

CAPACITANCE TYPE  
LEVEL INDICATOR  
**KLI/KLT/KLG**  
SERIES



No Moving Part, Easy to Handle!!

Wide measuring span

Cement, etc



Unaffected by dust on pneumatic conveyor

Cement, etc



Unaffected by fouling

Flour, etc



Interfacial detection of two liquids



# CLI/KLT/KLG SERIES

## CAPACITANCE TYPE LEVEL INDICATOR

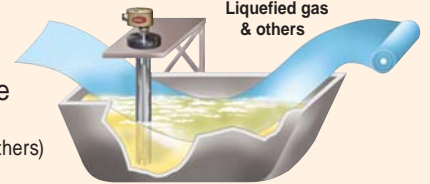
There being no moving part, it reliably operates for an extended period, and its maintenance is easy—best selling line in continuous measurement.

### Features

- Reliable detection even during the materials feeding.
- It can be applied to powder, granules, and liquid.
- Not affected by dust, it can accurately indicate.
- It is possible to select one of the most suitable sensors from a wide range of products, depending on the applicable conditions. (high temperature, high pressure, strong acid/ alkali, conductivity, insulation property, and others)
- Safely measure a long span with electrodes designed to be strong enough.
- The intrinsically safe explosion-proof model is also available in hazardous areas.

Accurate detection of minimal capacitance

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



### Operating Principle

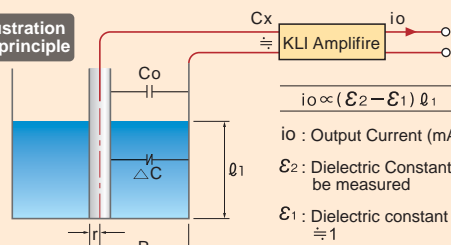
When an electrode is set in a tank to be coaxial with its wall, as shown below, there forms a capacitance  $C_x$  between the tank and the electrode. By offsetting the stray capacitance of  $C_o$ , when the tank is empty, with a high-frequency impedance bridge, it is possible to obtain  $\Delta C$ ,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

$$C_x = C_o + \Delta C$$

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

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

Illustration of principle



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

$i_o$ : Output Current (mA)

$\epsilon_2$ : Dielectric Constant of material to be measured

$\epsilon_1$ : Dielectric constant of Air  $\approx 1$



model **KLI**

Agitating vessel  
liquid, mud, etc.



**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.



Unaffected by static electricity

Resin pellet



model **KLG**

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



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

■ Applications

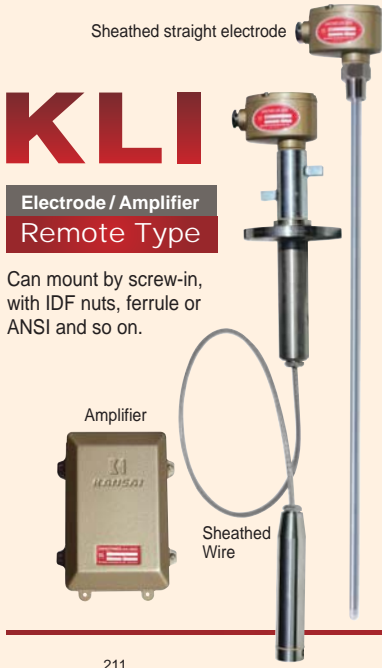
- |                   |                 |              |             |
|-------------------|-----------------|--------------|-------------|
| Molten resin      | Organic solvent |              |             |
| Flour             | Food oil        | Heavy oil    |             |
| Sludge            | Sulphuric 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**

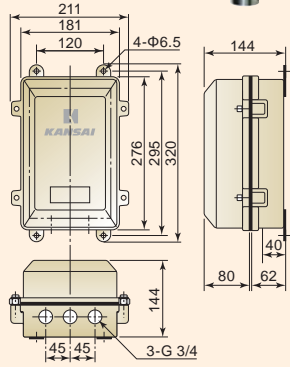
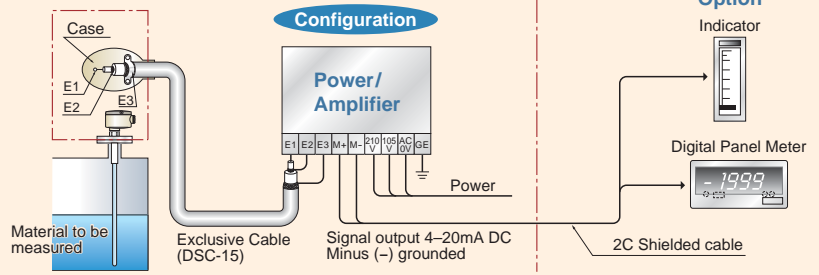
- No exclusive cable is required.
- 24VDC model can be available.





