

DX-ECAS level switch is a capacitive level sensor for level measurement of conductive liquid, nonconductive liquid, granulated materials with solid particles, adhesive and acid/basic liquids.

When a material comes between electrode rod and tank wall, a capacitance change occurs and when this change exceed adjustment threshold, contact output is delivered.

Designed for difficult process conditions. Refrigerated models can be manufactured for high temperature and pressure conditions.

Calibrations of triggering point and relay operation range can be performed by the user under workplace conditions.

It can be connected horizontally or vertically.

### Application Areas

Liquid tanks, food machines, cooling liquid tanks, shipping, glycol tanks, brine, waste water tanks.

Oil tanks, CO2 liquid tanks, high temperature tanks, non-conductive liquids.

Grain stores, cement, sand feed, flour, milk powder, organic and plastic granule.

Sticky hot and high viscosity liquid, acid and chemical liquids.



### Certification



II 1/2 G Ex d IIC Tx\*1 Ga/Gb For Gas  
 II 1/2 D Ex (ta/tb)\*3 IIIC Tx\*2 For Dust  
 Have a look at the temperature class chart.

### Technical Specifications :

Measurable Material	Non-conductive liquids Conductive liquids, refrigerants Solids particulate materials Adhesive and acid/basic liquids
Supply	9-36 VDC
Signal Output	1 NONC x5 A / 250 VAC Relay
Min.Di-Electric Constant	1,6 $\epsilon_r$
Connection Material	304 St.St. Opt. 316 St.St.
Isolation Material	PTFE, PFA Opt. Peek, Ceramic
Housing Material	Aluminum Injection - AISi12Fe (Std) Black (RAL.9005)
Working Pressure	-1...25 bar (Depending on the model)
Working Temperature	(-) 40 / (+) 150 °C (Depending on the model) 200 °C with cooling apparatus 230 °C with PEEK isolation 400 °C with ceramic isolation
Ambient Temperature	(-) 20 °C...(+) 60 °C
Display	With LED-Power and Contact LED
Isolation	Max. 500 V
Power Consumption	Max. 1 W
Electrical Connection	Terminal
Protection Class(EN60529)	IP 66
Test	EMC, Low Voltage
Max. Tensile Force	Max. 40 NM
Weight	285 g. for DX-ECAS 101

# DX-ECAS

## CAPACITIVE LEVEL SWITCH

**DX-ECAS 101 / 102 / 103 / 107**

**DX-ECAS 202 / 203 / 204 / 205 / 20S**

**DX-ECAS 301 / 304 / 305 / 30D**

**DX-ECAS 408A**

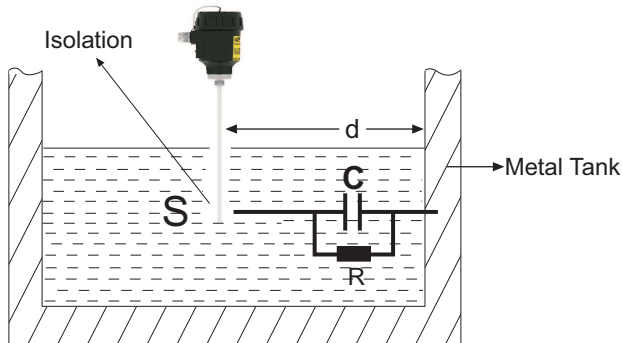
### Advantages :

- \* Optionally high temperature-resistant design.
- \* Easy assembly and sensitivity adjustment.
- \* No need to clean.
- \* Not affected by foam, liquid splash and probe coating.
- \* Can be mounted upside.



## Working Principle :

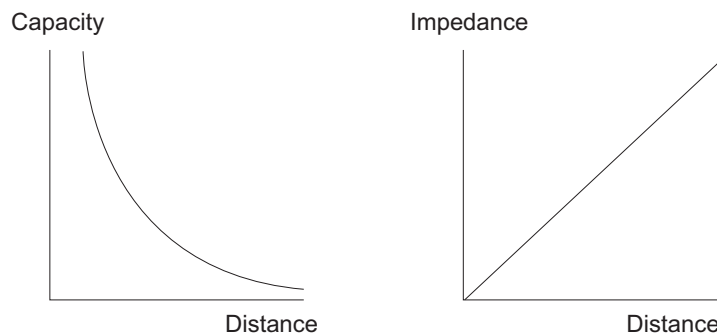
Capacitance definition, assuming two parallel conductive plates are used;



$$C = \frac{\epsilon_0 \cdot \epsilon_r \cdot S}{d}$$

C: Capacity , Farad  
S: Surface Area , m<sup>2</sup>  
d: Distance , m

However, there are scarcely any sensor type which this definition can be practically utilized. Above Formula can no longer be reliable especially when residual areas increase due to large distance (d) (which is usually the case). Thus, measuring impedance for distance measurements give more accurate results than capacitance measurement.



Impedance definition  $Z = R + jL\omega + (jC\omega)^{-1}$  R is defined as real component and represent ambient conductivity.

$jL\omega$  second component is defined as inductive reactance. This component is present even if we perform capacitive measurement. However we neglect this. Since we evaluate results based on electrostatic properties of the environment, no error will occur. Resulting impedance definition is  $Z = R + (jC\omega)^{-1}$ .

Measurement is made by charge transfer in our capacitive sensors. Total impedance is defined as  $Z = V / I$ .

