



# GAP-SENSOR

Non-Contact Displacement Measuring System

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## The GAP-SENSOR

The GAP-SENSOR is a non-contacting measuring system, capable of measuring displacement, vibration, rotation and the gauging distance with high accuracy. The GAP-SENSOR may be used in numerous applications, such as large compressors of turbines as well as measurement of vibration levels in rotating and reciprocation equipment . Other applications include observation and measurement of motion , position, speed and thickness of conductive surfaces.

A choice of the models and the probes for ultra-low temperature, water, oil high pressure, high temperature, high speed, is available depending upon applications. The GAP-SENSOR has a large demand for its high reliability, easy access, and moderate price.

The GAP-SENSOR is used for the Floating Controls of HSST of Japan Air Line introduced first in Japan because of the high quality product manufactured by the specialist, and is also employed to observe vibration of the Water Turbine Shaft of the Venezuelan hydroelectric power station, which is the largest in the world.

## FEATURES

NON-CONTACTING MEASUREMENT OF DISPLACEMENT AND VIBRATION  
RANGING FROM DC TO 20 KHz.

HIGH SENSITIVITY AND EXCELLENT LINEARITY.

HIGH RESOLUTION AND EXCELLENT STABILITY.

COMPLETELY MOLDED PROBE NOT AFFECTED BY VIBRATION, HEAT WATER, OR OIL

SMALL SIZE AND RUGGED CONSTRUCTION.

LOW COST

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# CONTENTS (Product Lineup)

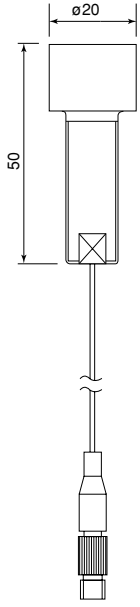
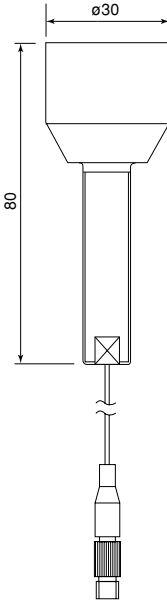
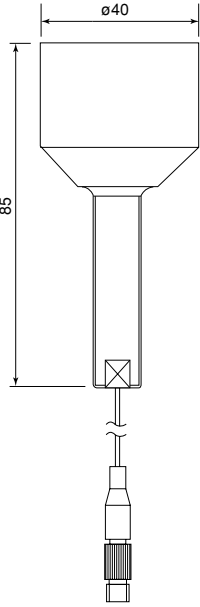
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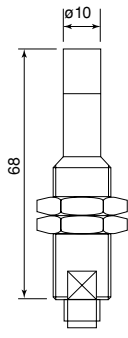
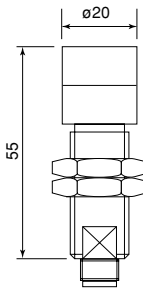
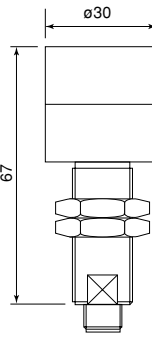
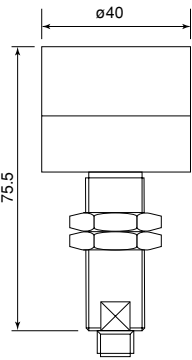
# Sensor Specifications

Model	PU-01	PU-015A	PU-02A	PU-03A
Standard outline view				
Gap measuring range	0 to 0.15mm	0 to 0.3mm	0 to 0.5mm	0 to 1mm
Resolution	0.5μm	0.5μm	0.5μm	0.5μm
Temperature range	-20°C to +120°C	-20°C to +180°C	-20°C to +180°C	-20°C to +180°C
Page	06	07	08	09

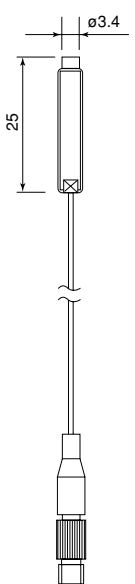
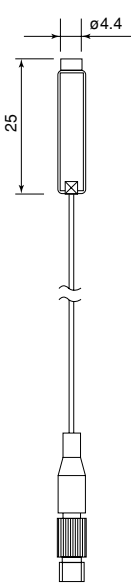
Model	PU-05	PU-07	PU-09	PU-14
Standard outline view				
Gap measuring range	0 to 2mm	0 to 3mm	0 to 4mm	0 to 6mm
Resolution	0.5μm	1μm	1μm	2μm
Temperature range	-20°C to +180°C	-20°C to +120°C	-20°C to +120°C	-20°C to +120°C
Page	10	11	12	13

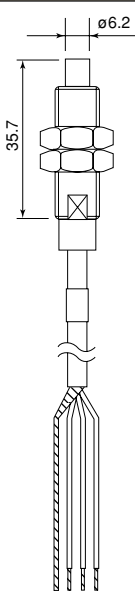
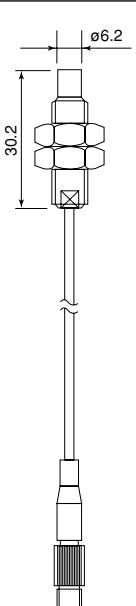
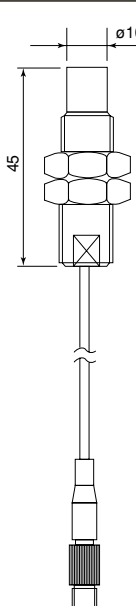
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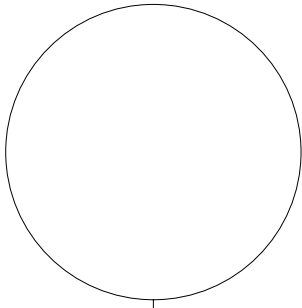
Model	PU-20	PU-30	PU-40	
Standard outline view				
Gap measuring range	0 to 8mm	0 to 12mm	0 to 16mm	
Resolution	3μm	4.5μm	6μm	
Temperature range	-20°C to +120°C	-20°C to +120°C	-20°C to +120°C	
Page	14	15	16	

Model	DPU-10A	DPU-20A	DPU-30A	DPU-40A
Standard outline view				
Gap measuring range	0 to 5mm	0 to 10mm	0 to 15mm	0 to 20mm
Resolution	2μm	4μm	5μm	6μm
Temperature range	-20°C to +80°C	-20°C to +80°C	-20°C to +80°C	-20°C to +80°C
Page	24	25	26	27

# Sensor Specifications

Model	PF-02	PF-03		
Standard outline view				
Gap measuring range	0 to 0.6mm	0 to 1mm		
Resolution	1.2μm	1.2μm		
Temperature range	-20°C to +140°C	-20°C to +140°C		
Page	32	33		

Model	ML-06	S-06	S-10	
Standard outline view				
Gap measuring range	0 to 1.2mm	0 to 2.4mm	0 to 4mm	
Resolution	1μm(59B during the use)	0.5μm	1μm	
Temperature range	-20°C to +105°C	-20°C to +180°C	-20°C to +120°C	
Page	40	52	53	



## Gap-sensor ■ **AEC-55 Series**

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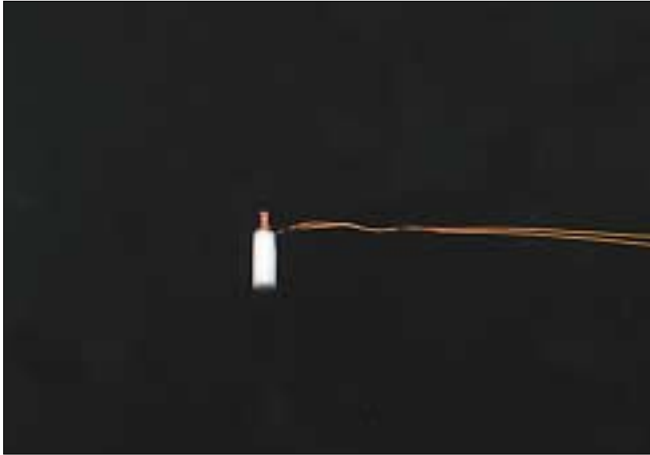
- Sensor PU model
  - Size  $\varnothing 0.93\text{mm}$  to 40mm
  - Resolution  $0.5\mu$  to (minimum)
  - Heat resistance temperature
  - 120°C or 180°C

# AEC-55 Series

Sensor : **PU-01**

Adopted converters : AEC-5501 55MS-S

Adopted cables : PC model cable  
: PCT model cable



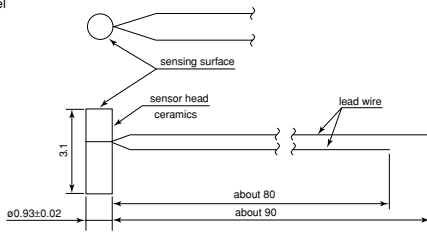
## Specifications

model	Sensor : PU-01	
measuring range (iron)	0 to 0.15mm ( $\alpha$ 0 : 0mm)	
output voltage	0 to 1.5V (0.1mm/V)	
adopted converter	5501	55MS-S
resolution	0.5 $\mu$ m	0.8 $\mu$ m
linearity	less than $\pm$ 3% of full scale	
temperature range	-20°C to 120°C	
thermal characteristics	$\pm$ 0.3 $\mu$ m/°C of drift between -20°C and 120°C	

※ See p86 about dead zone  $\alpha$  0.

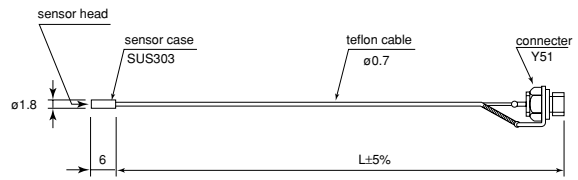
## Appearance

PU-01 model

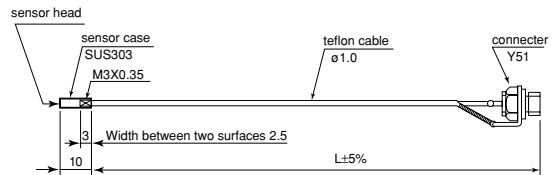


## Ordered profile

PU-01-002-XYZ model



PU-01-003-XYZ model



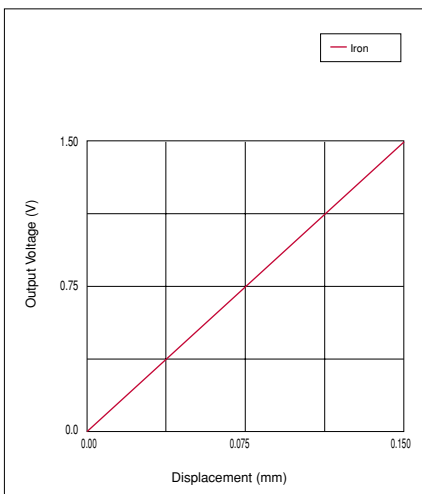
XYZ in model represents cable length, example 401 represents 400mm and 102 represents 1000mm.

## Features and specifications

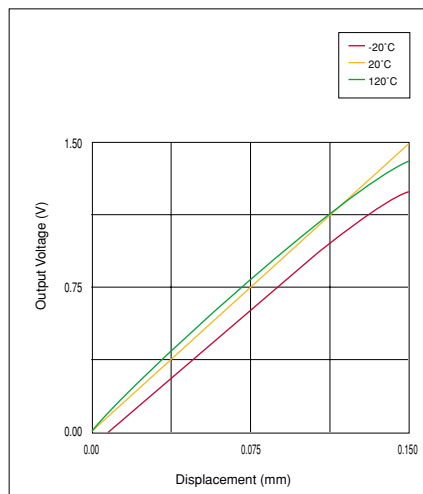
- Super miniature sensor
- Acceptable for orders such as vacuum and water resistance type
- Acceptable for an order of a requested size such as the total length of a sensor
- Ready for the shield type sensors with dimension of  $\phi$ 1.8 X 6mm (for example without screws: PU-01-002, and with screws: : PU-01-003)

※Special specification and profile need to match the conditions of use.  
Please do not hesitate to contact us concerning your requests.

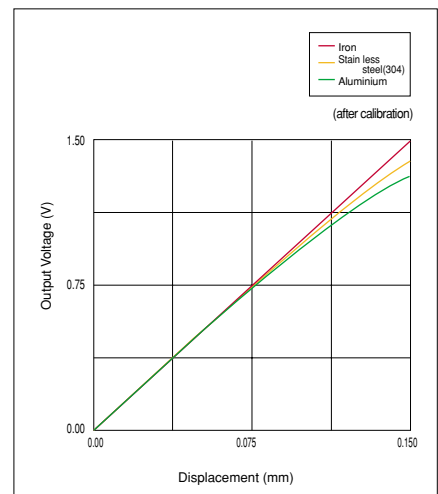
## Output characteristics / linearity



## Thermal characteristics



## Variation depending on target materials





# AEC-55 Series

Sensor : **PU-015A**

Adopted converters : AEC-55015 55MS-S 55015HF

Adopted cables : PC model cable  
: PCT model cable

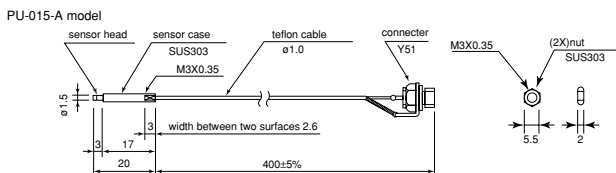


## Specifications

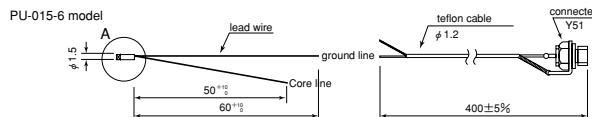
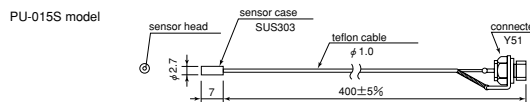
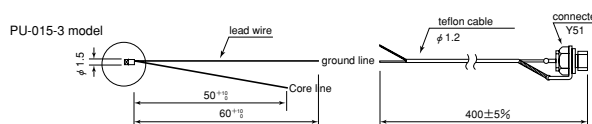
model	Sensor : PU-015A		
measuring range (iron)	0 to 0.3mm ( $\alpha$ 0 : 0mm)		
output voltage	0 to 3V (0.1mm/V)		
adopted converters	55015	55MS-S	55015HF
resolution	0.5 $\mu$ m	0.8 $\mu$ m	0.8 $\mu$ m
linearity	less than $\pm 1.7\%$ of full scale		
temperature range	-20°C to 180°C		
thermal characteristics	$\pm 0.9\mu\text{m}/^\circ\text{C}$ of drift between -20°C and 0°C $\pm 0.7\mu\text{m}/^\circ\text{C}$ of drift between 0°C and 180°C		

※ See p86 about dead zone  $\alpha$  0.

## Appearance



## Ordered profile



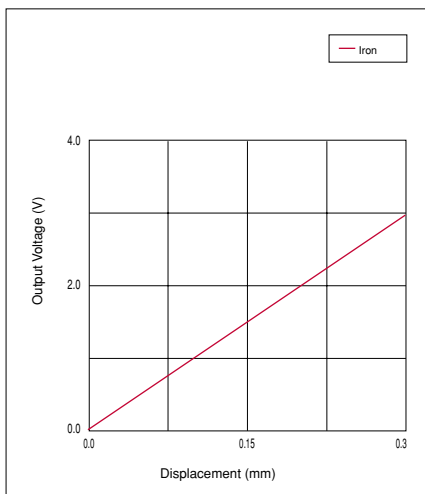
## Features and specifications

- Super miniature sensor
- Acceptable for orders such as vacuum and water resistance type
- Acceptable for an order of a requested size such as the total length of a sensor
- Ready for the shield type sensors with dimension of  $\phi 2.7$  7mm (for example PU-015S)
- The sensor head has some types (for example: PU-015-3, PU-015-6).

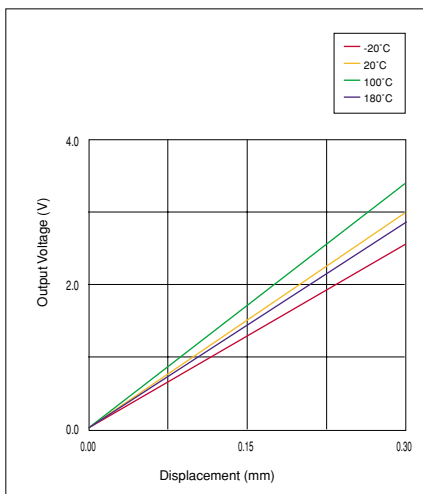
※ Special specification and profile need to match the conditions of use.  
Please do not hesitate to contact us concerning your requests.

XYZ in model represent cable length, example 401 represents 400mm and 102 represents 1000mm.

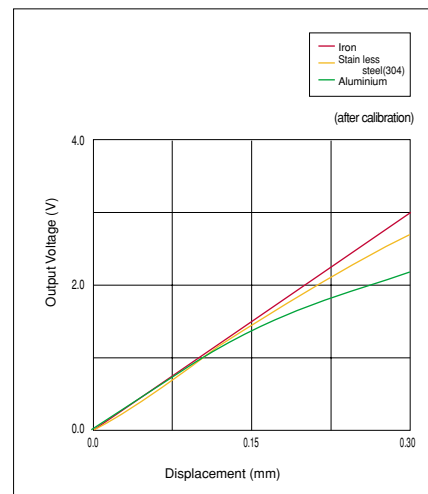
## Output characteristics / linearity



## Thermal characteristics



## Variation depending on target materials



# AEC-55 Series

## Sensor : PU-02A

Adopted converters : AEC-5502A 55MS-S 5502AHF

Adopted cables : PC model cable  
: PCT model cable

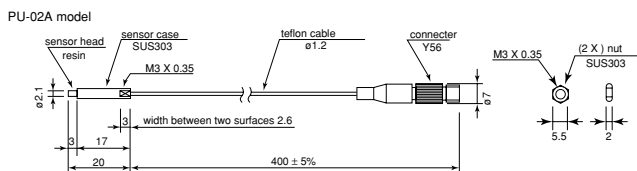


### Specifications

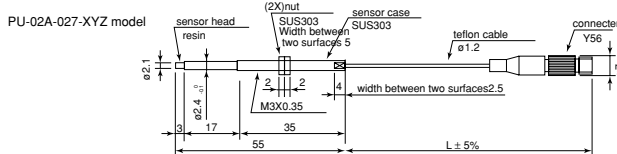
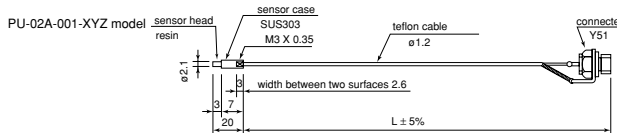
model	Sensor : PU-02A		
measuring range (iron)	0 to 0.5mm ( $\alpha$ 0 : 0mm)		
output voltage	0 to 2.5V (0.5mm/V)		
adopted converters	5502A	55MS-S	5502AHF
resolution	0.5 $\mu$ m	0.8 $\mu$ m	0.8 $\mu$ m
linearity	less than $\pm$ 2% of full scale		
temperature range	-20°C to 180°C		
thermal characteristics	$\pm$ 1.5 $\mu$ m/°C of drift between -20°C and 0°C $\pm$ 0.9 $\mu$ m/°C of drift between 0°C and 180°C		

※ See p86 about dead zone  $\alpha$  0.

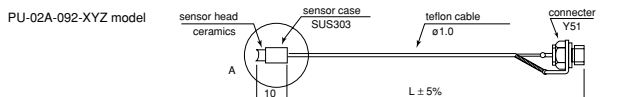
### Appearance



### Ordered profile



※See application example on P72.



※See application example on P75.

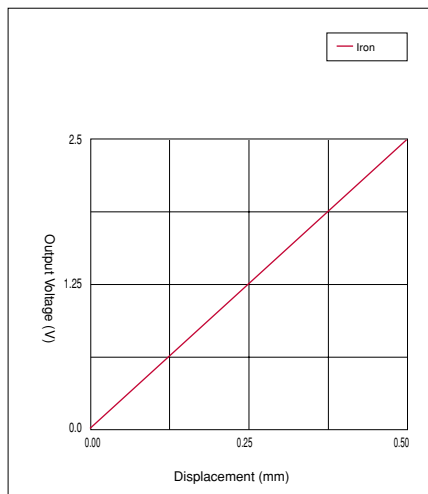
XYZ in model represent cable length, example 401 represents 400mm and 102 represents 1000mm.

### Features and specifications

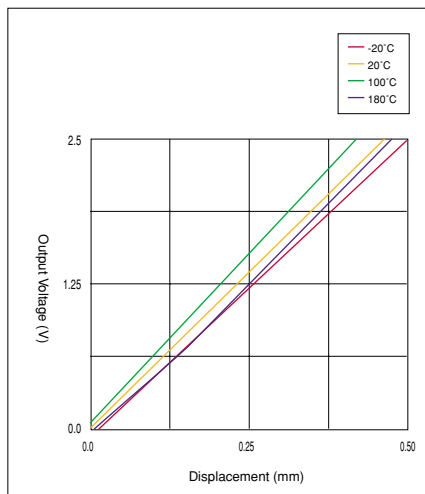
- High temperature resistance type max :200°C
- Acceptable for orders such as pressure, vacuum and water resistance type
- Acceptable for an order of a requested size such as the total length of a sensor (for example: PU-02A-001, PU-02A-007)
- Acceptable for an order of a requested type of sensor head
- Acceptable for an order of a thin type sensor as thick as 2mm (a cable connected to the lateral side of the sensor case)

※Special specification and profile need to match the conditions of use.  
Please do not hesitate to contact us concerning your requests.

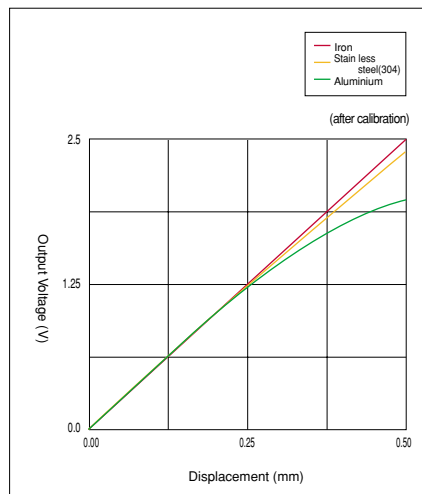
### Output characteristics / linearity



### Thermal characteristics



### Variation depending on target materials



# AEC-55 Series

## Sensor : PU-03A

Adopted converters : AEC-5503A 55MS-S 5503AHF

Adopted cables : PC model cable

: PCT model cable

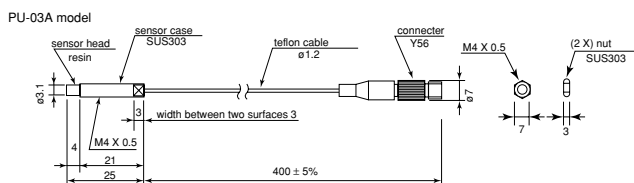


### Specifications

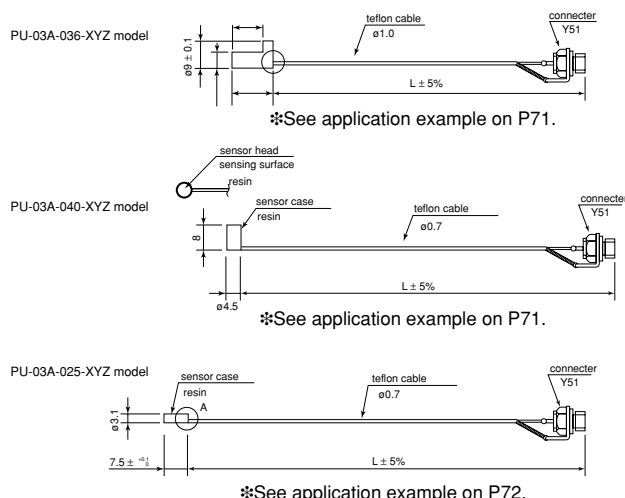
model	Sensor : PU-03A		
measuring range (iron)	0 to 1mm ( $\alpha$ 0 : 0mm)		
output voltage	0 to 5V (0.2mm/V)		
adopted converters	5503A	55MS-S	5503AHF
resolution	0.5 $\mu$ m	0.8 $\mu$ m	0.8 $\mu$ m
linearity	less than $\pm$ 1% of full scale		
temperature range	-20°C to 180°C		
thermal characteristics	$\pm$ 0.8 $\mu$ m/°C of drift between -20°C and 0°C $\pm$ 0.6 $\mu$ m/°C of drift between 0°C and 180°C		

※ See p86 about dead zone  $\alpha$  0.

### Appearance



### Ordered profile



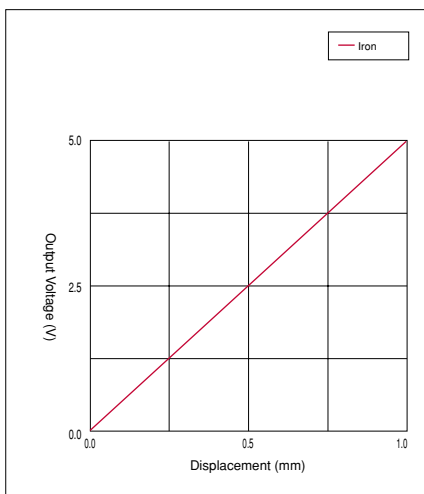
### Features and specifications

- High temperature resistance type max:250°C
- Acceptable for orders such as pressure, vacuum and water resistance type
- Acceptable for an order of a requested size such as the total length of a sensor (M3 case contained)
- Acceptable for an order of a requested type of sensor head
- Acceptable for an order of a thin type sensor as thick as 2mm (a cable connected to the lateral side of the sensor case)

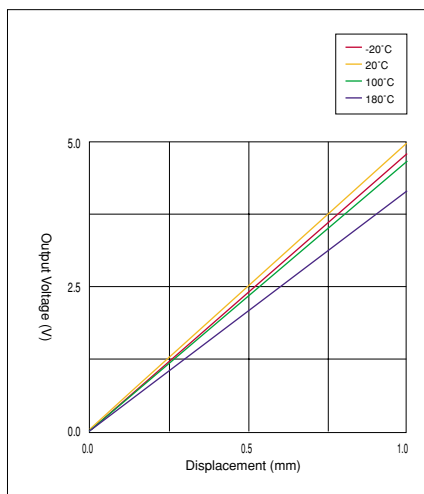
※Special specification and profile need to match the conditions of use. Please do not hesitate to contact us concerning your requests.

XYZ in model represent cable length, example 401 represents 400mm and 102 represents 1000mm.

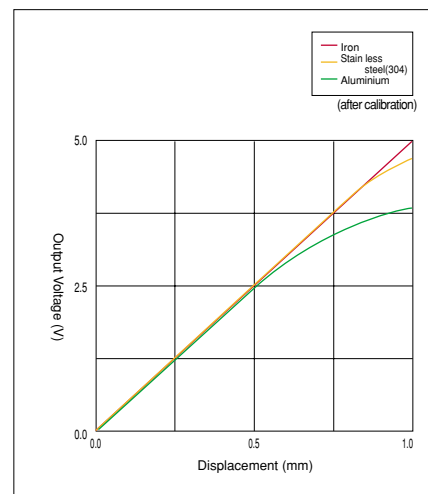
### Output characteristics / linearity



### Thermal characteristics



### Variation depending on target materials



# AEC-55 Series

## Sensor : PU-05

Adopted converters : AEC-5505 55MS-M 5505HF

Adopted cables : PC model cable  
: PCT model cable

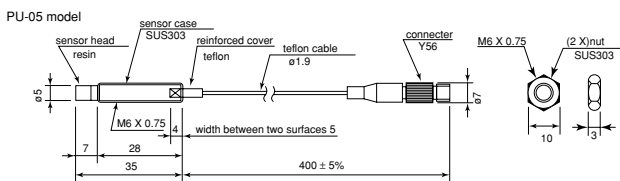


### Specifications

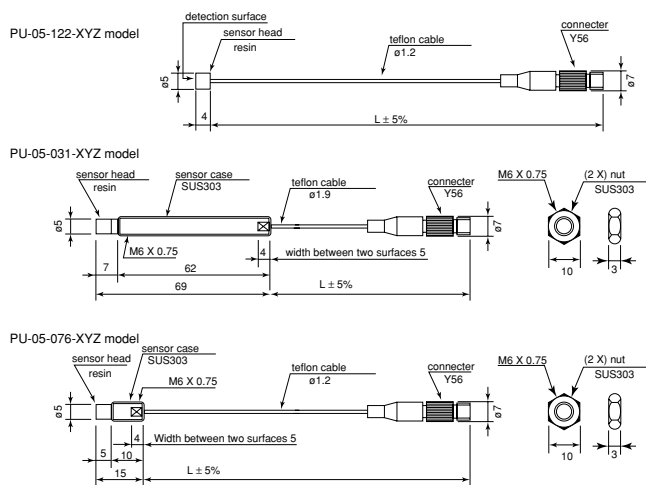
model	Sensor : PU-05		
measuring range (iron)	0 to 2mm ( $\alpha$ 0 : 0.05mm)		
output voltage	$\pm 5V$ (0.2mm/V)		
adopted converters	5505	55MS-M	5505HF
resolution	0.5 $\mu$ m	0.8 $\mu$ m	0.8 $\mu$ m
linearity	$\pm 0.5\%$ /FS (measuring distance of 0.2 to 1.8mm) 3%/FS (other measuring distance)		
temperature range	-20°C to 180°C		
thermal characteristics	$\pm 0.8\mu\text{m}/^\circ\text{C}$ of drift between -20°C and 80°C $\pm 1\mu\text{m}/^\circ\text{C}$ of drift between 80°C and 180°C		

※ See p86 about dead zone  $\alpha$  0.

### Appearance



### Ordered profile



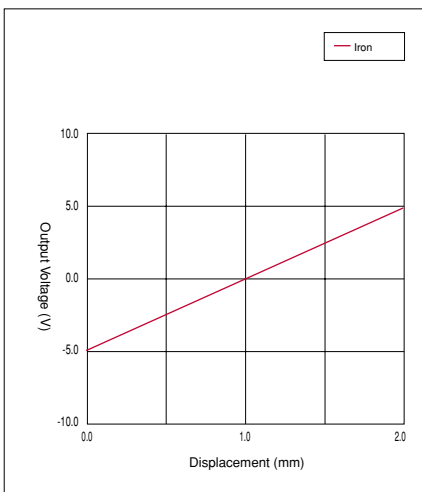
### Features and specifications

- High temperature resistance type max:250°C
- Acceptable for orders such as pressure, vacuum and water resistance type
- Acceptable for an order of a requested size such as the total length of a sensor (M6 case contained)
- Acceptable for an order of a requested type of sensor head (for example PU-05-122)
- Acceptable for an order of a thin type sensor as thick as 2mm (a cable connected to lateral side of sensor case)

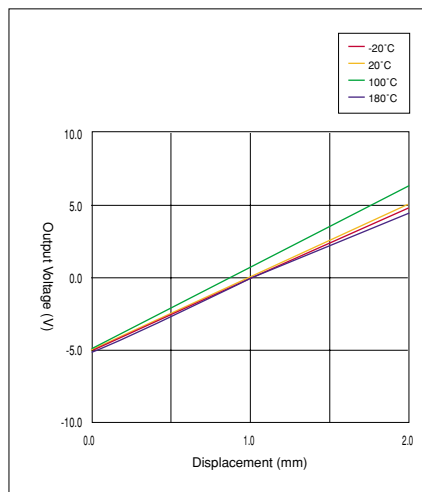
※ Special specification and profile need to match the conditions of use.  
Please do not hesitate to contact us concerning your requests.