**Electrode, Specification**

- Permissibly Distributed Capacitance : 0 – 400pF (Depending on shape)
- Allowable Temperature : -25 – +80°C (Standard)  
-200 – +500°C (Special)
- Allowable Pressure : 1MPa (10kg/cm<sup>2</sup>) (Standard)
- Enclosure Rating : IP-67
- Color : Hammer-net gold



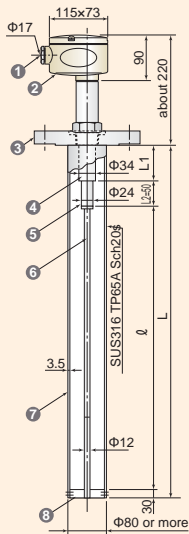
**Power/Amplifier, Specification (Outdoor wall mounting)**

- Input Power Source : 105/210VAC ±10% 50/60Hz (24VDC available)
- Power Consumption : 4VA
- Output Signal : 4-20mA DC, 500Ω Max (-) ground
- Measuring Sensitivity : 400pF, 1500pF, 6000pF, 30000pF (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 – +60°C (No Condensation or Freeze required)
- Enclosure Rating : IP-67
- Color : Hammer-net gold

**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**

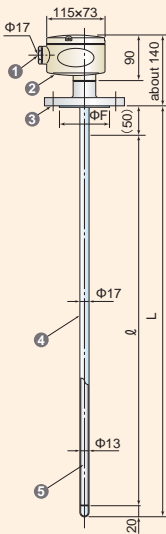
Mounting : JIS10K80A  
Temperature : -20 to +80°C  
Pressure : 1MPa  
Length of L : Max 4m



- 1 Cable Gland
- 2 Housing
- 3 Flange
- 4 Earth electrode
- 5 Insulator
- 6 Main electrode
- 7 Auxiliary electrode
- 8 Insulator supporter

**KLI-2□3**  
**K-P2-17**

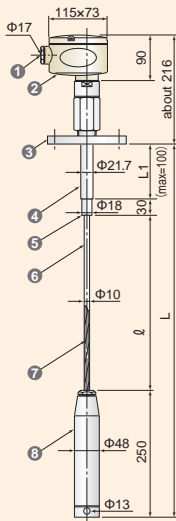
Mounting : JIS10K50A  
Temperature : -20 to +80°C  
Pressure : 1MPa  
Length of L : Max 4m



- 1 Cable gland C3604
- 2 Housing AC4B
- 3 Flange SUS304
- 4 Sheath Teflon
- 5 Main electrode SUS304

**KLI-4□3**  
**K-W-10P-(G)**

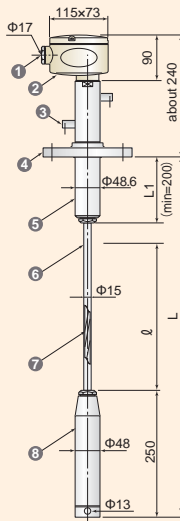
Mounting : JIS10K65A  
Temperature : -20 to +80°C  
Pressure : 1MPa  
Length of L : Max 15mm



- 1 Cable gland C3604
- 2 Housing AC4B
- 3 Flange SUS304
- 4 Earth electrode SUS304
- 5 Insulator Polyacetal
- 6 Sheathed Teflon
- 7 Main electrode wire SUS304
- 8 Weight SUS304

**KLI-4□3**  
**K-W-15P-3**

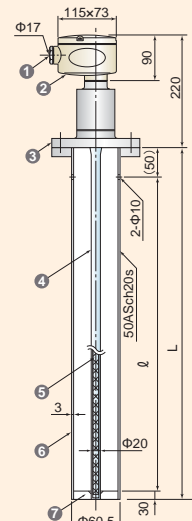
Mounting : JIS10K65A  
Temperature : -20 to +80°C  
Pressure : 1MPa  
Length of L : Max 30m



