

CAPACITANCE TYPE LEVEL INDICATOR

Model **KLI/KLT/KLG** SERIES



No Moving Part, Easy to Handle!!

Wide measuring span

Cement or the like



Unaffected by dust on pneumatic conveyor

Cement or the like



Unaffected by fouling

Flour or the like



Interfacial detection of two liquids



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.

Accurate detection of minimal capacitance

Adhesives, Lard (Food oil),
Liquefied gas
& others



Operating Principle

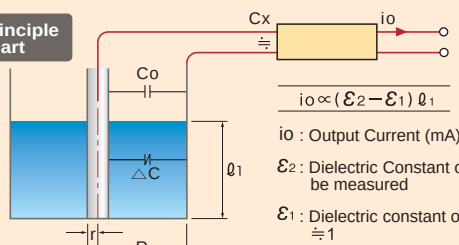
When an electrode is set in a tank so as to be coaxial with its wall as shown below, there forms a capacitance C_x between the tank and the electrode. By offsetting the stray capacitance of C_0 , when the tank is empty, with a high frequency impedance bridge, it is possible to obtain ΔC , namely the output electric signal which is proportional to the height (level) l_1 of the material to be measured.

$$C_x = C_0 + \Delta C$$

$$\Delta C = \frac{K(\epsilon_2 - \epsilon_1) l_1}{\log_{10} (R/r)}$$

(Increment of capacitance when the tank is filled with materials to be measured.
(C_0 : Capacitance when the tank is empty,
K = Constant)

Principle chart



$$i_o \propto (\epsilon_2 - \epsilon_1) l_1$$

i_o : Output Current (mA)

ϵ_2 : Dielectric Constant of material to be measured

ϵ_1 : Dielectric constant of Air
 ≈ 1



model KLI



Electrode / Amplifier Remote Type

(Outdoor wall mount)

- Length of Exclusive Cable: Max.50m (Sensitivity Class1 =Max.25m)
- 24VDC model can be available
- Electrostatic protective model can be manufactured.

Agitating vessel

Liquid, dirt or the like



Unaffected by static electricity

Resin pellet



model KLG

Intrinsically safe explosion-proof model
(i)2G4 RIIS No.T44622



- Attached safety barrier
- Exclusive cable : Max.25m

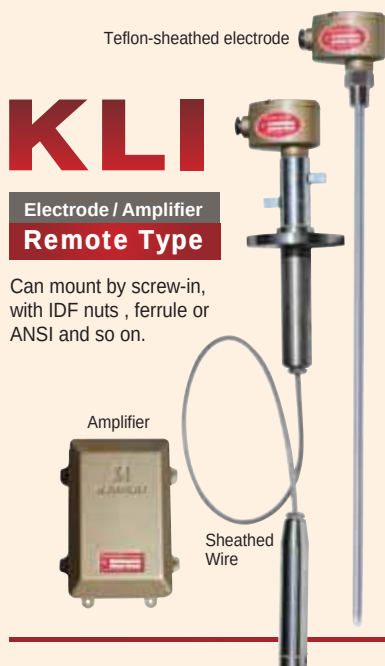
Applications

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			

model KLT

Electrode / Amplifier Built-in Type

- No exclusive cable is required.
- 24VDC model can be available.



KLI

Electrode / Amplifier
Remote Type

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

Electrode, Specification

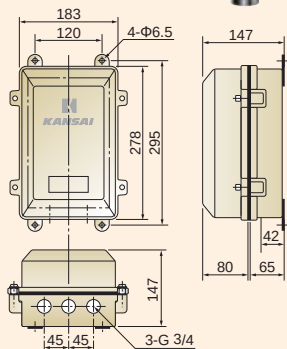
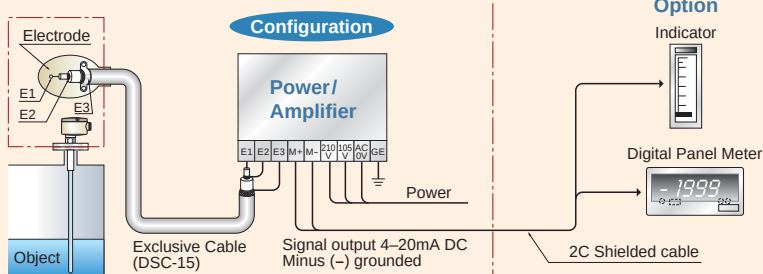
Permissibly Distributed : 0 – 400pF (Depending on shape)
 Capacitance

