



Humidity Sensor

# CHS Series

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# Humidity Sensor

Product compatible with RoHS directive

## Overview of the CHS Series

### APPLICATION

Refrigerators (The dew condensation prevention),  
 air conditioners (indoor humidity control), ,  
 PPCs, LBP printers (image quality control),  
 industrial electronic humidity sensors, air conditioners for plant factories, etc.

### PRODUCT LINEUP


#### Assembly

Type	Driving range	Guaranteed measurement accuracy range	Accuracy	Driving Voltage	Output voltage	Shapes	Dimensions	
CHS-UPS	5 to 95%RH 0 to +50°C	5 to 95%RH +25°C	±3%RH	5VDC	0 to 1.0V	SQUARE TYPE	27×11.5×6.5	
CHS-UPR						ROUND TYPE	ø20×9	
CHS-UGS		20 to 85%RH +25°C	±5%RH			SQUARE TYPE	27×11.5×6.5	
CHS-UGR						ROUND TYPE	ø20×9	
CHS-MSS		50%RH +25°C	±7%RH			PCB ASSY	SQUARE TYPE	20×10×5
CHS-CGC5-28								

#### Element

Type	Driving range	Guaranteed measurement accuracy range	Accuracy	Driving Voltage	Output voltage	Shapes	Dimensions
CHS-ESS-CA5	5 to 95%RH 0 to +50°C	50%RH +25°C	±5%RH	AC5V max.	1k to 80M Ω (AC1V/1kHz)	SQUARE TYPE	9.0×6.5×3.7

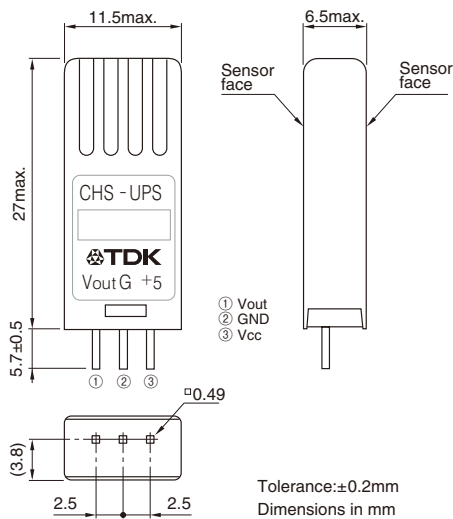
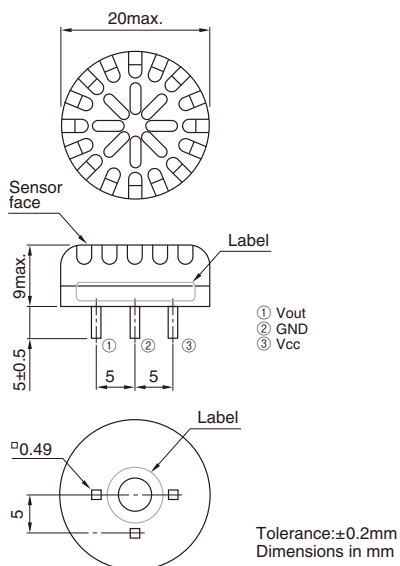
 RoHS Directive Compliant Product: See the following for more details related to RoHS Directive compliant products. <http://product.tdk.com/en/environment/rohs/>

 Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use.  
 Please note that the contents may change without any prior notice due to reasons such as upgrading.

## Assembly • Sensor units with built-in circuits

**CHS-UPS, -UPR, -UGS, -UGR****FEATURES**

- Guarantee a measurement accuracy of  $\pm 3\%$  RH in the humidity range of 5 to 95% RH.
- They are highly accurate. The nominal accuracy for the CHSUPR and CHR-UPS is within  $\pm 3(\%)$  RH.
- Characteristics are stable over a wide temperature range.
- Dry and wet characteristics exhibit virtually no hysteresis.
- Highly cost-effective and compact, requiring extremely little mounting space.
- Low current consumption.
- Outputs DC.1V at 100(%)RH; relative humidity can be read directly with a voltmeter.
- All-in-one construction integrates sensor with support circuitry. The entire module operates off a 5V power supply.