$I$  (current)  $I = Q/t$

$Q$  (Coulomb)

$T$  (sec)

Capacitive reactance we desire to measure is  $(jC\omega)^{-1}$ . Meaning that charge and impedance have the same phase.

To summarize, charge transferred to medium is directly proportional with capacitive reactance.

For sensors manufactured as coaxial;

a: Central electrode radius

b: Outer screen radius

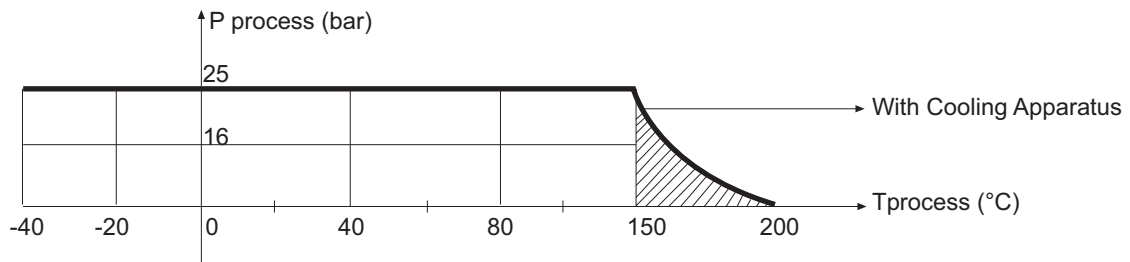
L: length

$$C = \frac{2 \cdot \pi \cdot \epsilon_0 \cdot \epsilon_r}{\ln(b/a)} \cdot L$$

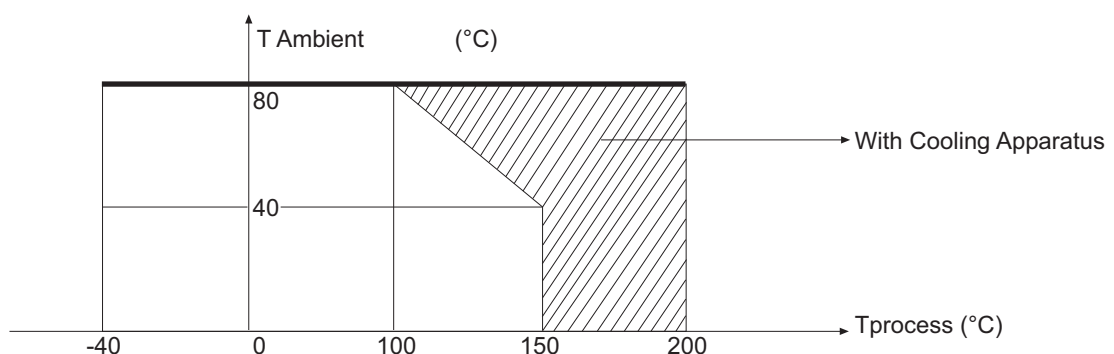
Impedance is calculated by this definition

Excitation applied between 10 KHz...250 KHz based on length for all our models. ( $\omega = 2\pi f$ )  
Linearity error that may be caused by conductivity component (R) effect is prevented by electronic circuit design and mechanical design. Reduced to a level lower than 1ppm, acceptable as zero.

