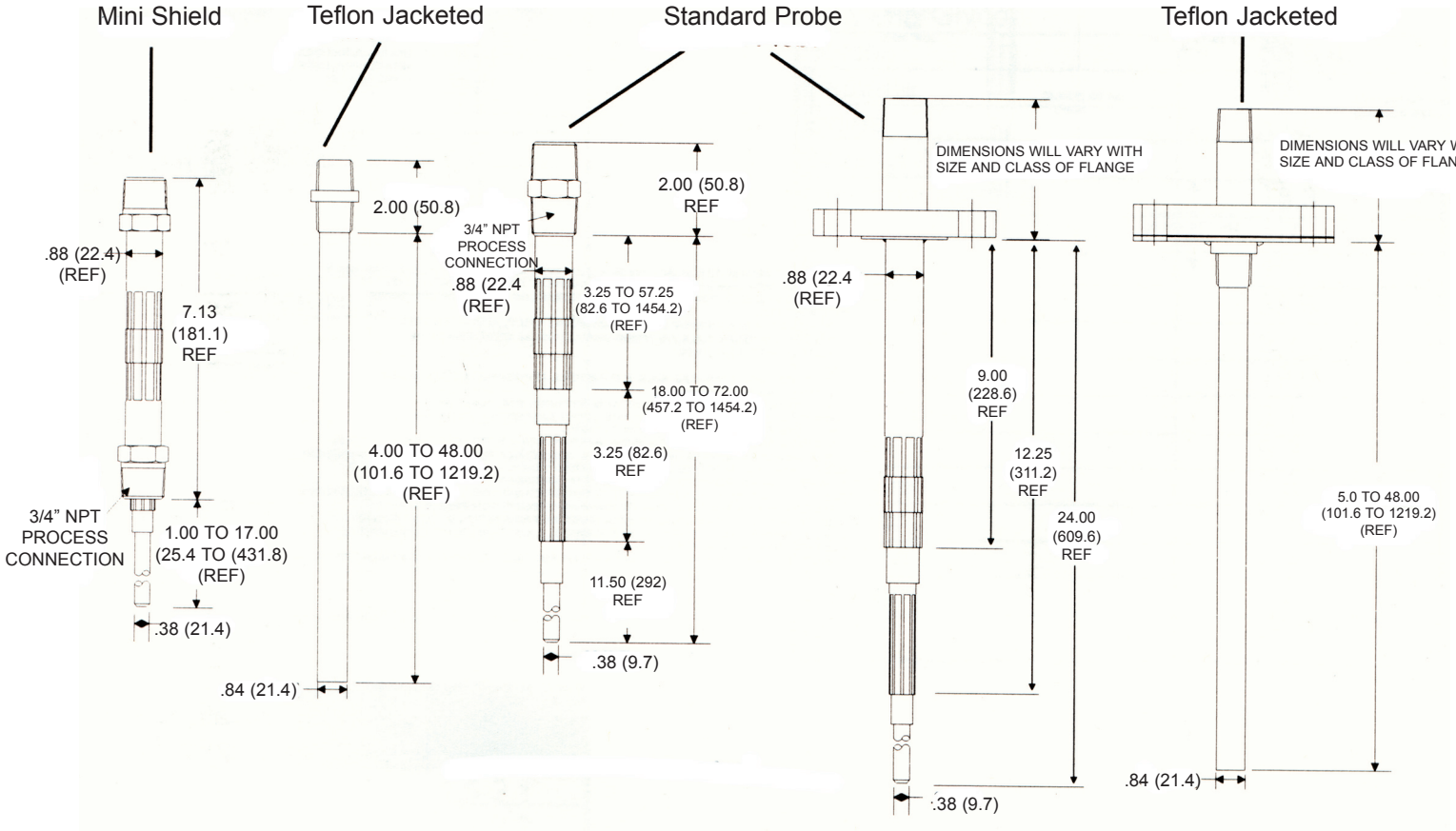
Accu-Cap Enclosure Dimensions





NOTES:
1. Dimensions are in inches (millimeters), nominal and are for references only.
2. Dimensions increase by 3 inches (76.2 mm) with installation of optional thermal isolator (3/4" NPT fitting only).

Accu-Cap Sensor Dimensions



Code	Hazardous Location Approvals
Z	Factory Mutual (FM) approved / Canadian Standards Association (CSA) certified

Code	Electronics
C	12-55 VDC input, 4-20 mA intrinsically safe output
D	15-35 VDC input, relay output, NO or NC user-selectable Auxiliary Fault Relay
E	115 VAC input, relay output, NO or NC user selectable Acuxillary Fault Relay
T	230 VAC input, relay output, NO or NC user-selectable Auxiliary Fault Relay

Code	Mounting Configurations
O	Integral Electronics and Probe
T	Thermal Isolator (required for 3/4" NPT units with process temperatures above 275°F/135°
R	Remote Mount (with pipe/wall mounting bracket & 25 ft of coax cable)

Code	Capacitance Sensor Type
D	Driven Shield (316 Stainless Steel with 3/4" NPT or 150# flange, 18in. to 72in only
M	MiniShield (with Driven Shield) (316 SS or Hast-C with 3/4" NPT only 1" to 17"
P	PFA Teflon (PFA Teflon Jacketed Probe with 3/4" NPT or PFA faced 316 SS 150# flg)

Code	Sensor Material (Wetted Surfaces)
S	316 Stainless Steel w/ PFA Teflon insulation
T	PFA Teflon
H	Hastelloy C

Code	Measurement for "A" Dimension
T	Inches
M	Millimeters

Code	Probe "A" Dimensions
OXXO	Sensors are available in 1.0" Increments only (i.e. 18" = 0180) 0080 - 0720 for NPT connection 0140 - 0720 for Flange connection Mini Shield lengths from 1" to 17" 3/4" NPT only 0010 - 0170 NPT connection only PFA Teflon Probes 0040 to 0480 for ¾" NPT connection 0050 to 0480 for Flange connection
XXXX	Min 3/4" NPT fitting=467mm; min flange fitting=1828mm, increments (i.e.457mm=0457 Max 3/4" NPT fitting=1828mm; max flange fitting=1828mm, 25 mm increments (i.e. 1828mm=1828) MiniShield 25mm to 432mm 3/4" NPT fitting only (i.e. 25mm=0025)

Code	Fitting/Flange
N	3/4" NPT
F	Flange 150 lb. ANSI Raised Face (N/A for MiniShield)

Code	Fitting/Flange Size
00	3/4" NPT Only
10	1" Flange
15	1 1/2" Flange
20	2" Flange
30	3" Flange
40	4" Flange
60	6" Flange

Code	Fitting/Flange Material
S	316 Stainless Steel
D	316 Stainless Steel with PFA Teflon Face (PFA Probe Only) Flat Faced
T	PFA Teflon (3/4" NPT Only)
H	Hastelloy C

Z	C	O	D	S	T	0180	N	00	S	Typical system nomenclature

NOTES

1. One instruction manual is supplied with each Accu-Cap system.
2. Warranty period for Accu-Cap systems is two years from date of installation or 30 months from the date of the original shipment from the factory, whichever comes first. Thermo MeasureTech warranty terms and conditions apply.

Performance specifications are effective with date of issue and are subject to change without notice. All brand and product names contained herein are trademarks or registered trademarks of their respective holders.

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