- 1 Cable gland C3604
- 2 Housing AC4B
- 3 Vent SS400
- 4 Flange SUS304
- 5 Earth electrode SUS304
- 6 Sheath Teflon
- 7 Main electrode wire SUS304
- 8 Weight SUS304

**KLI-6□3 Pyrex**  
**K-P1-20-SP (50A)**

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

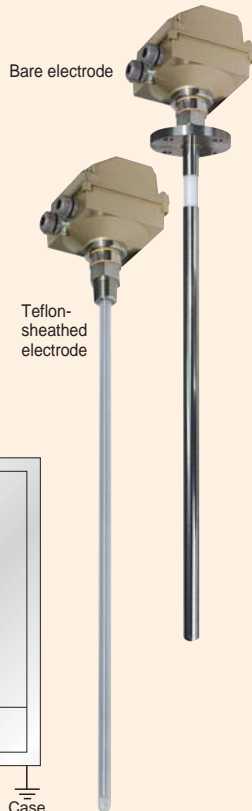


- 1 Cable gland C3604
- 2 Housing AC4B
- 3 Flange SUS304
- 4 Sheath Pyrex
- 5 Main electrode SUS304
- 6 Auxiliary electrode SUS304
- 7 Main electrode supporter Teflon

# KLT

Electrode / Amplifier  
Built-in Type

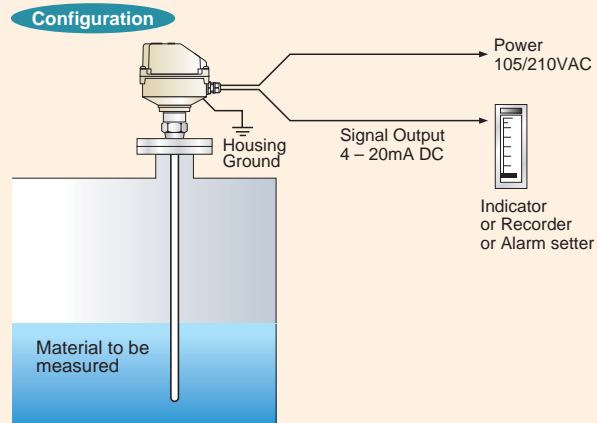
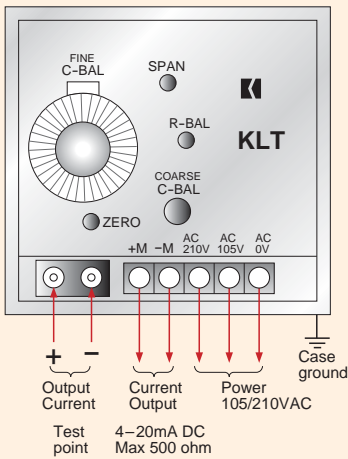
Can mount by screw-in,  
with IDF nuts, ferrule or  
ANSI and so on.



## Standard Specification

- Input Power Source : 105 /210VAC  $\pm 10\%$  50/60Hz (24VDC available)
- Power Consumption : 4VA
- Output Signal : 4 – 20mA DC, (500 $\Omega$  Max) Minus (-) grounded
- Measuring Sensitivity : 800pF, 2000pF, 7000pF, 30000pF (F.S)
- Accuracy :  $\pm 1\%$
- Permissibly Distributed Capacitance : 0 – 400pF (Depending on shape)
- Allowable Temperature : -25 – +80°C (Standard)  
-200 – +500°C (Special)
- Maximum Pressure : 980kPa
- Enclosure Rating : IP-67
- Color : Hammer-net gold

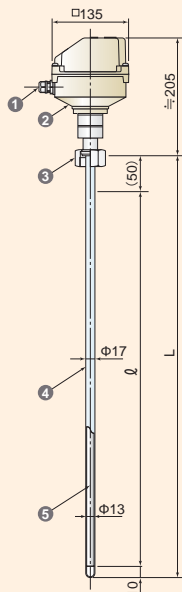
## Wiring Diagram



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□□ T-P1-17-IN1.5S

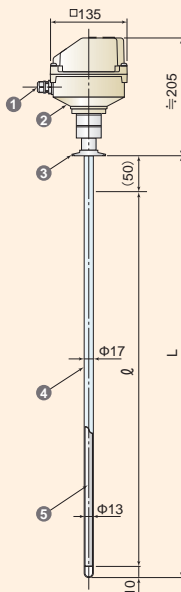
Mounting : IDF1.5S  
Temperature : -20 to +60°C  
Pressure : 300kPa  
Length of L : Max 4m