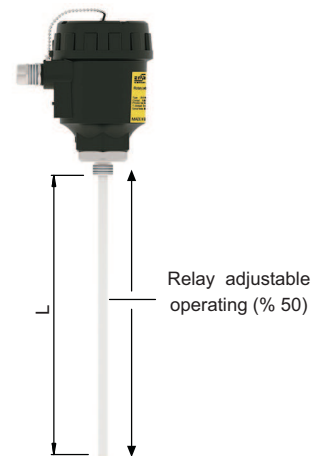
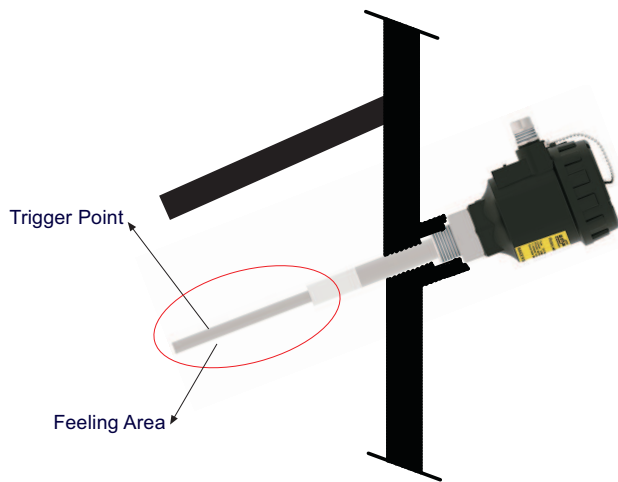
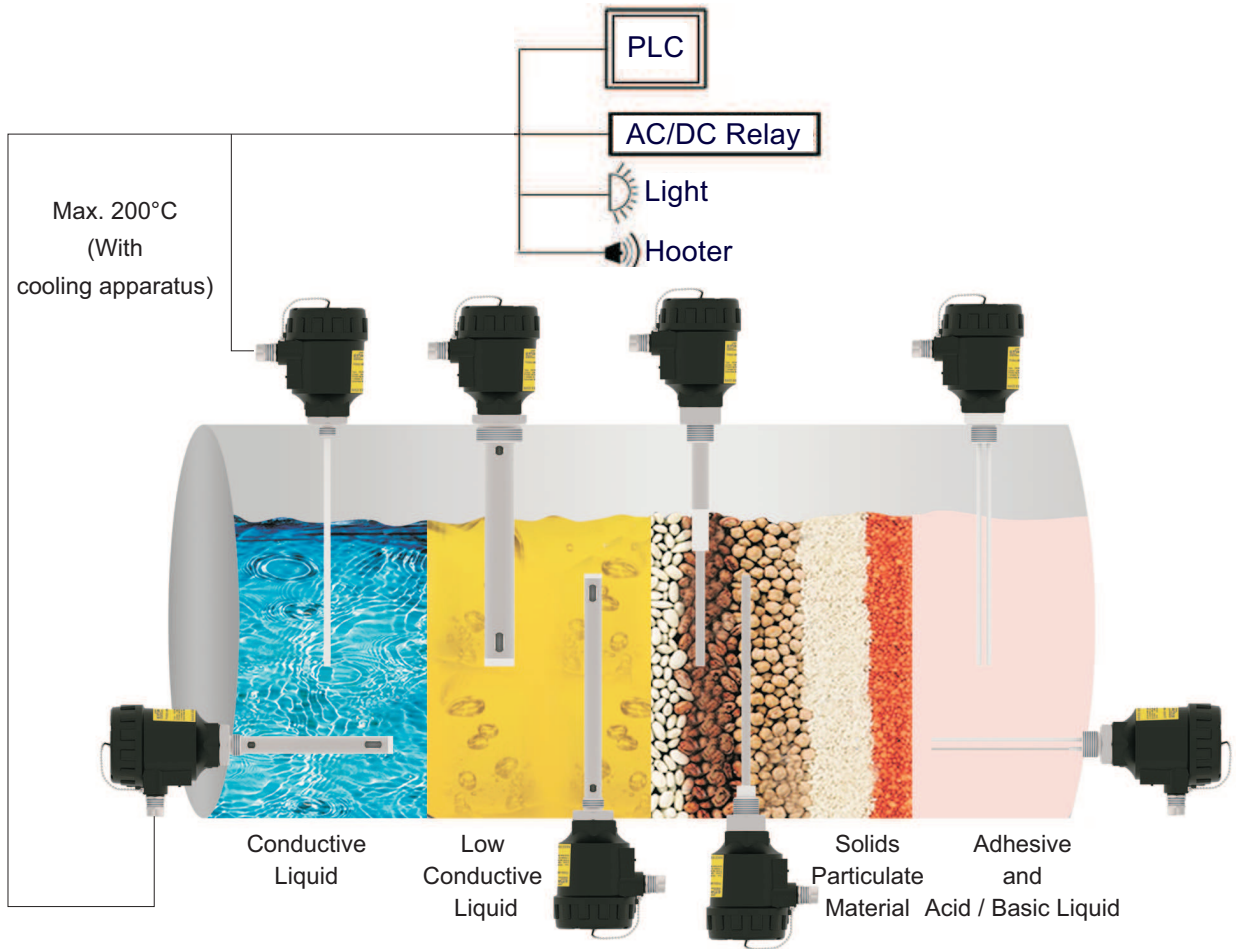
Process Pressure / Temperature Chart



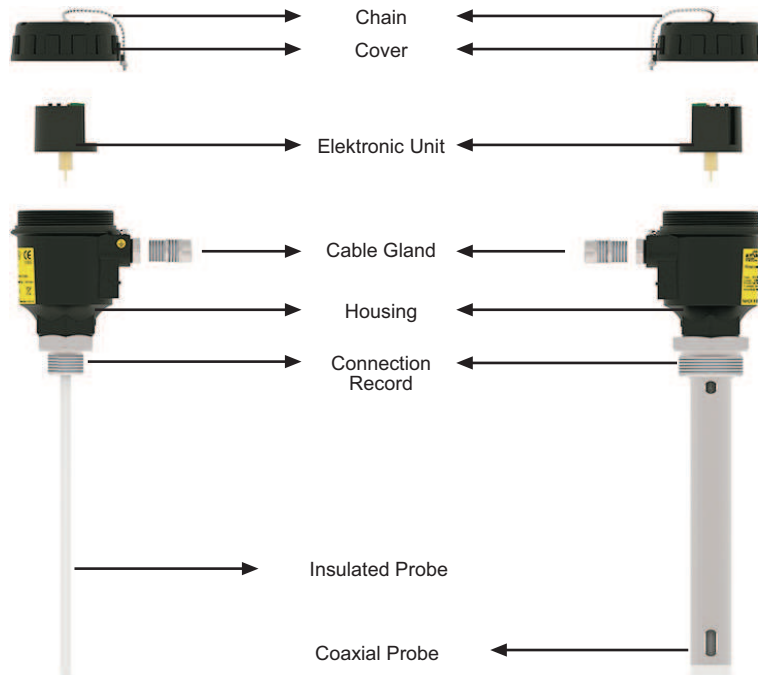
Environment Pressure / Temperature Chart