**SHAPE & DIMENSIONS****CHS-UGS, -UPS****CHS-UGR, -UPR**

Assembly • Sensor units with built-in circuits

# CHS-UPS, -UPR, -UGS, -UGR

## MAXIMUM RATINGS (Ta=25°C)

Power supply voltage Edc	7V max.
Operating conditions	0 to +50°C, power supply voltage of 5 V, no dew condensation
Storage conditions	-20 to +60°C, no dew condensation

## TYPICAL ELECTRICAL CHARACTERISTICS

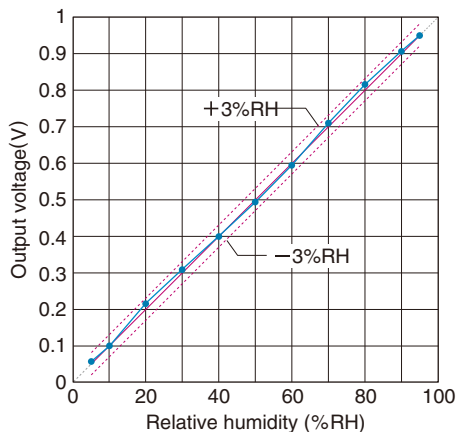
Item	Min.	Standard	Max.	Condition	
Measurement accuracy(%RH)	CHS-UPS, -UPR		-3	+3	E <sub>dc</sub> =5V, 25°C, 5 to 95%RH
	CHS-UGS, -UGR		-5	+5	E <sub>dc</sub> =5V, 25°C, 5 to 95%RH
Driving Voltage E <sub>dc</sub> (V)	4.75	5	5.25		
Operating current(mA)			0.6	E <sub>dc</sub> =5V, 25°C	
Output voltage(mV)/%RH		10		E <sub>dc</sub> =5V, 25°C, 5 to 95%RH	
Output impedance(kΩ)		200*		at DC	
Hysteresis(%RH)		=0		Stable time: 20min	
Temperature dependency(%RH)	-5		+5	E <sub>dc</sub> =5V, 25°C standard, +5 to 45°C, 5 to 95%RH	
Response time(min)		1		1 Response time to reach 90% of actual humidity from 30 to 85% RH	
Recommended operating temperature(°C)	+5		+45	E <sub>dc</sub> =5V, no dew condensation	