XYZ in model represent cable length, example 401 represents 400mm and 102 represents 1000mm.

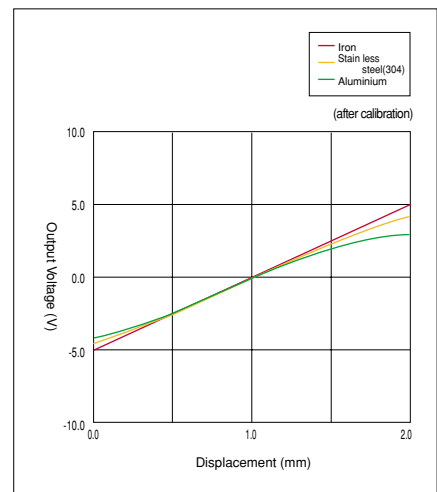
### Output characteristics / linearity



### Thermal characteristics



### Variation depending on target materials



# AEC-55 Series

Sensor : **PU-07**

Adopted converters : AEC-5507 55MS-M 5507HF

Adopted cables : PC model cable  
: PCT model cable

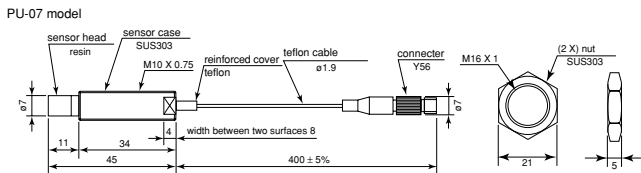


## Specifications

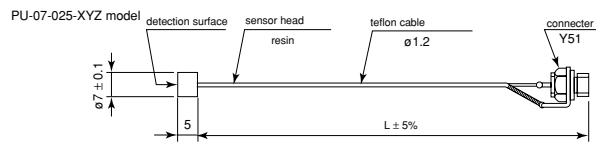
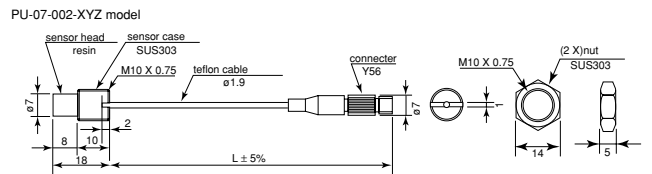
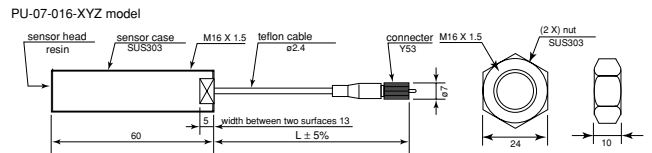
model		Sensor : PU-07		
measuring range (iron)	0 to 3mm ( $\alpha$ 0 : 0.1mm)			
output voltage	$\pm$ 5V (0.3mm/V)			
adopted converter	5507	55MS-M	5507HF	
resolution	1 $\mu$ m	1.2 $\mu$ m	1.2 $\mu$ m	
linearity	$\pm$ 0.5%/FS (measuring distance of 0.3 to 2.7mm) 3%/FS (other measuring distance)			
temperature range	-20°C to 120°C			
thermal characteristics	$\pm$ 1.5 $\mu$ m/°C of drift between -20°C and 120°C			

※ See p86 about dead zone  $\alpha$  0.

## Appearance



## Ordered profile



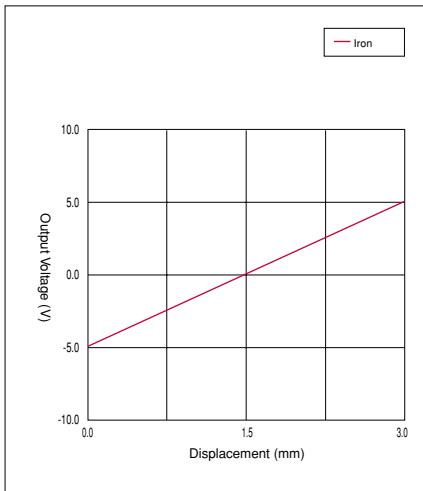
XYZ in model represent cable length, example 401 represents 400mm and 102 represents 1000mm.

## Features and specifications

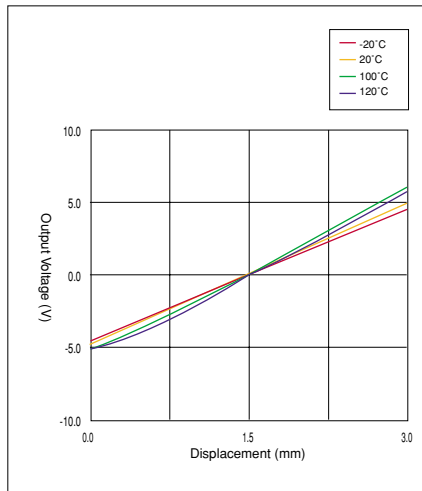
- High temperature resistance type max: 180°C
- Acceptable for orders such as pressure, vacuum and water resistance type
- Acceptable for an order of a requested size such as the total length of a sensor (for example PU-07-002)
- Acceptable for an order of a requested type of sensor head (for example PU-07-025)
- Ready for the shield type sensors (for example PU-07-016)

※ Special specification and profile need to match the conditions of use. Please do not hesitate to contact us concerning your requests.

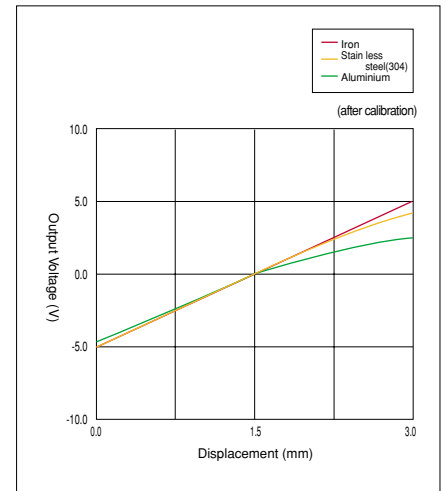
## Output characteristics / linearity



## Thermal characteristics



## Variation depending on target materials



# AEC-55 Series

## Sensor : PU-09

Adopted converters : AEC-5509 55MS-M 5509HF

Adopted cables : PC model cable

: PCT model cable

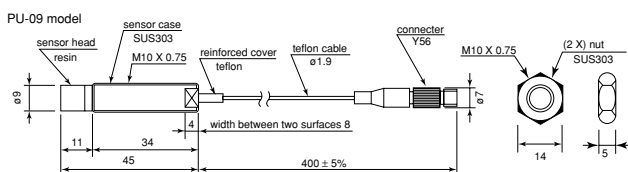


### Specifications

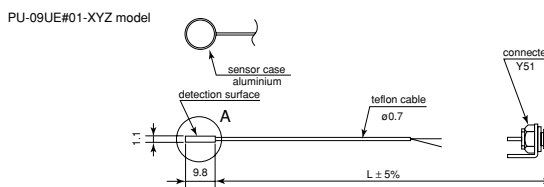
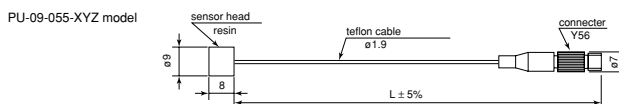
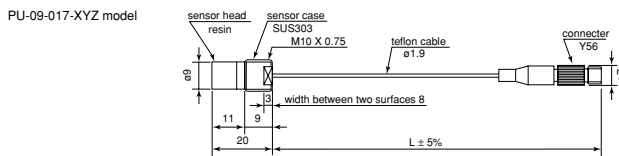
Sensor : PU-09	
model	Sensor : PU-09
measuring range (iron)	0 to 4mm ( $\alpha$ 0 : 0.2mm)
output voltage	$\pm$ 5V (0.4mm/V)
adopted converters	5509      55MS-M      5509HF
resolution	1.0 $\mu$ m      1.6 $\mu$ m      1.6 $\mu$ m
linearity	$\pm$ 0.5%/FS (measuring distance of 0.4 to 3.6mm) 3%/FS (other measuring distance)
temperature range	-20°C to 120°C
thermal characteristics	$\pm$ 1.6 $\mu$ m/°C of drift between -20°C and 0°C $\pm$ 1 $\mu$ m/°C of drift between -0°C and 80°C $\pm$ 1.6 $\mu$ m/°C of drift between 80°C and 120°C

※ See p86 about dead zone  $\alpha$  0.

### Appearance



### Ordered profile



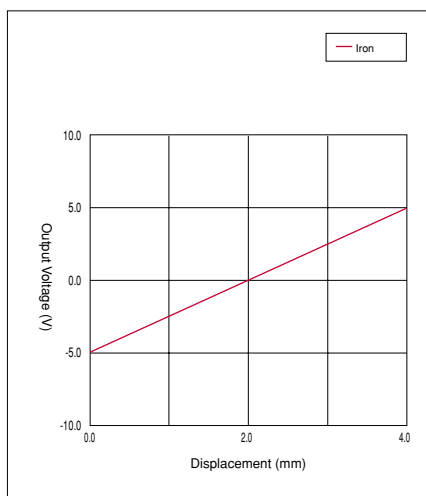
### Features and specifications

- High temperature resistance type max18°C
- Acceptable for orders such as pressure, vacuum and water resistance type
- Acceptable for an order of a requested size such as the total length of a sensor (for example PU-09-017)
- Acceptable for an order of a requested type of a sensor head (for example PU-09-055)
- Acceptable for an order of a thin type sensor as thick as 1.1mm (for example PU-09UE#01)

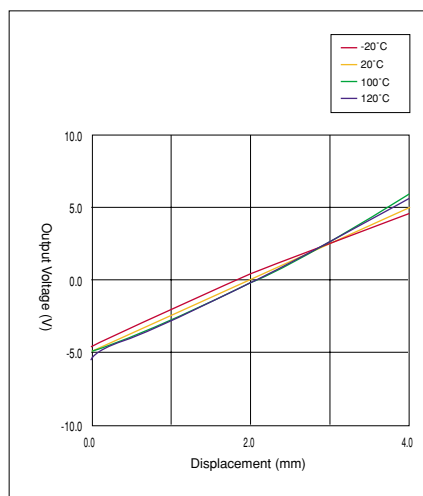
※Special specification and profile need to match the conditions of use.  
Please do not hesitate to contact us concerning your requests.

XYZ in model represent cable length, example 401 represents 400mm and 102 represents 1000mm.

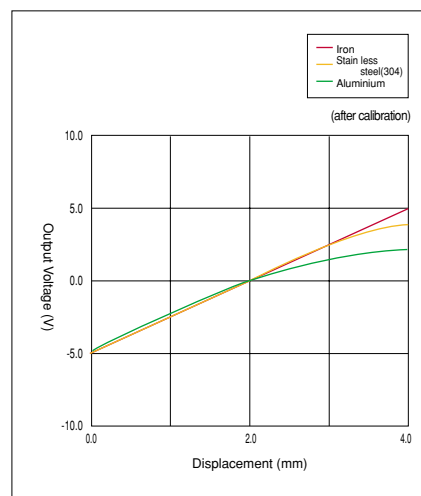
### Output characteristics / linearity



### Thermal characteristics



### Variation depending on target materials



# AEC-55 Series

## Sensor : PU-14

Adopted converters : AEC-5514 5514HF 55MS

Adopted cables : PC model cable  
: PCT model cable

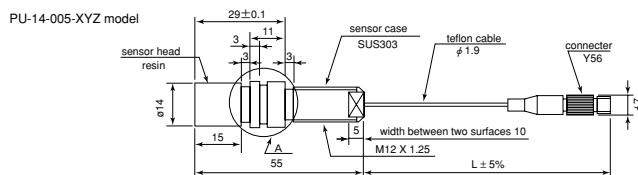
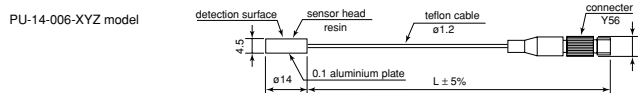
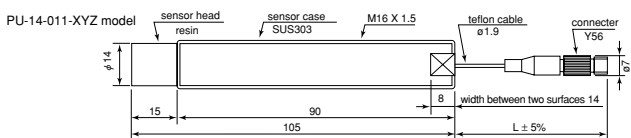
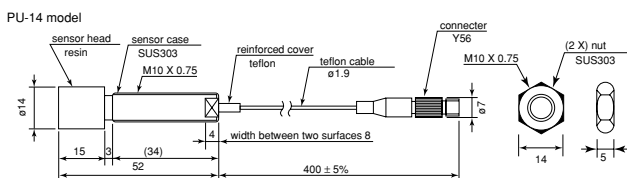


### Specifications

model	Sensor : PU-14		
measuring range (iron)	0 to 6mm ( $\alpha$ 0 : 0.3mm)		
output voltage	$\pm 5V$ (0.6mm/V)		
adopted converters	5514	MS	5514HF
resolution	2 $\mu$ m	4 $\mu$ m	4 $\mu$ m
linearity	$\pm 0.5\%/FS$ (measuring distance of 0.6 to 5.4mm) 3%/FS (other measuring distance)		
temperature range	-20°C to 120°C		
thermal characteristics	$\pm 03\mu m/^{\circ}C$ of drift between -20°C and 120°C		

※ Contact us if you use MS model converter.  
※ See p86 about dead zone  $\alpha$  0.

### Appearance



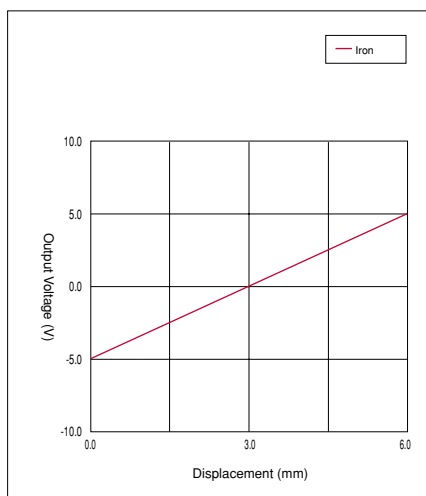
### Features and specifications

- Acceptable for orders such as pressure, vacuum and water resistance type
- Acceptable for orders of a requested size such or the total length of a sensor (for example PU-14-011)
- Acceptable for an order of a requested type of sensor head (for example PU-14-006)
- Acceptable for an order of a sensor with a requested o-ring (for example PU-14-005)

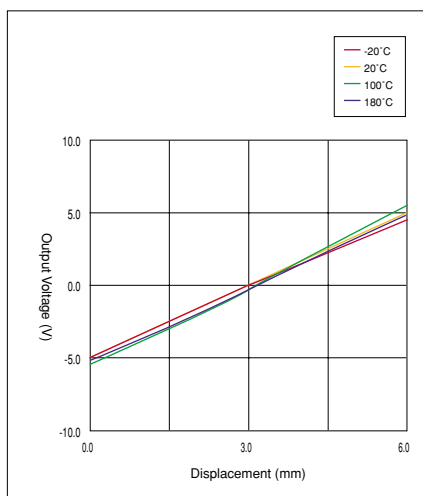
※ Special specification and profile need to match the conditions of use.  
Please do not hesitate to contact us concerning your requests.

XYZ in model represent cable length, example 401 represents 400mm and 102 represents 1000mm.

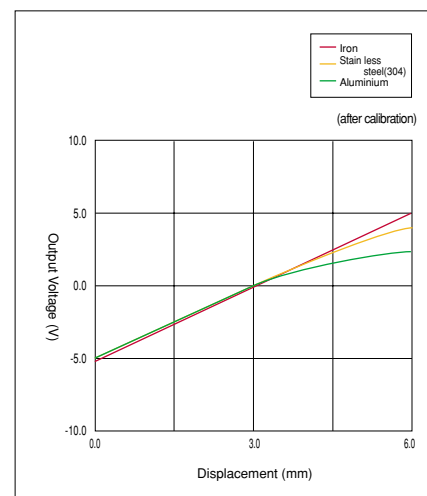
### Output characteristics / linearity



### Thermal characteristics



### Variation depending on target materials





# AEC-55 Series

## Sensor : PU-20

Adopted converters : AEC-5520 55MS-L 5520HF

Adopted cables : PC model cable  
: PCT model cable

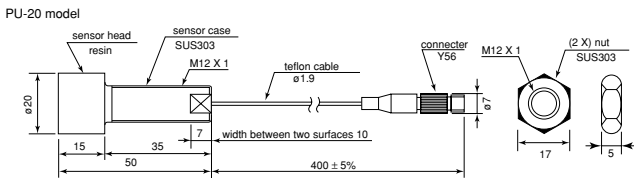


### Specifications

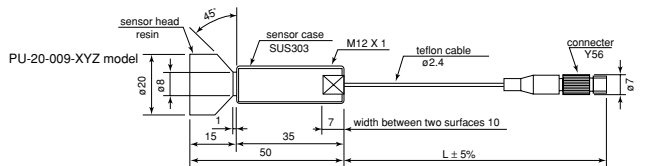
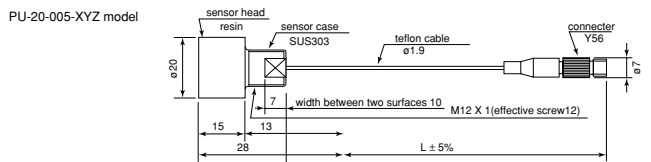
Sensor : PU-20	
model	Sensor : PU-20
measuring range (iron)	0 to 8mm ( $\alpha$ 0 : 0.4mm)
output voltage	$\pm 5V$ (0.8mm/V)
adopted converters	5520      55MS-L      5520HF
resolution	3 $\mu$ m      4.8 $\mu$ m      4.8 $\mu$ m
linearity	$\pm 0.5\%$ /FS (measuring distance of 0.8 to 7.2 mm) 3% (other measuring distance)
temperature range	-20°C to 120°C
thermal characteristics	$\pm 4\mu$ m/°C of drift between -20°C and 120°C

※ See p86 about dead zone  $\alpha$  0.

### Appearance



### Ordered profile



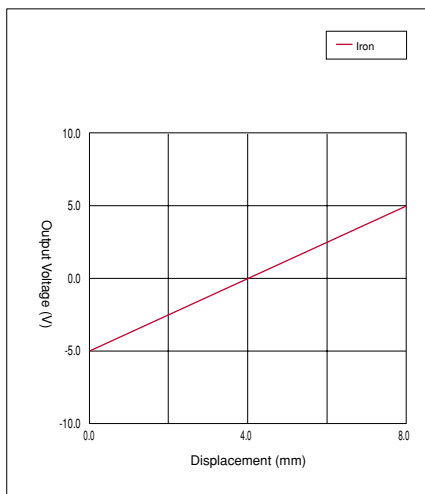
XYZ in model represent cable length, example 401 represents 400mm and 102 represents 1000mm.

### Features and specifications

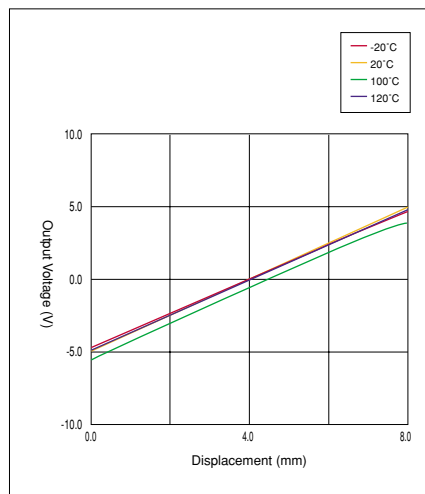
- Acceptable for orders such as pressure, vacuum and water resistance type
- Acceptable for an order of a requested size such as the total length of a sensor (for example PU-20-005, PU-20-009)
- Acceptable for an order of a requested type of sensor head

※Special specification and profile need to match the conditions of use.  
Please do not hesitate to contact us concerning your requests.

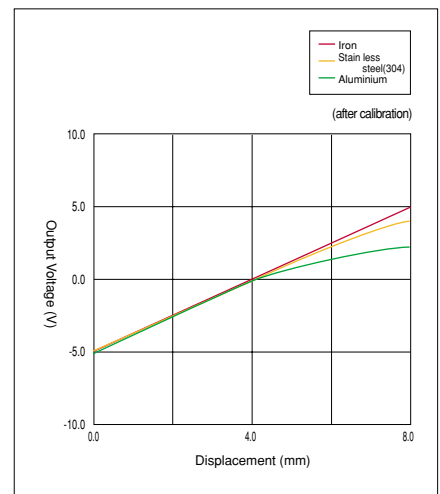
### Output characteristics / linearity



### Thermal characteristics



### Variation depending on target materials





# AEC-55 Series

## Sensor : PU-30

Adopted converters : AEC-5530 55MS-L 5530HF  
 Adopted cables : PC model cable  
 : PCT model cable

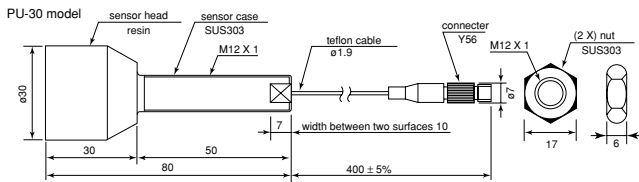


### Specifications

model	Sensor : PU-30		
measuring range (iron)	0 to 12mm ( $\alpha$ 0 : 0.6mm)		
output voltage	$\pm 5V$ (1.2mm/V)		
adopted converters	5530	55MS-L	5530HF
resolution	4.5 $\mu$ m	7.2 $\mu$ m	7.2 $\mu$ m
linearity	$\pm 0.5\%/FS$ (measuring distance of 1.2 to 10.8 mm) 3%/FS (other measuring distance)		
temperature range	-20°C to 120°C		
thermal characteristics	$\pm 6\mu\text{m}/^\circ\text{C}$ of drift between -20°C and 120°C		

※ See p86 about dead zone  $\alpha$  0.

### Appearance

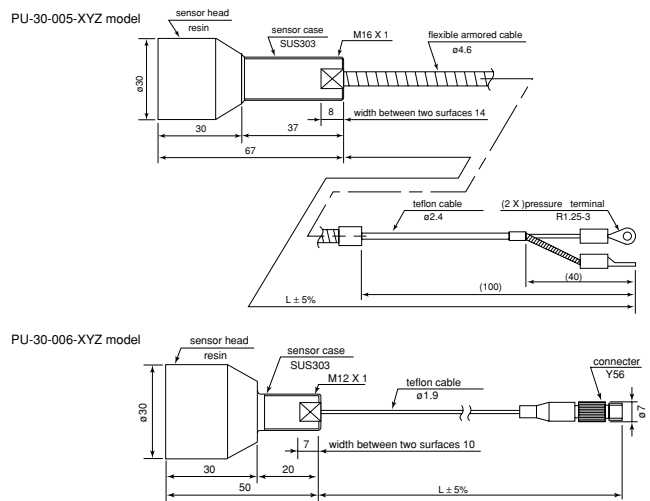


### Features and specifications

- Acceptable for orders such as pressure, vacuum and water resistance type
- Acceptable for an order of a requested size such as the total length of a sensor (for example PU-30-006)
- Acceptable for an order of a requested type of sensor head
- Acceptable for an order of a sensor with a requested flexible armored cable (for example PU-30-005)

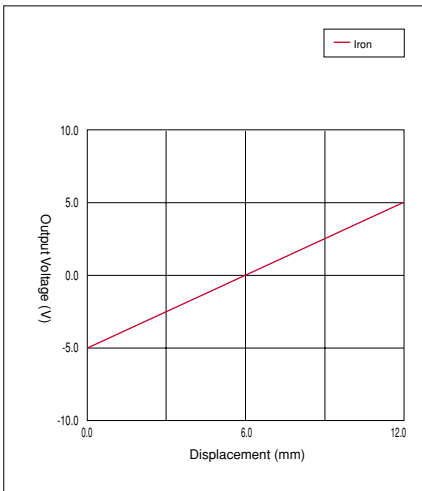
※ Special specification and profile need to match the conditions of use.  
 Please do not hesitate to contact us concerning your requests.

### Ordered profile

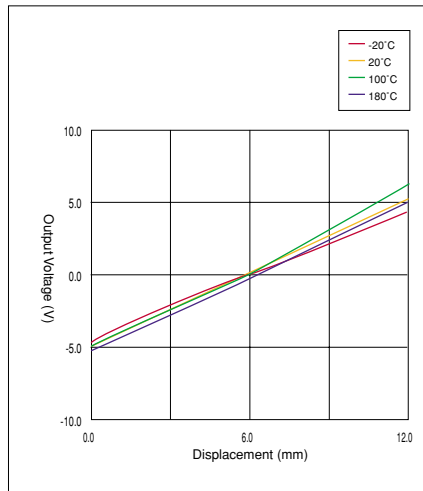


XYZ in model represent cable length, example 401 represents 400mm and 102 represents 1000mm.

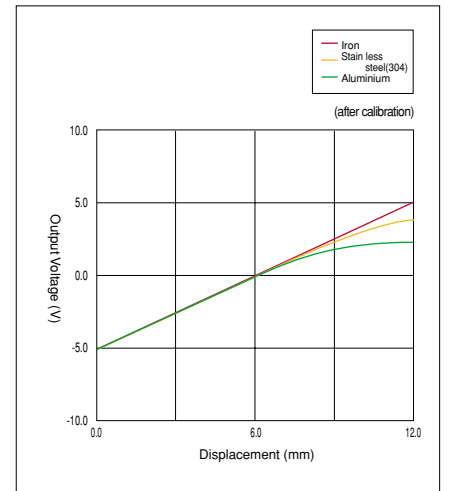
### Output characteristics / linearity



### Thermal characteristics



### Variation depending on target materials



# AEC-55 Series

## Sensor : PU-40

Adopted converters : AEC-5540 55MS-L 5540HF

Adopted cables : PC model cable  
: PCT model cable

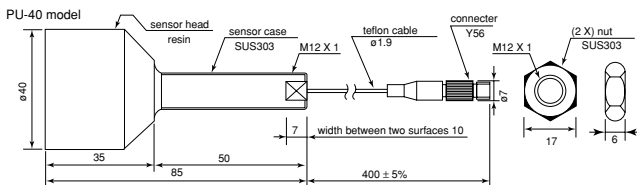


### Specifications

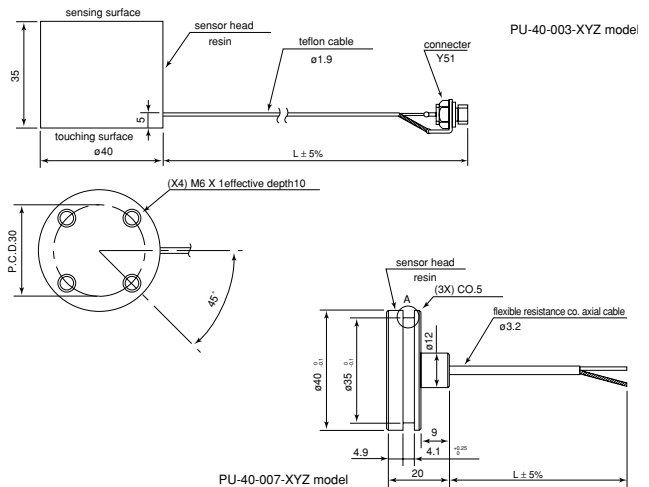
model	Sensor : PU-40		
measuring range (iron)	0 to 16mm ( $\alpha$ 0 : 0.8mm)		
output voltage	$\pm 5V$ (1.6mm/V)		
adopted converters	5540	55MS-L	5540HF
resolution	6 $\mu$ m	9.6 $\mu$ m	9.6 $\mu$ m
linearity	$\pm 0.5\%/FS$ (1.6 to 14.4 mm of measuring distance) 3%/FS (other measuring distance)		
temperature range	-20°C to 120°C		
thermal characteristics	$\pm 8\mu\text{m}/^\circ\text{C}$ of drift between -20°C and 120°C		

※ See p86 about dead zone  $\alpha$  0.

### Appearance



### Ordered profile



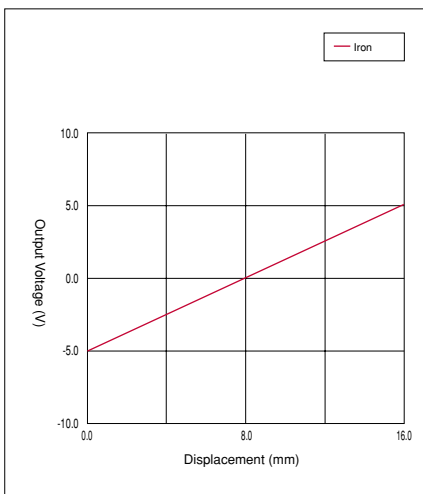
### Features and specifications

- Acceptable for orders such as pressure, vacuum and water resistance type
- Acceptable for an order of a requested size such as the total length of a sensor
- Acceptable for an order of a requested type of sensor head (for example PU-40-003)

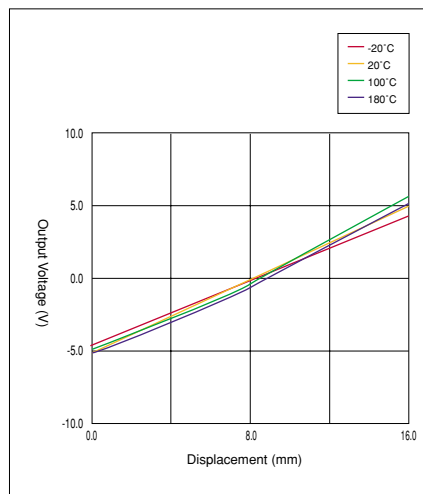
※Special specification and profile need to match the conditions of use.  
Please do not hesitate to contact us concerning your requests.

XYZ in model represent cable length, example 401 represents 400mm and 102 represents 1000mm.