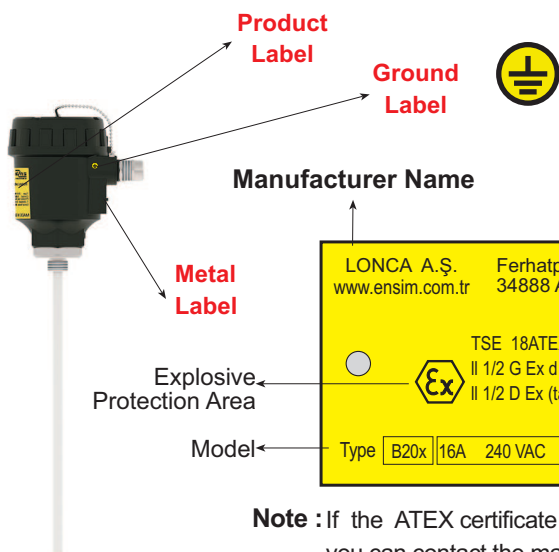
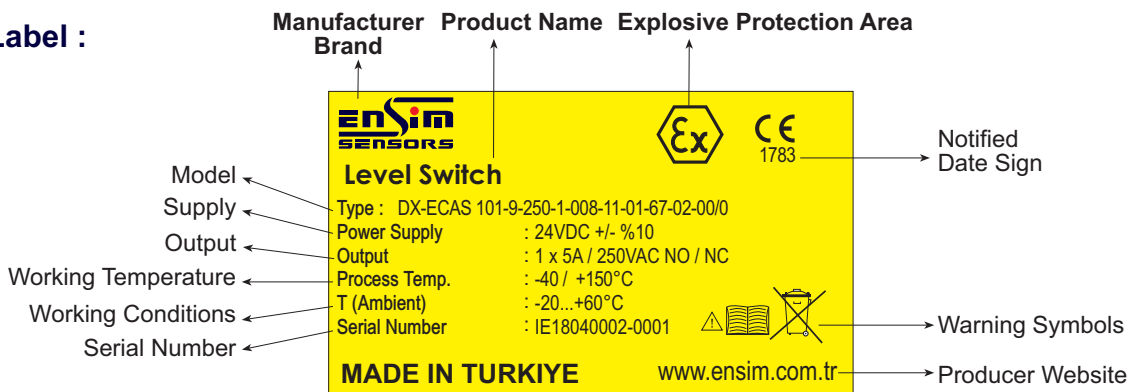
**Application Examples :**



**Parts :**



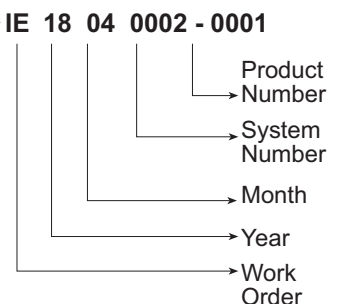
**Label :**



DO NOT OPEN WHEN ENERGIZED  
KEEP TIGHT WHEN CIRCUIT ALIVE



**Note :** If the ATEX certificate metal label is damaged, you can contact the manufacturer with the serial number.

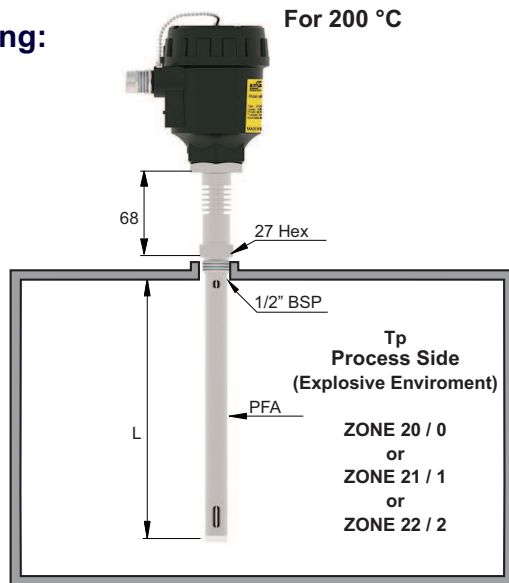


### Housing :

ORDER CODE	TYPE	MATERIAL	PROTECTION CLASS	TEMPERATURE (°C)	SIZE a x b (mm)
25	B20x	Aluminium	IP 66	(-) 40...(+) 200	132 x 104



### Cooling:



### Protection Case:

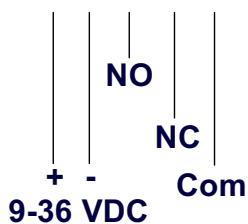


Ta  
Factory Area  
(Safe)

ZONE 21 / 1  
or  
ZONE 22 / 2

**Material :** 304 Stainless Steel  
Welded manufacturing  
Opens - Closes Hinged  
To Protect Against external conditions.