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

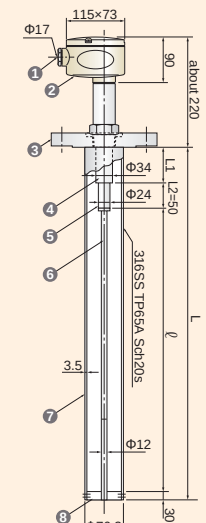
*Compact amplifier (panel mounting)
 is optionally available.

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.

KLI-1□3 Special **B31-Z-SP-65**

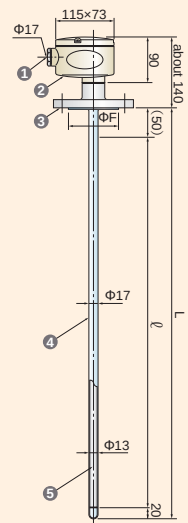
Mounting : JPI300#3B
 Temperature : -20 to +80°C
 Pressure : 1MPa
 Length of L : Max 4m



- | | |
|-----------------------|---------|
| ① Cable Gland | C3604 |
| ② Housing | AC4B |
| ③ Flange | 316SS |
| ④ Earth electrode | 316SS |
| ⑤ Insulator | Ceramic |
| ⑥ Main electrode | 316SS |
| ⑦ Auxiliary electrode | 316SS |
| ⑧ Insulator supporter | Teflon |

KLI-2□3 **K-P2-17**

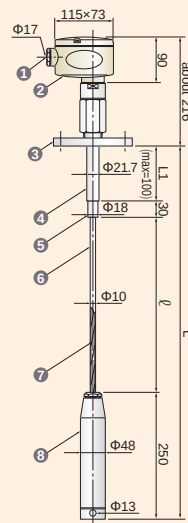
Mounting : JIS10K50A
 Temperature : -20 to +80°C
 Pressure : 1MPa
 Length of L : Max 4m



- | | |
|------------------|--------|
| ① Cable gland | C3604 |
| ② Housing | AC4B |
| ③ Flange | 304SS |
| ④ Sheath | Teflon |
| ⑤ Main electrode | 304SS |

KLI-4□3 **K-W-10P-(G)**

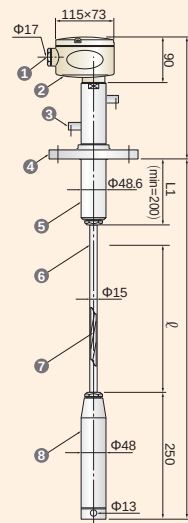
Mounting : JIS10K65A
 Temperature : -20 to +80°C
 Pressure : 1MPa
 Length of L : Max 15mm



- | | |
|-----------------------|------------|
| ① Cable gland | C3604 |
| ② Housing | AC4B |
| ③ Flange | 304SS |
| ④ Earth electrode | 304SS |
| ⑤ Insulator | Polyacetal |
| ⑥ Sheathed | Teflon |
| ⑦ Main electrode wire | 304SS |
| ⑧ Weight | 304SS |

KLI-4□3 **K-W-15P-3**

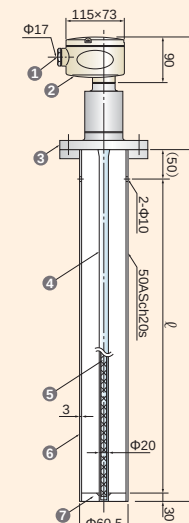
Mounting : JIS10K65A
 Temperature : -20 to +80°C
 Pressure : 1MPa
 Length of L : Max 30m