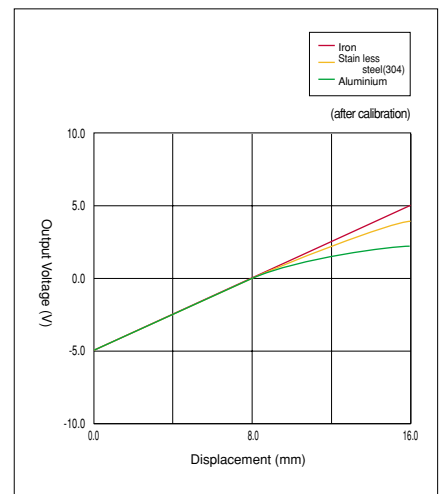
### Output characteristics / linearity



### Thermal characteristics



### Variation depending on target materials



## ■ AEC-55 Series

### Converter

- Converter: AEC-55 model  
Miniature standard type  
DC to 20kHz frequency response
- Built-in power supply converter: AEC-55MS model  
Built-in power supply type of AEC-55 model  
Free power supply : AC85 to 264V  
Visible liquid crystal voltage display  
Utilisation of some kinds of sensors by switch-over  
The volume control is located on the front panel.
- Wide band converter:AEC-55HF model  
High frequency response type of AEC-55 model  
DC to 200kHz frequency response

# AEC-55 Series

Converter : **AEC-55**

Adopted converter : PU model sensor  
 Adopted cables : PC model cable  
 : PCT model cable



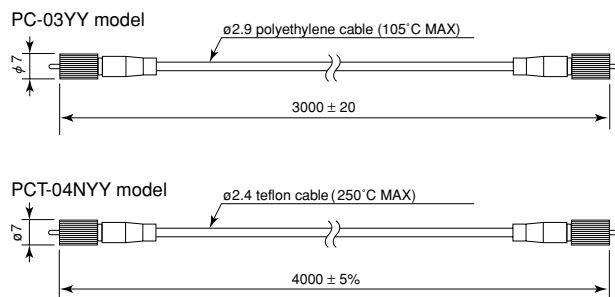
## Specifications

model	Converter : AEC-55 □□ (□□ symbolize sensor diameter)
output voltage	See each sensor section.
frequency characteristics	DC to 20kHz -2dB
resolution	See each sensor section.
temperature range	-10°C to 55°C
Thermal characteristics	0.1%/°C of drift between -10°C and 55°C
power supply	DC ± 11V to DC ± 17V, ± 40mA max

## Features and specifications

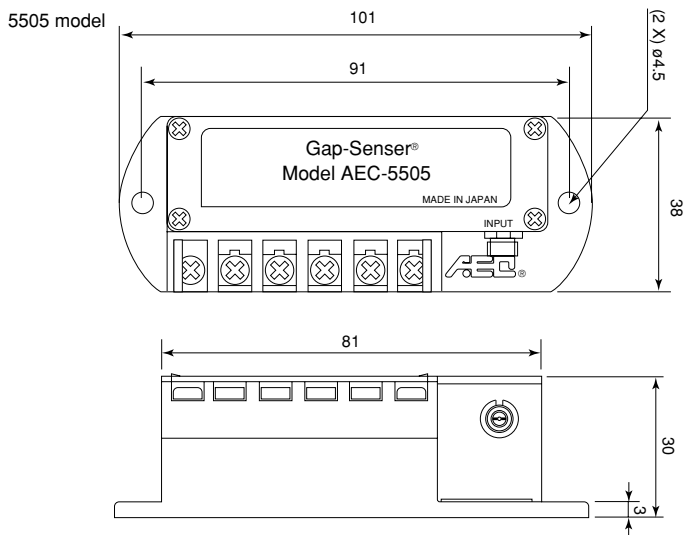
- Optimum miniature converter for installation
- Able to calibrate and adjust sensitivity with a built-in volume control dial
- Able to prepare a converter that is designed to protect from interference noise caused when multiple sensors approach each other
- Able to prepare a specified build-in power supply multi-channel on demand

## Adopted ordered cables



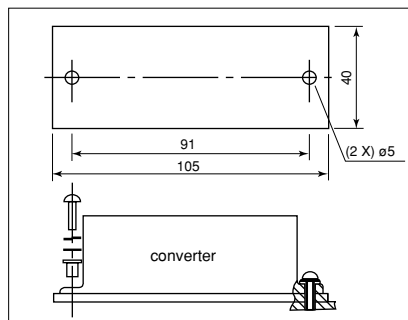
※Acceptable for use with all kinds and lengths of flexible armoured cables

## Outline view

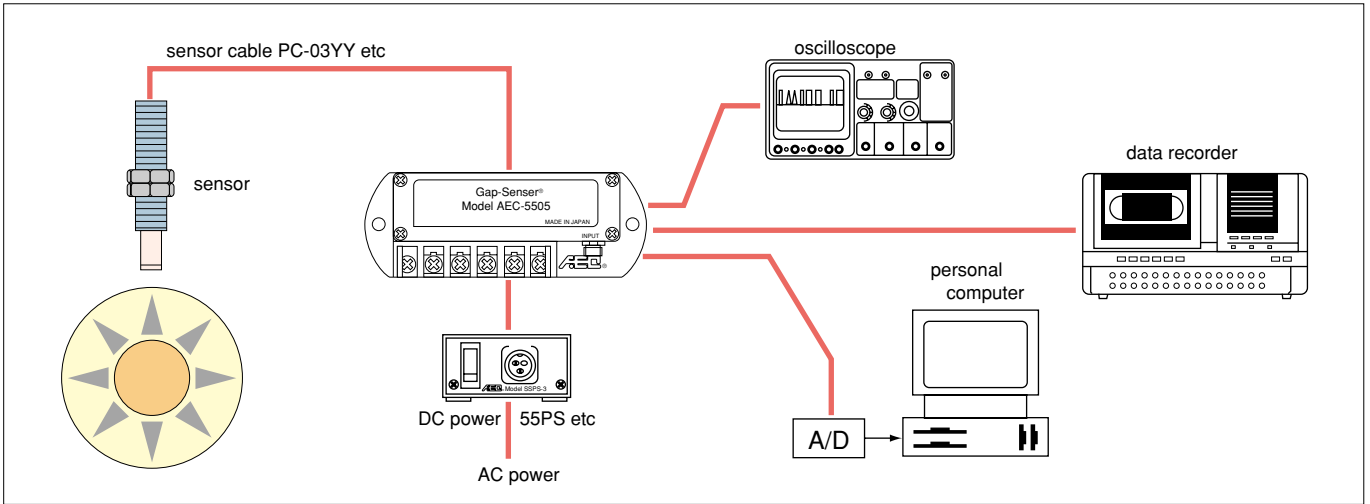


## 55 model Converter (option)

Insulating bakelite plate (55IP)



**Measuring system**



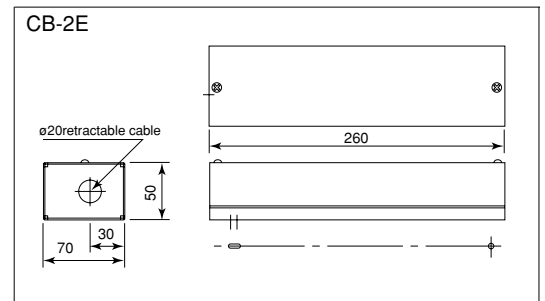
**55model Converter (option)**

**Power supply**

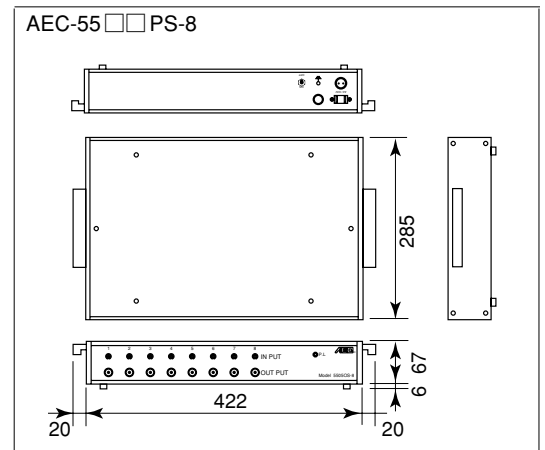
outline view

model	AEC-55PS-1	AEC-55PS-3
channel number	1channel	3channels
input	AC100V	AC100V
output	DC ± 15V, ± 100mA	DC ± 15V, ± 300mA

**Converter rack**

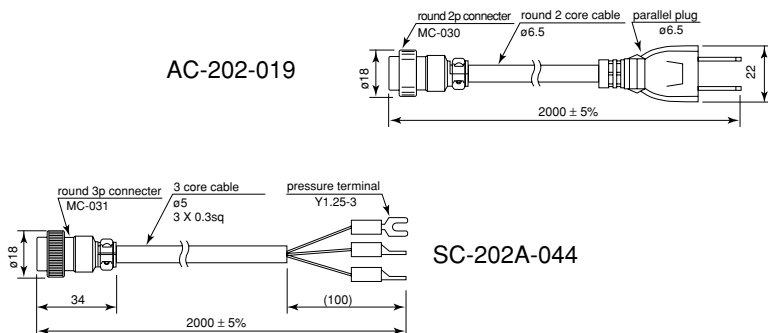


**Built-in power supply converter storage rack**



channel number	model
4channels	AEC-55 □ □ PS-4
6channels	AEC-55 □ □ PS-6
8channels	AEC-55 □ □ PS-8
10channels	AEC-55 □ □ PS-10
12channels	AEC-55 □ □ PS-12
16channels	AEC-55 □ □ PS-16
32channels	AEC-55 □ □ PS-32

**Accessories for Power supply**



# AEC-55 Series

Converter : **AEC-55MS**

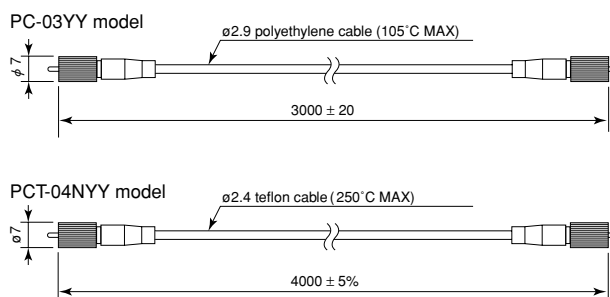
Adopted converter : PU model sensor  
 Adopted cables : PC model cable  
 : PCT model cable



## Features

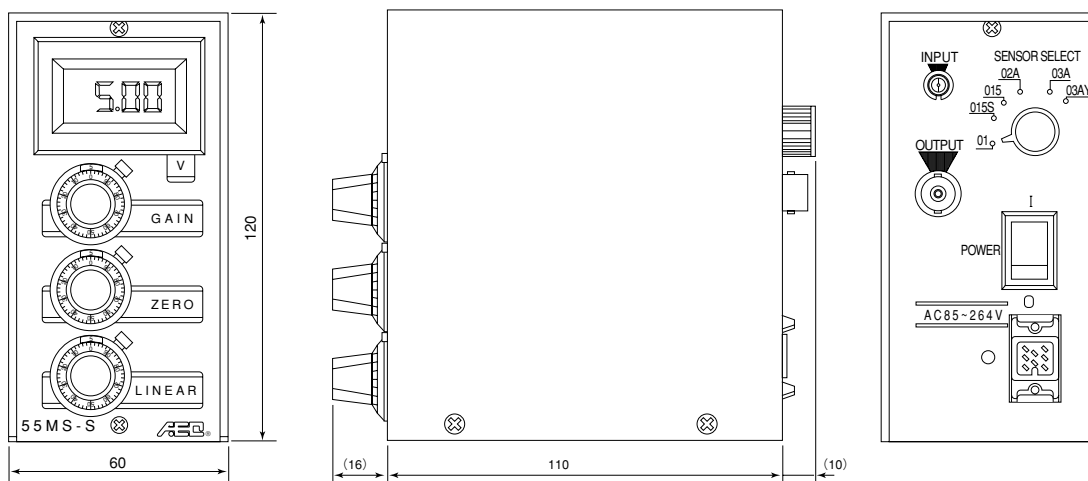
- Able to share several kinds of sensors with selective channels
- Simple calibration and readjustment due to the location of the volume control dial and the voltage display on the front panel
- Available not only in Japan but also abroad because of free power supply of AC85 to 264V
- Available for purchase of a multi-channel storage rack

## Adopted ordered cables



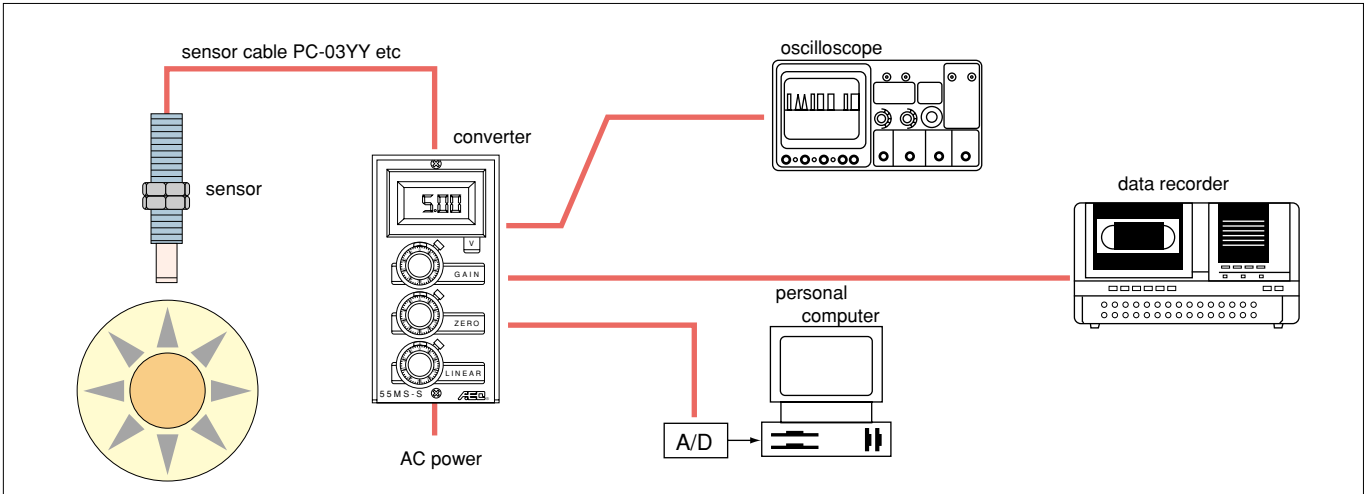
※ Acceptable for use with all kinds and lengths of flexible armoured cables

## Outline view



55MS - S Model

**Measuring system**



**Specifications**

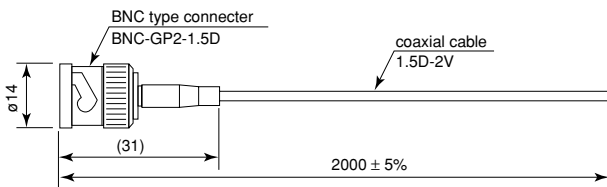
model	AEC-55MS-S	AEC-55MS-M	AEC-55MS-L
adopted sensor	$\phi 1$ to $\phi 3$ <b>SENSOR SELECT</b> 	$\phi 5$ to $\phi 9$ <b>SENSOR SELECT</b> 	$\phi 20$ to $\phi 40$ <b>SENSOR SELECT</b> 
out put	See each sensor section.		
frequency characteristics	DC to 20kHz -2dB		
resolution	See each sensor section.		
temperature range	0 to 55°C		
thermal characteristics	0.1%/°C		
power	AC 85 to 264V 47 to 440Hz 10VA		

※ Y range has non-interface capability. See technical explanation for details on P87.

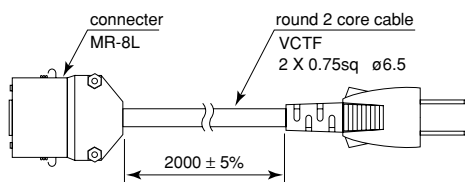
**Option**

Cable outline view

Output cable OC-202BN-010

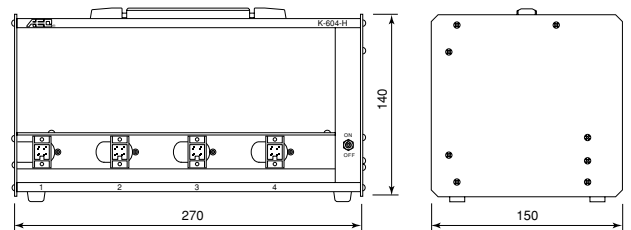


Power supply cable AC-202-093

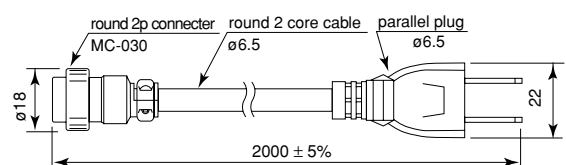


**55model Converter (option)**

Converter rack K-604-HB



Power supply cable for a rack AC-202-019



## AEC-55 Series

Converter : **AEC-55HF**

Adopted converter : PU model sensor  
 Adopted cables : PC model cable  
 : PCT model cable



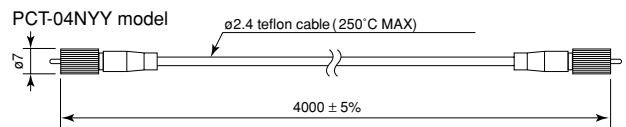
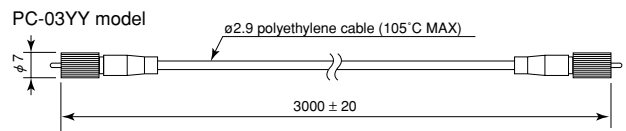
### Specifications

model	converter : AEC-55 □□ HF (□□ symbolize sensor diameter)
output voltage	See each sensor section.
frequency characteristics	DC to 200kHz -2dB at 200kHz
resolution	See each sensor section.
temperature range	-10 to 55°C
thermal characteristics	0.1%/°C of drift between -10°C and 55°C
power supply	DC ± 15V, ± 40mA

### Features and specifications

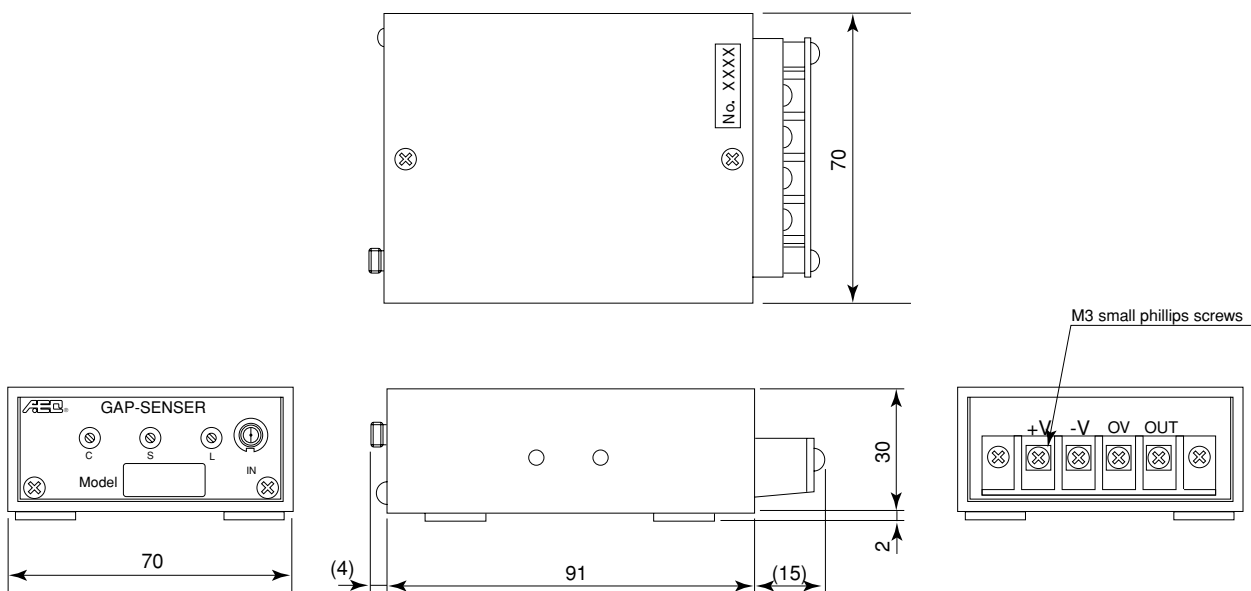
- Able to measure DC to 200kHz of vibration and displacement
- Optimum miniature converter for installation
- Able to calibrate and adjust sensitivity with the built-in volume control dials
- Able to prepare a converter that is designed to protect from interference noise caused when multiple sensors approach each other
- Able to prepare a specified build-in power supply multi-channel on demand

### Adopted ordered cables

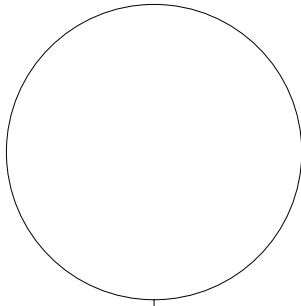


※Acceptable for use with all kinds and lengths of flexible armoured cables

### Outline view







## Dual coil type

# ■ AEC-37 Series

- Sensor unit DPU model
  - Size  $\varnothing 10$  (length : 5mm to)
  - Sensitivity is affected only slightly the quality materials
- Converter AEC-37 model
  - Standard type
  - DC to 10kHz frequency response
- Built-in power supply converter AEC-37MS model
  - Power supply built-in type of AEC-37 model
  - Free power supply : AC 85 to 264V
  - Visible liquid crystal voltage display
  - Utilisation of some kinds of sensors by switch-over
  - Volume control dial located on the front panel

# AEC-37 Series

## Sensor : DPU-10A

Adopted converters : AEC-3710 37MS-10

Adopted cable : DPC model cable

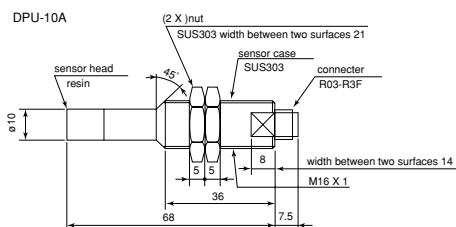


### Specifications

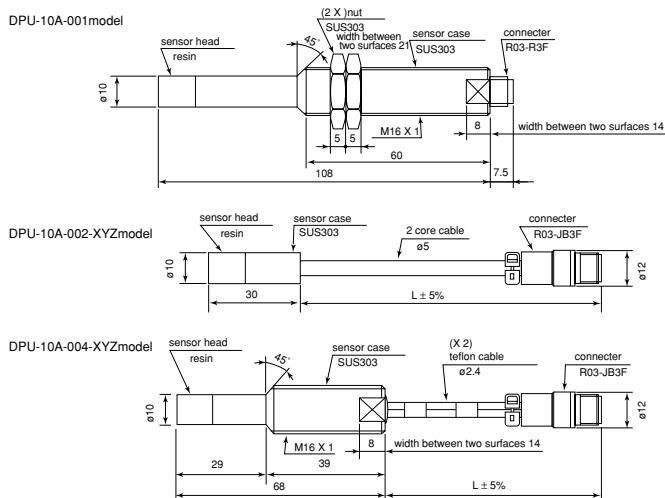
model	sensor : DPU-10A	
measuring range (iron)	0 to 5mm ( $\alpha$ 0 : 0mm)	
output voltage	$\pm$ 5V (0.5mm/V)	
adopted converter	3710	37MS-10
resolution	2 $\mu$ m	3.2 $\mu$ m
linearity	$\pm$ 0.5%/FS (0.5 to 4.5 mm of measuring distance) 3%/FS (other measuring distance)	
temperature range	-20°C to 80°C	
thermal characteristics	$\pm$ 0.5 $\mu$ m/°C of drift between -20°C and 80°C	

※ See p86 about dead zone  $\alpha$  0.

### Appearance



### Ordered profile



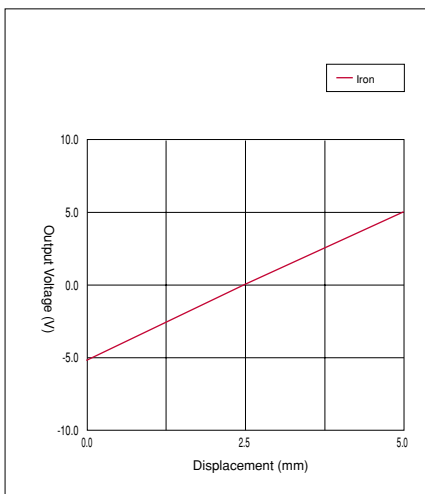
XYZ in model represent cable length, example 401 represents 400mm and 102 represents 1000mm.

### Features and specifications

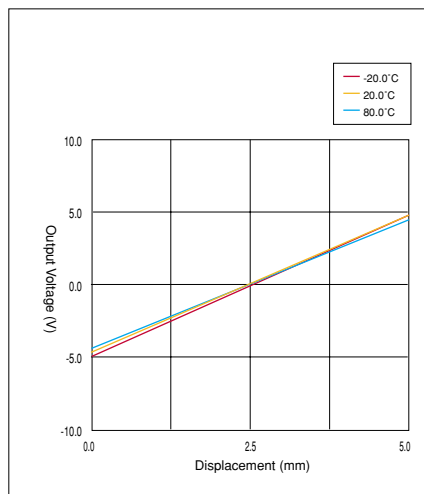
- High temperature resistance type max:120°C
- Acceptable for orders such as pressure, vacuum and water resistance type
- Acceptable for an order of a requested size such as the total length of a sensor (for example DPU-10A-001)
- Acceptable for an order of the sensor connected with the cable (for example DPU-10A-004)
- Acceptable for an order of a requested type of sensor head

\*Special specification and profile need to match the conditions of use. Please do not hesitate to contact us concerning your requests.

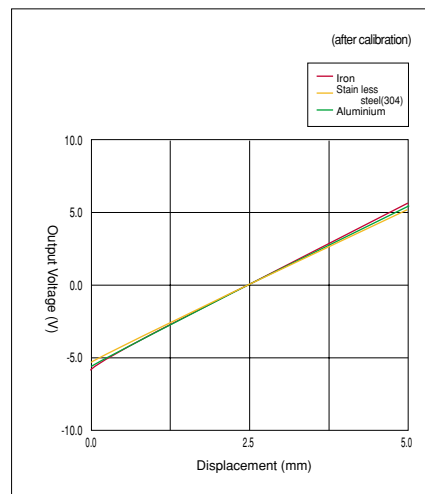
### Output characteristics / linearity



### Thermal characteristics



### Variation depending on target materials



# AEC-37 Series

Sensor : **DPU-20A**

Adopted converters : AEC-3720 37MS-20

Adopted cable : DPC model cable

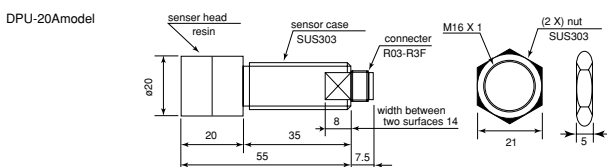


## Specifications

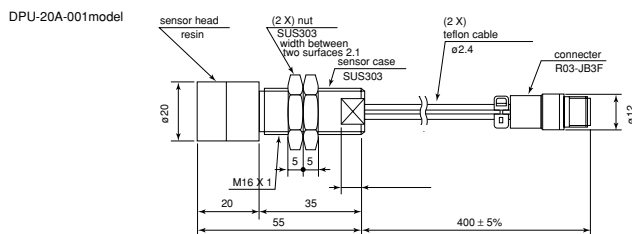
model	sensor : DPU-20A	
measuring range (iron)	0 to 10mm ( $\alpha$ 0 : 0mm)	
output voltage	$\pm 5V$ (1.0mm/V)	
adopted converter	3720	37MS-20
resolution	4 $\mu$ m	6.4 $\mu$ m
linearity	$\pm 0.5\%/FS$ (1 to 9 mm of measuring distance) 3%/FS (other measuring distance)	
temperature range	-20°C to 80°C	
thermal characteristics	$\pm 1\mu\text{m}/^\circ\text{C}$ of drift between -20°C and 80°C	

※ See p86 about dead zone  $\alpha$  0.

## Appearance

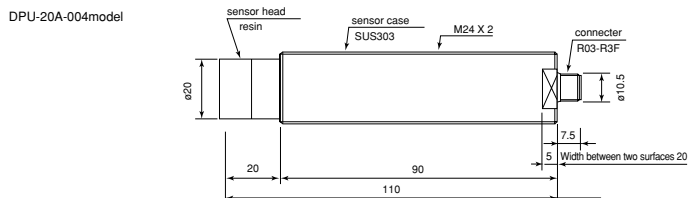


## Ordered profile



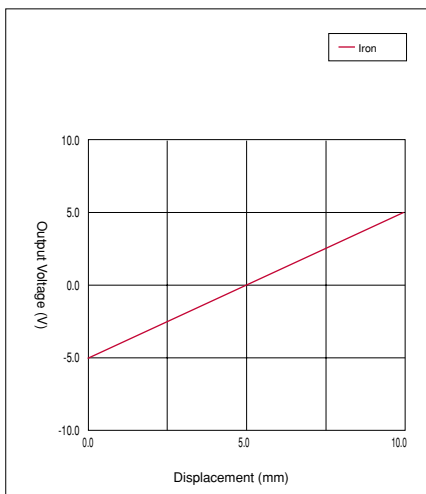
## Features and specifications

- High temperature resistance type max: 120°C
- Acceptable for orders such as pressure, vacuum and water resistance type
- Acceptable for an order of a requested size such as the total length of a sensor (for example DPU-20A-004)
- Acceptable for an order of the sensor connected with the cable (for example DPU-20A-001)
- Acceptable for an order of a requested type of sensor head

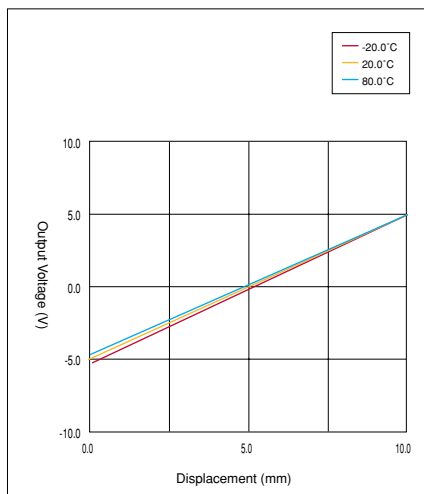


\*Special specification and profile need to match the conditions of use.  
Please do not hesitate to contact us concerning your requests .

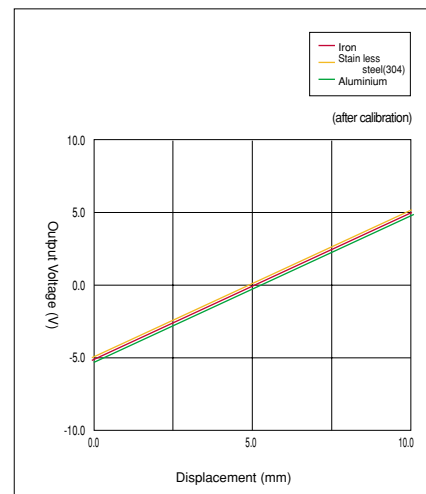
## Output characteristics / linearity



## Thermal characteristics



## Variation depending on target materials



# AEC-37 Series

Sensor : **DPU-30A**

Adopted converters : AEC-3730 37MS-30

Adopted cable : DPC model cable



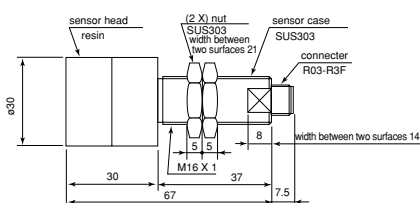
## Specifications

model	sensor : DPU-30A	
measuring range (iron)	0 to 15mm ( $\alpha$ 0 : 0mm)	
output voltage	$\pm$ 5V (1.5mm/V)	
adopted converters	3730	37MS-30
resolution	5 $\mu$ m	8 $\mu$ m
linearity	$\pm$ 0.5%/FS (1.5 to 13.5 mm of measuring distance) 3%/FS (other measuring distance)	
temperature range	-20°C to 80°C	
thermal characteristics	$\pm$ 1.5 $\mu$ m/°C of drift between -20°C and 80°C	

※ See p86 about dead zone  $\alpha$  0.

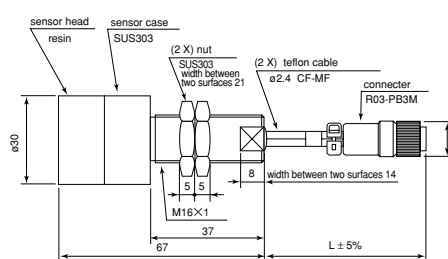
## Appearance

DPU-30A-001model

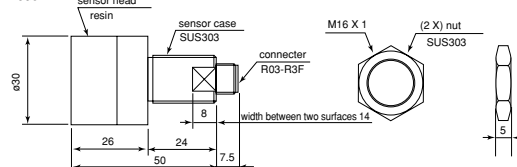


## Ordered profile

DPU-30A-002-XYZmodel



DPU-30A-007-XYZmodel



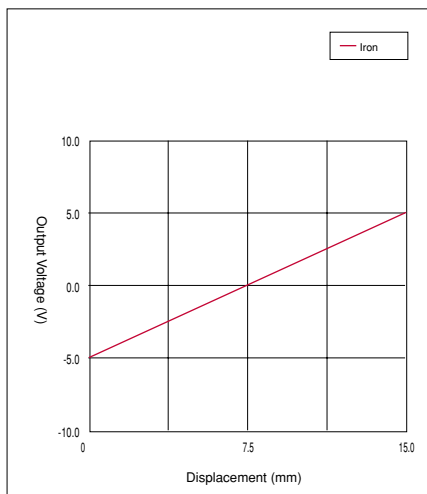
## Features and specifications

- High temperature resistance type max: 120°C
- Acceptable for orders such as pressure, vacuum and water resistance type
- Acceptable for an order of a requested size such as the total length of a sensor (for example DPU-30A-007)
- Acceptable for an order of the sensor connected with the cable (for example DPU-30A-002)
- Acceptable for an order of a requested type of sensor head

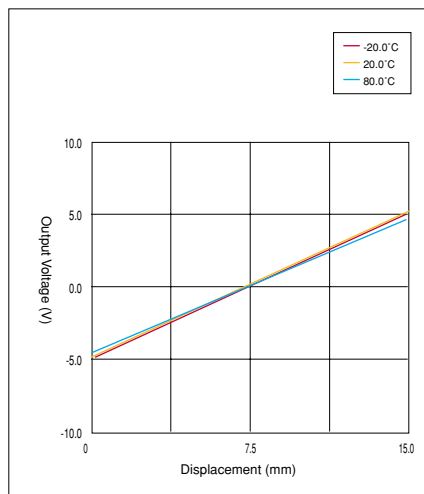
※ Special specification and profile need to match the conditions of use. Please do not hesitate to contact us concerning your requests.