### Electrical Connection :

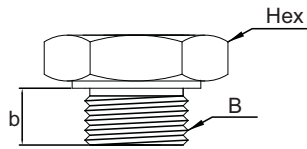


### Indification and Calibarion :

- \* **RlyLED:** "Relay active" during normal operation; means operation continues during calibration. Flashes continuously in normal operation mode –if relay is active– and blinks in calibration mode. It is red colored.
- \* **PwrLED:** Means there is no sensor failure during normal operation, and means "desired measurement values are saved in memory" during calibration. Operates by flashing. If light is continuous, it indicates failure. It is gren colored.
- \* **CAL - S Button:** Used to acquire "High Level-span-"value during calibration.
- \* **CAL - Z Button:** Used to acquire "Low Level-zero-"value during calibration.
- \* **TST Button:** During normal operation, functions as "Relay Test"; during calibration, performs "saving to nonvolatile memory" of Zero-Span, the values previously acquired by S and Z button, function.
- \* **LVL - C Pot:** Adjusts relay triggering point between Zero-Span values.
- \* **LVL - F Pot:** Performs as "fine tuning" for triggering point. Adjustment field is equal to +/- 5% of the point adjusted by "C Pot" (total 10%).
- \* **DIF Pot:** Adjusts "Release" level of the relay activated by "C/F Pot". Highest adjustable value is equal to half (50%) of the operation region specified by "Z and S". Meaning that, when DIF Pot is at 100% and relay is pulled, the level to release it shall be reduced as half of the total scale.

## Mechanical Connection :

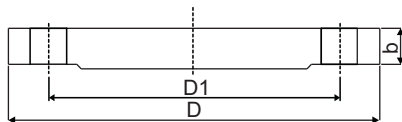
### Thread



(ISO228-1)

Order Code	Dimension B	Hex [mm]	Stem Length b [mm]
003	3/8" BSP	50	20
004	1/2" BSP	50	14
005	3/4" BSP	50	14
006	1" BSP	50	23
007	1 1/4" BSP	50	23
008	1 1/2" BSP	60	23
009	2" BSP	70	23

### Flanged



(ISO1092-1)

Order Code	PN 16	D (mm)	D1 (mm)	b (mm)
103	DN 25	165	85	16
104	DN 32	140	100	16
106	DN 50	165	125	18
108	DN 80	200	160	20
109	DN 100	220	180	20

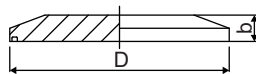
Order (ISO1092-1)

Code	PN 40	D (mm)	D1 (mm)	b (mm)
303	DN 25	115	85	18
304	DN 32	140	100	20
306	DN 50	165	125	20
308	DN 80	200	160	20
309	DN 100	235	190	24

Order (ANSI B16.5)

Code	150 LBS	D (mm)	D1 (mm)	b (mm)
606	DN 50	152,4	121	19
607	DN 65	177,8	139,7	22,2
608	DN 80	190,5	152,4	23,8
609	DN 100	228,6	157,2	23,8

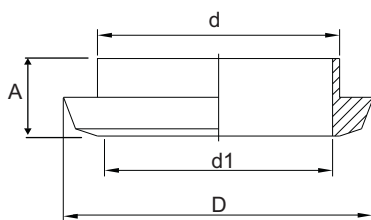
### Clamp



Order (ISO2852)

Code	Dimension	Dia. D (mm)	b (mm)
851	DN 32	50,5	15
852	DN 50	64	17
853	DN 65	91	17

### Dairy



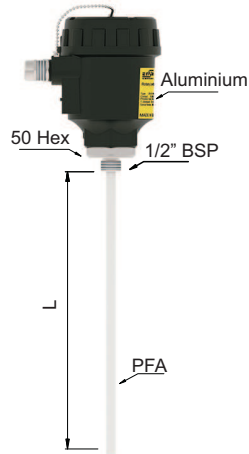
Order

Code	Dimension	Dimension D (mm)	d1 (mm)	A (mm)	
870	DN 40	DN 40	56	48	13
871	DN 50	DN 50	68	61	14
872	DN 100	DN 100	121	114	20

## CONDUCTIVE LIQUIDS

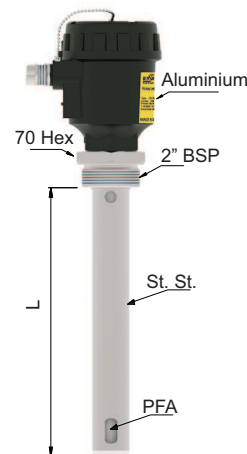
### Sample Models:

**DX-ECAS 101**  
Fully Insulated Probe  
Conductive Tank



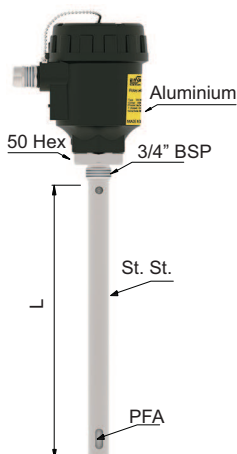
L=250 mm.(Std) Max. 4 m.  
(-) 1 bar...(+) 25 bar  
(-) 40 °C...(+) 150 °C

**DX-ECAS 102**  
Fully Insulated Coaxial Probe  
Insulated Tank



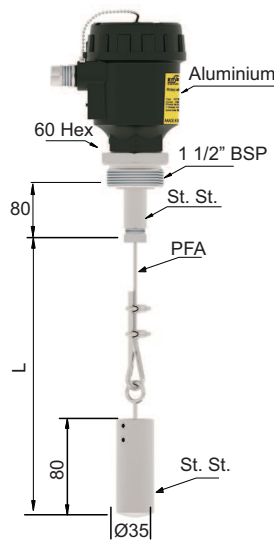
L=250 mm.(Std) Max. 4 m.  
(-) 1 bar...(+) 25 bar  
(-) 40 °C...(+) 150 °C