\* Reference value

### Example of sensor linearity characteristics

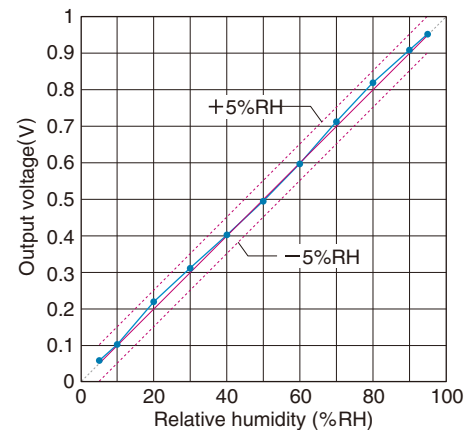
CHS-UPS, -UPR

at E<sub>dc</sub>=5V, Ta=25°C, 5% to 95%RH



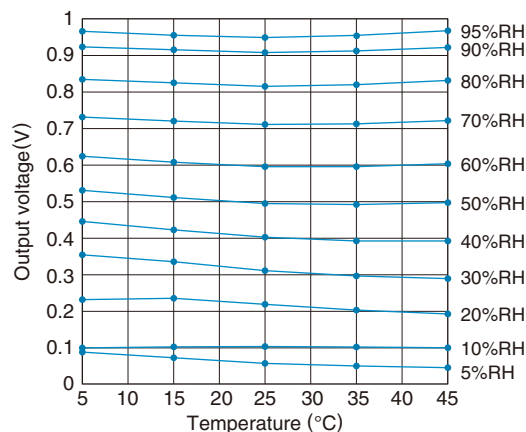
CHS-UGS, -UGR

at E<sub>dc</sub>=5V, Ta=25°C, 5% to 95%RH



### Example of thermal characteristics(Temperature dependency)

at E<sub>dc</sub>=5V, +5 to +45°C, 5% to 95%RH



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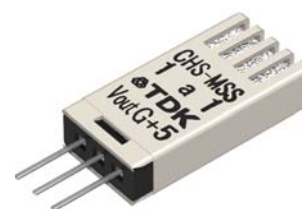
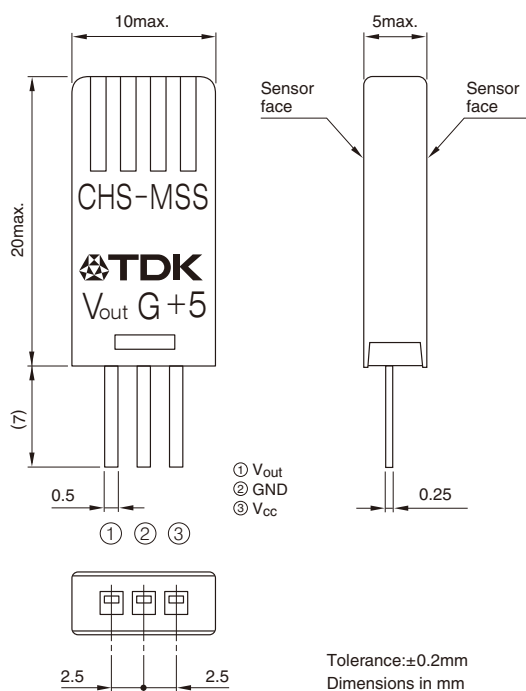
# Assembly • Sensor units with built-in circuits

## CHS-MSS

### FEATURES

- A compact type that is the smallest and lightest in the series.
- Guarantees a measurement accuracy of  $\pm 5\%$  RH in the humidity range of 20 to 85% RH.
- Sensor units with built-in circuits that output an Edc of 10 mV per 1% RH when connected to a 5 V power supply.
- Feature low current consumption (0.6 mA with an operating voltage of 5 V at 25°C).
- Dry and wet characteristics exhibit virtually no hysteresis.

### SHAPE & DIMENSIONS



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Assembly • Sensor units with built-in circuits

# CHS-MSS

## MAXIMUM RATINGS (Ta=25°C)

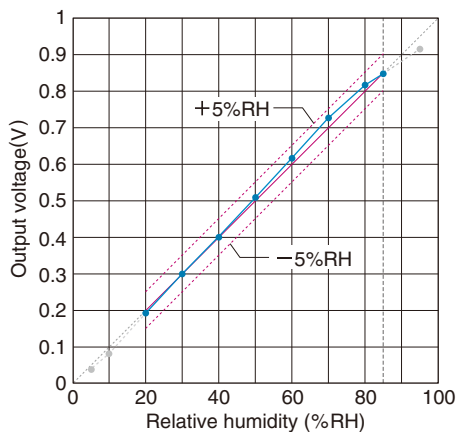
Power supply voltage Edc	7V max.
Operating conditions	0 to +50°C, power supply voltage of 5 V, no dew condensation
Storage conditions	-20 to +60°C, no dew condensation

## TYPICAL ELECTRICAL CHARACTERISTICS

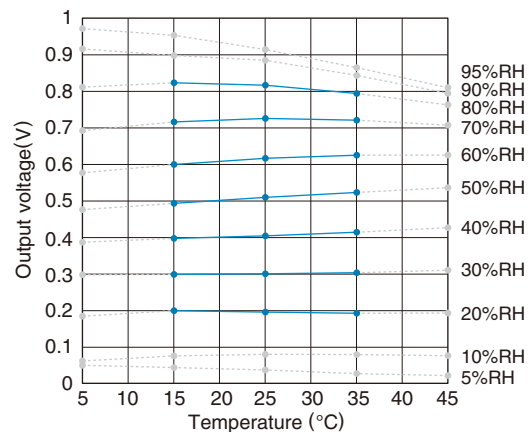
Item	Min.	Standard	Max.	Condition
Driving Voltage Edc(V)	4.75	5	5.25	
Operating current(mA)			0.6	E <sub>dc</sub> =5V, 25°C
Output voltage(mV)/%RH		10		E <sub>dc</sub> =5V, 25°C, 20 to 85%RH
Output impedance(kΩ)		200*		at DC
Measurement accuracy(%RH)	-5		+5	E <sub>dc</sub> =5V, 25°C, 20 to 85%RH
Hysteresis(%RH)		=0		Stable time: 20min
Temperature dependency(%RH)	-5		+5	E <sub>dc</sub> =5V, 25°C standard, +15 to 35°C, 20 to 85%RH
Response time(min)		1		1 Response time to reach 90% of actual humidity from 30 to 85% RH
Recommended operating temperature(°C)	+15		+35	E <sub>dc</sub> =5V, no dew condensation

\* Reference value

Example of sensor linearity characteristics  
at E<sub>dc</sub>=5V, Ta=25°C, 20% to 85%RH



Example of thermal characteristics (Temperature dependency)  
at E<sub>dc</sub>=5V, +15 to +35°C, 20% to 85%RH