XYZ in model represent cable length, example 401 represents 400mm and 102 represents 1000mm.

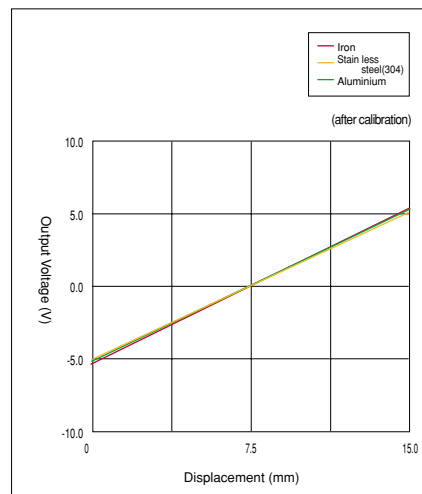
## Output characteristics / linearity



## Thermal characteristics



## Variation depending on target materials



# AEC-37 Series

Sensor : **DPU-40A**

Adopted converters : AEC-3740 37MS-40

Adopted cable : DPC model cable



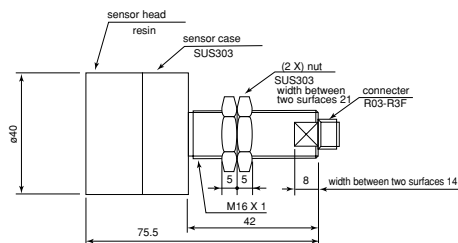
## Specifications

model	sensor : DPU-40A	
measuring range (iron)	0 to 20mm ( $\alpha$ 0 : 0mm)	
output voltage	$\pm$ 5V (2.0mm/V)	
adopted converters	3740	37MS-40
resolution	6 $\mu$ m	9.6 $\mu$ m
linearity	$\pm$ 0.5%/FS (2 to 18 mm of measuring distance) 3%/FS (other measuring distance)	
temperature range	-20°C to 80°C	
thermal characteristics	$\pm$ 2.5 $\mu$ m/°C of drift between -20°C and 80°C	

※ See p86 about dead zone  $\alpha$  0.

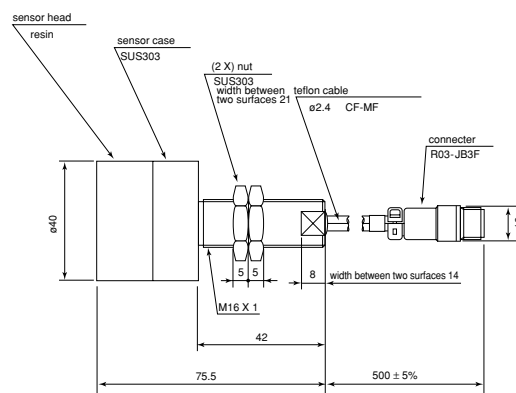
## Appearance

DPU-40Amodel



## Ordered profile

DPU-40A-002model

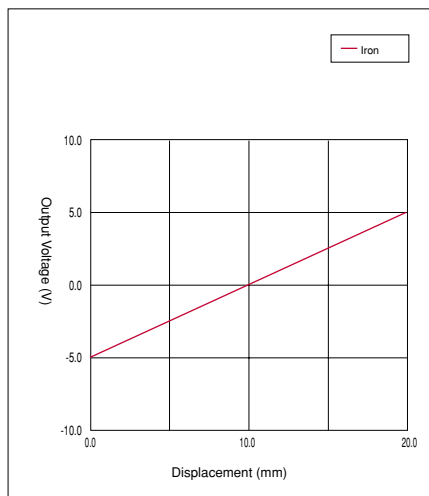


## Features and specifications

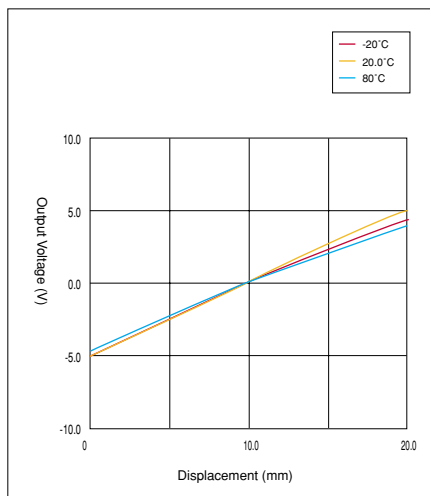
- High temperature resistance type max:120°C
- Acceptable for orders such as pressure, vacuum and water resistance type
- Acceptable for an order of a requested size such as the total length of a sensor
- Acceptable for an order of the sensor connected with the cable (for example DPU-40A-002)
- Acceptable for an order of a requested type of sensor head

※:Special specification and profile need to match the conditions of use.  
Please do not hesitate to contact us concerning your requests.

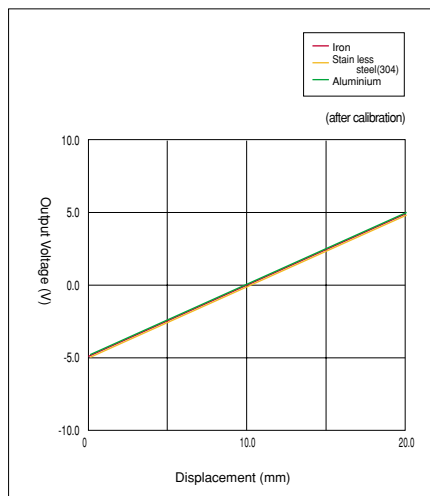
## Output characteristics / linearity



## Thermal characteristics



## Variation depending on target materials



## AEC-37 Series

Converter : **AEC-37**

Adopted converter : DPU model sensor

Adopted cable : DPC model cable



### Specifications

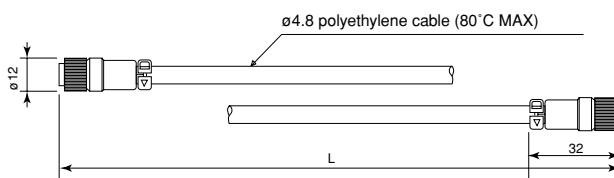
model	Converter : AEC-37 □□ (□□ symbolize sensor diameter)
output voltage	See each sensor section.
frequency characteristics	DC to 10kHz +0.5dB -3dB
resolution	2μm (Specification is subject to be changed.)
temperature range	-10°C to 55°C
thermal characteristics	0.05%/°C of drift between -10°C and 55°C
power supply	DC ± 15V, ± 100mA

### Features and specifications

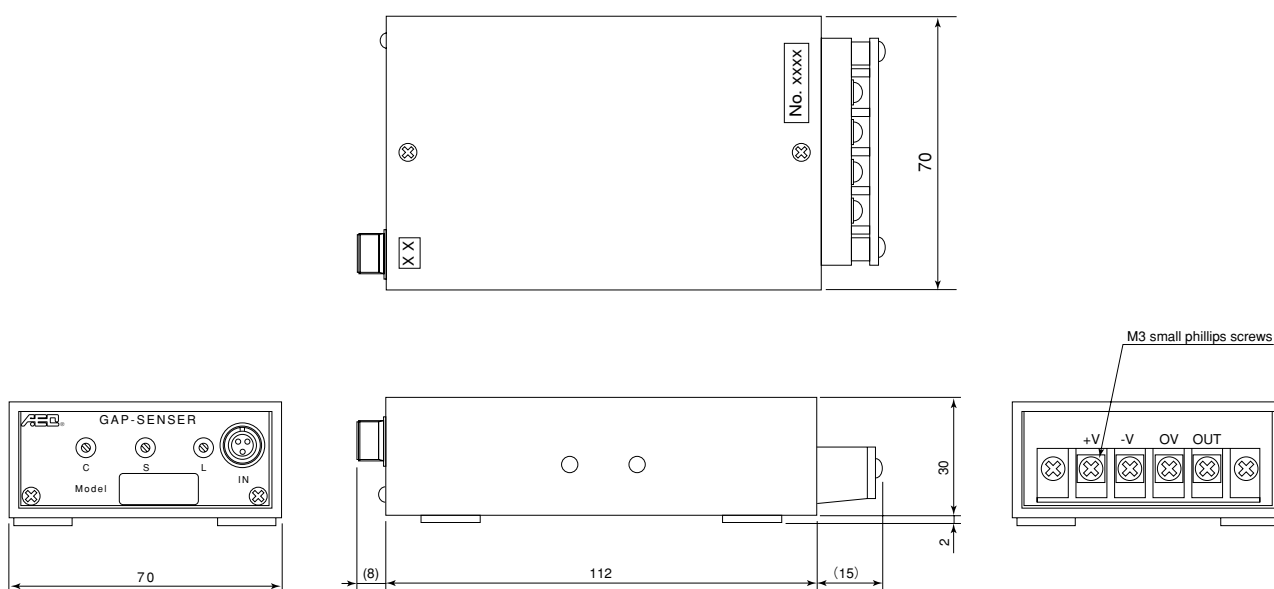
- Improved so as to widen the range of measurement and make a maximum approximation of individual output characteristics depending on every material by use of our original circuit
- Thermal drifts are differentially neglected with dual coils (for measurement and for reference)

### Adopted cable

- DPC-03RR (L: 3m)
- DPC-05RR (L: 5m)
- DPC-10RR (L: 10m)



### Outline view



## AEC-37 Series

Converter : **AEC-37MS**

Adopted converter : DPU model sensor

Adopted cable : DPC model cable



### Features

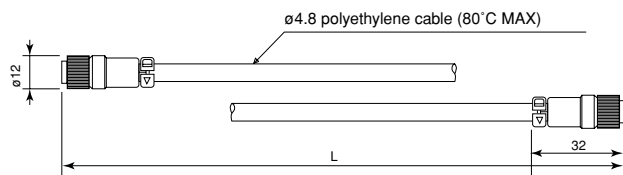
- Both the volume control dial and the voltage display are located on the front panel.
- Power supply covers a range of AC 85 to 264V.
- Available for purchase of a multi-channel storage rack

### Specifications

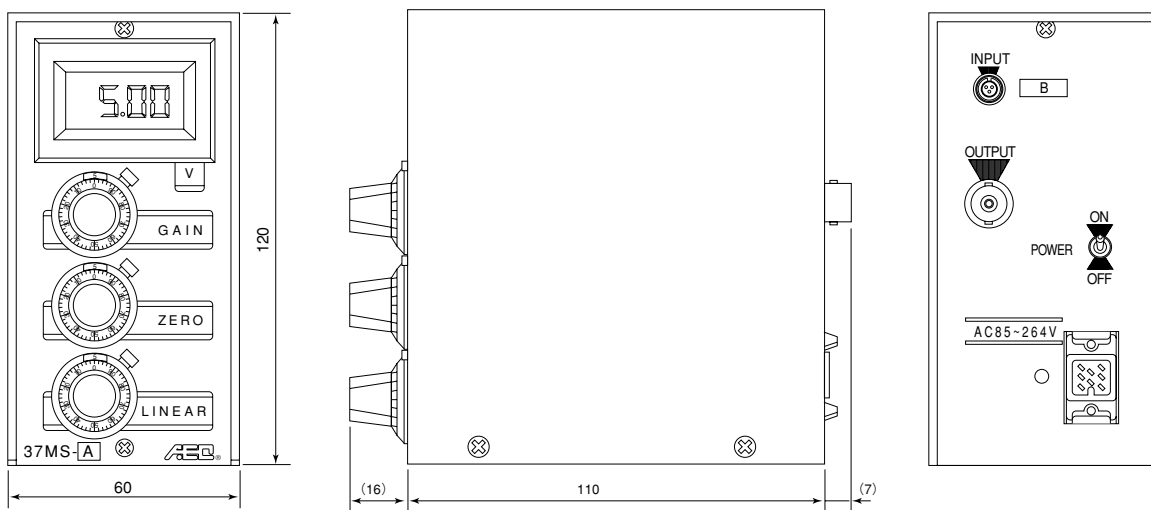
model	Converter : 37MS □□ (□□ symbolize sensor diameter)
output voltage	See each sensor section.
frequency characteristics	DC to 10kHz -2dB
resolution	See each sensor section.
temperature range	0°C to 55°C
thermal characteristics	± 0.1%/°C
power supply	AC85 to 264V 47 to 440Hz 10VA

### Outline view size

- DPC-03RR (L: 3m)
- DPC-05RR (L: 5m)
- DPC-10RR (L: 10m)



### Outline view



- See accessories (power supply, power cable) on P21.

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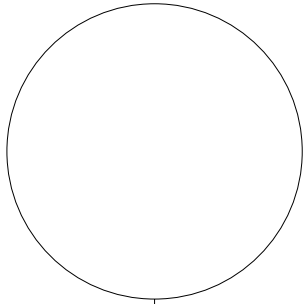
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## Shield type

# ■ PF Series

- **Sensor PF model**
  - The sensor is not influenced by the surrounding metals due to shielded type.
  - Decreases thermal drifts
  - High temperature resistance type max:140°C
- **Converter model CFC**
  - Standard type
  - Frequency respond :DC to 20kHz
- **Built-in power supply converter CFC-MS model**
  - Built-in power supply type of CFC model converter
  - Free power supply covers range of AC 85 to 264V
  - Visible liquid crystal voltage display
  - Utilisation of some kinds of sensors by switch-over
  - The volume control dial located on the front panel

**PF Series**

Sensor : **PF-02**

Adopted converters : CFC-02 CFCMS-S  
 Adopted cables : PC model cable  
 : PCT model cable

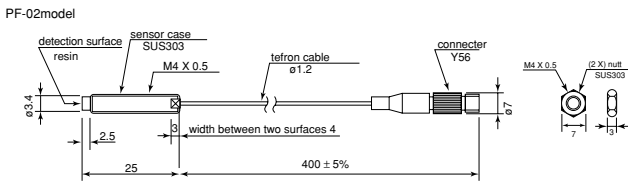


**Specifications**

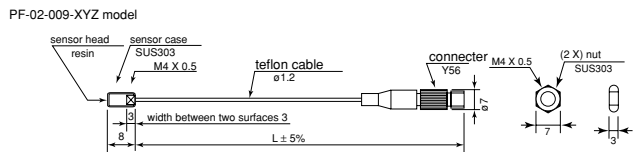
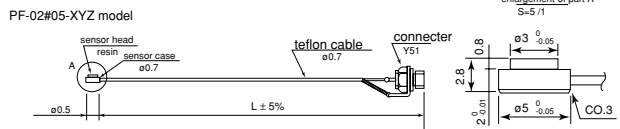
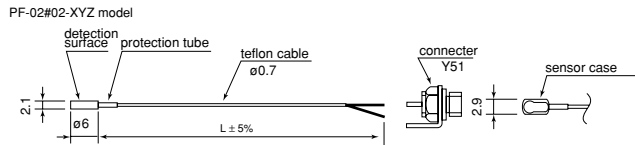
model	sensor : PF-02	
measuring range (iron)	0 to 0.6mm ( $\alpha$ 0 : 0mm)	
output voltage	0 to 3V (0.2mm/V)	
adopted converters	CFC-02	CFCMS-S
resolution	1.2 $\mu$ m	1.5 $\mu$ m
linearity	$\pm$ 1%/FS	
temperature range	-20°C to 140°C	
thermal characteristics	0.2 $\mu$ °C of drift between -20°C and 140°C	

※ See p86 about dead zone  $\alpha$  0.

**Appearance**



**Ordered profile**



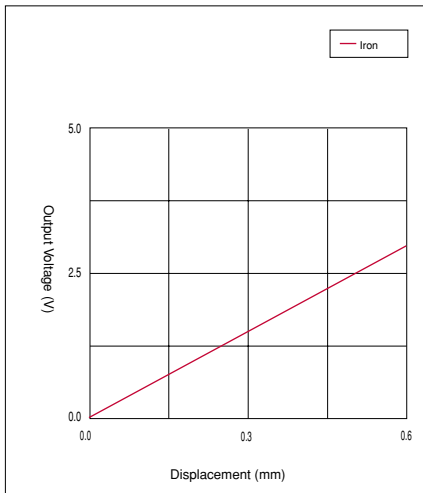
**Features and specifications**

- The sensor is not influenced by surrounding metals due to shielded type.
- Thermal drifts are decreased to about a half of our conventional drifts.
- Stable linearity is accomplished even though the dimensions of the sensitive area are the same as that of the target.
- Acceptable for an order of a requested size such as the total length of a sensor (for example PF-02-009)
- Practiced to measure gasket units (for example PF-02 # 02,PF-02 # 05)

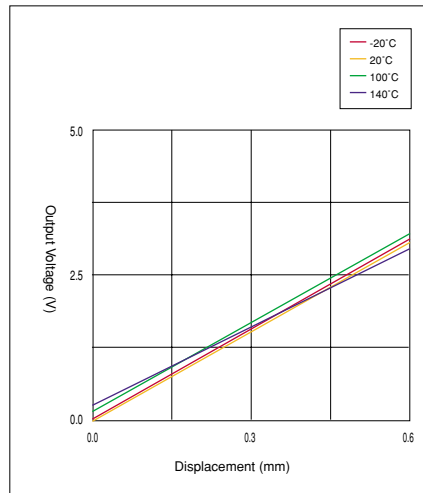
XYZ in model represent cable length, example 401 represents 400mm and 102 represents 1000mm.

※Special specification and profile need to match the conditions of use. Please do not hesitate to contact us concerning your requests.

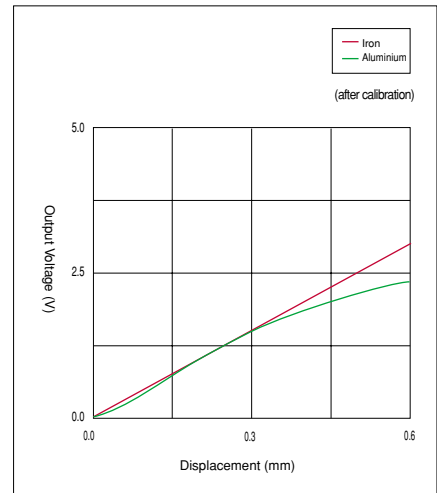
**Output characteristics / linearity**



**Output characteristics / linearity**



**Variation depending on target materials**



**PF Series**

Sensor : **PF-03**

Adopted converters : CFC-03 CFCMS-S  
 Adopted cables : PC model cable  
 : PCT model cable

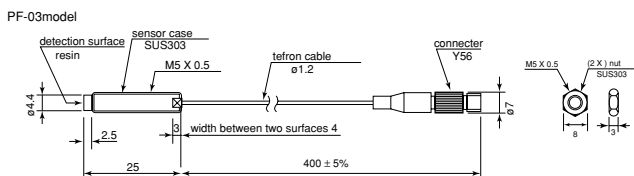


**Specifications**

model	sensor : PF-03	
measuring range (iron)	0 to 1mm ( $\alpha$ 0 : 0mm)	
output voltage	0 to 5V (0.2mm/V)	
adopted converters	CFC-03	CFCMS-S
resolution	1.2 $\mu$ m	1.5 $\mu$ m
linearity	$\pm$ 1%/FS	
temperature range	-20°C to 140°C	
thermal characteristics	0.2 $\mu$ V/°C of drift between -20°C and 140°C	

※ See p86 about dead zone  $\alpha$  0.

**Appearance**

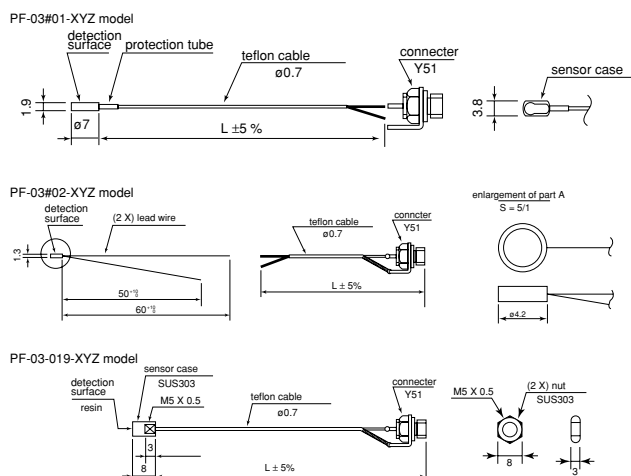


**Features and specifications**

- Sensor is not influenced by surrounding metals owing to shielded type.
- Thermal drifts are decreased to about a half of our conventional drifts.
- Stable linearity is accomplished even though the dimensions of the sensitive area are the same as that of the target.
- Acceptable for an order of a requested size such as the total length of a sensor (for example PF-03-019)

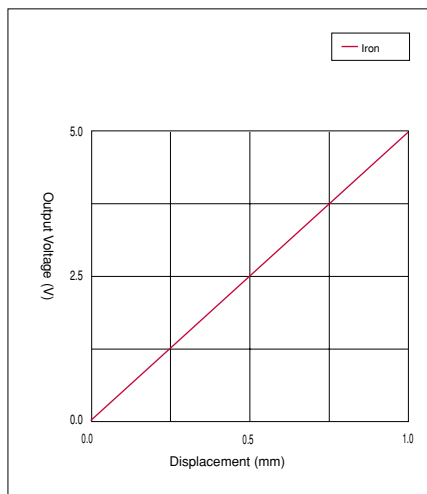
\*Special specification and profile need to match the conditions of use. Please do not hesitate to contact us concerning your requests.

**Ordered profile**

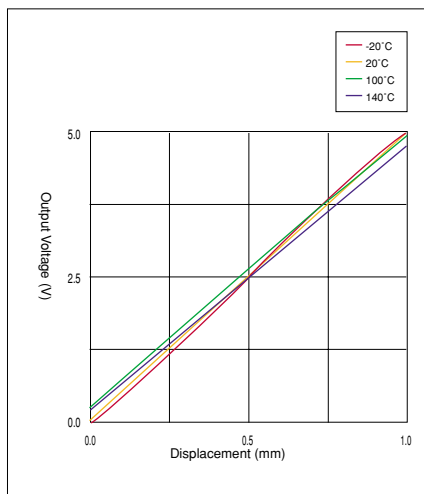


XYZ in model represent cable length, example 401 represents 400mm and 102 represents 1000mm.

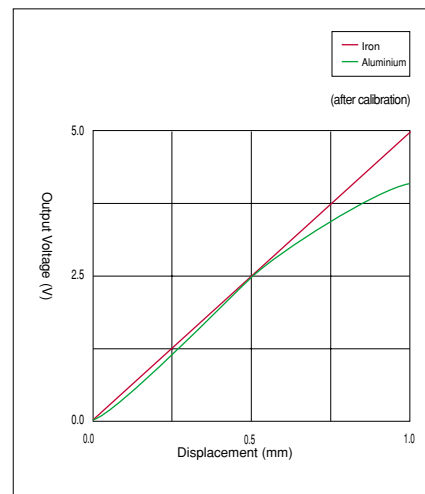
**Output characteristics / linearity**



**Output characteristics / linearity**



**Variation depending on target materials**



**PF Series**

Converter : **CFC**

Adopted converters : PF-02 PF-03  
 Adopted cables : PC model cable  
 : PCT model cable



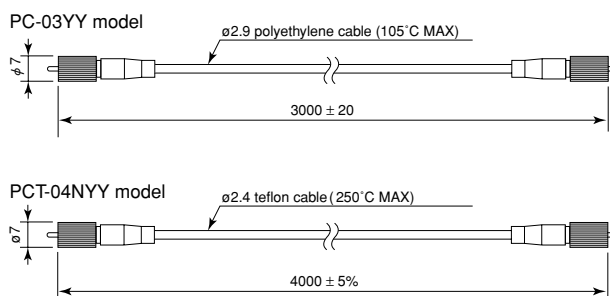
**Specifications**

model	Converter : CFC-□□ (□□ symbolize sensor diameter)
output voltage	See each sensor section.
frequency characteristics	DC to 20kHz -2dB
resolution	1.2μm
temperature range	0°C to 50°C
thermal characteristics	0.05%/°C of drift between 5°C and 40°C 0.1%/°C of drift between 40°C and 55°C
power supply	DC ± 11V to 17V

**Features and specifications**

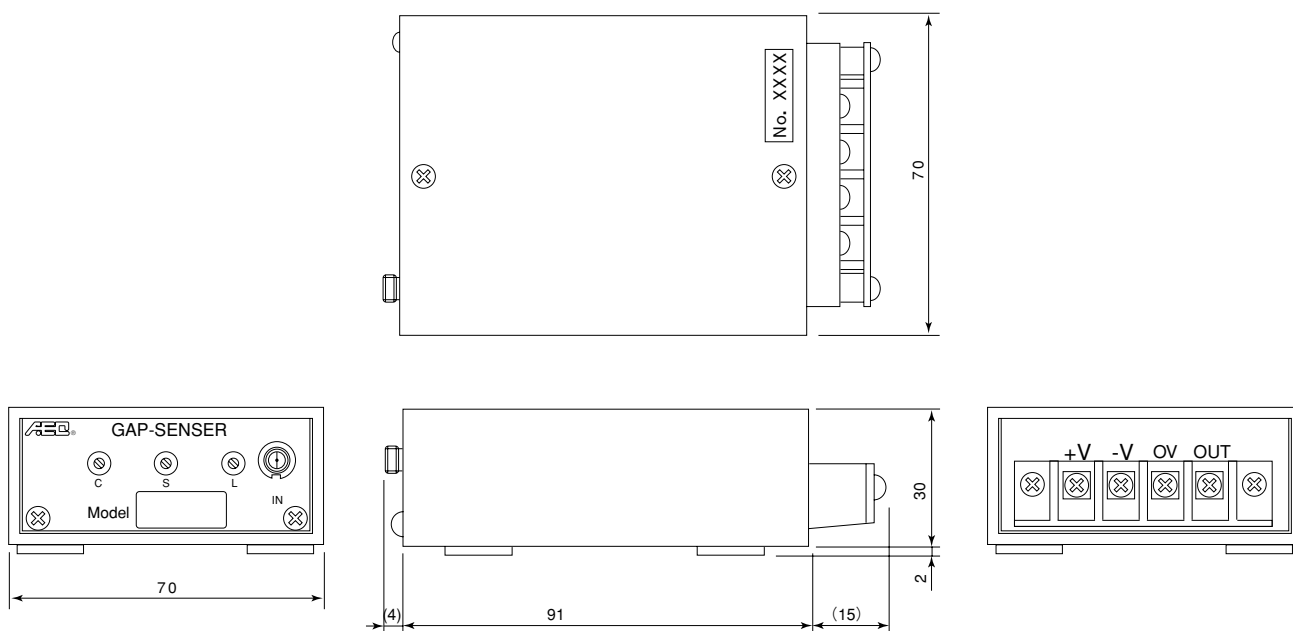
- Optimum miniature converter for installation
- Able to calibrate and adjust sensitivity with the built-in volume control dial
- Able to prepare the converter that is designed to protect from interference noise caused when multiple sensors approach each other
- Able to prepare a specified build-in power supply multi-channel on demand

**Standard adopted cables**



※ Acceptable for use with all kinds and lengths of flexible armoured cables

**Outline view**



**PF Series**

Converter : **CFCMS-S**

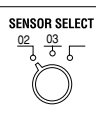
Adopted converters : PF-02 PF-03  
 Adopted cables : PC model cable  
 : PCT model cable



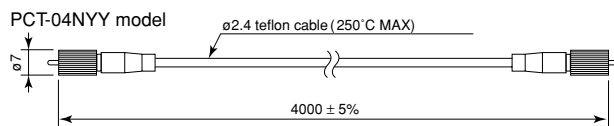
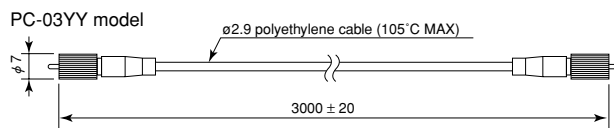
**Features and specifications**

- Able to share several kinds of sensors with selective channels
- Simple calibration and readjustment due to the location of the volume control dial and voltage display on the front panel
- Available not only in Japan but also abroad due to free power supply of AC 85 to 264V
- Available for purchase of a multi-channel storage rack

**Specifications**

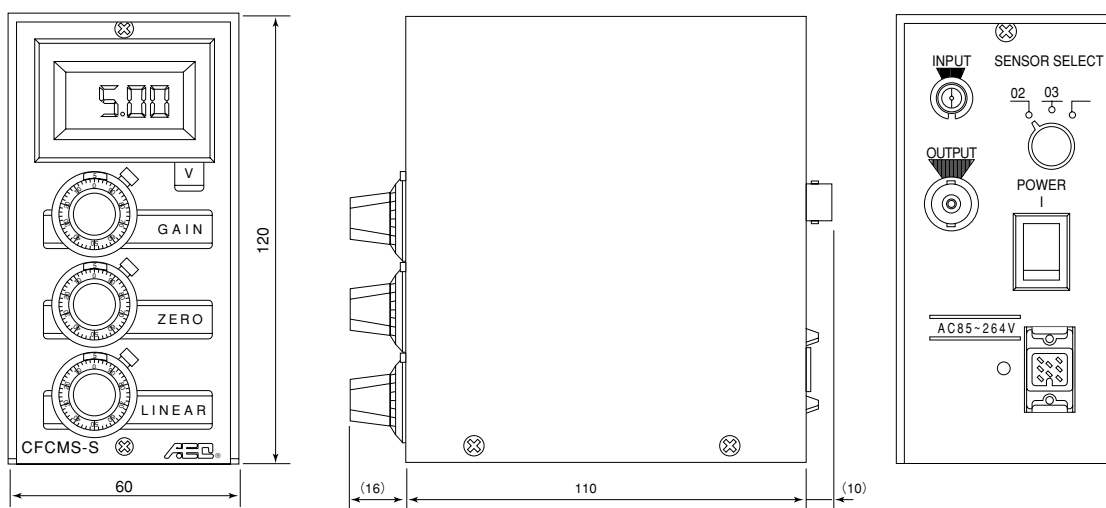
model	converter : CFCMS-S
adopted sensor	PF-02 PF-03 
output voltage	See each sensor section.
frequency characteristics	DC to 20kHz -2dB
resolution	1.5μm
temperature range	0°C to 50°C
thermal characteristics	0.05%/°C of drift between 5°C and 40°C 0.1%/°C of drift between 40°C and 55°C
power supply	AC85 to 264V 47 to 440Hz 10VA

**Adopted cables**



※Acceptable for use with all kinds and lengths of flexible armoured cables

**Outline view**



● See accessories (power supply, power cable) on P21.