- |                  |            |
|------------------|------------|
| 1 Cable gland    | Polyacetal |
| 2 Housing        | ADC        |
| 3 IDF Union nut  | SUS304     |
| 4 Sheath         | Teflon     |
| 5 Main electrode | SUS304     |

### KLT-2□□ T-P1-17-IF1.5S

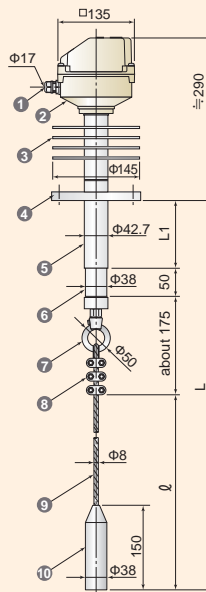
Mounting : IDF1.5S  
Temperature : -20 to +60°C  
Pressure : 1MPa  
Length of L : Max 4m



- |                  |            |
|------------------|------------|
| 1 Cable gland    | Polyacetal |
| 2 Housing        | ADC        |
| 3 IDF Ferrule    | SUS304     |
| 4 Sheath         | Teflon     |
| 5 Main electrode | SUS304     |

### KLT-3□□-H<sup>Special</sup> T-W8-B3-H3

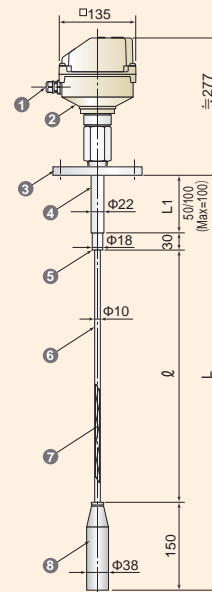
Mounting : JIS10K50A  
Temperature : -20 to +400°C  
Pressure : 1MPa  
Length of L : Max15m



- |                   |            |
|-------------------|------------|
| 1 Cable gland     | Polyacetal |
| 2 Housing         | ADC        |
| 3 Fin             | AC         |
| 4 Flange          | SUS304     |
| 5 Earth electrode | SUS304     |
| 6 Insulator       | Ceramic    |
| 7 Eye nut         | SUS304     |
| 8 Wire clip       | SUS304     |
| 9 Main electrode  | SUS304     |
| 10 Weight         | SUS304     |

### KLT-4□□ T-W-10P-L

Mounting : JIS5K50A  
Temperature : -20 to +60°C  
Pressure : 1MPa  
Length of L : Max15m



- |                       |            |
|-----------------------|------------|
| 1 Cable gland         | Polyacetal |
| 2 Housing             | ADC        |
| 3 Flange              | SUS304     |
| 4 Earth electrode     | SUS304     |
| 5 Insulator           | Polyacetal |
| 6 Sheath              | Teflon     |
| 7 Main electrode wire | SUS304     |
| 8 Weight              | SUS304     |