**DX-ECAS 103**  
Fully Insulated Coaxial Probe  
Insulated Tank



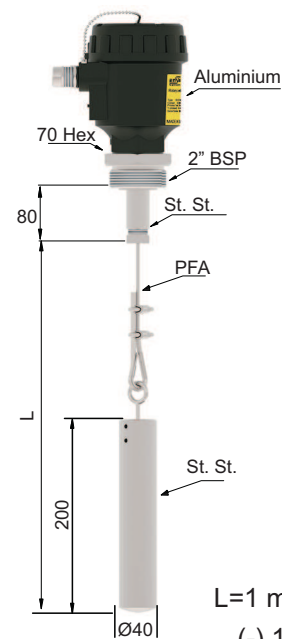
L=250 mm.(Std) Max. 1 m.  
(-) 1 bar...(+) 25 bar  
(-) 40 °C...(+) 150 °C

**DX-ECAS 107**  
Fully Insulated Rope  
Conductive Tank



L=1 m.(Std) Max. 16 m.  
(-) 1 bar...(+) 25 bar  
(-) 40 °C...(+) 150 °C

**DX-ECAS 107**  
Fully Insulated Rope  
Conductive Tank



L=1 m.(Std) Max. 32 m.  
(-) 1 bar...(+) 25 bar  
(-) 40 °C...(+) 150 °C

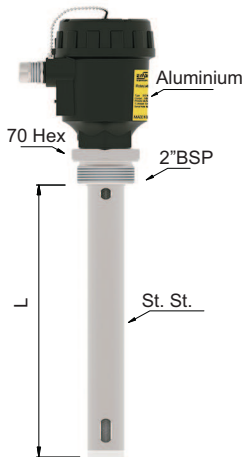


## LOW CONDUCTIVE LIQUIDS

### Sample Models:

#### DX-ECAS 202

Partly Insulated Coaxial Probe  
Conductive / Insulating Tank



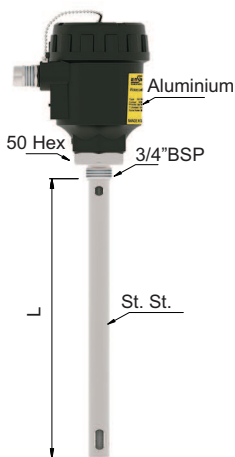
L=250 mm.(Std) Max. 4 m.

(-) 1 bar...(+) 25 bar

(-) 40 °C...(+) 150 °C

#### DX-ECAS 203

Partly Insulated Coaxial Probe  
Conductive / Insulating Tank



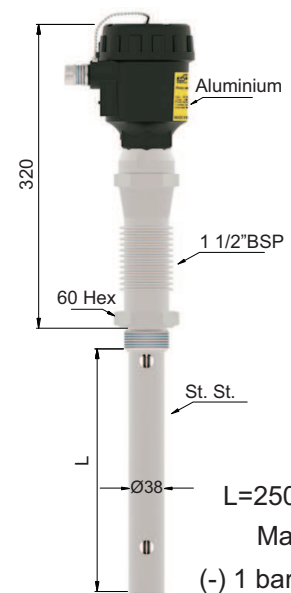
L=250 mm.(Std) Max. 1 m.

(-) 1 bar...(+) 25 bar

(-) 40 °C...(+) 150 °C

#### DX-ECAS 20S

İzolesiz Koaksiyel Prob  
İletken / Yalıtkan Tank

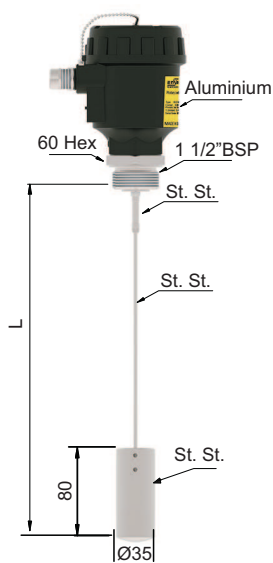


L=250mm.(Std)  
Max. 4 m.

(-) 1 bar...(+) 25 bar  
(-) 40 °C...(+) 400 °C

#### DX-ECAS 204

Partly Insulated Rope  
Conductive Tank



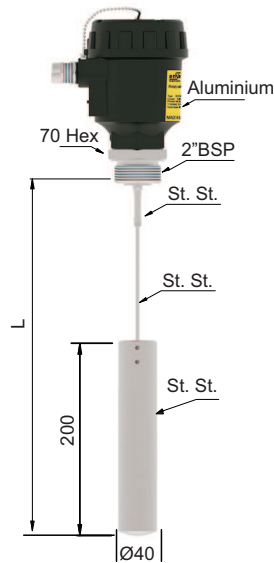
L=1 m.(Std) Max. 16 m.

(-) 1 bar...(+) 25 bar

(-) 40 °C...(+) 150 °C

#### DX-ECAS 204

Partly Insulated Rope  
Conductive Tank



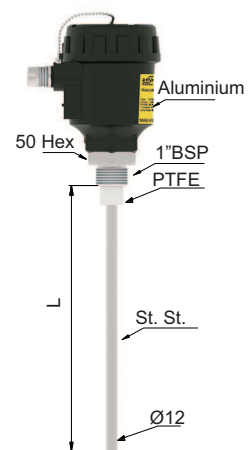
L=1 m.(Std) Max. 32 m.