High resolution

## ■ AEC-57 Series

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Maximum resolution is 0.02 $\mu$ m with mode selection  
High temperature resistance type: max180 $^{\circ}$ C  
Supply voltage: AC100V

**AEC-57 Series**

Converter : **AEC-5706PS**

Adopted sensor : S-06  
Adopted cable : PC model cable



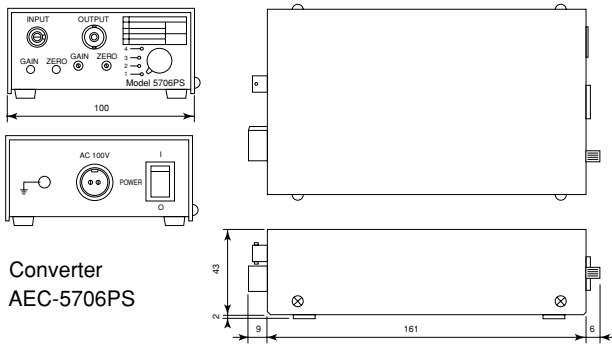
**Specifications**

model	converter : AEC-5706PS		
measuring range	0 to 1mm		
output voltage	± 5V (0.1mm/V)		
frequency	mode	frequency band	resolution
resolution	①	DC to 30Hz	0.02μm
	②	DC to 80kHz	0.1μm
	③	100Hz to 15kHz	0.05μm
	④	100Hz to 80kHz	0.09μm
linearity	±1%/FS (0.2 to 0.8 mm of measuring distance) 5%/FS (other measuring distance)		
temperature range	sensor	-20°C to 180°C	
	converter	-10°C to 55°C	
thermal	sensor	± 0.04%/°C/FS	
characteristics	converter	± 0.10%/°C/FS	
power supply	AC100V ± 10% 3VA		

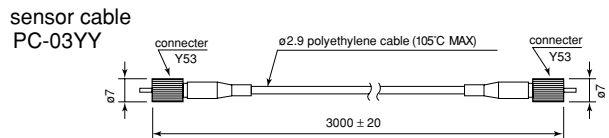
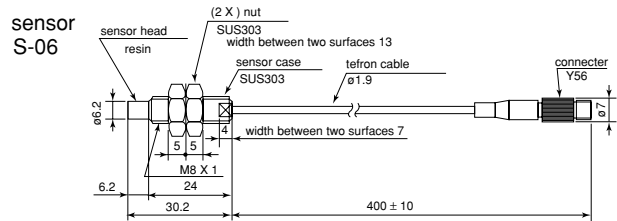
**Features and specifications**

- High resolution gap sensor

**Outline view**

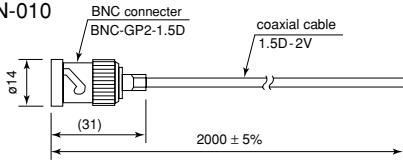


Converter  
AEC-5706PS

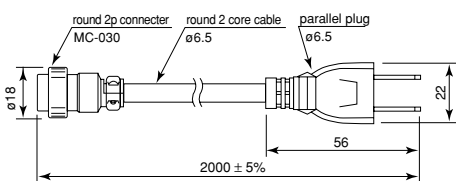


sensor cable  
PC-03YY

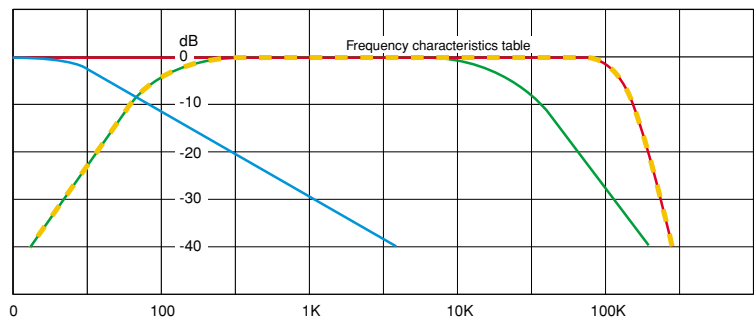
Output cable (accessory for converter)  
OC-202BN-010



Power supply cable (accessory for converter)  
AC-202-019

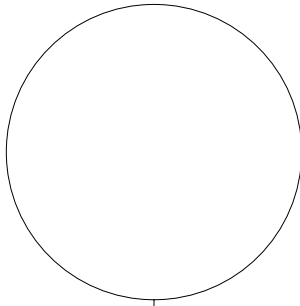


**Frequency characteristics table**



mode	frequency band	output
— (blue)	DC~30Hz	10mV/μm
— (red)	DC~80kHz	
— (green)	100Hz~15kHz	100mV/μm
- - - (yellow)	100Hz~80kHz	





## Built-in amplifier type

# ■ ML Series

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- Built-in amplifier sensor ML-06 model
  - Only able to use commercial power source
  - the use for slip ring
  - Linearizer for ML-06 model
- Linear amplifier AEC-59B06FC-01

**ML Series**

Sensor : **ML-06**

The adopted linear amplifier : AEC-59B06FC-01



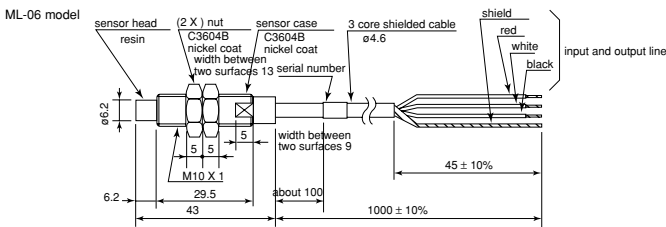
**Specifications**

model	sensor : ML-06
measuring range	1.2mm
output voltage	See graphs about output characteristics to input power supply voltage.
temperature range	-20°C to 105°C
frequency response	DC to 10KHz

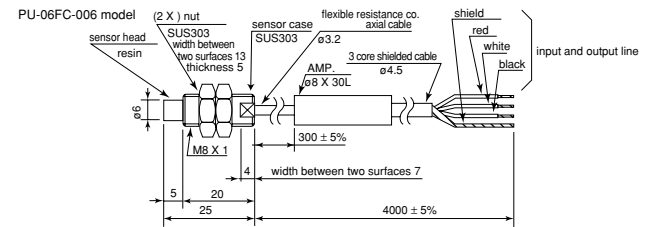
Output characteristics to input power supply voltage

power supply voltage	+5V	+8V	+12V	+15V	+18V
dissipation current	1.8	3.0	4.7	5.9	7.2
output noise	2	4	6	8	13

**Appearance**



**Ordered profile**

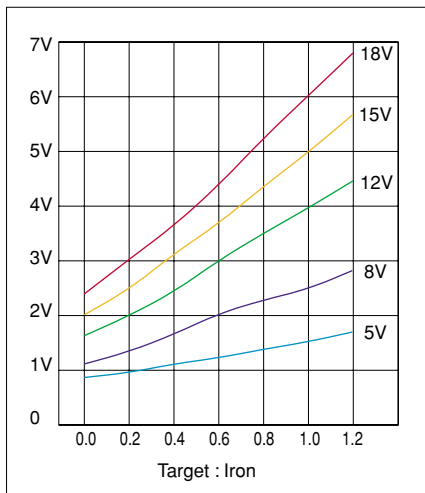


**Features and specifications**

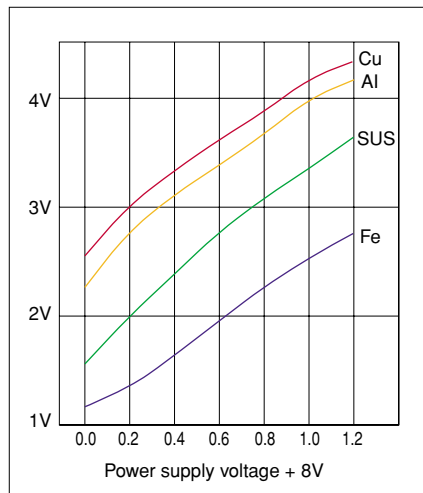
- The amplifier is built into the GAP-SENSOR, allowing the user immediate use after the power supply is turned on.
- While the output varies depending on the input voltage (see the reference data below), the output voltage that is proportional to the displacement measured in the order of micron can be obtained.
- The built-in amplifier design can extend the cable up to 100 m.
- This GAP-SENSOR, when used with a slip ring, can be used as a noise-free system.
- A separate amplifier model is also available (see the example of special-order profile). Please consult us about the service environment.
- The linear control amplifier AEC-59B06FC-01 is available to adjust the output voltage. (See the next page for specifications.)

※Special specifications and profile are determined from the service conditions. We will deal with your other special requests.  
Please do not hesitate to contact us concerning your requests.

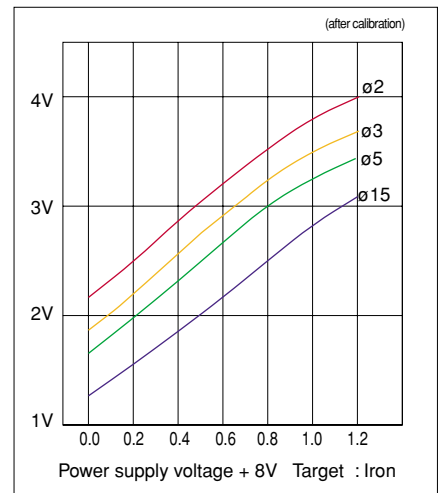
**Output characteristics to input power supply voltage**



**Variation depending on target materials**



**Output variation depending on shapes of measuring targets.**



**ML Series**

Adopted sensor : ML-06

Converter : **59B06FC-01**



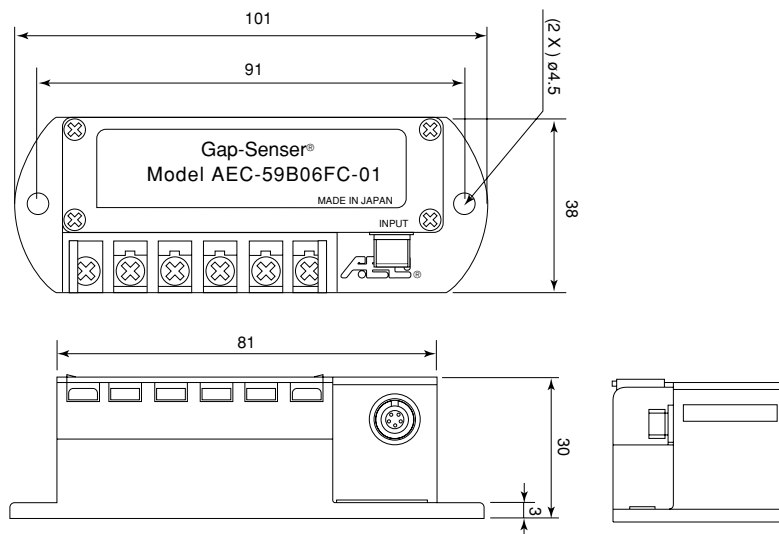
**Specifications**

model	Converter : 59B06FC-01
measuring range (iron)	0 to 2.0mm
output voltage	adjustable between 1 and 11 volts
frequency characteristics	DC to 20kHz -3dB
resolution	1μm
temperature range	-10°C to 55°C
power supply	DC+15V

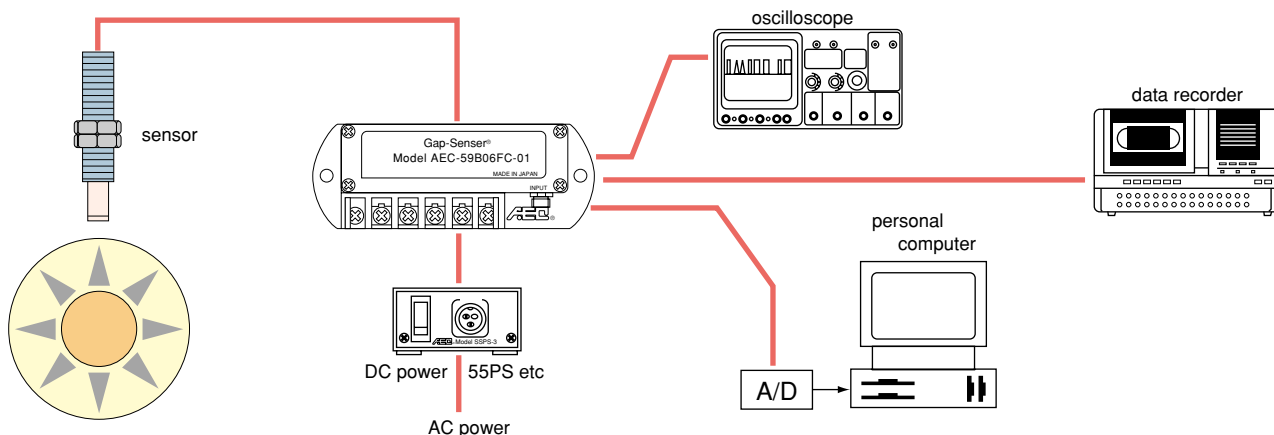
**Features and specifications**

- Linearity adjusting amplifier only for ML model
- Able to calibrate and adjust sensitivity of non-linear output from the ML model with a built-in volume control dial

**Outline view**



**Measuring system**



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Equipment maintenance  
diagnosis monitor

## ■ 73 Series

Compact design: 48(H) X 96(w)

Free power supply: AC 85 to 264V

Able to build a central control system

- Axis vibration monitor:73-V
- Axis position monitor: 73-D
- Acceleration monitor: 73-A 2
- Acceleration monitor :73-A 3
- Roller bearing vibration monitor :73-A 4
- Signal converter :DVA-02
- Rotational monitor : 73R
- 73-V/ D sensor for watching monitor:  
S-06, S-10, AEC-76
- Piezoelectric Acceleration sensor

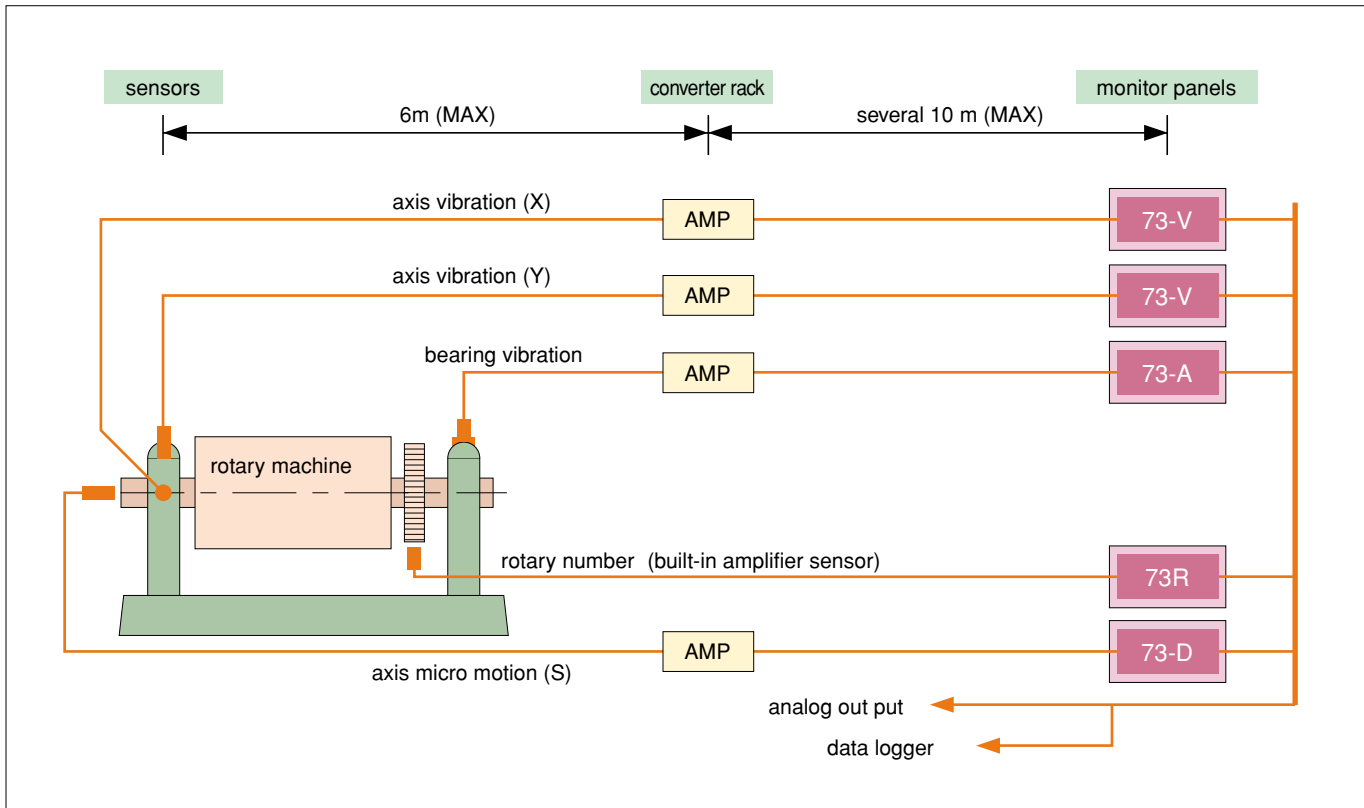
## Monitor 73Series

### Axis vibration monitor : 73-V

#### General

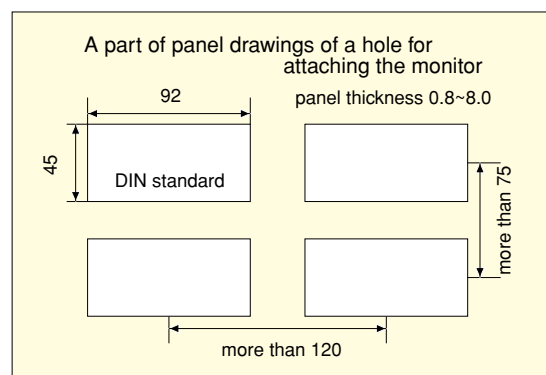
It is extremely important for Monitoring of vibration, displacement, and rotation to ascertain the running condition of rotating machines and machinery such as turbines, electric generators and compressors.

The system of the monitor 73 series is formulated for low cost price



#### Features

- Compact design (48 (H) X 96 (W)), and easy to attach to the control board by placement in square hole.
- Free power supply: AC 85 to 264V/ 50 to 60Hz (In case of 73 model, able to supply DC power source: option)
- Full scale of measuring value is determinable if desired.
- Easy to set up alarm call
- Large scale and visible digital display (character is 14.2 mm)
- Analog current output (4 to 20mA)
- Self-diagnosis function always makes operational condition and installation position of sensor confirm to be in normal or abnormal (73-V, 73-D mode only).
- Test mode is equipped as standard, which checks operation condition without running the machine. (except 73R model).
- In case of RS-485 model, communication facility can be provided as option.



# Axis vibration monitor

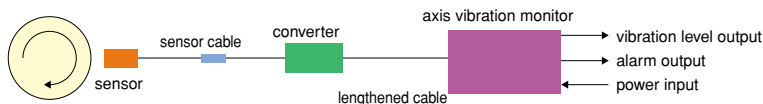
## model : 73-V

Adopted sensors : S-06 S-10 (see P52, P53)  
 Adopted converters : AEC-7606, 7610 (see P54)  
 Adopted cable : PC-06YY model cable



### System

Axis vibration monitor :	73-V	1
Sensor :	S-06/S-10	1
Sensor cable :	PC-06YY	1
Converter :	7606/7610	1
Lengthened cable :	EC-XYZAA-012(option)	1



※ Acceptable for use with cable length and filter characteristics

### General

This non-contact gap sensor system has capability of the continuous detection of axis vibration of rotational machinery such as turbines, dynamo generators and compressors. If the monitored vibration values are beyond the previously set values, which are determined by two steps (low and high), individual output is able to alarm at every step. The terminal block is removable from the body. There is no need to pull the external wire from the terminal block.

### Features

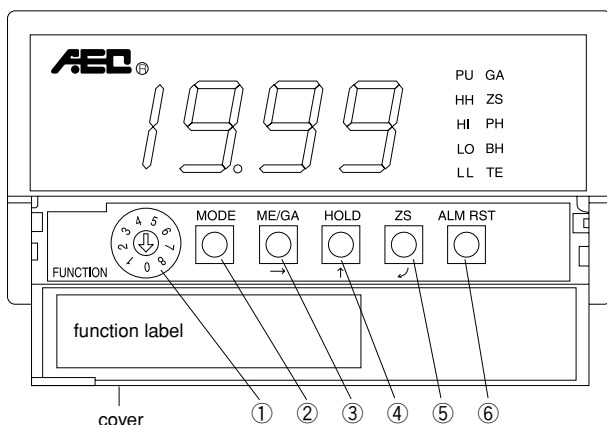
- Able to lengthen cables as long as several ten meters in between the gap-sensor and monitor.
- Easy setting on the front panel
- A built-in power supply for sensor is located within the monitor
- Full scale of measuring value is determinable if desired.
- The front panel permits peak and bottom values to hold, the alarm delay time to set, and the alarm to go off.
- Equipped with a zero-setting function to calibrate the ordinary vibration to zero.

### Specifications

display	0 to 19.99 : green LED
unit	mm (0.000mm)
input signal	1-5V input (option : 4-20mA input)
input impedance	about 200kΩ (option : 250Ω in case of 4-20mA)
alarm delay time	0.1 to 60.0sec (settable with resolution of 0.1 sec)
alarm output	relay contact output : comparative alarm (2 points) : each 1a contact input over alarm (1 point) : 1a contact point relay contact capacitance : AC 125V 0.3 A(resistance lead) DC 110V 0.2A (resistance lead)
built-in L.P.F	10kHz of built in L.P.F
built-in H.P.F	5Hz of built in H.P.F
analog output	DC4-20mA (allowable load resistance 0 to 600Ω) (insulated from input output)
power output for sensor	DC18V, 50mA of built-in DC stabilized power supply
withstand voltage	AC1000V(1min) between input and output AC1500V(1min) between in- and output terminal and outer case AC1500V(1min) between terminals (except power supply terminals) DC1500V(1min) between power supply and GND
vibration impact test	according to JIS C1003
cancel of hold alarm	able to cancel both wire connecter and switch operation
operating temperature	0 to 50°C
operating humidity	35 to 85%RH (without condensation)
power supply	AC85 to 264V (free) : 50Hz/60Hz:about15VA
size, weight	48H X 96W X 132D mm : about450g

### Outline view

● Front panel (opened)



Key	function1(setting mode)	function2(setting mode)
①	Function Switch (see specification.)	—
②	MODE (measurement/setting) key	—
③	ME/GA key	→ (shift)
④	HOLD(peak · bottom · peak bottom) key	↑ (up)
⑤	ZS (zero set) key	↶ (return)
⑥	ALM RST (cancel of alarm output) key	—

# Axis position monitor

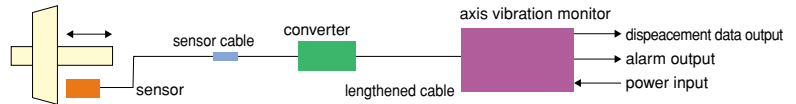
## model : 73-D

Adopted sensors : S-06 S-10 (see P52, P53)  
 Adopted converters : AEC-7606, 7610 (see P54)  
 Adopted cable : PC-06YY model cable



### System

Axis vibration monitor :	73-D	1
Sensor :	S-06/S-10	1
Sensor cable :	PC-06YY	1
Converter :	7606/7610	1
Lengthened cable :	EC-XYZAA-012(option)	1



※ Acceptable for use with cable length and filter characteristics

### General

This non-contact gap sensor system has capability of the continuous detection of axis vibration of rotational machinery such as turbines, dynamo generators and compressors. If the monitored vibration values are beyond the previously set values, which are determined by two steps (low and high), individual output is able to alarm at every Step .4 points (low 2points and high 2points) of alarm output are programmed as settings. The terminal block is removable from the body. There is no need to pull the external wire from the terminal block.

### Features

- Able to lengthen cables as long as several ten meters in between the gap-sensor and the monitor
- Easy setting on the front panel
- A built-in power supply for the sensor is located within the monitor.
- The front panel permits peak and bottom values to hold, and the alarm delay time to set, and the alarm to go off.
- Equipped with a zero- setting function to calibrate the initial value to zero

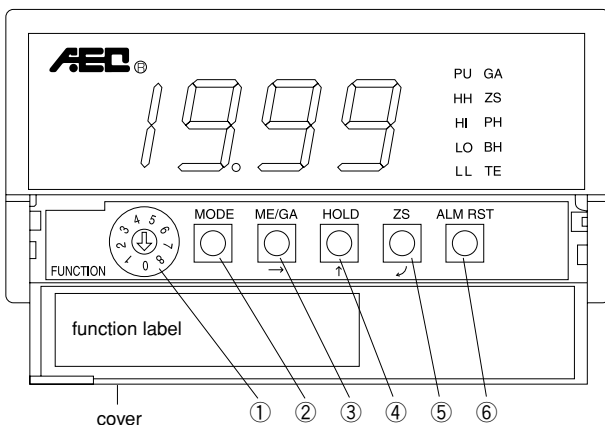
※Minus sign is displayed when target approaches from zero displacement position.

### Specifications

display	0 to 19.99 : green LED ※
unit	mm (±0.000mm)
input signal	1-5V input (option : 4-20mA input)
input impedance	about 200kΩ (option : 250 Ω in case of 4-20mA)
alarm delay time	0.1 to 60.0sec (settable with resolution of 0.1 sec)
alarm output	relay contact output : comparative alarm (4 points) : each 1a contact input over alarm (1 point) : 1a contact point relay contact capacitance : AC 125V 0.3 A(resistance lead) DC 110V 0.2A (resistance lead)
built-in L.P.F	100Hz of built-in L.P.F
analog output	DC4-20mA (allowable load resistance 0 to 600Ω) (insulated from input )
power output for sensor	DC18V, 50mA of built-in DC stabilized power supply
withstand voltage	AC1000V(1min) between input and output AC1500V(1min) between in- and output terminal and outer case AC1500V(1min) between terminals (except power supply terminals) DC1500V(1min) between power supply and GND
vibration impact test	according to JIS C1003
cancel of self-hold alarm	able to cancel both wire connector block and switch operation
operating temperature	0 to 50°C
operating humidity	35 to 85%RH (without condensation)
power supply	AC85 to 264V (free) : 50Hz/60Hz:about15VA
size, weight	48H X 96W X 132D mm : about 450g

### Outline view

- Front panel (opened)



Key	function1(setting mode)	function2(setting mode)
①	Function Switch (see specification.)	—
②	MODE (measurement/setting) key	—
③	ME/GA key	→ (shift)
④	HOLD(peak · bottom · peak bottom) key	↑ (up)
⑤	ZS (zero set) key	↵ (return)
⑥	ALM RST (cancel of alarm output) key	—



## Acceleration monitor

model : 73-A2

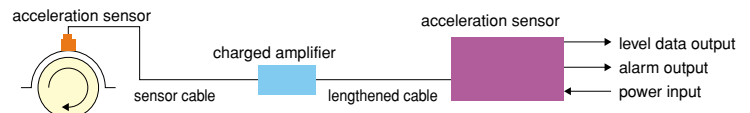
Adopted sensor : AEC-5032  
 Adopted converter : CA-95  
 Adopted cable : HB-2C

See P55,56



## System

Axis vibration monitor : 73-A2	1
Acceleration sensor : (for example : AEC-5032)	1
Sensor cable : HB-2C (2m)	1
Charged amplifier : CA-95	1
Lengthened cable : EC-XYZAA-012	1



※ Acceptable for use with cable length and filter characteristics

## General

The non-contact gap sensor system equipped with a piezoelectric acceleration sensor has the capability of continuous detection of the vibration that is difficult to determine on a stationary base.

If the monitored acceleration values are beyond the previously set values which are determined by two steps (low and high), individual output is able to alarm at every step. The terminal block is removable from the body. There is no need to pull the external wire from the terminal block

## Features

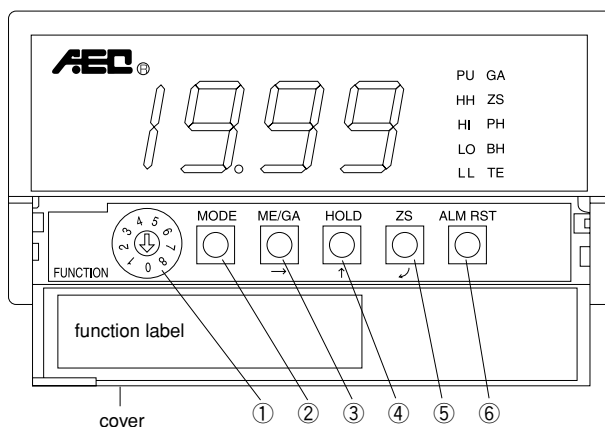
- Easy setting on the front panel
- A built-in power supply for sensor is located within the monitor
- Full scale of measuring value is determinable if desired.
- The front panel permits peak and bottom values to hold, the alarm delay time to set, and alarm to go off.
- Separation of the charging amplifier from the sensor enables the user to choose between miniature type and high temperature resistance type.
- High current output from 4 to 20mA enables lengthening the wire cable to several hundred meters between the charge amplifier and the acceleration monitor.

## Specifications

display	0 to 1999 : green LED
unit	G (0.000G)
input signal	16mAp-p (12mA:without vibration)
input impedance	about 250kΩ
alarm delay time	0.1 to 60.0sec (settable with vibration resolution of 0.1 sec)
alarm output	relay contact output : comparative alarm (2 points) : each 1a contact input over alarm (1 point) : 1a contact point relay contact capacitance : AC 125V 0.3 A(resistance lead) DC 110V 0.2A (resistance lead)
built-in L.P.F	10kHz of built-in L.P.F
built-in H.P.F	5Hz of built-in H.P.F
analog output	DC4- 20mA (allowable load resistance 0 to 600Ω)(insulated from input )
power output for sensor	DC18V, 50mA of built-in DC stabilized power supply
withstand voltage	AC1000V(1min) between input and output AC1500V(1min) between in- and output terminal and outer case AC1500V(1min) between terminals (except power supply terminals) DC1500V(1min) between power supply and GND
vibration impact test	according to JIS C1003
cancel of hold alarms	able to cancel both wire connector block and switch operation
operating temperature	0 to 50°C
operating humidity	35 to 85%RH (without condensation)
power supply	AC85 to 264V (free) : 50Hz/60Hz:about15VA
size, weight	48H X 96W X 132D mm : about 450g

## Outline view

- Front panel (opened)



Key	function1(setting mode)	function2(setting mode)
①	Function Switch (see specification.)	—
②	MODE (measurement/setting) key	—
③	ME/GA key	→ (shift)
④	HOLD(peak · bottom · peak bottom) key	↑ (up)
⑤	ZS (zero set) key	↶ (return)
⑥	ALM RST (cancel of alarm output) key	—

## Acceleration monitor

model : 73-A3

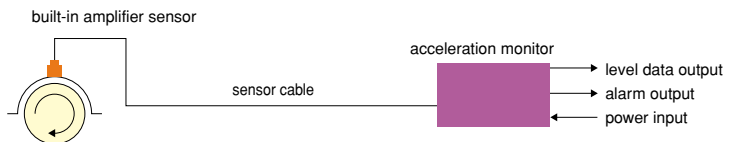
Adopted sensor : AEC-122R (built-in amplifier)  
 Adopted converter :  
 Adopted cable : CX-010AT(10m)

See P55、56



## System

Axis vibration monitor : 73-A3 1  
 Built-in amplifier sensor : AEC-122R 1  
 Sensor cable : CX-010AT(10m) 1



※ Acceptable for use with cable length and filter characteristics

## General

The non-contact gap sensor system, equipped with a piezoelectric acceleration sensor, has the ability of continuous detection of the vibration that is difficult to detect on a stationary base.

If the monitored acceleration values are beyond the previously set values, which are determined with two steps (low and high), individual output is able to alarm at every step.

The terminal block is removable from the body. There is no need to pull the external wire from the terminal block.

