CAPACITANCE TYPE LEVEL INDICATOR
Model KLI/KLT/KLG SERIES

No Moving Part, Easy to Handle!!
KLI/KLT/KLG SERIES
CAPACITANCE TYPE LEVEL INDICATOR

There being no moving part, it reliably operates for a long period of time and its maintenance is easy. Best selling line in continuous measurement.

Features

● Reliable detection even when objects are being fed.
● It can be applied to anything including powder, granules and liquid.
● Not affected by dust, it can accurately indicate.
● It is possible to select one of the most suitable sensors out of a wide range of products, depending upon the applicable conditions. (high temperature, high pressure, strong acid/alkali, conductivity, insulation property and others)
● Safely measure a wide span with electrodes designed to be strong enough.
● The intrinsically safe explosion-proof model is also available for use at an explosive area.

Operating Principle

When an electrode is set in a tank so as to be coaxial with its wall as shown below, there forms a capacitance $C_x$ between the tank and the electrode. By offsetting the stray capacitance of $C_0$, when the tank is empty, with a high frequency impedance bridge, it is possible to obtain $\Delta C$, namely the output electric signal which is proportional to the height (level) $\ell_1$ of the material to be measured.

$$C_x = C_0 + \Delta C$$

$$\Delta C = \frac{K(\varepsilon_2 - \varepsilon_1) Q}{\log_e (R/r)}$$

Increment of capacitance when the tank is filled with materials to be measured.

$C_0$: Capacitance when the tank is empty.
$K$: Constant

$\varepsilon_2$: Dielectric Constant of material to be measured
$\varepsilon_1$: Dielectric constant of Air

$I_0$: Output Current (mA)
Electrode / Amplifier

Remote Type

(Outdoor wall mount)

- Length of Exclusive Cable: Max.50m
  (Sensitivity Class 1 = Max.25m)
- 24VDC model can be available
- Electrostatic protective model can be manufactured.

model KLI

model KLG

model KLT

Applications

- Molten resin
- Organic solvent
- Flour
- Food oil
- Heavy oil
- Sludge
- Sulphuric acid
- Caustic soda
- Industrial water
- Fruit juice
- Sea water
- Waste water
- Cement
- Grain
- Resin pellet
- Calcium carbonate
- Powdered coal
- Metal powder

Unaffected by static electricity

Liquid, dirt or the like

Agitating vessel

Attached safety barrier

Exclusive cable: Max.25m
KLI/KLT/KLG SERIES CAPACITANCE TYPE LEVEL INDICATOR

**Remote Type**
Can mount by screw-in, with IDF nuts, ferrule or ANSI and so on.

**Electrode, Specification**
- Permissibly Distributed: 0 – 400pF (Depending on shape)
- Capacitance
- Allowable Temperature: -25 – +80°C (Standard)  
  ~200 – +500°C (Special)
- Allowable Pressure: 1MPa (10kgf /cm²) (Standard)
- Enclosure Rating: IP-67
- Color: Hammer-net gold

**Power/Amplifier, Specification** (Outdoor wall mounting)
- Input Power Source: 105/210VAC ±15%  50/60Hz (24VDC OK)
- Power Consumption: 4VA
- Output Signal: 4 – 20mA DC, (500Ω Max) (-) grounded
- Measuring Sensitivity: 10pF, 30pF, 300pF, 3000pF (F·S)
- Accuracy: ±(Amplifier) 1%
- Weight: 6.5Kg (Outdoor use)
- Box Type: Outdoor Wall mounting or Panel built-in
- Length of Exclusive Cable: Max. 50m (Sensitivity Class1=Max.25m)
- Allowable Temperature: -20 – +70°C
- Enclosure Rating: IP-67
- Color: Hammer-net gold

*Compact amplifier (panel mounting) is optionally available.*

**Specifications & Dimensions**
*Below is a standard specifications and dimensions. Please contact your local sales agent for special specifications, such as heat-resistant and/or pressure-resistant specifications.*
Specifications & Dimensions

*Below is a standard specifications and dimensions. Please contact your local sales agent for special specifications, such as heat-resistant and/or pressure-resistant specifications.