- | | |
|-----------------------|--------|
| ① Cable gland | C3604 |
| ② Housing | AC4B |
| ③ Vent | SS400 |
| ④ Flange | 304SS |
| ⑤ Earth electrode | 304SS |
| ⑥ Sheath | Teflon |
| ⑦ Main electrode wire | 304SS |
| ⑧ Weight | 304SS |

KLI-6□3 Pyrex **K-P1-20-SP (50A)**

Mounting : JIS10K65A
 Temperature : -20 to +200°C
 Pressure : 2MPa
 Length of L : Max 1m



- | | |
|----------------------------|--------|
| ① Cable gland | C3604 |
| ② Housing | AC4B |
| ③ Flange | 304SS |
| ④ Sheath | Pyrex |
| ⑤ Main electrode | 304SS |
| ⑥ Auxiliary electrode | 304SS |
| ⑦ Main electrode supporter | Teflon |

KLT

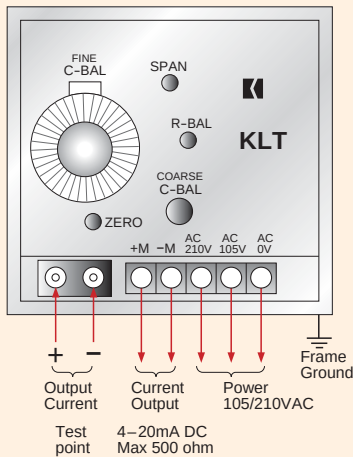
Electrode / Amplifier Built-in Type

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

Bare electrode

Teflon-
sheathed
electrode

Wiring Diagram



Standard Specification

Input Power Source : 105 /210VAC $\pm 15\%$ 50/60Hz (24VDC OK)

Power Consumption : 4VA

Output Signal : 4 – 20mA DC, (500 Ω Max) Minus (–) grounded

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

Accuracy : 1%

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

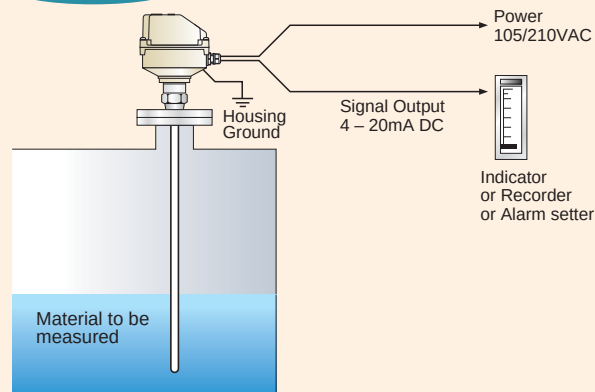
Allowable Temperature : –25 – +80°C (Standard)
–200 – +500°C (Special)

Maximum Pressure : 1MPa (10kgf /cm²) (Standard)

Enclosure Rating : IP-67

Color : Hammer-net gold

Configuration

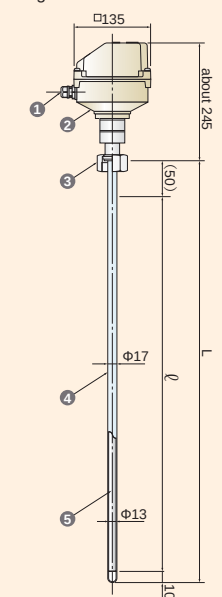


Specifications & Dimensions

*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□0 T·P1·17·IN2S

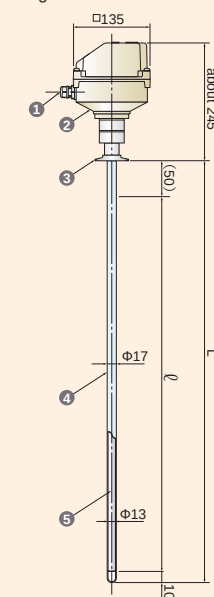
Mounting : IDF2s
Temperature : –20 to +50°C
Pressure : 300kPa
Length of L : Max 4m