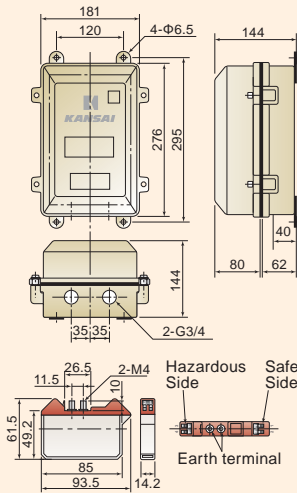
# KLG

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

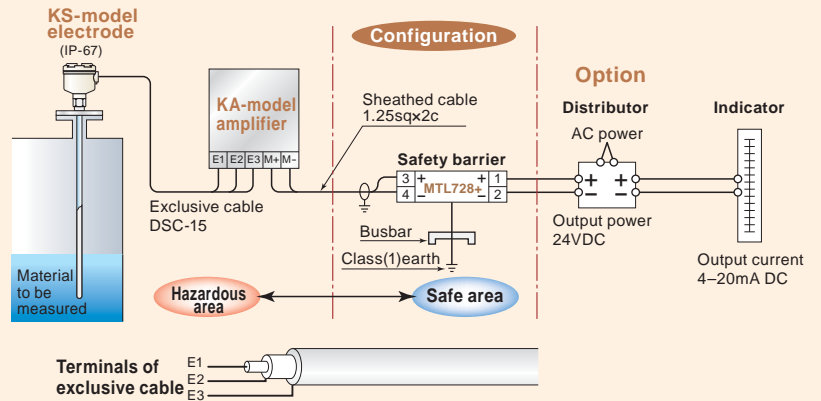
For Hazardous Gas Environment  
Explosion-proof available  
Certified by Technology Institution  
of Industrial Safety



Safety Barrier  
**MTL728+**  
Fuse Built-in type



**Can safely be used at any hazardous environment.**



### ■ Amplifier, Specification

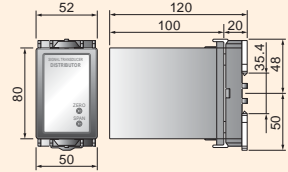
- Power Consumption : 4 VA
- Output Signal : 4 – 20mA DC (100Ω Max)
- Measuring Sensitivity : 130pF, 300pF, 3000pF (F.S)
- Accuracy : (Amplifier) ±1%
- Weight : 6.0 kg
- Housing : Outdoor Wall mounting
- Length of Exclusive Cable : Max.25 m
- Enclosure Rating : IP-67
- Painting Color : Hammer-net gold

### ■ Power, Specification (Option)

- Distributor: 100 /110VAC or 200 /220V
- Allowable load resistance 600Ω Max
- (Using Model 7552 made by Tsuruga Electric Corp.)



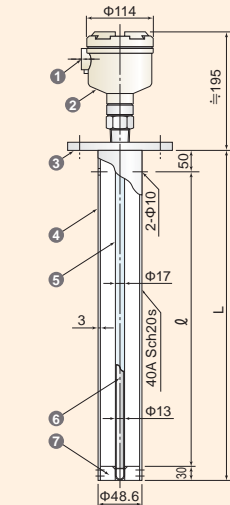
Distributor



**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)

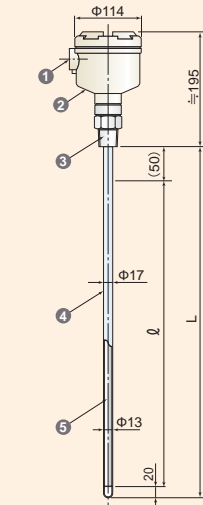
Mounting : JIS10K50A  
Temperature : -20 to +80°C  
Pressure : 1MPa  
Length of L : Max 4m



- 1 Cable gland G 3/4
- 2 Housing ADC
- 3 Flange SUS304
- 4 Auxiliary electrode SUS304
- 5 Sheath Teflon
- 6 Main electrode SUS304
- 7 Main electrode supporter Teflon

#### KLG-2□3 G-P1-17

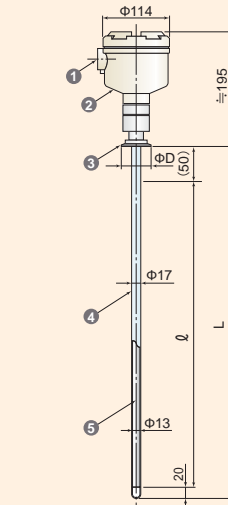
Mounting : R1  
Temperature : -20 to +80°C  
Pressure : 1MPa  
Length of L : Max 4m



- 1 Cable gland G 3/4
- 2 Housing ADC
- 3 Screw SUS304
- 4 Sheath Teflon
- 5 Main electrode SUS304

#### KLG-2□3 G-P1-17-IF-1S

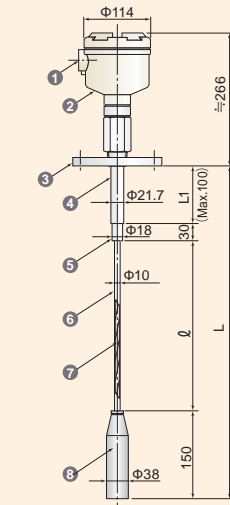
Mounting : IDF ferrule 1S  
Temperature : -20 to +80°C  
Pressure : 1MPa  
Length of L : Max 4m