**KLT-2**

- **Mounting:** IDF2s
- **Temperature:** -20 to +50°C
- **Pressure:** 10kgf/cm²
- **Length of L:** Max 4m

**KLT-2 T·P1·17·IF2S**

- **Mounting:** IDF2s
- **Temperature:** -20 to +50°C
- **Pressure:** 10kgf/cm²
- **Length of L:** Max 4m

**KLT-3**

- **Mounting:** JIS10K50A
- **Temperature:** -20 to +400°C
- **Pressure:** 10kgf/cm²
- **Length of L:** Max 15m

**KLT-4**

- **Mounting:** JIS5K50A
- **Temperature:** -20 to +50°C
- **Pressure:** 10kgf/cm²
- **Length of L:** Max 15m

**Input Power Source:** 105/210VAC ±15% 50/60Hz (24VDC OK)

**Power Consumption:** 4VA

**Output Signal:** 4 – 20mA DC, (5000Ω Max) Minus (−) grounded

**Measuring Sensitivity:** 10pF, 30pF, 300pF, 3000pF (F, S)

**Accuracy:** 1%

**Permissibly Distributed:** 0 – 400pF (Depending on shape)

**Capacitance:**

- **Allowable Temperature:** -25 to +80°C (Standard)
- **Maximum Temperature:** -200 to +500°C (Special)

**Enclosure Rating:** IP-67

**Color:** Hammer-net gold

**Input Power Source:** 105/210VAC ±15% 50/60Hz (24VDC OK)

**Power Consumption:** 4VA

**Output Signal:** 4 – 20mA DC, (5000Ω Max) Minus (−) grounded

**Measuring Sensitivity:** 10pF, 30pF, 300pF, 3000pF (F, S)

**Accuracy:** 1%

**Permissibly Distributed:** 0 – 400pF (Depending on shape)

**Capacitance:**

- **Allowable Temperature:** -25 to +80°C (Standard)
- **Maximum Temperature:** -200 to +500°C (Special)

**Enclosure Rating:** IP-67

**Color:** Hammer-net gold
For Hazardous Gas Environment

Certified by Industry Safety-Technology Association, Labor Ministry.

Explosion-proof available

Length of L : Max 4m
Pressure : 1MPa
Temperature : 20 to +80°C

Mounting : JIS10K50A

G 3/4

Teflon tubing

SIGNAL TRANSDUCER
DISTRIBUTOR

Material to be measured

Can safely be used at any explosive environment.

KLG-2 3
G-P1-17-SP(40A)

Mounting : JIS10K50A
Temperature : -20 to +80°C
Pressure : 1MPa
Length of L : Max 4m

KLG-2 3
G-P1-17

Mounting : R1
Temperature : -20 to +80°C
Pressure : 1MPa
Length of L : Max 4m

KLG-2 3
G-W-10P-L

Mounting : JIS10K50A
Temperature : -20 to +80°C
Pressure : 1MPa
Length of L : Max 15m

Specifications & Dimensions

*Below is a standard specifications and dimensions. Please contact your local sales agent for special specifications, such as heat-resistant and/or pressure-resistant specifications.
Intrinsically safe

CSA

Class ɿ, Groups A, B, C, D; Class 伊拉克, Groups E, F, G; Class ɿ; T3C

Meter Relay LV1000-AI-A2

- Power supply: AC85 to 264V (50/60Hz) DC12 to 24V ±10%
- Power consumption: Max 22VA (Option 10W)
- Sensor supply voltage: DC24V (150mA)
- Analog Current Output: DC4 to 20mA (Resistance load Max.500Ω)
- Analog Current Input: DC4 to 20mA (Input resistance 250Ω)
- Contact capacity: AC250V 0.3A (Resistance load)
- DC30V 2A (Resistance load) Max 60W
- Linearization function: 20 points
- Alarm contact output: 2c