- | | |
|------------------|------------|
| ① Cable gland | Polyacetal |
| ② Housing | ADC |
| ③ IDF Union nut | 304SS |
| ④ Sheath | Teflon |
| ⑤ Main electrode | 304SS |

KLT-2□0 T·P1·17·IF2S

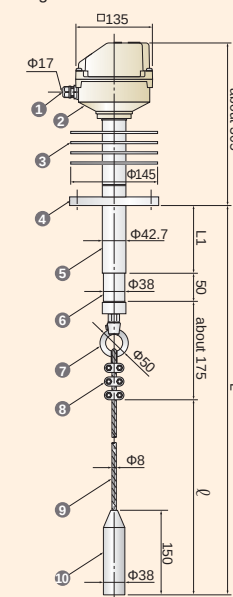
Mounting : IDF2s
Temperature : –20 to +50°C
Pressure : 1MPa
Length of L : Max 4m



- | | |
|------------------|------------|
| ① Cable gland | Polyacetal |
| ② Housing | ADC |
| ③ IDF Ferrule | 304SS |
| ④ Sheath | Teflon |
| ⑤ Main electrode | 304SS |

KLT-3□0-H Special T·W8·B3·H3

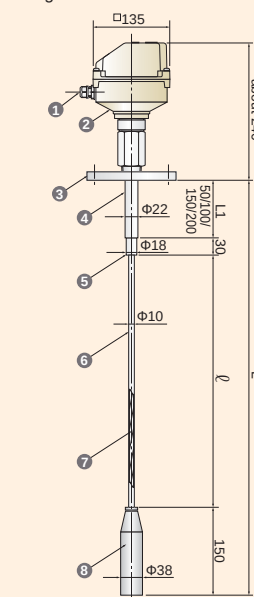
Mounting : JIS10K50A
Temperature : –20 to +400°C
Pressure : 1MPa
Length of L : Max15m



- | | |
|-------------------|------------|
| ① Cable gland | Polyacetal |
| ② Housing | ADC |
| ③ Fin | AC |
| ④ Flange | 304SS |
| ⑤ Earth electrode | 304SS |
| ⑥ Insulator | Ceramic |
| ⑦ Eye nut | 304SS |
| ⑧ Wire clip | 304SS |
| ⑨ Main electrode | 304SS |
| ⑩ Weight | 304SS |

KLT-4□0 T·W·10P·L

Mounting : JIS5K50A
Temperature : –20 to +50°C
Pressure : 1MPa
Length of L : Max15m



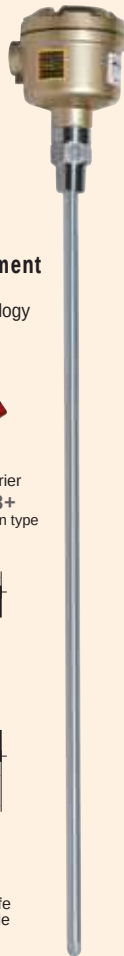
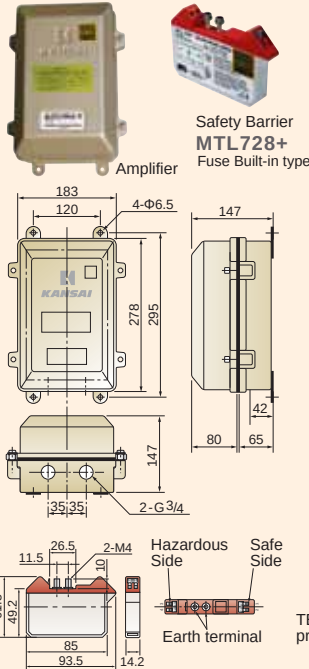
- | | |
|-----------------------|------------|
| ① Cable gland | Polyacetal |
| ② Housing | ADC |
| ③ Flange | 304SS |
| ④ Earth electrode | 304SS |
| ⑤ Insulator | Polyacetal |
| ⑥ Sheath | Teflon |
| ⑦ Main electrode wire | 304SS |
| ⑧ Weight | 304SS |