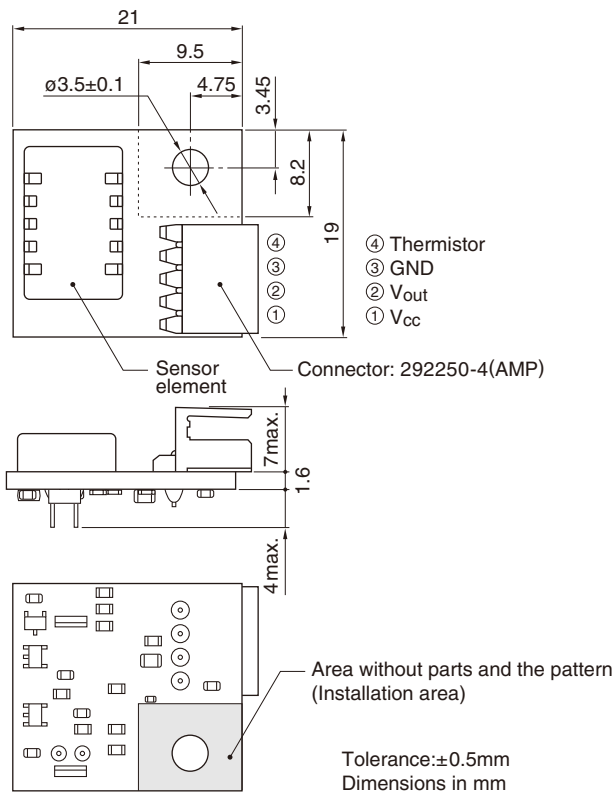
## Assembly • Sensor units with built-in circuits

## CHS-CGC5-28

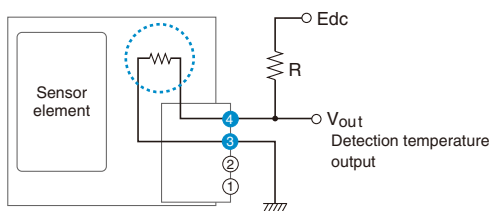
## FEATURES

- A small sensor element and connector are mounted on a PCB on which a circuit is provided.
- Guarantees a measurement accuracy of  $\pm 7\%$  RH at a humidity of 50 % RH.
- Outputs power suitable to the measured humidity when connected to a 5 V power supply.
- The hysteresis of the dry and wet characteristics is about 1% RH.
- Equipped with a thermistor for humidity detection.

## SHAPE &amp; DIMENSIONS



## BUILT-IN SENSOR (THERMISTOR) CONNECTION EXAMPLE



Assembly • Sensor units with built-in circuits

# CHS-CGC5-28

## MAXIMUM RATINGS (Ta=25°C)

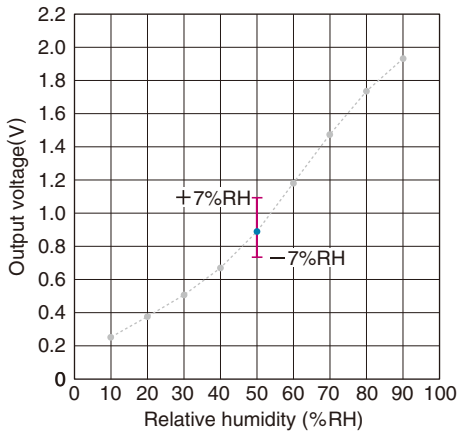
Power supply voltage Edc	7V max.
Operating conditions	0 to +50°C, power supply voltage of 5 V, no dew condensation
Storage conditions	-20 to +60°C, no dew condensation

## TYPICAL ELECTRICAL CHARACTERISTICS

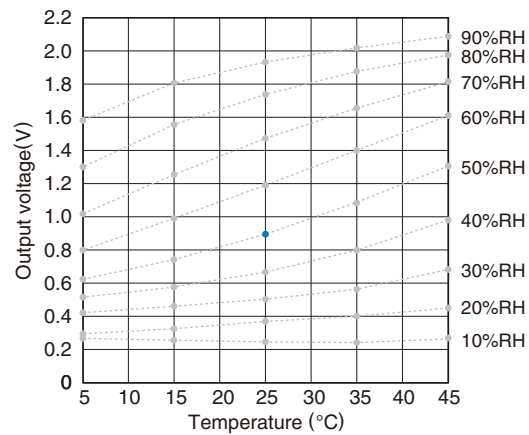
Item	Min.	Standard	Max.	Condition
Driving Voltage Edc(V)	4.75	5	5.25	
Operating current(mA)			2	E <sub>dc</sub> =5V, 25°C
Output impedance(kΩ)		100*		at DC
Measurement accuracy(%RH)	-7		+7	E <sub>dc</sub> =5V, 25°C, at 50%RH
	0.724V	0.89V	1.096V	
Hysteresis(%RH)		=0		Stable time: 20min
Response time(min)		1		1 Response time to reach 90% of actual humidity from 30 to 85% RH