Safety Barriers MTL728+

Approval Proof: Intrinsically Safe 2G4

Safety Description: Intrinsically Safe circuit

- Max Volts: 28V
- Max Current: 93mA
- Max Power: 650mW
- Intrinsically Safe Circuit: 250VAC 250VDC
- Permissible Capacitance: 0.047μF
- Permissible Inductance: 2.75mH
- Working Volts: 25.5VDC
- Working Current: 50mA
- Temperature: 60℃

Tension Test

Osaka Prefectural Industry Technology Research, 2/24/84

Name of parts for tension test

1. Φ8 wire rope at lead brazing
2. Φ8 wire rope/ prevent falling
3. Φ8 wire rope/ eyenut
4. Φ8 wire rope/ bob base
5. Φ12 wire rope/ bob base
6. Φ12 wire rope/ eyebolt

Description of Deformed Part

P → P

Φ8 Wire

Electrode Type

1 = Bare straight rod type
2 = Covered straight rod type
3 = Bare wire type
4 = Covered wire type
5 = Coaxial cable type
6 = Special

Electrode/Amplifier Built-in Type

Alternative type of power supply amplifier Unit
0 = Built-in type
1 = Panel mount type
3 = Outdoor type

(F.S.) Sensitivity
1 = 10~100 pF
2 = 30~300 pF
3 = 300~3,000 pF
4 = over 7,000 pF
5 = Special

Electrode Type

1 = Bare straight rod type
2 = Covered straight rod type
3 = Bare wire type
4 = Covered wire type
5 = Coaxial cable type
6 = Special

Electrode/Amplifier Remote Type

Alternative type of power supply amplifier Unit
0 = Built-in type
3 = Outdoor type

(F.S.) Sensitivity
1 = 10~130 pF
2 = 30~300 pF
3 = 300~3,000 pF

Electrode Type

1 = Bare straight rod type
2 = Covered straight rod type
3 = Bare wire type
4 = Covered wire type
5 = Coaxial cable type
6 = Special

Electrode/Amplifier Remote Type

Intrinsically safe explosion-proof type (i)2G4

*As for the model of “Pyrex” and “Special”, please check with our Sales staff.

Power Supply

- Power consumption
- Sensor supply voltage
- Analog Current Output
- Analog Current Input
- Contact capacity
- Linearization function
- Alarm contact output

Power Consumption

- Max 22VA (Option 10W)

Sensor Supply Voltage

- DC24V (150mA)

Analog Current Output

- DC4 to 20mA (Resistance load Max.500Ω)

Analog Current Input

- DC4 to 20mA (Input resistance 250Ω)

Contact Capacity

- AC250V 0.3A (Resistance load)
- DC30V 2A (Resistance load) Max 60W

Linearization Function

- 20 points

Alarm Contact Output

- 2c

*On 2G4, no alarm contact output is provided.

Permissible Capacitance

- 0.047μF

Permissible Inductance

- 2.75mH

Working Volts

- 25.5VDC

Working Current

- 50mA

Temperature

- 60℃

Linearization Function

- 20 points

Alarm Contact Output

- 2c

*On 2G4, no alarm contact output is provided.

Electrode Type

1 = Bare straight rod type
2 = Covered straight rod type
3 = Bare wire type
4 = Covered wire type
5 = Coaxial cable type
6 = Special

Electrode/Amplifier Remote Type

Alternative type of power supply amplifier Unit
0 = Built-in type
1 = Panel mount type
3 = Outdoor type

(F.S.) Sensitivity
1 = 10~100 pF
2 = 30~300 pF
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Electrode Type

1 = Bare straight rod type
2 = Covered straight rod type
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4 = Covered wire type
5 = Coaxial cable type
6 = Special

Electrode/Amplifier Built-in Type

Alternative type of power supply amplifier Unit
0 = Built-in type
3 = Outdoor type

(F.S.) Sensitivity
1 = 10~130 pF
2 = 30~300 pF
3 = 300~3,000 pF

Electrode Type

1 = Bare straight rod type
2 = Covered straight rod type
3 = Bare wire type
4 = Covered wire type
5 = Coaxial cable type
6 = Special

Electrode/Amplifier Remote Type

Intrinsically safe explosion-proof type (i)2G4

*As for the model of “Pyrex” and “Special”, please check with our Sales staff.