KLG

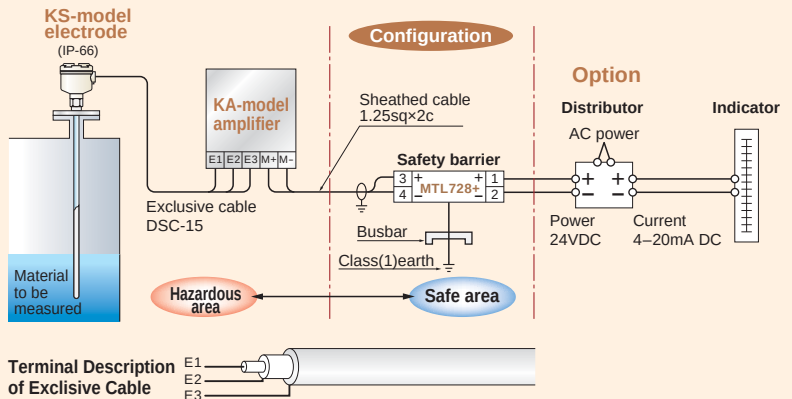
Intrinsically safe
explosion-proof model
(i)2G4 RIIS No.T44622

For Hazardous Gas Environment

Explosion-proof available
Certified by Industry Safety-Technology
Association, Labor Ministry.



Can safely be used at any explosive environment.



■ Amplifier, Specification

Power Consumption : 4 VA

Output Signal : 4 ~ 20mA DC (100Ω Max)

Measuring Sensitivity : 130pF, 300pF, 3000pF

Accuracy : (Amplifier) 1%

Weight : 6.0 kg

Housing : Outdoor Wall mounting

Length of Exclusive

Cable : Max.25 m

Enclosure Rating : IP-67

Painting Color : Hammer-net gold

■ Power, Specification (Option)

Distributor: 100 /110VAC or 200 /220V

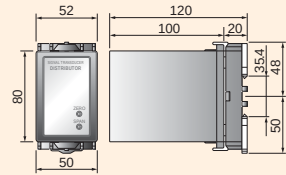
Allowable load resistance 600Ω Max

(Using Model 7552 made by

Tsuruga Electric Corp.)



Distributor



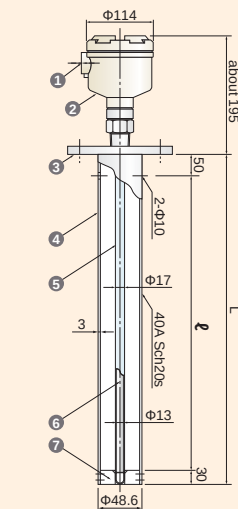
Specifications & Dimensions

*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.

KLG-2□3

G·P1·17·SP(40A)

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

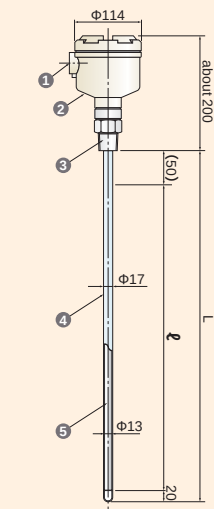


- ① Cable gland G 3/4
- ② Housing ADC
- ③ Flange 304SS
- ④ Auxiliary electrode 304SS
- ⑤ Sheath Teflon
- ⑥ Main electrode 304SS
- ⑦ Main electrode supporter Teflon