\* Reference value

Example of sensor linearity characteristics  
at E<sub>dc</sub>=5V, Ta=25°C, 50%RH



Example of thermal characteristics (Temperature dependency)  
at E<sub>dc</sub>=5V, 25°C, 50%RH

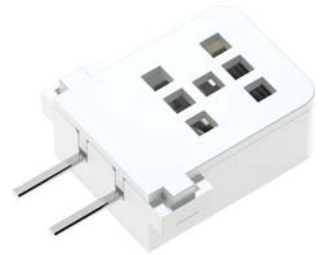
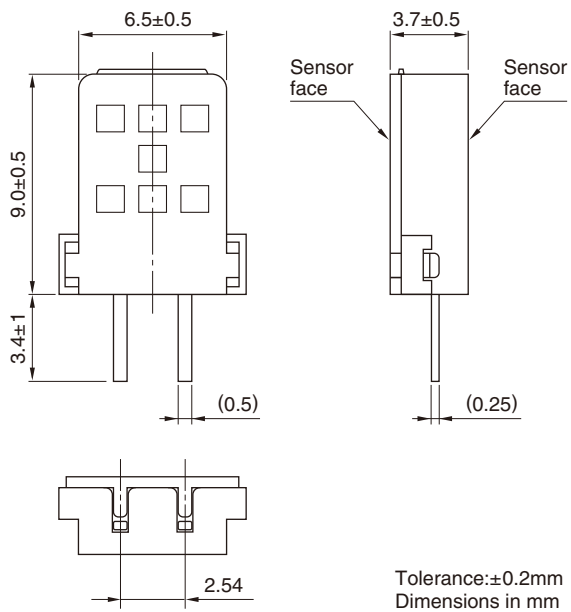




## Element

**CHS-ESS-CA5****FEATURES**

- A variable resistance humidity sensor with superior water and gas resistance in a small package.
- Features a large impedance change in response to humidity changes and exhibits excellent responsiveness and sensitivity.
- Guarantees a measurement accuracy of  $\pm 5\%$  RH at a humidity of 50 % RH.
- The hysteresis of the dry and wet characteristics is suppressed at about 1% RH.

**SHAPE & DIMENSIONS**

Element

# CHS-ESS-CA5

## MAXIMUM RATINGS (Ta=25°C)

Power supply voltage Edc	7V max.
Operating conditions	0 to +60°C, 10 to 90%RH, no dew condensation
Storage conditions	-20 to +85°C, 5 to 95%RH, no dew condensation

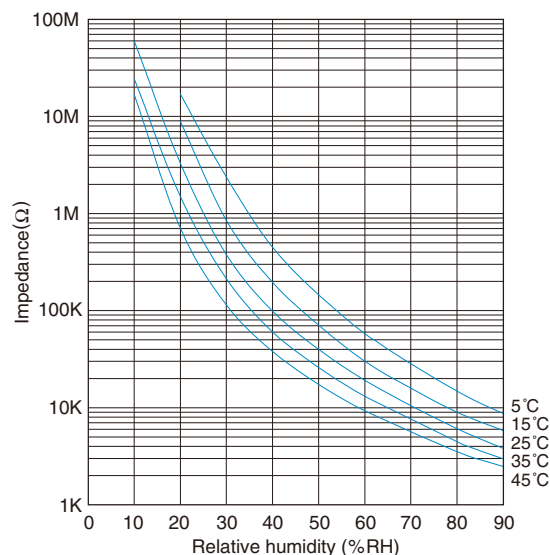
## TYPICAL ELECTRICAL CHARACTERISTICS

Item	Min.	Standard	Max.	Condition
Driving Voltage Edc(V)			5	
Operating current(mA)			0.5	
Output impedance(kΩ)	26	40	62	25°C, at 50%RH
Measurement accuracy(%RH)	-5		+5	Edc=5V, 25°C, at 50%RH
	26kΩ	40kΩ	62kΩ	
Hysteresis(%RH)			1	
Response time(min)		1		1 Response time to reach 90% of actual humidity from 30to 85% RH