- 1 Cable gland G 3/4
- 2 Housing ADC
- 3 IDF Ferrule SUS304
- 4 Sheath Teflon
- 5 Main electrode SUS304

#### 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 SUS304
- 4 Earth electrode SUS304
- 5 Insulator Polyacetal
- 6 Sheath Teflon
- 7 Main electrode wire SUS304
- 8 Weight SUS304

## Optional Units



### Meter Relay LV1000-AI-A2

Power supply : AC85 to 264V (50/60Hz)  
 DC12 to 24V  $\pm 10\%$  (Option)  
 Power consumption : Max.23VA(Option DC type 10W)  
 Sensor supply voltage : DC24V  $\pm 5\%$  Max.150mA  
 Analog Current : DC4 to 20mA  
 Output : (Resistance load Max.500 $\Omega$ )  
 Alarm contact output : AC250V 0.3A /DC30V 2A  
 Feature : 21 points linearize function,  
 Max. 4 points available for  
 alarm contact output  
 (2 points for standard)

### SAFTY BARRIERS MTL728+

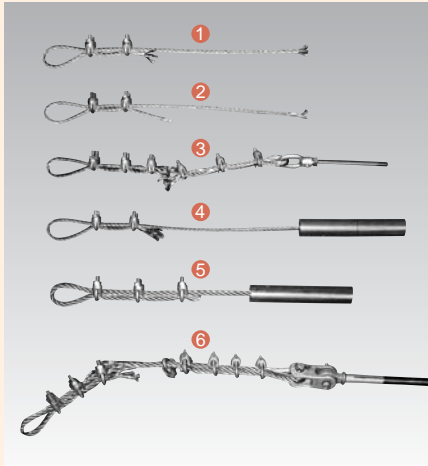
Approval Proof : Intrinsically Safe  
 Safty Discription : Intrinsically Safe circuit

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

Permissible Capacitance : 0.047 $\mu$ F  
 Permissible Inductance : 2.75mH  
 Working Volts : 25.5VDC  
 Working Current : 50mADC  
 Temperature : 60 $^{\circ}$ C

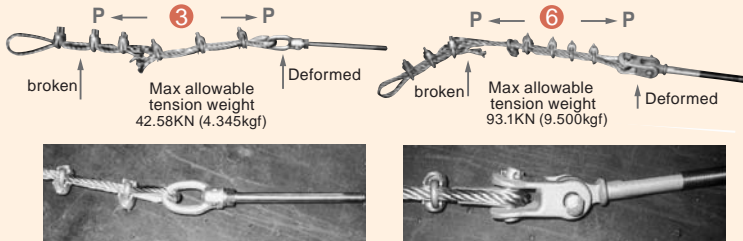


## Tension Test Osaka Prefectural Industry Technology Research, 2/24/84



### Name of parts for tension test

- 1  $\Phi 8$  wire rope at lead brazing
- 2 Same as above. For preventing the falling
- 3  $\Phi 8$  wire rope/ eyenut
- 4  $\Phi 8$  wire rope/ bob Weight
- 5  $\Phi 12$  wire rope/ bob Weight
- 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.