KLG-2□3

G·P1·17

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

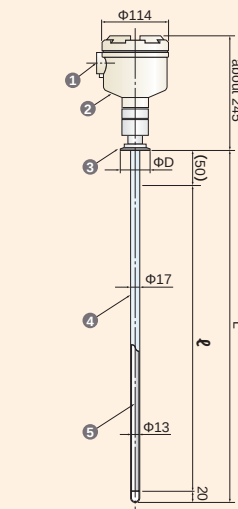


- ① Cable gland G 3/4
- ② Housing ADC
- ③ Screw 304SS
- ④ Sheath Teflon
- ⑤ Main electrode 304SS

KLG-2□3

G·P1·17·IF·1S

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

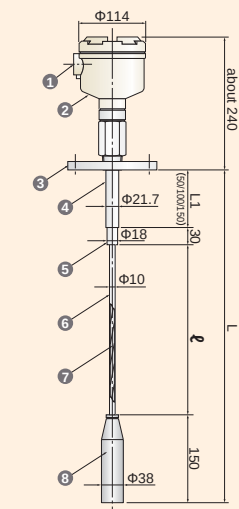


- ① Cable gland G 3/4
- ② Housing ADC
- ③ IDF Ferrule 304SS
- ④ Sheath Teflon
- ⑤ Main electrode 304SS

KLG-4□3

G·W·10P·L

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



- ① Cable gland G 3/4
- ② Housing ADC
- ③ Flange 304SS
- ④ Earth electrode 304SS
- ⑤ Insulator Polyacetal
- ⑥ Sheath Teflon
- ⑦ Main electrode wire 304SS
- ⑧ Weight 304SS

Optional Units



Meter Relay LV1000-AI-A2

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

Safety Barriers MTL 728+

Approval Proof : Intrinsically Safe 2G4

Safety Discription : Intrinsically Safe circuit

Max Volts	28V
Max Current	93mA
Max Power	650mW
Intrinsically Safe Circuit	
Permissible Volts	250VAC 250VDC

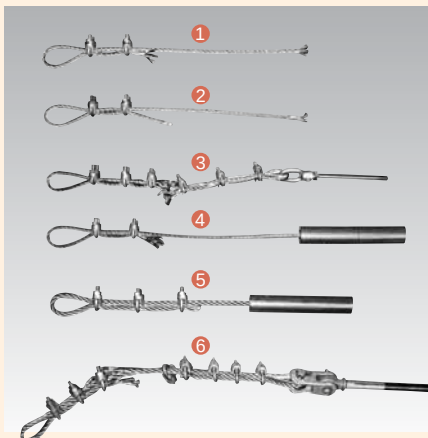
Permissible Capacitance	: 0.047 μ F
Permissible Inductance	: 2.75mH
Working Volts	: 25.5VDC
Working Current	: 50mADC
Temperature	: 60°C



CSA
Intrinsically safe

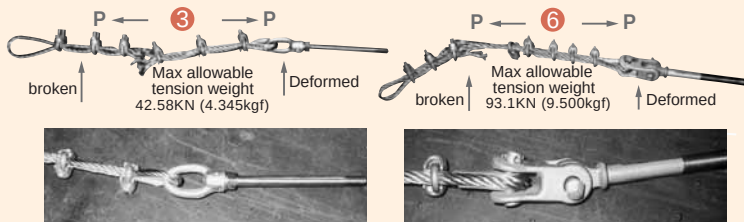
CSA: Class I, Groups A,
B, C, D; Class II, Groups
E, F, G; Class III; T3C

Tension Test Osaka Prefectural Industry Technology Research, 2/24/84



Name of parts for tension test

- ① $\Phi 8$ wire rope at lead brazing
- ② $\Phi 8$ wire rope/ prevent falling
- ③ $\Phi 8$ wire rope/ eyenut
- ④ $\Phi 8$ wire rope/ bob base
- ⑤ $\Phi 12$ wire rope/ bob base
- ⑥ $\Phi 12$ wire rope/ eyebolt



③ Description of Deformed Part

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

③ $\Phi 8$ 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.