(-) 1 bar...(+) 25 bar

(-) 40 °C...(+) 150 °C

#### DX-ECAS 205

Partly Insulated Probe  
Conductive Tank



L=250 mm.(Std) Max. 6 m.

(-) 1 bar...(+) 25 bar

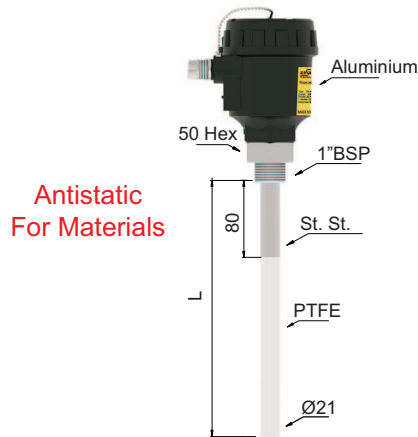
(-) 40 °C...(+) 150 °C

## SOLID PARTICULATE MATERIALS

### Sample Models:

#### DX-ECAS 301

Compled Insulated Probe  
Conductive Tank



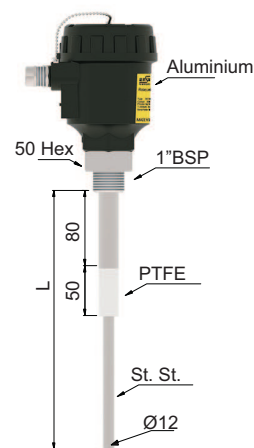
L=250 mm.(Std) Max. 1 m.

(-) 1 bar...(+) 25 bar

(-) 40 °C...(+) 150 °C

#### DX-ECAS 305

Partly Insulated Probe  
Conductive Tank



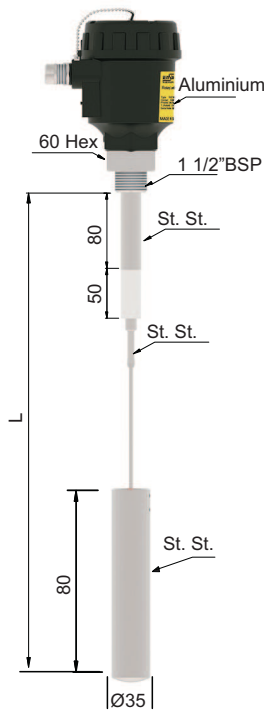
L=250 mm.(Std) Max. 6 m.

(-) 1 bar...(+) 25 bar

(-) 40 °C...(+) 150 °C

#### DX-ECAS 304

Partly Insulated Rope  
Conductive Tank



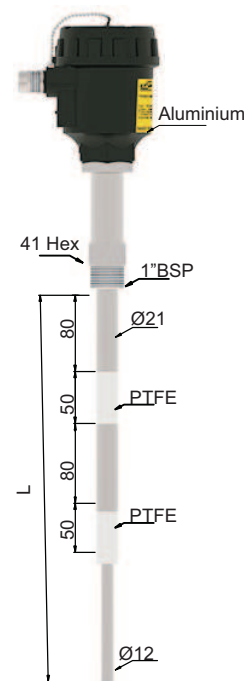
L=1000 mm.(Std) Max. 16 m.

(-) 1 bar...(+) 25 bar

(-) 40 °C...(+) 150 °C

#### DX-ECAS 30D

Double Partly Insulated Probe  
Insulating Tank



L=380 mm.(Std) Max. 1 m.

(-) 1 bar...(+) 25 bar

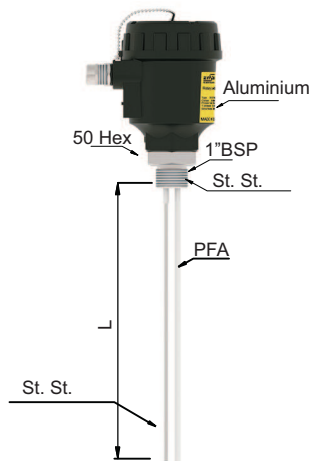
(-) 40 °C...(+) 200 °C

## ADHESIVE AND ACID / BASIC LIQUIDS

### Sample Models:

#### ECAS 408A

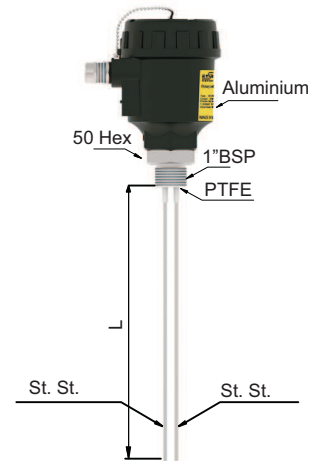
**Double Probe (Single Fully Insulated)  
Conductive / Insulating Tank**



L=250 mm.(Std) Max. 4 m.  
(-) 1 bar...(+) 25 bar  
(-) 40 °C...(+) 150 °C

#### ECAS 408A

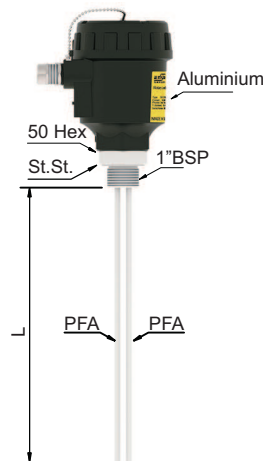
**Double Probe (Single Fully Insulated)  
Conductive / Insulating Tank**



L=250 mm.(Std) Max. 6 m.  
(-) 1 bar...(+) 25 bar  
(-) 40 °C...(+) 150 °C

#### ECAS 408A

**Double Probe (Single Fully Insulated)  
Conductive / Insulating Tank**



L=250 mm.(Std) Max. 1 m.  
(-) 1 bar...(+) 25 bar  
(-) 40 °C...(+) 150 °C

### Temperature Class Table

STD. MODEL	DX-ECAS
Working Temperature	(-) 40 °C...(+ ) 150 °C
Without opening the cover standby time	30 min.