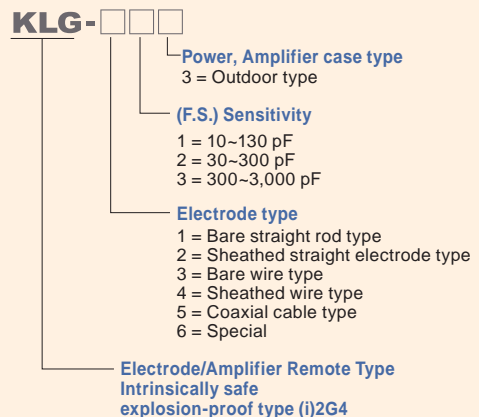
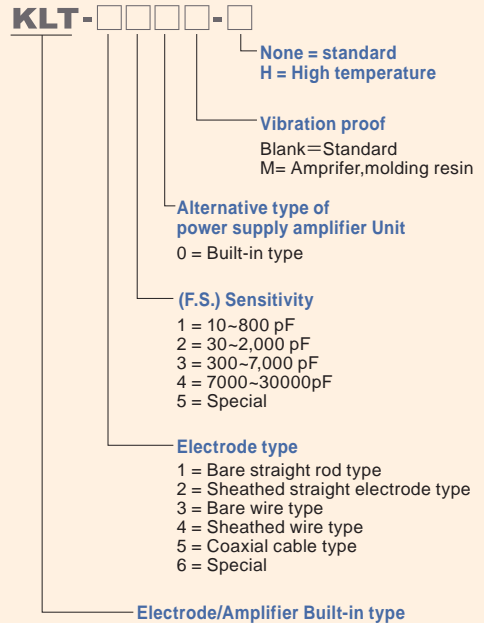
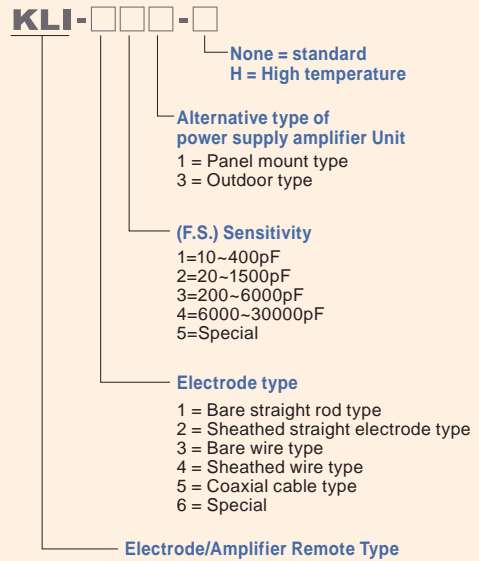
### 6 Eyebolt Portion of $\Phi 12$ Wire

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

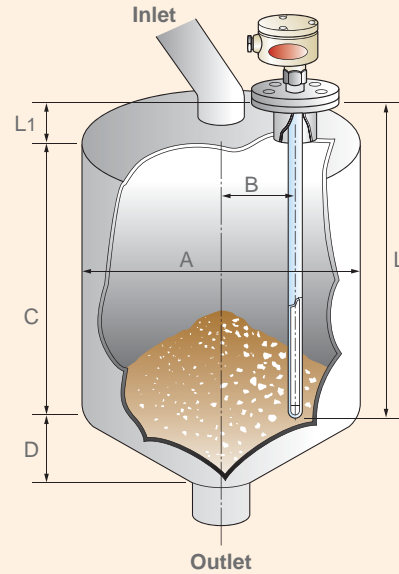


\*As for the model of "Pyrex" and "Special", please check with our Sales staff.



## Please inform us of the following when inquiring and ordering

1. Name of substance to be measured	[	]
2. Dielectric constant, Specific resistance	[	]
3. Particle size	[	]
4. Viscosity / Agglomerating	[ Yes • No	]
5. Corrosive	[ Yes • No	]
6. Foamy	[ 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 (Supplied with the sensor)	[	]
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 Installation Location	[	]
L Length of Electrode	[	]
L1 Height of Nozzle installed	[	]
∅ 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
- 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.

General Manufacturer of Level Controllers for Powder, Granules, and Liquid

**KANSAI Automation Co., Ltd.**

#### Headquarters :

2-14, Togano-cho, Kita-ku, Osaka 530-0056, Japan  
 TEL. 81-6-6312-2071 FAX. 81-6-6314-0848  
 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  
 TEL. 81-3-5777-6931 FAX. 81-3-5777-6933

**Nagoya Office:** 3-10-17, Uchiyama, Chigusa-ku, Nagoya 464-0075, Japan  
 TEL. 81-52-741-2432 FAX. 81-52-741-1588

**Hiroshima Office:** 13-11, Noborimachi, Naka-ku, Hiroshima 730-0016, Japan  
 TEL. 81-82-222-1555 FAX. 81-82-222-1556

**Kyushu Office:** 1-1-21, Komemachi, Kokura Kita-ku, Kitakyushu 802-0003, Japan  
 TEL. 81-93-511-4741 FAX. 81-93-511-4580



official site



Agent

**SCIGATE**  
Your Automation Partner



SCIGATE AUTOMATION (S) PTE LTD

No.1 Bukit Batok Street 22 #01-01 Singapore 659592

Tel: (65) 6561 0488 Fax: (65) 6562 0588

Email: sales@scigate.com.sg Web: www.scigate.com.sg

Business Hours: Monday - Friday 8.30am - 6.15pm