\* Reference value

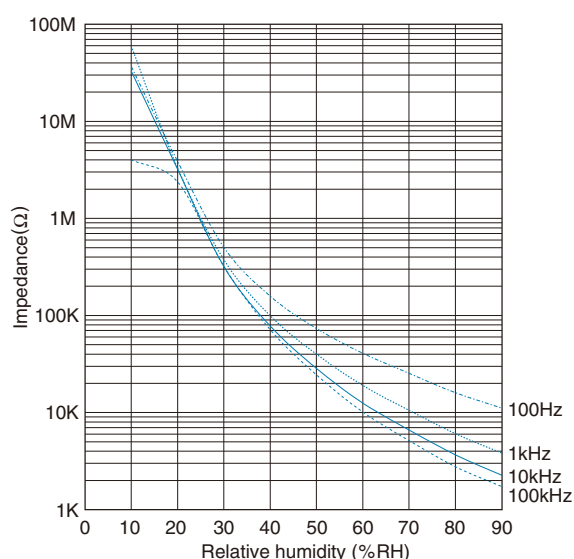
### Impedance-humidity characteristics (by temperature)

at Edc=1V, 1kHz



### Impedance-humidity characteristics (by frequency)

at Edc=1V, 25°C



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# CHS Series

## ■ Handling Precautions

### For all CHS Series products

- Please request the delivery specification form containing more detailed information on characteristics and specifications, so as to ensure correct and safe use of the products.
- Operating life of the products becomes shorter depending on the environmental conditions. If you place emphasis on the stable operation period, please confirm the operating life in the actual environment in advance.

#### [Storage Environment]

- Check the standards concerning the storage conditions described in the delivery specifications of the products, and store them in accordance with the standards.
- It is recommended that the products be stored in an airtight container with silica gel.
- Avoid storing the products in environments in which corrosive gases are generated, enter, or stagnate, or in dusty environments.
- Storage in high temperature and high-humidity environments, environments where dew condensation occurs, or environments where sudden temperature changes may cause deterioration of the moisture sensitive film, resulting in fluctuations of output exceeding the guaranteed range. If the products have been stored in such environments, check their characteristics before use.
- Storage in environments where products may come into contact with water or saltwater may cause deterioration of the moisture sensitive film, resulting in fluctuations of output exceeding the guaranteed range. If the products have been stored in such environments, check their characteristics before use.
- Storage for an extended period of time may cause deterioration of the moisture sensitive film, resulting in fluctuations of output exceeding the guaranteed range. If the products have been stored for an extended period of time, check their characteristics before use.

#### [Usage Environment/Operating Conditions]

- As for operating conditions and operating conditions of the products, check the standards concerning the operating conditions described in the delivery specifications, and use the products in accordance with the standards.
- Generation, influx, or stagnation of corrosive gases or a large amount of dust may become a cause of deterioration of the moisture sensitive film, resulting in fluctuations of output exceeding the guaranteed range.
- High temperature and high humidity, dew condensation, or sudden temperature changes may become a cause of deterioration of the moisture sensitive film, resulting in fluctuations of output exceeding the guaranteed range.
- Environments where the products come into contact with water or saltwater may become a cause of deterioration of the moisture sensitive film, resulting in fluctuations of output exceeding the guaranteed range.

#### [Product Handling]

- Do not apply excessive mechanical shock to the products, such as dropping.
- Do not cover the sensor face of the products when mounting.
- Pay attention not to apply excessive stress on the main unit when forming terminals.
- In processes in which a flux decomposition gas is generated, such as flow soldering, take measures to prevent corrosive gases from entering into the product, such as applying a temporary seal on the opening of the main unit (corrosive gases may become a cause of deterioration of the moisture sensitive film, resulting in fluctuations of output exceeding the guaranteed range).

## Element type

#### [Usage Environment/Operating Conditions]

- The rated voltage of this product is  $E_{ac}$  5 V max. Please be reminded that serious damage including electrolysis or peeling of the moisture sensitive material may occur if a direct current is applied to the products. In addition, please keep in mind that there may be similar impacts that occur in the case of direct current application will occur even when applying an alternating current, due to (1) residual direct current or (2) asymmetrical waveforms.

## ■ Other Requests/Notices

- We will not assume any responsibility for damage caused by use outside the ranges or conditions defined in the delivery specifications.
- Specifications of the products in this catalog are subject to change without notice, due to improvements or other reasons. In addition, supply of the products may be canceled without notice.