Thermal Protection Insurance is 105 °C

(-) 20 °C ≤ T Ambient ≤ (+) 30 °C...(+ ) 60 °C		Working Temperature :(-) 40 °C...(+ ) 150 °C	
DX-ECAS (Metal)			
T Ambient MAX. AMBIENT TEMPERATURE ZONE 21 / 1	T Process MAX. PROCESS TEMPERATURE ZONE 20 / 0	T Surface MAX. SURFACE TEMPERATURE	TEMPERATURE CLASS
30 °C	150 °C	60 °C	T6
40 °C	150 °C	67 °C	T6
50 °C	150 °C	75 °C	T6
60 °C	150 °C	88 °C	T5

(-) 20° C ≤ T Ambient ≤ (+) 30° C...(+ ) 60° C		Working Temperature :(-) 20...(+ ) 200°C	
DX-ECAS (Metal + Cooling)			
T Ambient MAX. AMBIENT TEMPERATURE ZONE 21 / 1	T Process MAX. PROCESS TEMPERATURE ZONE 20 / 0	T Surface MAX. SURFACE TEMPERATURE	TEMPERATURE CLASS
30 °C	200 °C	42 °C	T6
40 °C	200 °C	46 °C	T6
50 °C	200 °C	56 °C	T6
60 °C	200 °C	68 °C	T6

## 1 MODEL DX-ECAS

Conductive Liquids.....1	Solids Particulate Materials.....3
Low Conductive Liquids .....2	Adhesive and Acid/Basic Liquids.....4

## 2 CERTIFICATE

No.....0	(EN10204-3-1) Material Certification.....1
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## 3 PROBE TYPE (MAX. LENGHT)

Single Probe - Insulated (Max 4 m) ..... 1	Double Probe - Single Fully Insulated (Max 4 m) ..... 8A
Single Probe - Coaxial (max 4 m) Ø 38 ..... 2	Ceramic Partly Insulated Probe (Max 4 m) ..... S
Single Probe - Thin Coaxial (max 1 m), Ø21 ... 3	Double Fully Insulated Probe (Max 4 m) ..... D
Rope - Partly Insulated (Max 32 m).....4	Special ..... X
Single Probe - Partly Insulated (Max 6 m) .... 5	
Single Probe - High Temperature (Max 4 m) ... 6	
Rope - Fully Insulated (0 ... 32 m) ..... 7	

## 4 PROBE DIAMETER (Ø)

.....mm	Special ..... X
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## 5 STEM LENGHT

.....mm

## 6 PROCESS TEMPERATURE

150 °C Standard .....0	(-)196°C For Cryogenic Tank .....2
200 °C with Cooling Apparatus .....1	230°C with Peek Insulated .....3
	400°C with Seramic Insulated .....4

## 7 CONNECTION

<u>Thread (ISO 228-1)</u>	<u>Clamp (ISO 2852)</u>	<u>ISO Flange (1092-1)</u>	<u>ASA Flange (B16.5)</u>	<u>Special Flange</u>
1/2" BSP.....04	DN 25 - PN16 ... 21	DN 25 - PN 40 ... 26	DN 50 - 150 lb ... 41	Ø 70 Flanged...71
3/4" BSP.....05	DN 50 - PN16 ... 23	DN 32 - PN 40 ... 27	DN 80 - 150 lb ... 43	Special.....X
1" BSP.....06		DN 50 - PN 40 ... 28	DN 100 - 150 lb ... 44	
1 1/2" BSP .....08		DN 80 - PN 40 ... 29		
2" BSP.....09		DN 100 - PN 16 ... 30		
1/2" NPT.....12				
3/4" NPT.....13				

## 8 OUTPUT

Relay Output (NO/NC) (5A).....11	Special.....X
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## 9 HOUSING

Aluminium Housing, B20x.....368	Special.....X
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## 10 INSULATION MATERIAL

PBT.....65	Polyamide.....69
PTFE.....66	Ceramic.....70
PFA.....67	Rubber.....81
PEEK.....68	FKM.....84
	Special.....X

## 11 CONNECTION MATERIAL

316 Stainless Steel.....02	Delrin.....63
Brass.....41	PVDF.....64
PVC.....61	PBT.....65
Polypropylene.....62	PTFE.....66
	Special.....X

## 12 ELECTRICAL CONNECTION

With Terminal.....00	Special.....X
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## 13 OPTIONAL

No...../ 0	Wall Apparatus...../ W
	Special...../ X

## SAMPLE

DX-ECAS 101 - 10 - 300 - 0 - 006 - 11 - 368 - 66 - 02 - 00 / 0  
 For Cond. Liquid, L=300 mm, 1" BSP, Relay Output, Aluminium Housing , Ø 10 Probe