## Features

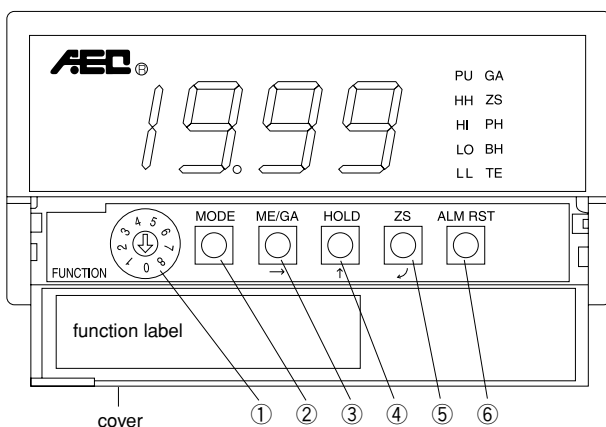
- Easy settings on the front panel
- The full scale of measuring value is determinable if desired.
- The front panel permits peak and bottom values to hold, the alarm delay time to set and alarm to go off.
- Simple composition due to a built-in amplifier sensor vibration to zero.

## Specifications

display	0 to 1999 : green LED
unit	G (0.000 G)
input signal	8V p-p(7.2V:without vibration) (AEC-122R type sensor input)
alarm delay time	0.1 to 60.0sec (settable with resolution of 0.1 sec)
alarm output	relay contact output : comparative alarm (2 points) : each 1a contact input over alarm (1 point) : 1a contact point relay contact capacitance : AC 125V 0.3 A(resistance lead) DC 110V 0.2A (resistance lead)
analog output	DC4-20mA (allowable load resistance 0 to 600Ω) (insulated from input)
withstand voltage	AC1000V(1min) between input and output AC1500V(1min) between in- and output terminal and outer case AC1500V(1min) between terminals (except power supply terminals) DC1500V(1min) between power supply and GND
vibration impact test	according to JIS C1003
cancel of self-hold alarm	able to cancel both wire connector block and switch operation
operating temperature	0 to 50°C
operating humidity	35 to 85%RH (without condensation)
power supply	AC85 to 264V (free) : 50Hz/60Hz:about15VA
size, weight	48H X 96W X 132D mm : about 450g

## Outline view

- Front panel (opened)



Key	function1(setting mode)	function2(setting mode)
①	Function Switch (see specification.)	—
②	MODE (measurement/setting) key	—
③	ME/GA key	→ (shift)
④	HOLD(peak · bottom · peak bottom) key	↑ (up)
⑤	ZS (zero set) key	↵ (return)
⑥	ALM RST (cancel of alarm output) key	—

# Roller bearing vibration monitor

## model : 73-A4

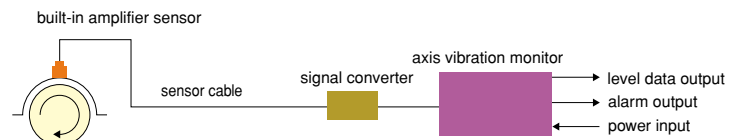
Adopted sensor : AEC-122R (built-in amplifier)  
 Adopted converter : DVA-02 (signal converter)  
 Adopted cable : CX-101BT (10m)

See P55, 56



### System

Axis vibration monitor :	73-A4	1
Built-in amplifier :	AEC-122R	1
Sensor cable :	CX-101BT (10m)	1
Signal converter :	DVA-02	1



※ Acceptable for use with cable length and filter characteristics

### General

The non-contact gap sensor system, equipped with a piezoelectric acceleration sensor has the ability of continuous detection of the vibration that is difficult to determine on a stationary base.

The monitor displays acceleration, speed, or amplitude signal through switching, while detected signals are input into the converter.

If the monitored acceleration values are beyond the previously set values which are determined by two steps (low and high), individual output is able to alarm at every step.

The terminal block is removable from the body. There is no need to pull the external wire from the terminal block.

### Features

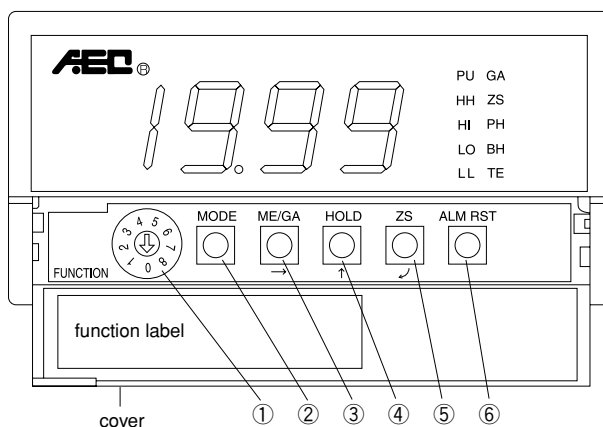
- The monitor of the signal converter displays either acceleration, speed or amplitude signal.
- Easy settings on the front panel
- The power supply for the signal converter is built into the monitor.
- The front panel permits peak and bottom values to hold, the alarm delay time to set, and alarm to go off. vibration to zero.

### Specifications

display	0 to 1999 : green LED
unit	G · mm / s · mm
input signal	12mA (without vibration) 16mAp-p (signal converter output)
input impedance	about 250Ω
alarm delay time	0.1 to 60.0sec (settable with resolution of 0.1 sec)
alarm output	relay contact output : comparative alarm (2 points) : each 1a contact input over alarm (1 point) : 1a contact point relay contact capacitance : AC 125V 0.3 A(resistance lead) DC 110V 0.2A (resistance lead)
analog output	DC4 - 20mA (allowable load resistance 0 to 600Ω) (insulated from input)
power output for sensor	DC18V, 50mA of built-in DC stabilized power supply
withstand voltage	AC1000V(1min) between input and output AC1500V(1min) between in- and output terminal and outer case AC1500V(1min) between terminals (except power supply terminals) DC1500V(1min) between power supply and GND
vibration impact test	according to JIS C1003
cancel of self-hold alarm	able to cancel both wire connector and switch operation
operating temperature	0 to 50°C
operating humidity	35 to 85%RH (without condensation)
power supply	AC85 to 264V (free) : 50Hz/60Hz:about15VA
size, weight	48H X 96W X 132D mm : about 450g

### Outline view

- Front panel (opened)



Key	function1(setting mode)	function2(setting mode)
①	Function Switch (see specification.)	—
②	MODE (measurement/setting) key	—
③	ME/GA key	→ (shift)
④	HOLD(peak · bottom · peak bottom) key	↑ (up)
⑤	ZS (zero set) key	↶ (return)
⑥	ALM RST (cancel of alarm output) key	—

Signal converter  
model : **DVA-02**

Adopted sensor : AEC-122R (built-in amplifier) } See P55、56  
 Adopted cable : CX-010BT (10m)  
 Adopted monitor : 73-A4



**System**

- Built-in amplifier sensor : AEC-122R 1
- Sensor cable : CX-010BT (10m) 1
- Converter : DVA-02 1



**General**

The non-contact gap sensor system ,equipped with a piezoelectric acceleration sensor, has the ability of continuous detection of vibration that is difficult to detect on a stationary base.

The signal converter permits input signals to transform into acceleration, speed, and amplitude through switching, which are read out respectively as DC4 to 20mA of output current.

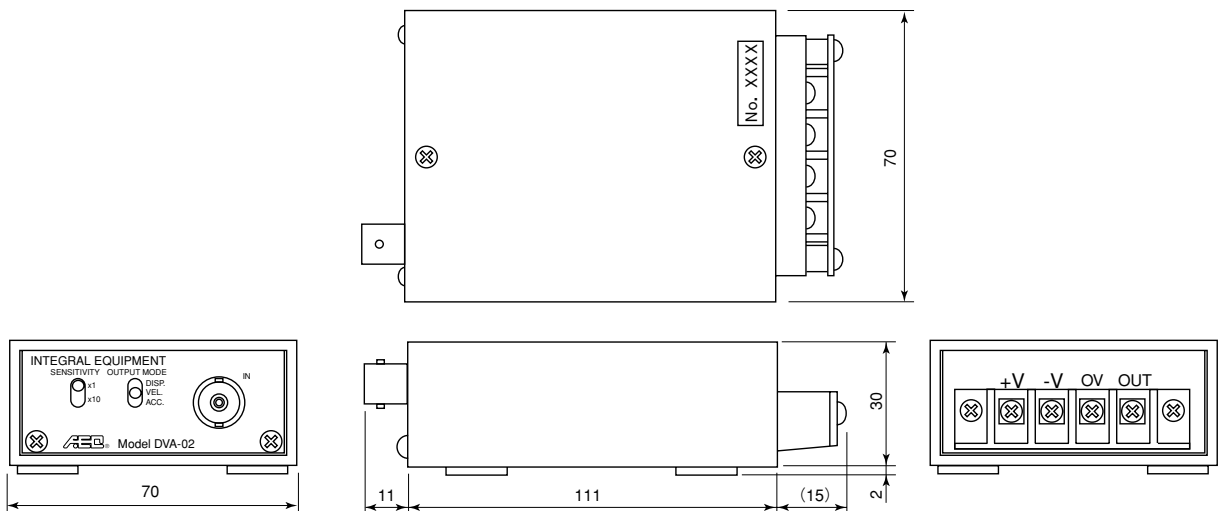
**Features**

- Selectable output from acceleration, speed, or amplitude
- Easy to locate a sensor after machinery is completely installed.
- Direct readout of acceleration, speed, and amplitude which consist of invisible vibration.
- 73-4A is suitable for monitoring

**Specifications**

mode and frequency response	scale	resolution
acceleration	1G	0.0005G
	10 to 6500Hz	10G
speed	10mm/s	0.007mm/s
	10 to 1200kHz	100mm/s
vibration amplitude	0.1mm	0.00024mm
	10 to 300kHz	1mm
output	4-20mA/FS	
temperature range	0 to 55°C	
power supply	supply from monitor 73-A4	

**Outline view**



## Rotational monitor

model : 73R

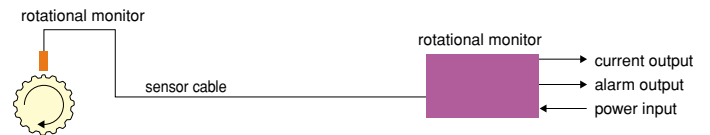
Adopted sensor : ML-06 (built-in amplifier) See P40.

※ Available for other gap sensor and electromagnetic pick-up



## System

Rotational monitor : 73R 1  
 Rotational sensor : ML-06 1 (built-in amplifier cable 1m)  
 Lengthened sensor cable : □□ m of 3 core shielded cable 1 peace (option)



## General

Rotational pulse is generated from the combination of the key groove of the rotary machine, gearwheel, turbine, fin and gap-sensor.

The rotary monitor watches the rotary numbers through the pulse.

The pulse number per rotation is changeable as desired.

In case of a conveyer, setting of moving distance per rotation permits direct read-out of moving speed.

## Features

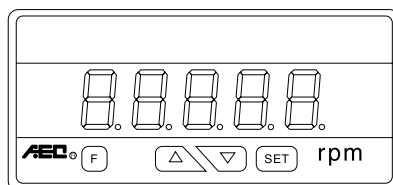
- The cable between the gap-sensor and the monitor is able to extend up to 100 m.
- The pulse responds to 0.3Hz to 30Hz of range.
- The relay contact point or the open collector can be selected to use for alarm output.
- Easy output settings with the key on the front of the monitor, where 4 to 20mA of analog output is proportional to the rotary number.
- Other optional sensors are available for customer order, as well as the ML sensor.

## Specifications

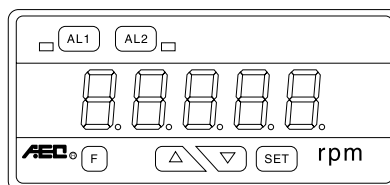
input signal	gap sensor 0.3Vp-p to 12Vp-p standard
response speed	0.3Hz to 30kHz (duty50%)standard
input impedance	100kΩ
voltage for sensor	DC12V 80mA
formulation	CPU cycle computing type
sampling cycle	10m sec
accuracy	±0.003%rdg ± digit (23°C ± 5°C)
display cycle	0.1sec, 0.2sec and 1 to 5sec of average value (L settable by parameter)
maximum display digit	5digits (0 to 99999)
decimal display	(0.0, 0.00, 0.000, 0.0000)settable to any decimal point by parameter
function	inhibit function of power on : inhibit function against lower level output when power supply is satisfied on key protect : inhibit against settings of parameter and comparative power
contact point capacitance	AC250V 5A cos φ=1 DC30V 5V resistance load (in case of 4 point outputs AC250V 3A cos φ=1)
operating temperature	0 to 50°C (without condensation)
operating humidity	35 to 85%RH (without dew point)
power voltage	AC85 to 264V (free power supply) : 50Hz/60Hz : about 5VA DC16 to 40V witch in 5%of ripple (option)
size, weight	48H X 96W X 90.4D mm : about 300g

## Outline view

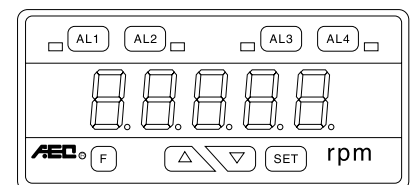
## ●Front panel



display only



display equipped with 2 points of comparative outputs



display equipped with 4 points of comparative outputs

73-V/ D sensor for watching monitor

Sensor : **S-06**

Adopted converter : AEC-7606 See P54.  
 Adopted cable : PC model cable

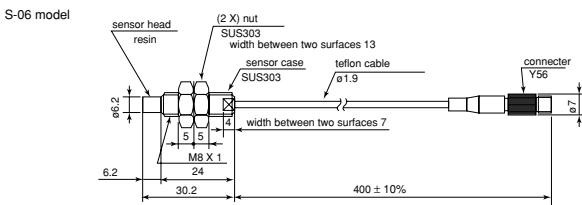


**Specifications**

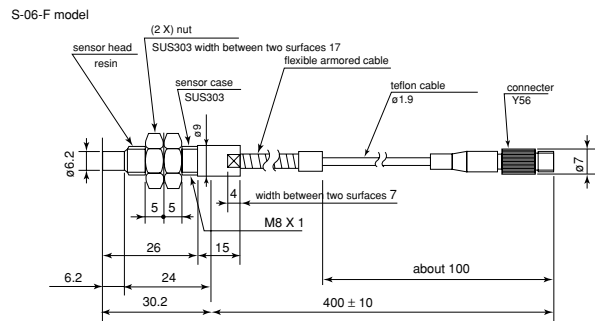
model	sensor : S-06
measuring range (iron)	0 to 2.4mm ( $\alpha$ 0 : 0.1mm)
output voltage	1 to 5V (0.6mm/V)
adopted converter	AEC-7606
resolution	0.5 $\mu$ m
linearity	$\pm$ 1%/FS (0.2 to 1.8 mm of measuring distance) 3%/FS (other measuring distance)
temperature range	-20°C to 180°C
thermal characteristics	$\pm$ 0.8 $\mu$ m/°C of drift between -20°C and 80°C $\pm$ 1 $\mu$ m/°C of drift between 80°C and 180°C

※ See p86 about dead zone  $\alpha$  0.

**Appearance**



**Option**

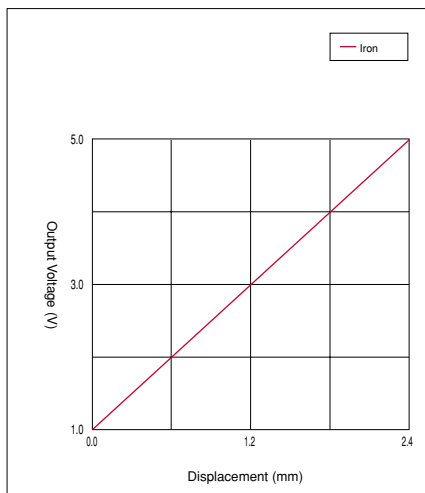


**Features and specifications**

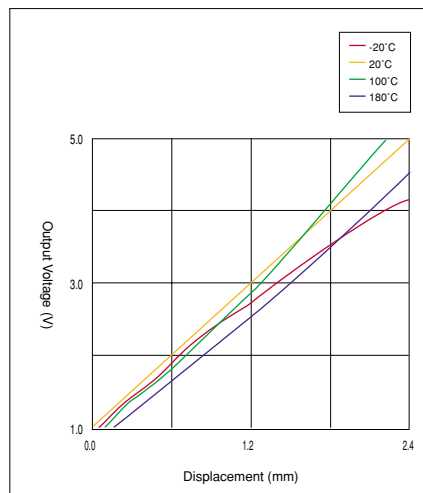
- Sensor for 73Monitor
- Acceptable for special size as well as 55 series
- 1 to 5V/FS in combination with 7606 Converter

※ Special specification and profile need to match the conditions of use.  
 Please do not hesitate to contact us concerning your requests .

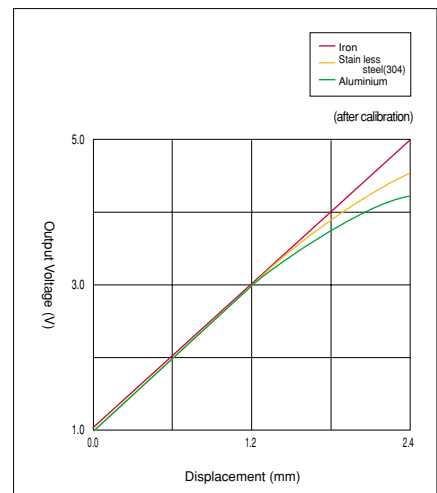
**Output characteristics / linearity**



**Thermal characteristics**



**Variation depending on target materials**



73-V/ D sensor for watching monitor

Adopted converter : AEC-7610 SeeP54.  
 Adopted cable : PC model cable

Sensor : **S-10**

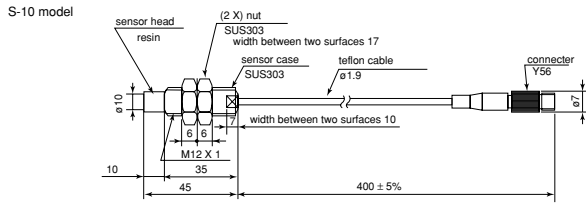


**Specifications**

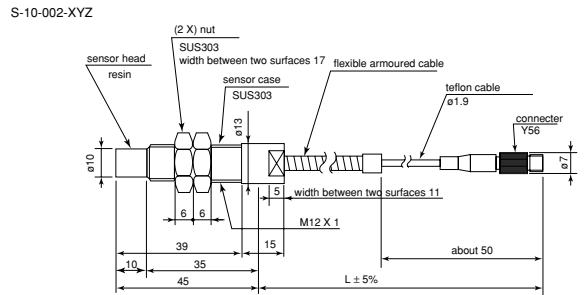
model	sensor : S-10
measuring range (iron)	0 to 4mm ( $\alpha$ 0 : 0.1mm)
output voltage	1 to 5V (1mm/V)
adopted converter	AEC-7610
resolution	1 $\mu$ m
linearity	$\pm$ 1%/FS
temperature range	-20°C to 120°C
thermal characteristics	1.6 $\mu$ m/°C of drift between -20°C and 0°C 1 $\mu$ m/°C of drift between 0°C and 80°C 1.6 $\mu$ m/°C of drift between 80°C and 120°C

※ See p86 about dead zone  $\alpha$  0.

**Appearance**



**Option**



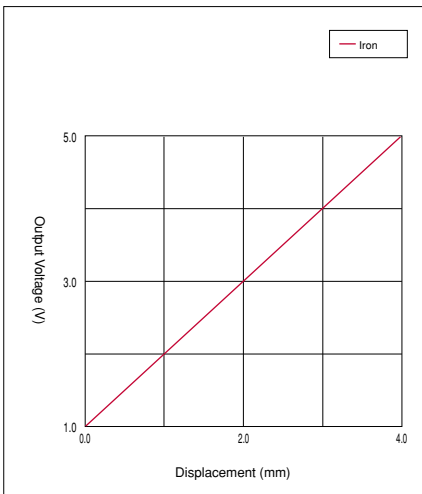
**Features and specifications**

- Sensor for 73Monitor
- Acceptable for special size as well as 55 series
- 1 to 5V/FS in combination with 7610 Converter

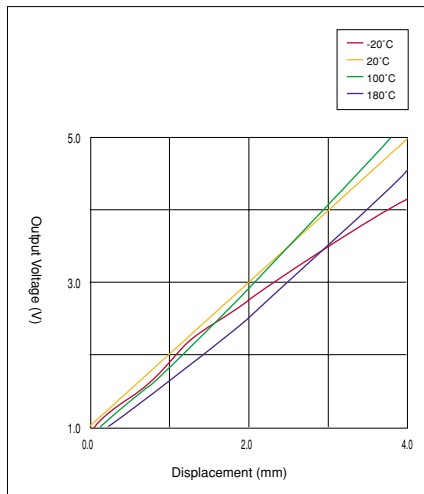
XYZ in model represent cable length, example 401 represents 400mm and 102 represents 1000mm.

※ Special specification and profile need to match the conditions of use.  
 Please do not hesitate to contact us concerning your requests.

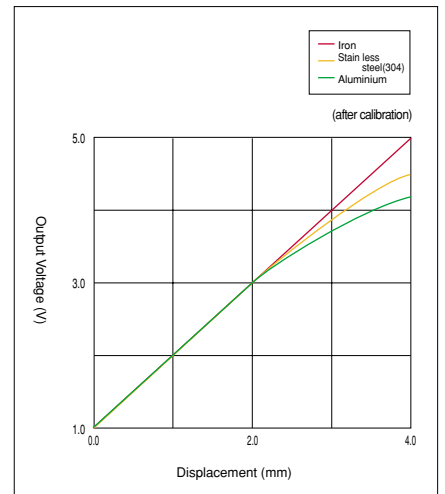
**Output characteristics / linearity**



**Thermal characteristics**



**Variation depending on target materials**





73-V/ D converter for watching monitor

Adopted converter : S model sensor SeeP52, 53  
 Adopted cable : PC model cable

converter : **AEC-76**



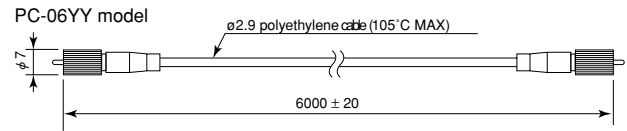
**Specifications**

model	converter : AEC-76□□ (□□ symbolize sensor diameter)
output voltage	see each sensor section
frequency	DC to 20kHz
resolution	see each sensor section
temperature range	-10°C to 70°C
thermal characteristics	±0.05%/°C of drift between 5°C and 4°C ±0.1%/°C of drift between 40°C and 55°C
power supply	DC±11V to 26V、25mA (supply from monitor)

**Features and specifications**

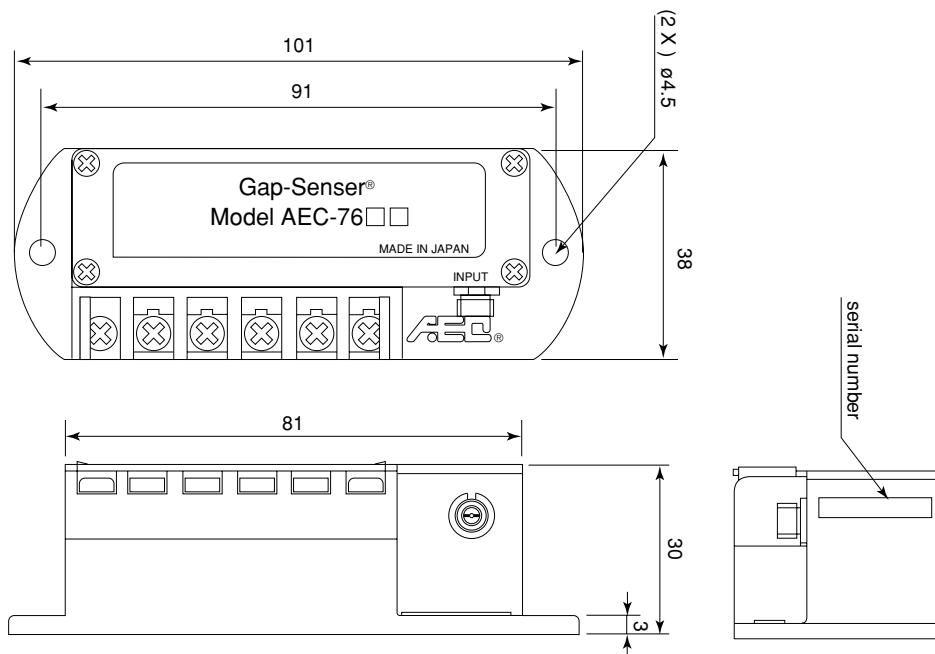
- Optimum miniature converter for installation
- Available for purchase of a converter which is intend to protects from interference noise caused when multiple sensors come close each other.
- Able to manufacture a built-in power supply multi-channel type, if desired.

**Adopted cable**



※Acceptable for use with all kinds and lengths of flexible armoured cables

**Outline view**





## Sensor

# Piezoelectric Acceleration sensor



### Features

- The acceleration pick characterizes small size, durable, high sensitivity and wide band due to the piezoelectric ceramics. This sensor is widely used from low frequency vibration acceleration to high acceleration, such as collision.

outline view					
type	small sized light weight type			multi purpose and high temperature type	
model	AEC-0402	AEC-2008	AEC-CT-50	AEC-5032	AEC-50H
features	super miniature light weight type	super miniature light weight type	light weight high sensitivity	multipurpose low coat	high temperature type
structure	compression type	compression type	bending type	compression type	compression type
voltage	[mV/m/s <sup>2</sup> ]	0.04	0.2	3.5	5.0
	[mV/G]	0.4	2.0	35	50
resonance frequency [kHz]	60	40	35	40	25
operating frequency [kHz]	20	20	1	8	5
electric capacitance [pF]	300	700	2700	1000	1000
maximum acceleration	[m/s <sup>2</sup> ]	100000	10000	2000	16000
	[G]	10000	1000	200	1600
insulation resistance [MΩ]	10000	10000	1000	10000	10000
operating temperature [°C]	-20 to 110	-20 to 110	-20 to 80	-20 to 150	-20 to 250
weight [g]	0.2	0.8	1	32	35
materials	titanium	titanium	aluminum	SUS	SUS
fixing	adhension	adhension	adhension	M6 X 1	M6 X 1
cable	ø0.8 X 2m	HB-2C	ø1.2 X 2m	HB-2C	HB-2C

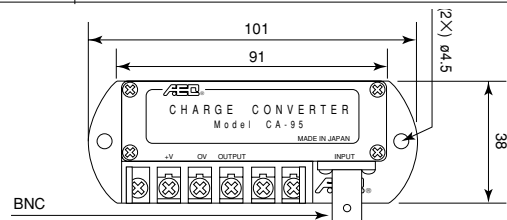
**Application example**

●The acceleration pick is generally used for vibration and acceleration measurements. For example: equipment diagnosis for rotary machines, durability test for bearings, research of vibration and noise source, acceleration measurement for impact tester, and detection against abnormal vibration of many machines.

**Option**

**Charge amplifier ( conversion charge into current )**

model	CA-95
Input charge sensitivity	0.1 to 1100pC/G
frequency	2.5Hz to 20kHz
Input charge sensitivity	0.1 to 1100pC/G ± 3db
rated power	4-20mA/FS
operating voltage	DC+12V to +18V
operating temperature	-20°C to 60°C



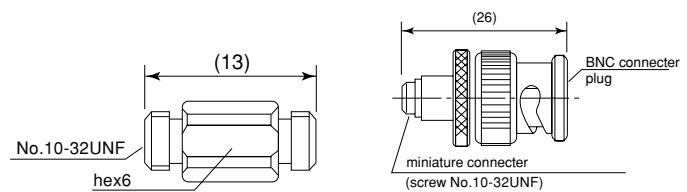
**Magnet holder Insulation type (MH-20)**



**Connector**

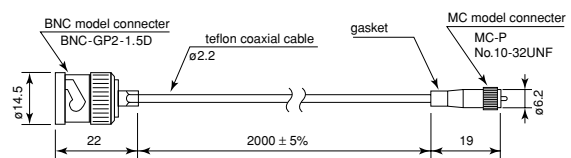
trunk connector (ZR-ZR)

conversion connector (BNCP-ZR)

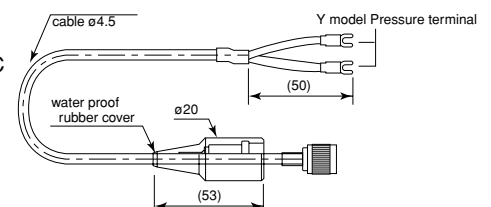


**Sensor cable**

HB-2C (normal 2m) thermal resistance : 200°C



CX-010AT (10m) thermal resistance 80°C



outline view		
type	built-in amplifier type	
model	AEC-122R      AEC-AM-51	
features	insulation · waterproof      miniature · light weight	
structure	share type      compression type	
voltage	[mv/m/s <sup>2</sup> ]	10      5.0
	[mv/G]	100      50
resonance frequency [kHz]	20      35	
operating frequency [kHz]	0.003 to 6      0.003 to 12	
electric capacitance [pF]	-      -	
maximum acceleration	[m/s <sup>2</sup> ]	350      500
	[G]	35      50
insulating resistance [MΩ]	10000      -	
operating temperature [°C]	-20 to 110      -20 to 110	
weight [g]	55      19	
materials	SUS      SUS	
fixing	M6XP1      M6 X P1	
cable	CX-010AT      HB-2C	



## ■ Application examples

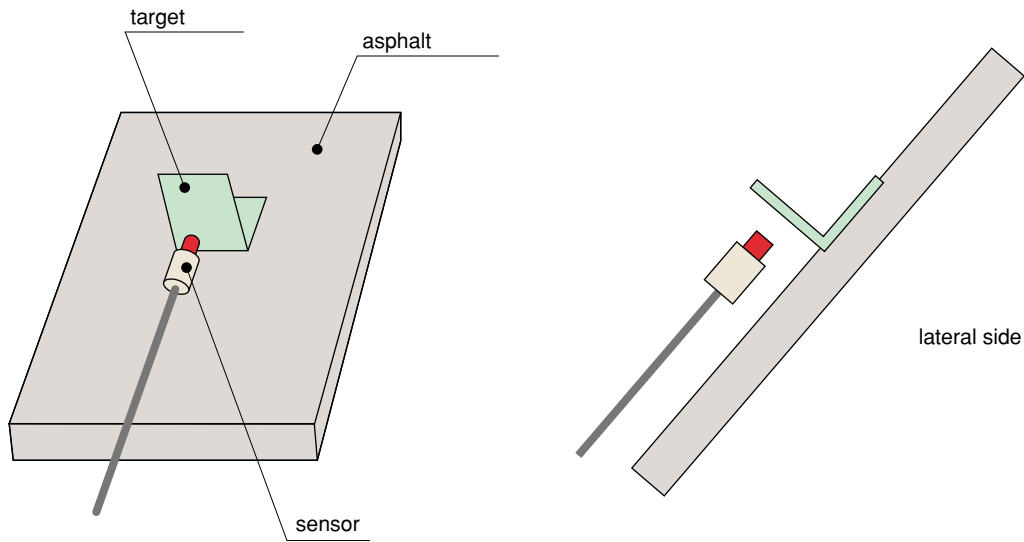
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Measurement in asphalt slope flow test  
Measurement of silicon wafer thickness in a lapping machine  
Application to consolidation tester  
Measurement of axis vibration on a high-speed destructive tester  
Measurement of wafer thickness  
Detection of CD's surface instability  
Inspection of bearing tone vibration  
Vibration and rotation monitoring control of large rotary equipment  
Lift control for linear motor vehicles  
Detection of steel plate vibration  
Detection of vehicle's position  
Measurement of vibrations, displacements, and rotations  
under vacuum conditions  
Centering of the pipeline length measuring instrument