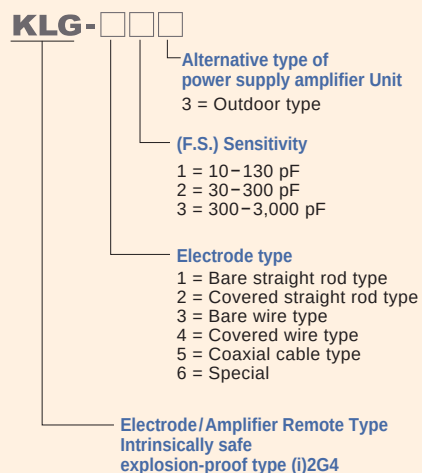
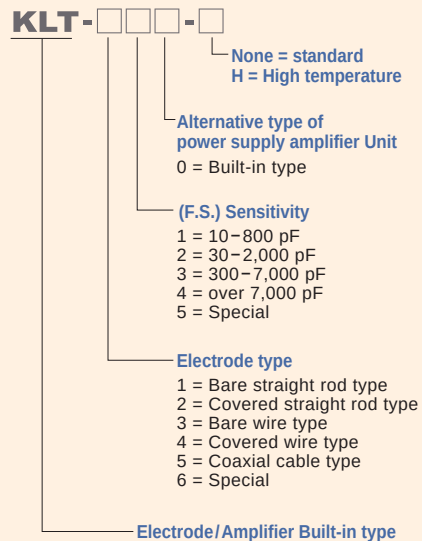
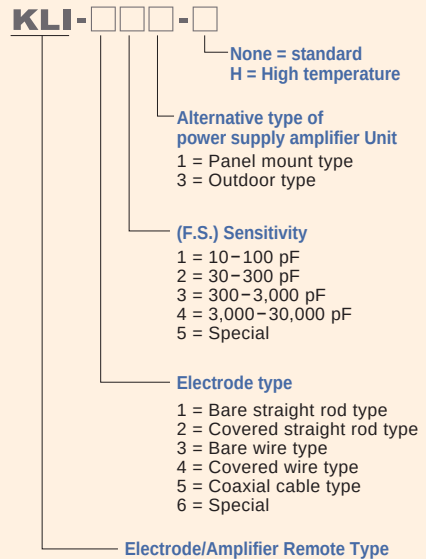
⑥ Eyebolt Portion of $\Phi 12$ Wire

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.

⑥ 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.

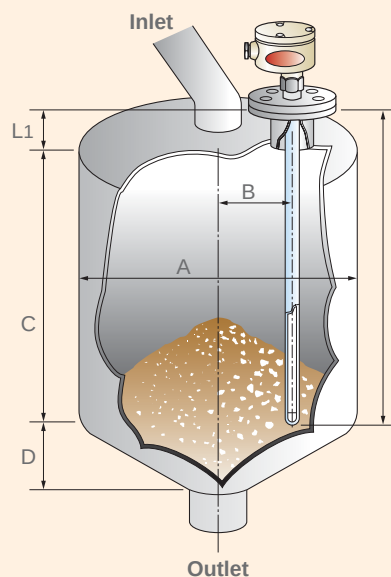
Type Designation



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

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



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

■ 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	[	]

Line of business

- Rotary Paddle Type Level Switch
- Vibration Type Level Switch
- Swing Type Level Switch
- Acoustic Level Switch
- Capacitance Type Level Switch
- Capacitive Proximity Sensor
- Capacitance Type Level Indicator
- 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.

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

KANSAI Automation Co., Ltd.

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e-mail: info@kansai-automation.co.jp

<http://www.kansai-automation.co.jp>



Tokyo Branch : 1-29-6, Hamamatsu-cho, Minato-ku, Tokyo 105-0013, Japan
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Kyushu Office : 1-2-39, Asano, Kokura Kita-ku, Kitakyushu 802-0001, Japan
TEL. 81-93-511-4741 FAX. 81-93-511-4580

Agent



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