Description of Deformed Part

The eyenet ring ovalizes but does not crack. No exception is noted on the screw-thread part of stainless steel bar.

Φ8 Wire

Eyenut Method. An eyenut and a heart thimble deform but withstand any breakage. The withstanding weight is 4.345 tons. The official tension shear weight of the wire is 4.13 tons.

Φ12 Wire

Eyebolt Portion of Φ12 Wire

A right-angled crevice and a heart thimble deform but withstand any breakage. The withstanding weight is 9.5 tons. The official tension shear weight of the wire is 9.48tons.

Description of Deformed Part

Two pins of right-angled crevice, the lower half of the crevice and a pin-hole of the eyebolt as well as a heart thimble were metamorphosed. The left pin and the lower half of the crevice were severely damaged. The right pin and the eyebolt hole were metamorphosed by about 1mm.

Description of Deformed Part

P → P

Φ8 wire rope at lead brazing

Φ8 wire rope/ prevent falling

Φ8 wire rope/ eyenut

Φ8 wire rope/ bob base

Φ12 wire rope/ bob base

Φ12 wire rope/ eyebolt

P → P

Φ8 Wire

Max allowable tension weight 42.58KN (4.345kgf)

P → P

Φ12 Wire

Max allowable tension weight 93.16KN (9.500kgf)

P → P

Φ12 Wire

Max allowable tension weight 93.16KN (9.500kgf)

P → P

Φ12 Wire

Max allowable tension weight 93.16KN (9.500kgf)
Please inform us of the following when inquiring and ordering

1. Name of material to be measured [ ] [ ]
2. Dielectric constant, Specific resistance [ ] [ ]
3. Granularity [ ] [ ]
4. Viscosity / Agglomerating Nature [ Yes ] [ No ]
5. Corrosive Nature [ Yes ] [ No ]
6. Foamy Nature [ Yes ] [ No ]
7. Tank Material [ ] [ ]
8. Tank Shape (1. Circular, 2. Square) [ ] [ ]
9. Agitator [ Yes ] [ No ]
10. Service Temperature / °C [ ] [ °C ]
11. Service Pressure / Pa [ ] [ Pa ]
12. Length of Exclusive Cable (attachment) [ ] [ ]
13. Type of Amplifier Housing [ ] [ ]
14. Indicator and other ancillary equip. [ Yes ] [ No ]

Fill out the following blanks:

A Tank Diameter [ ] [ ]
B Instrument Location [ ] [ ]
L Length of Electrode [ ] [ ]
L1 Height of Nozzle installed [ ] [ ]
\( L \) Measuring Span [ ] [ ]
C Height of Tank's Cylindrical Part [ ] [ ]
D Height of Tank's Conical Part [ ] [ ]

Caution
You may come across some indication errors under the varied conditions as follows:
1. Varied water content of a material to be measured
2. Varied dielectric constant of a material to be measured
3. Varied particle size of a material to be measured

All-round Manufacturer of Level Controllers for Powder, Granules and Liquid

Line of business
- Rotary Paddle Type Level Switch
- Vibration Type Level Switch
- Swing Type Level Switch
- Acoustic Level Switch
- Capacitive Proximity Sensor
- Capacitance Type Level Switch
- Diaphragm Type Level Switch
- Tilt Switch
- Leak Type Level Switch
- Microwave Switch
- Sounding Bob Type Level Indicator
- Flow Switch
- Conductance Type Level Switch
- Float Switch
- Float Type Level Indicator
- Ultrasonic Type Level Indicator
- Equipments For Conveyor Lines
- Dust Monitor System
- Zirconia Oxygen Analyzer
- Laser Type Level Indicator
- RADAR Type Level Indicator
- On-line Sensors for Accurate Liquid Analysis
- Ultrasonic Flow meter

*Please be sure to read USER'S GUIDE, Installation & Operation Instructions before using the instrument.
*The specifications herein may be subject to change without advance notice.