• **Internal combustion engine (other applications)**

Measurement of piston behaviour  
Measurement of piston ring displacement  
Measurement of connecting rod bearing clearance  
Measurement of crankshaft clearance 1,2  
Measurement of turbo turbine and compressor rotating speeds  
Measurement of valve lifting level 1,2,3  
Measurement of valve guide clearance and displacement  
Measurement of gasket displacement 1,2  
Measurement of wheel balance  
Measurement of brake disk surface instability  
Measurement of pulley and belt vibration  
Measurement example for applying the slip ring

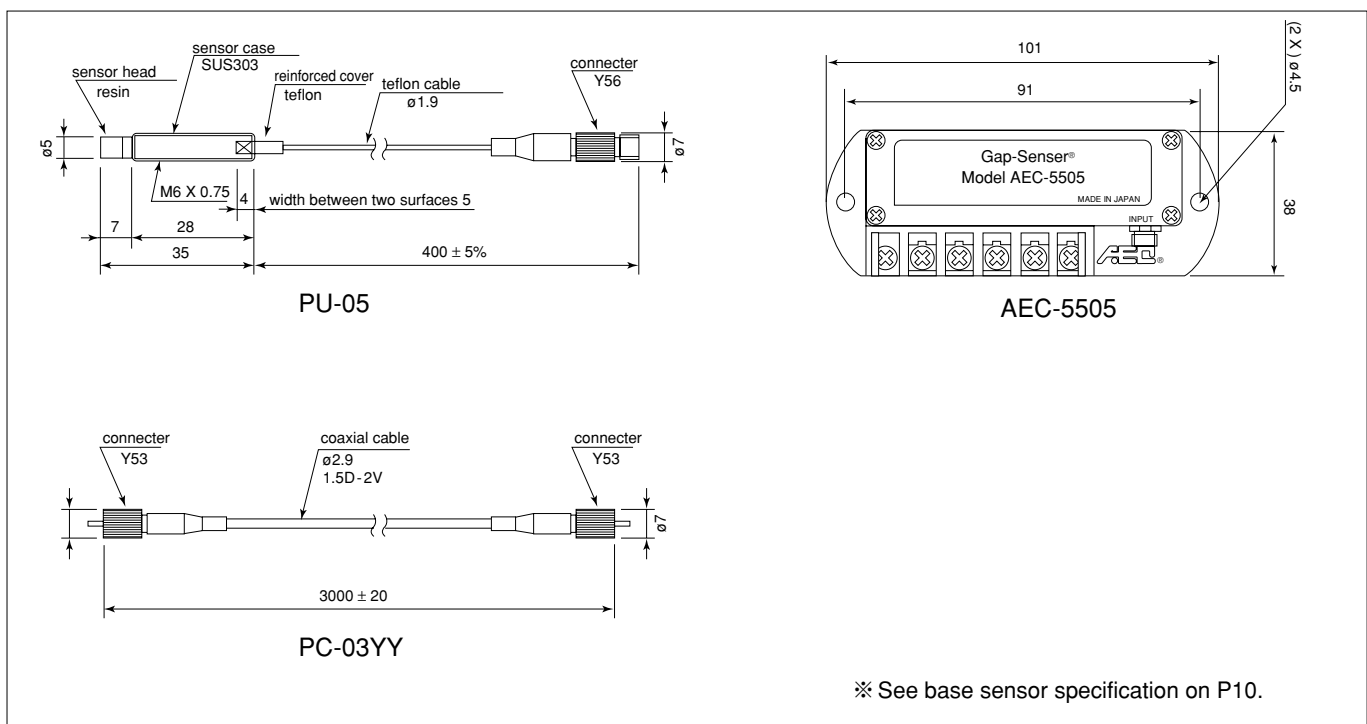
**Measurement in asphalt slope flow test**



**General**

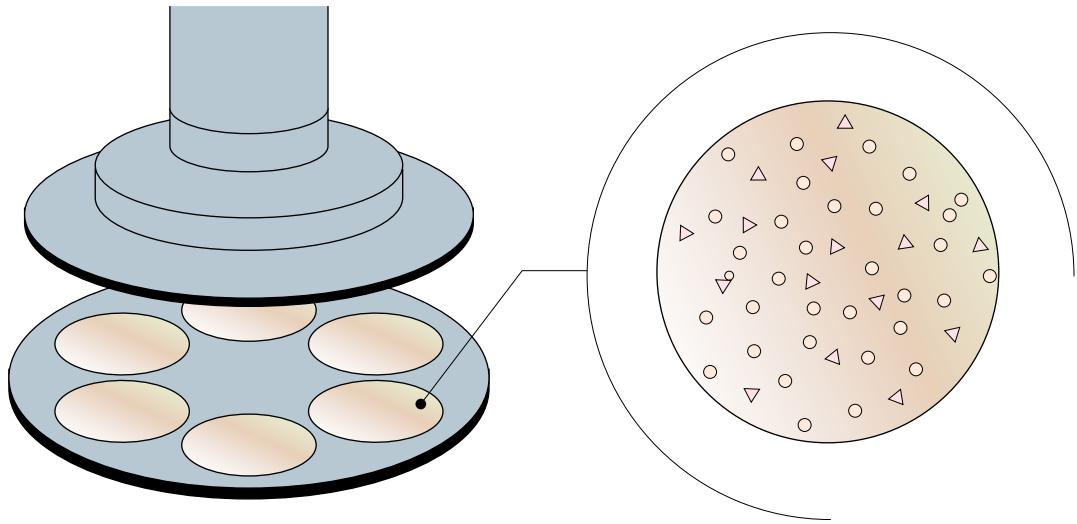
The sensing target is placed on the inclined asphalt and the displacement of the asphalt to the target is identified as the drift of the asphalt.

**Used units**



※ See base sensor specification on P10.

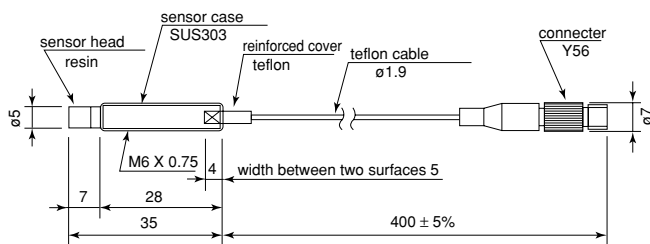
Measurement in silicon wafer thickness in a lapping machine



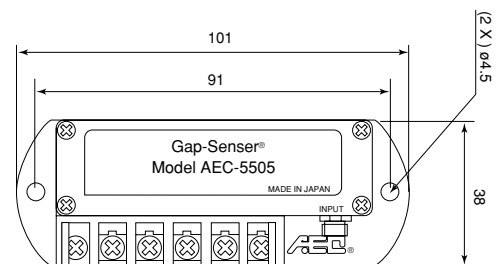
General

To lap the sliced silicon wafer to a certain level of the surface roughness, the GAP-SENSOR is mounted to the lapping machine that laps the wafer with the accuracy of  $\pm 3 \mu\text{m}$ .

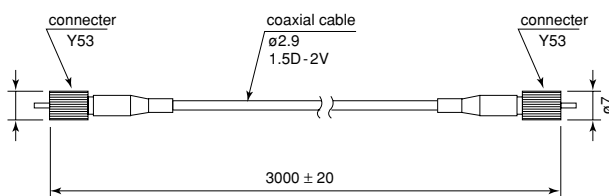
Used units



PU-05



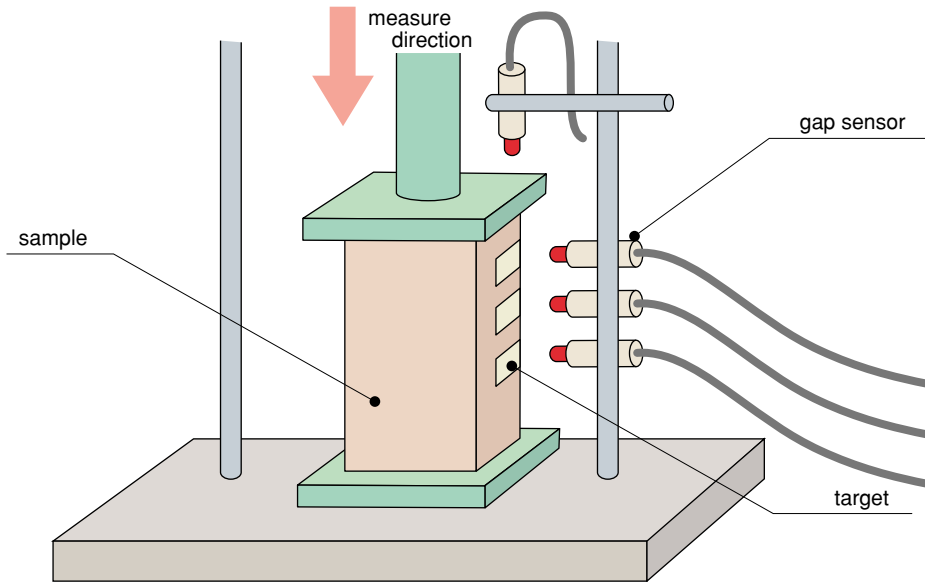
AEC-5505



PC-03YY

※ See base sensor specification on P10.

Measurement to consolidation tester



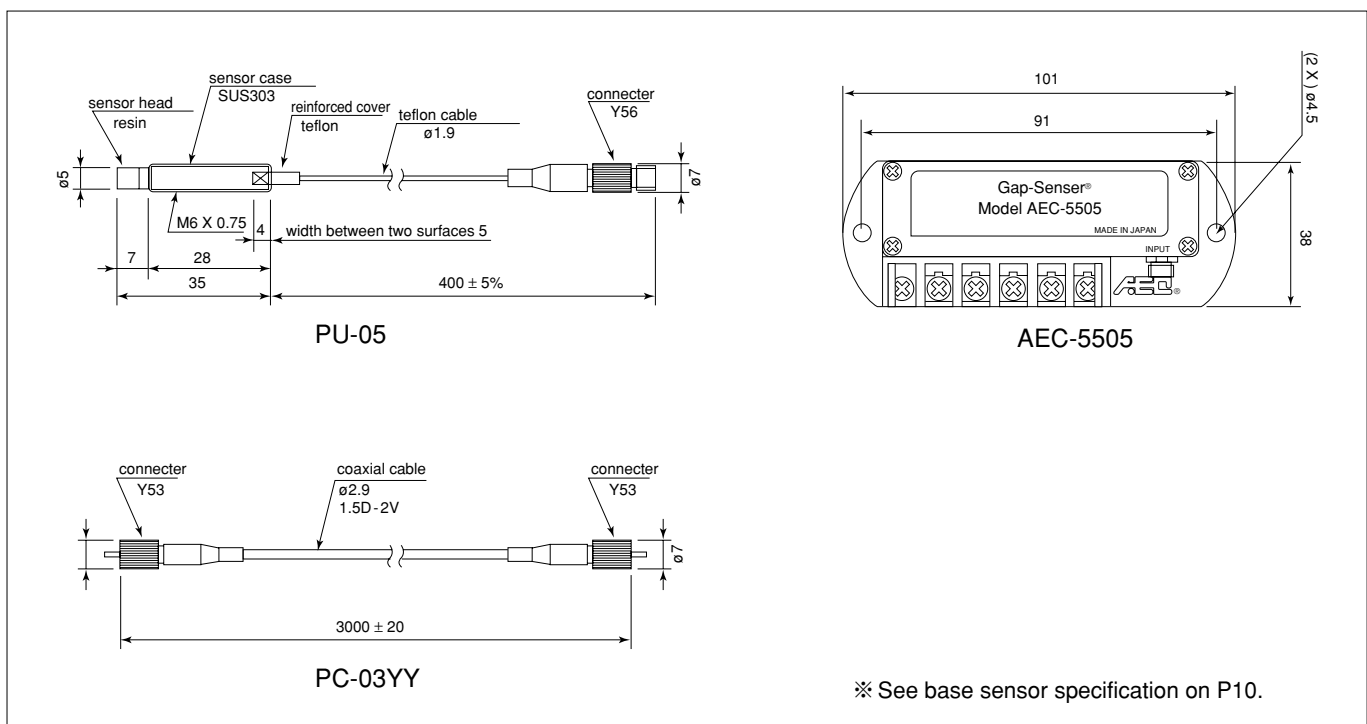
General

Sensors are mounted to the consolidation tester, used in the soil test, and the soil properties (strain and deflection) are measured with the displacement gage when the sample is pressed.

Usually, a thin iron plate or aluminum foil is mounted on the sample to configure the targets for the gap sensor.

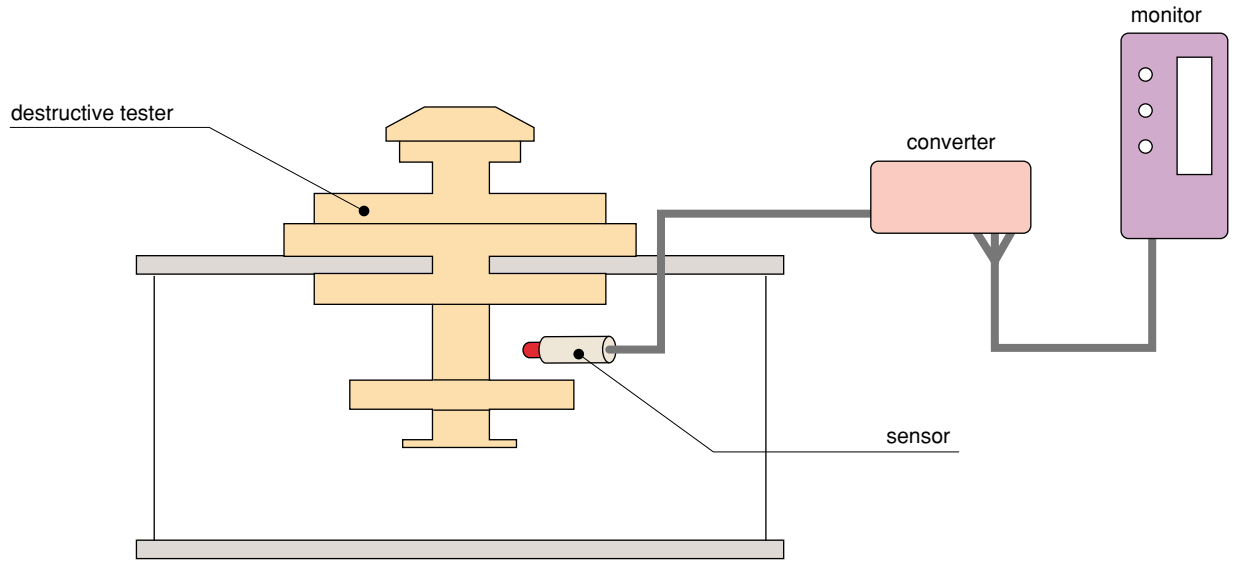
※ For the target that does not generate an eddy current, another target is prepared and available to be mounted for measurement.

Used units



※ See base sensor specification on P10.

Measurement of axis vibration a high-speed destructive tester

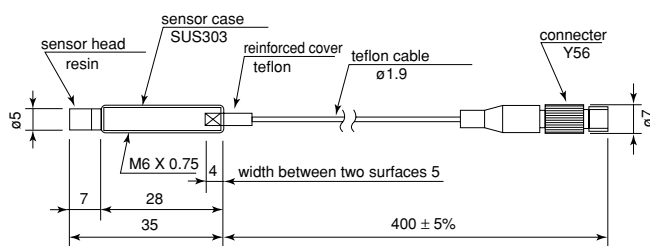


General

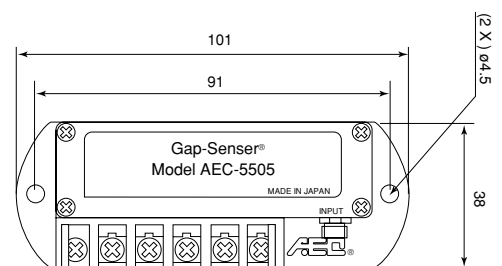
GAP-SENSOR is used to measure axis vibrations of the high speed destruction tester that has been used in the durability test for turbine blades of jet engines.

The sensor, in conjunction with a monitor, allows you to ascertain the condition of the tester and state of the tested components.

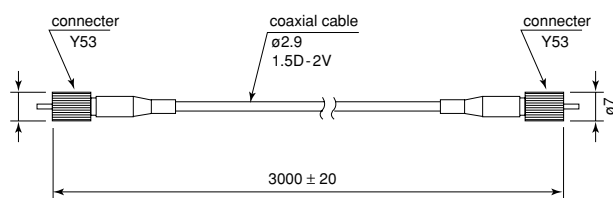
Used units



PU-05



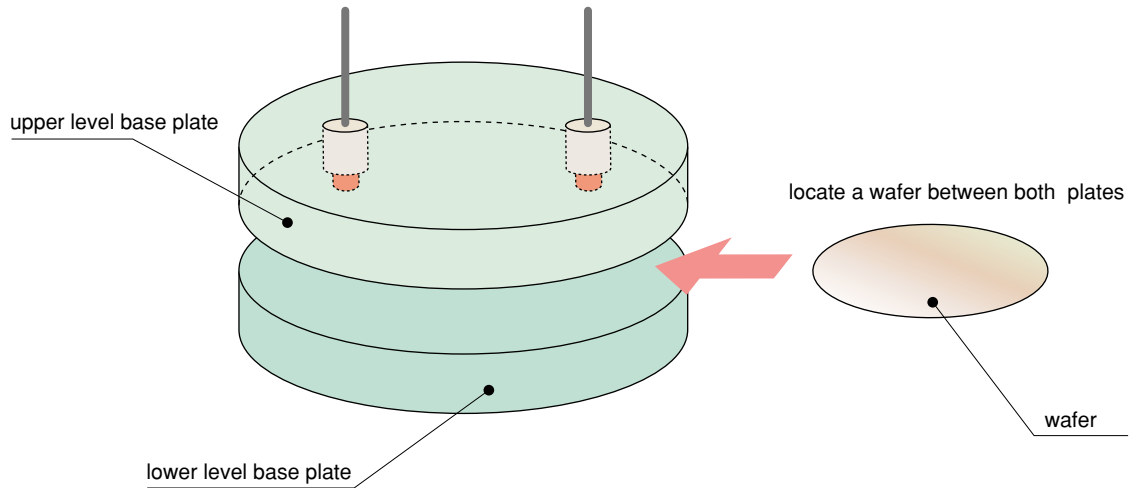
AEC-5505



PC-03YY

※ See base sensor specification on P10.

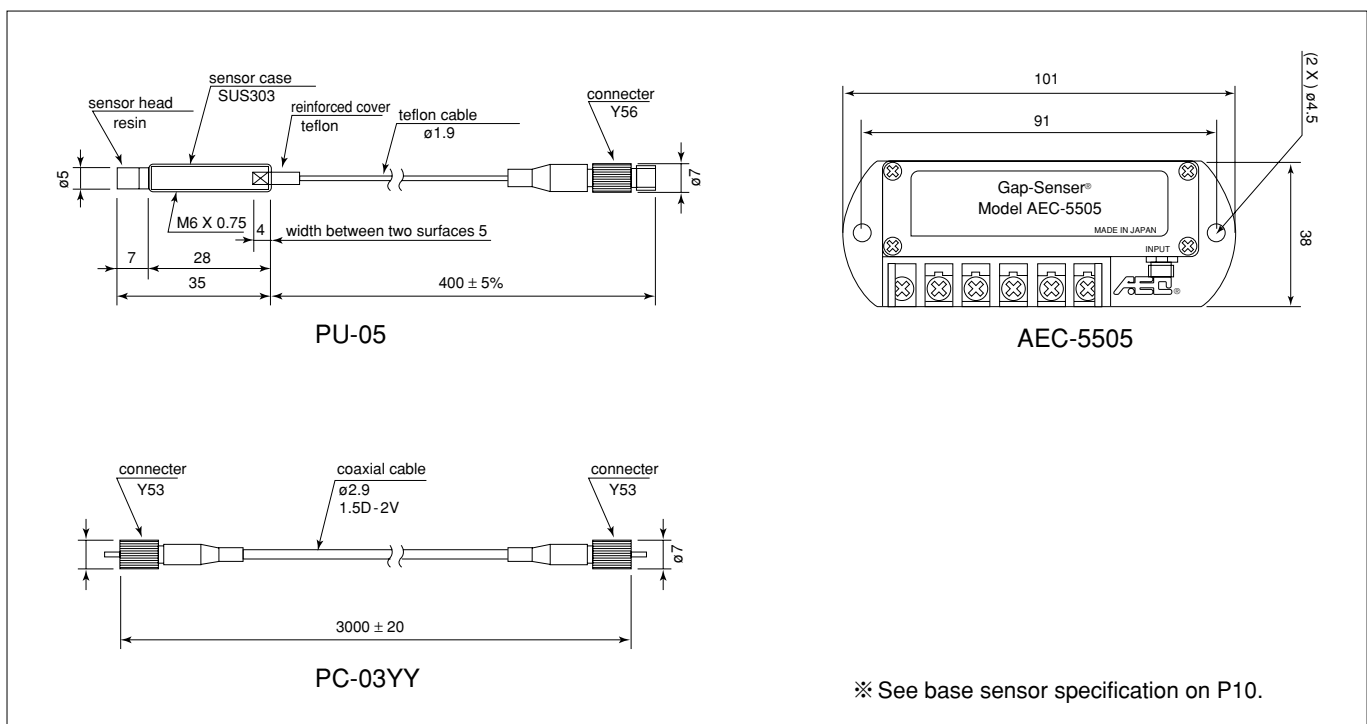
**Measurement of wafer thickness**



**General**

GAP-SENSOR is used to measure the thickness of the silicon wafer prepared by thinly slicing the silicon ingot. The sensor detects the clearance between the upper and lower level base plates to calculate the wafer thickness. While 05 coil type sensors are mainly used, 09 type products are occasionally used also. The sensors are embedded into the upper base plate.

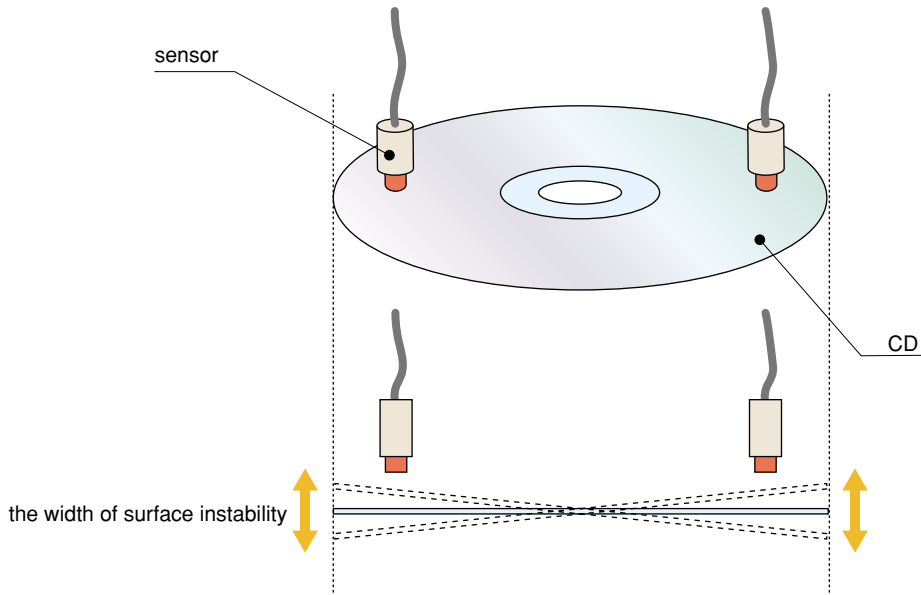
**Used units**



※ See base sensor specification on P10.



**Detection of CD's surface instability**



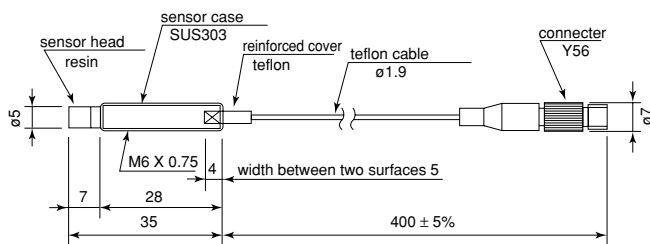
**General**

GAP-SENSOR is used to control the surface instability of products, such as CDs.

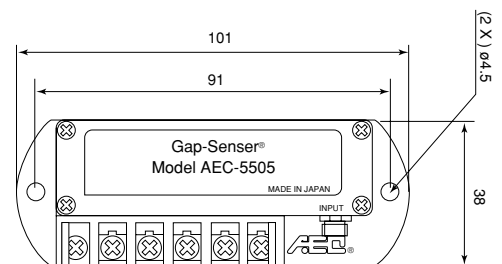
As the measuring points increase, two-dimensional or three-dimensional measurement is available.

The sensor system can be used for DVDs and other rotating bodies. The optimum sensor is selected according to the magnitude of instability or measurement conditions.

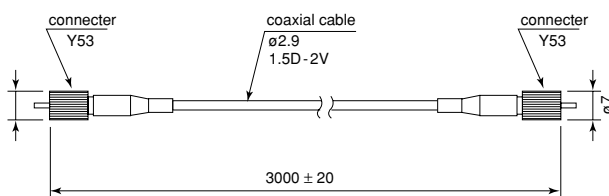
**Used units**



PU-05



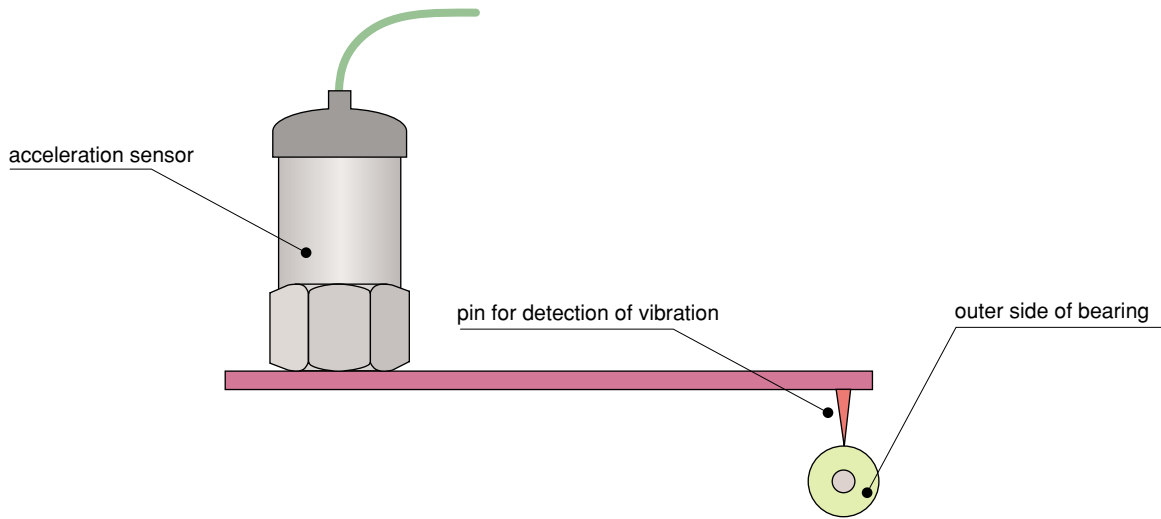
AEC-5505



PC-03YY

※ See base sensor specification on P10.

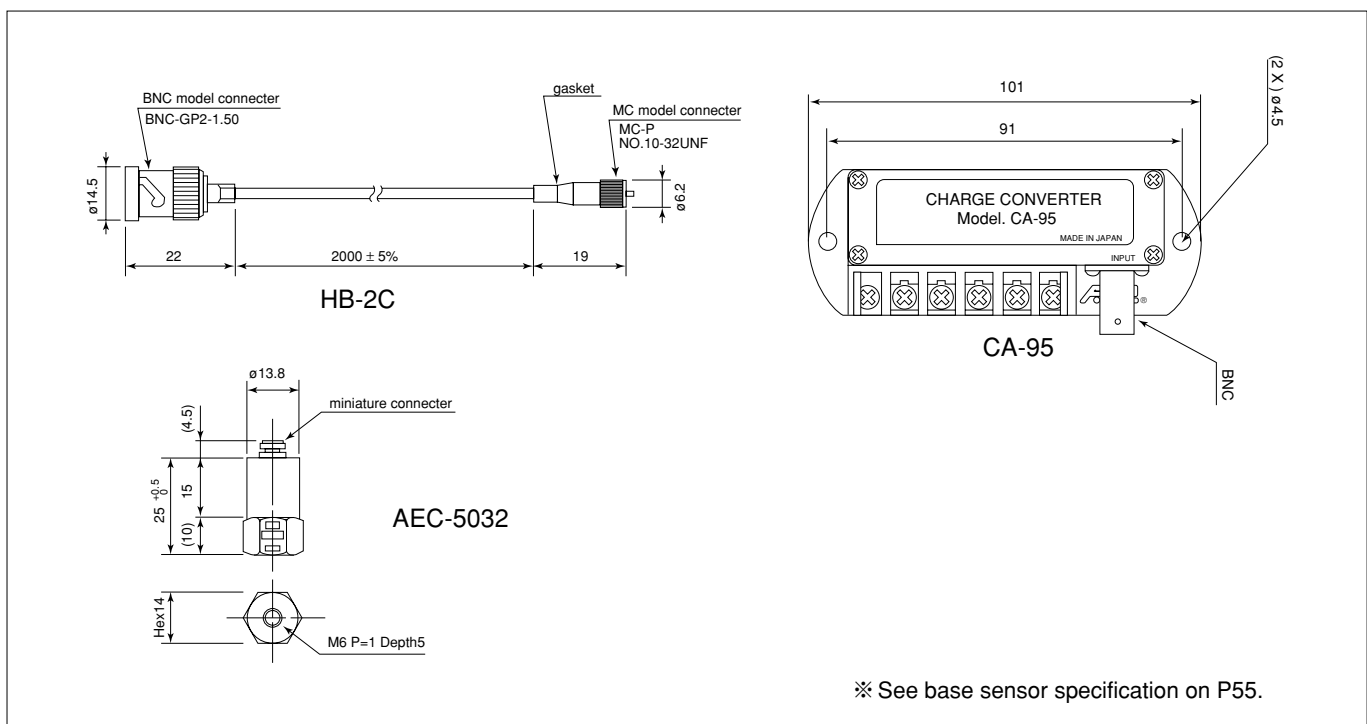
**Inspection of bearing tone vibration**



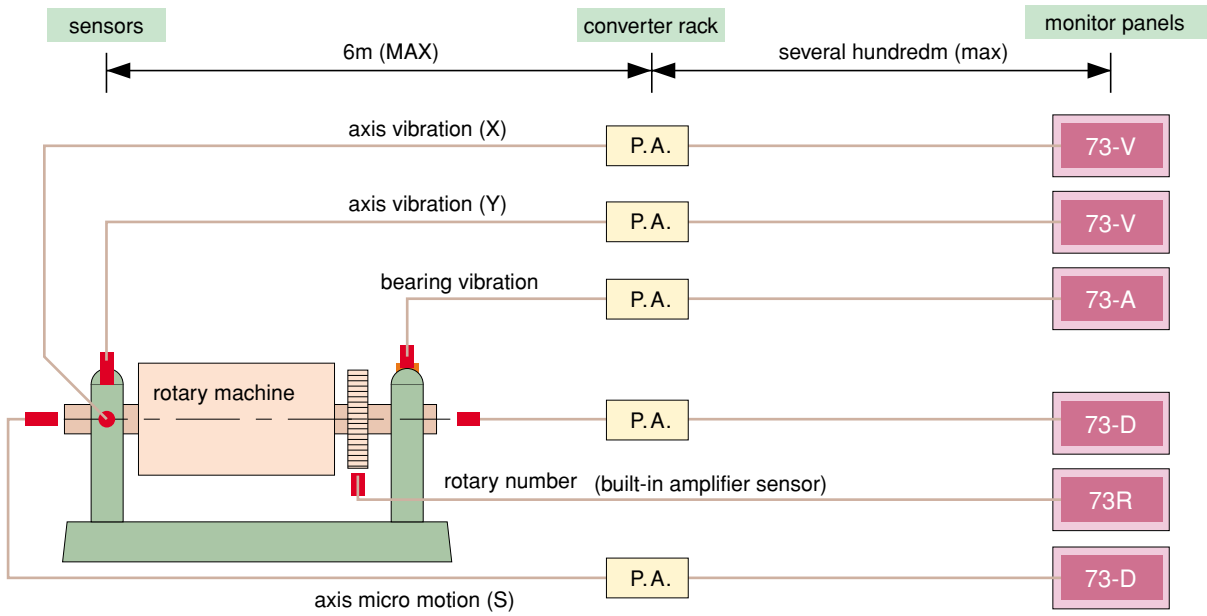
**General**

The acceleration sensor is used for the mass-produced bearing to collect and inspect the sounds (vibrations). Acceleration sensors are widely used to inspect the bearings installed in home electrical appliances and OA equipment.

**Used units**



Vibration and rotation monitoring control of large rotary equipment

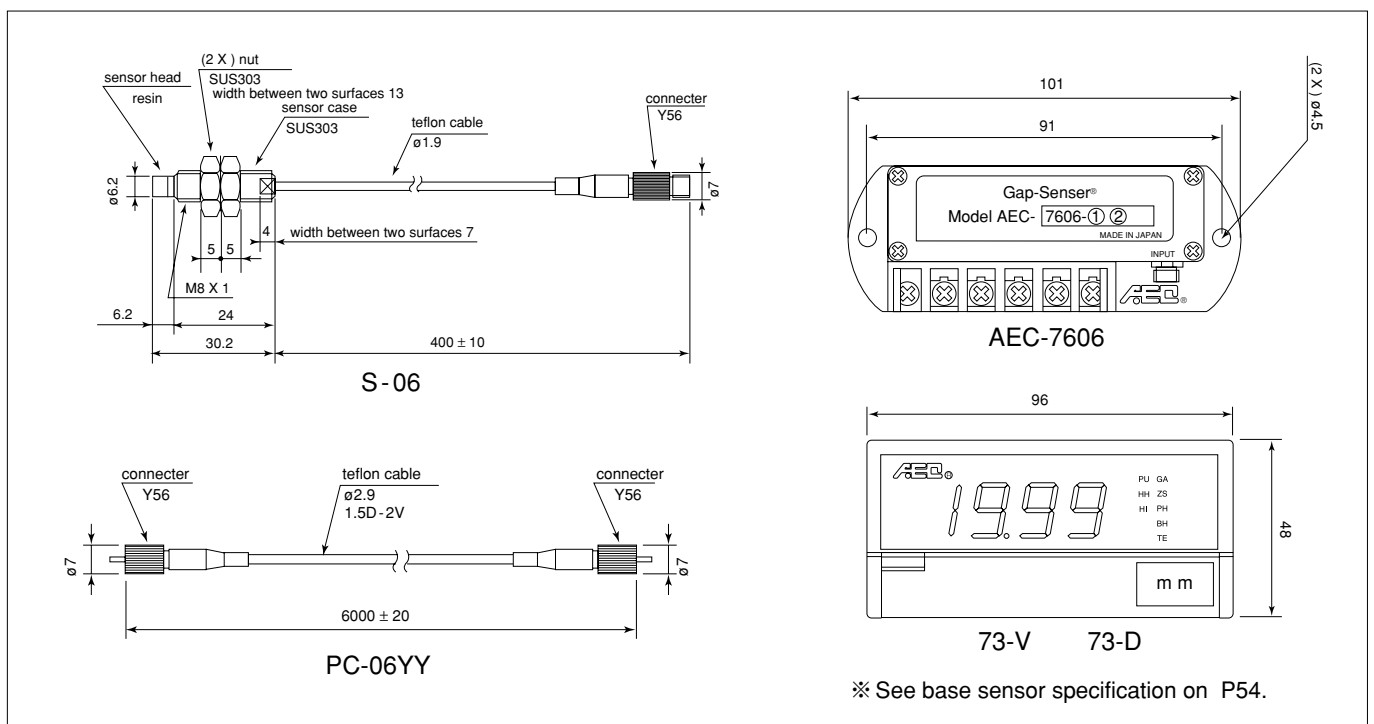


General

By taking advantage of the environment resistance characteristics, GAP-SENSOR detects vibrations, positions, and rotating speeds of axes of the large rotary equipment installed in power stations and manufacturing plants such as turbines, generators, and compressors, without contact.

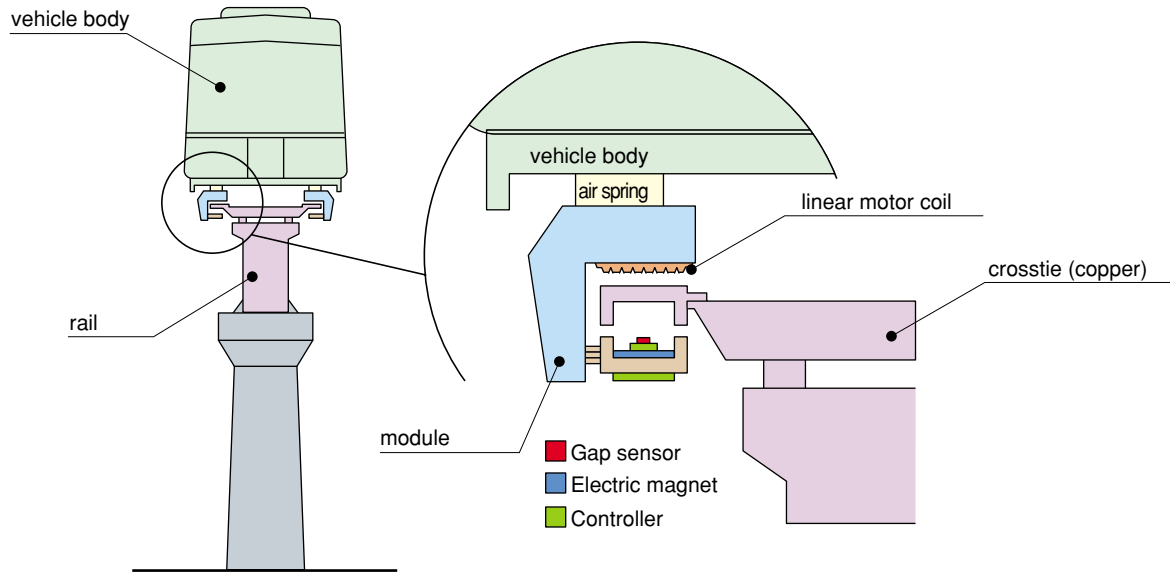
The sensor contributes to control motion, grasp operational status and manage fixed period maintenance for large rotary equipment.

Used units



※ See base sensor specification on P54.

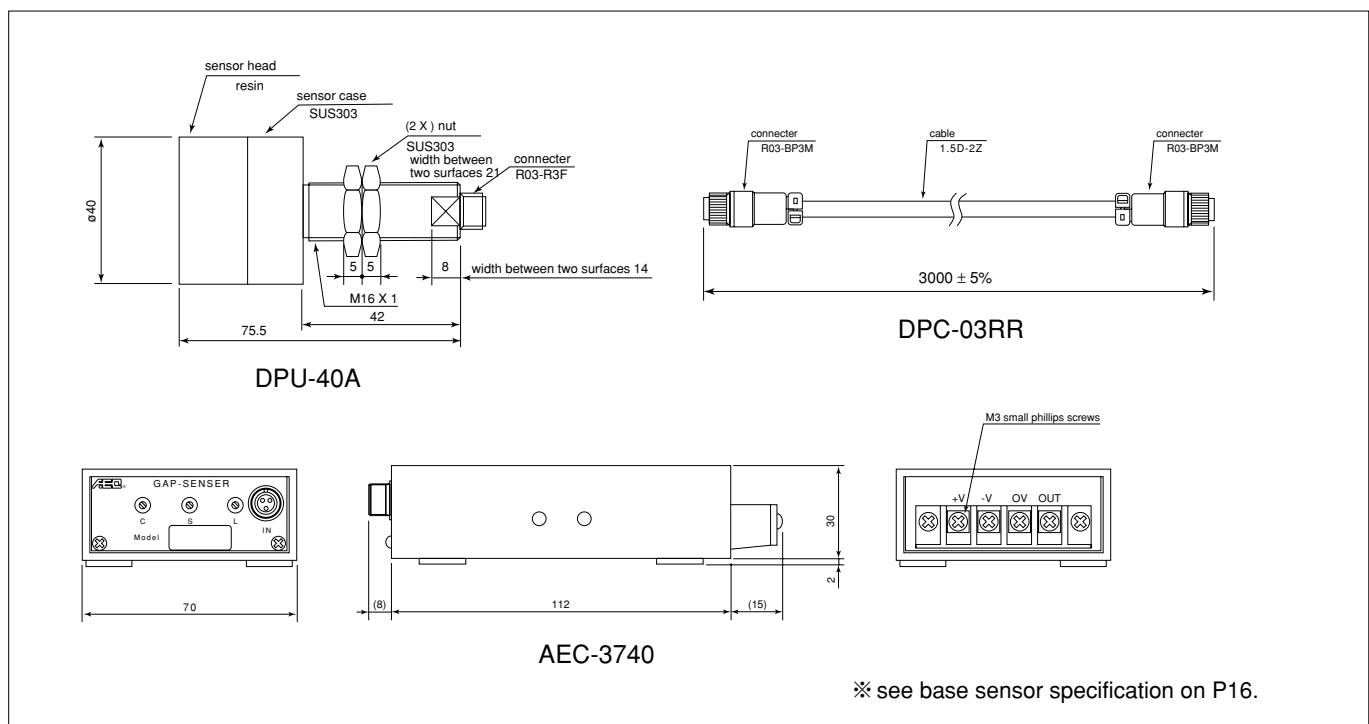
**Lift control for linear motor vehicles**



**General**

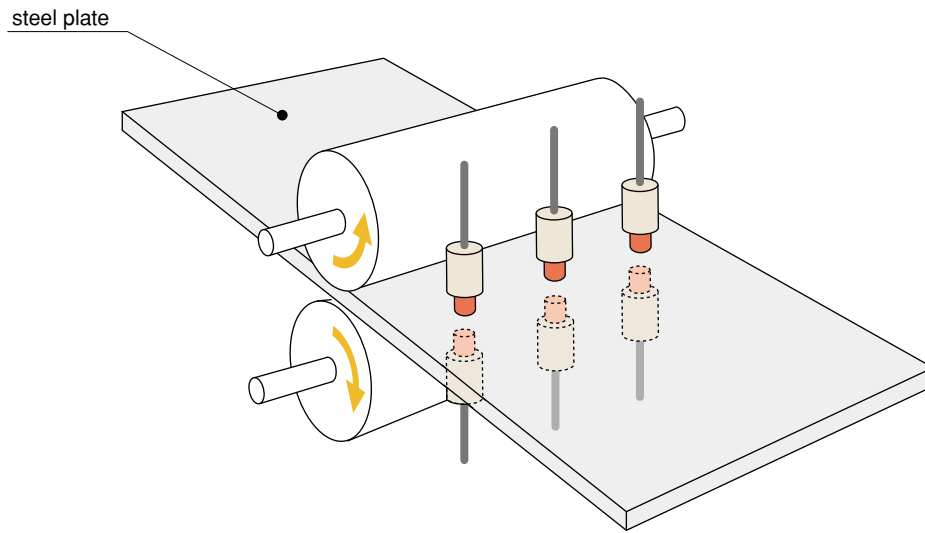
The electromagnets installed on the vehicle body exert a pull on the rail from bottom and thus lift the vehicle body due to ascending force. GAP-SENSOR controls conditions to keep the constant separation between magnet and rail, so contact with the rail does not occur.

**Used units**



※ see base sensor specification on P16.

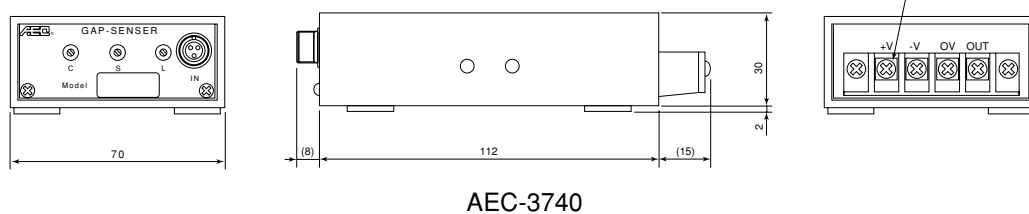
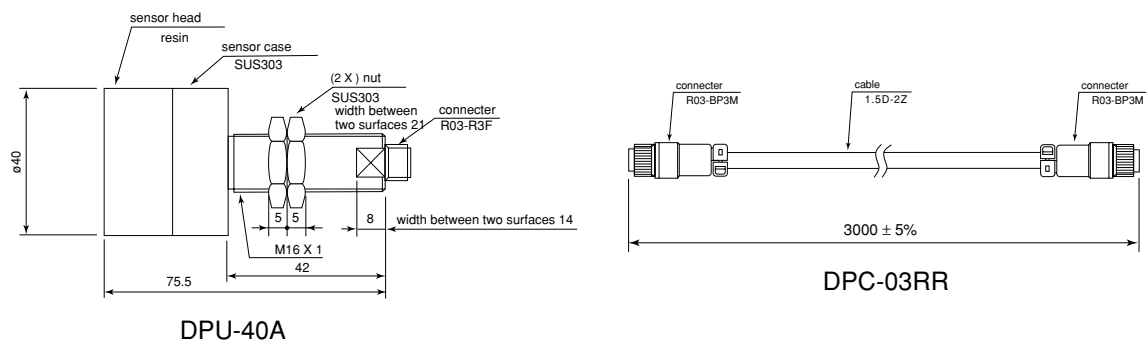
Detection of steel plate vibration



General

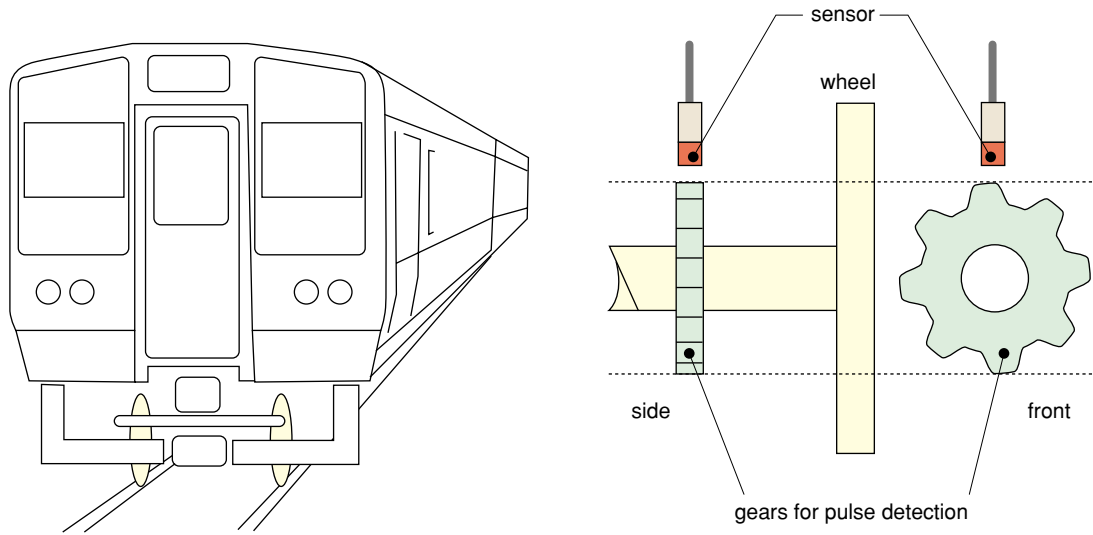
GAP-SENSOR is used to control the vibrations of the steel plates in the production line of the steelworks. Several sensors are arranged laterally on the front and back surfaces of steel so that the vibrations of the plate surface can be measured.

Used units



※ See base sensor specification on P16.

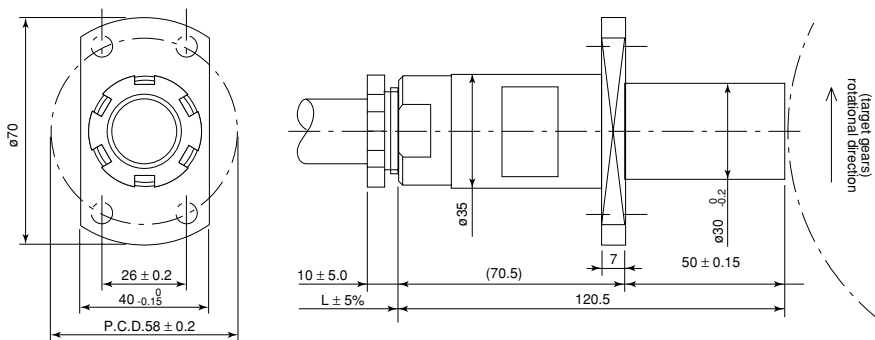
Defection of the vehicle's position



General

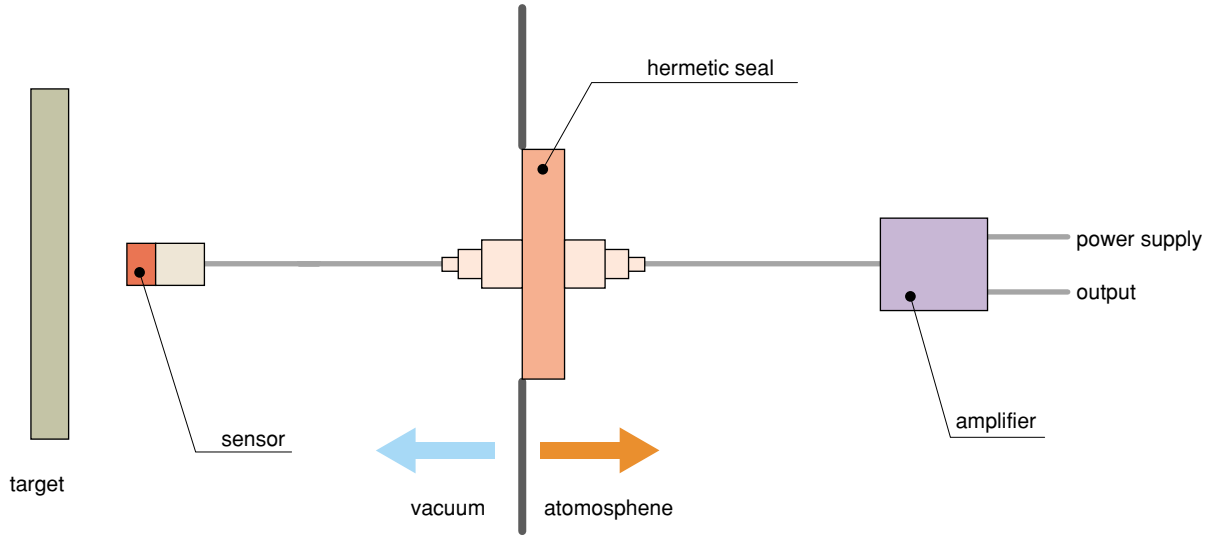
GAP-SENSOR detects the rotating pulse from the gears installed on the wheels to calculate the running speed of the rolling stock. Using the data from the sensor, the base station controls the operations of the rolling stock. for example, and the running speed obtained is used further to detect the vehicle's position to prevent collision.

Used units



VP-29-3-XYZ

**Measurement of vibrations, displacements, and rotations under vacuum conditions**



**General**

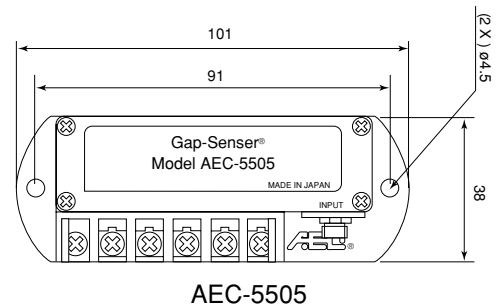
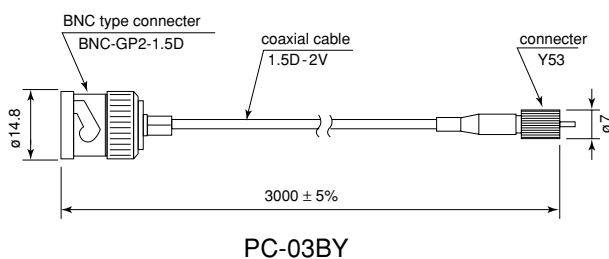
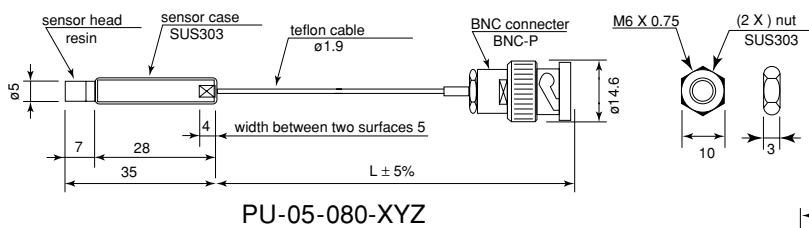
By taking advantage of the environment resistance characteristics, vibrations, displacements, and rotations can be measured under vacuum conditions.

The sensor unit is made of material that can be used in a vacuum, and the hermetic seal is used to separate a vacuum completely from the atmosphere.

In actual applications, this GAP-SENSOR has been used in a vacuum of up to  $1.33 \times 10^{-2}$  Pa.

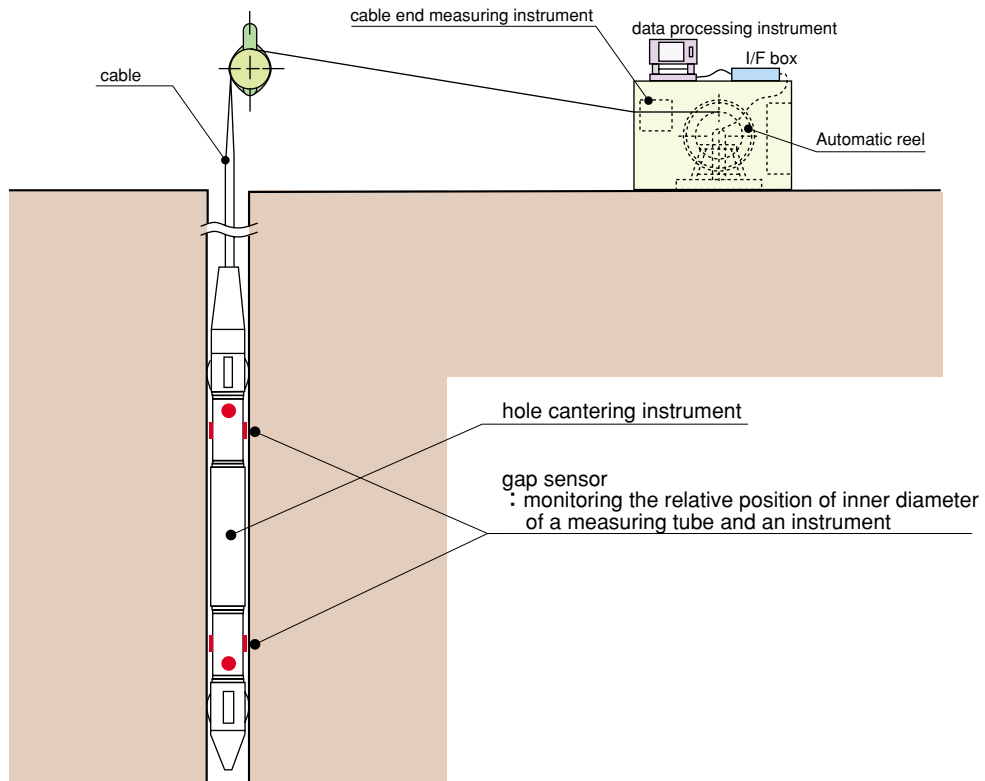
**Used units**

※ See hermetic seal on P81.



※ See base sensor specification on P10.

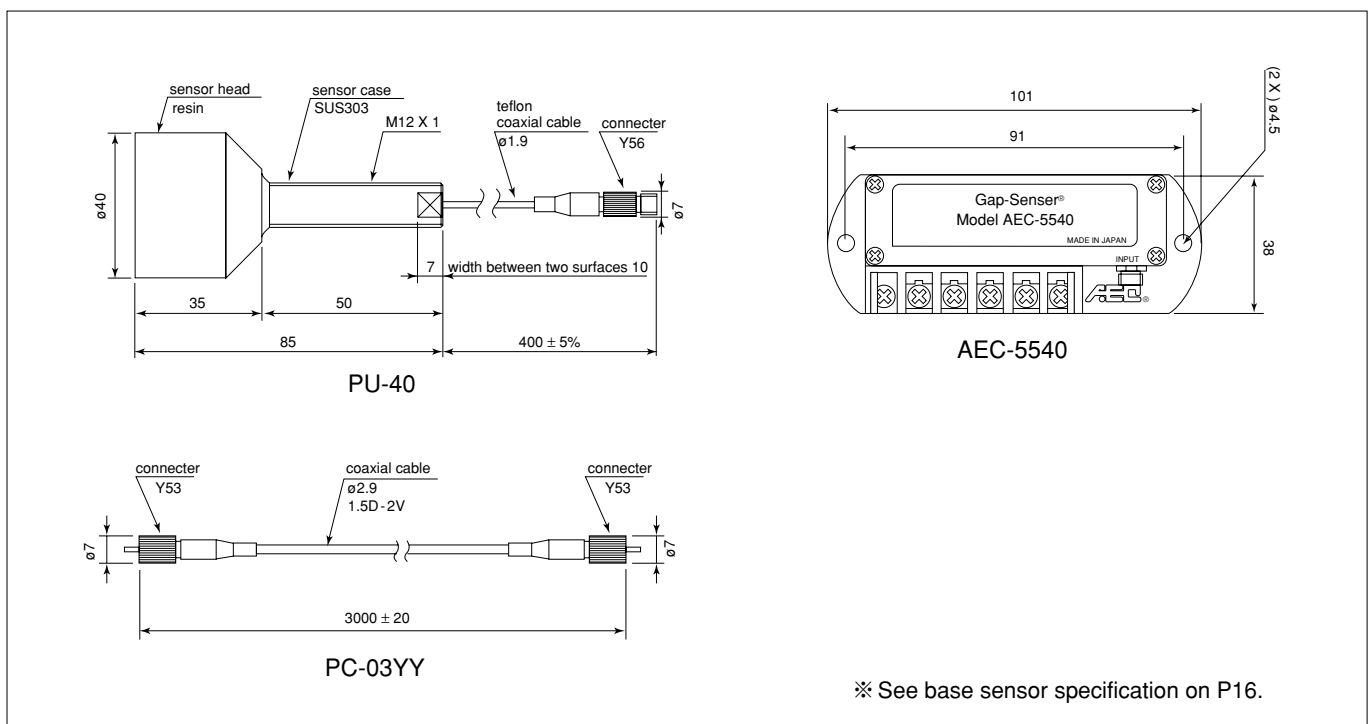
**Centering of the pipeline length measuring instrument**



**General**

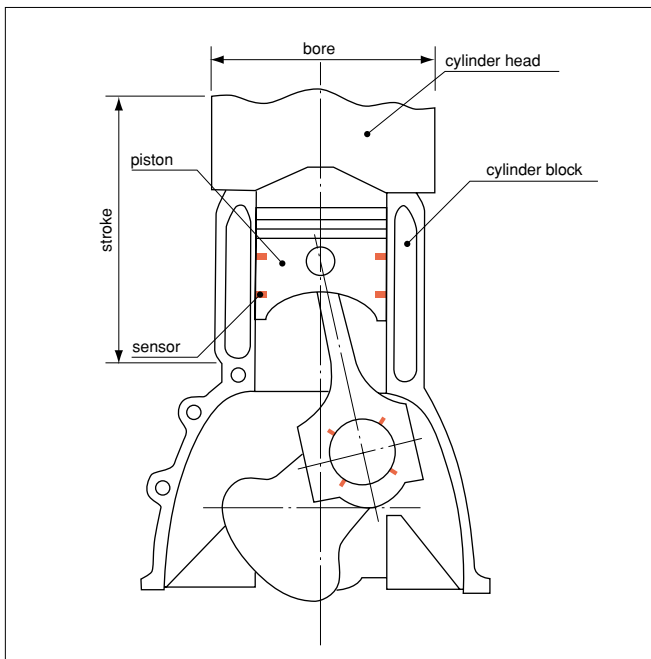
In this example, GAP-SENSOR is used to center the pipeline length measuring instrument within the pipeline. The sensor detects the clearance between the pipe and pipeline length measuring machine without contact and controls the measured clearance so that the measuring instrument will travel along the pipe center.

**Used units**





Measurement of piston behavior



Explanations

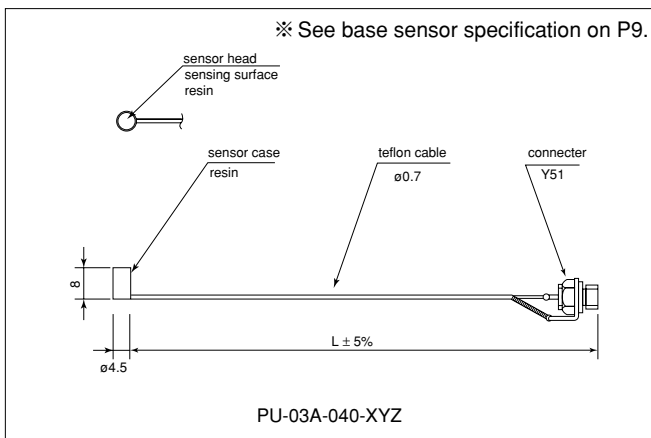
4 miniature sensors are embedded into a piston and piston movement is analyzed through measurement of the clearance between the cylinder and the piston.

Specifications

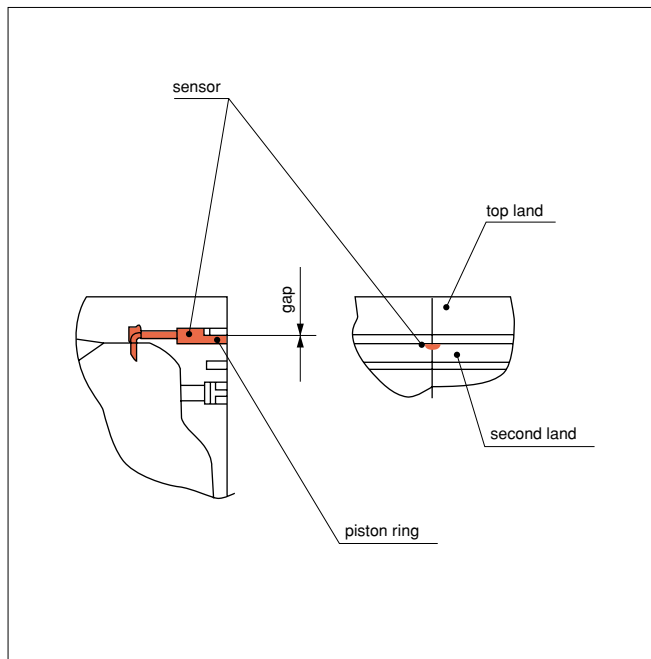
Typical conditions  
 Operating temperature: 180°C maximum  
 Measuring range: 0 to 0.2mm (within range of linearity)  
 Please contact us to place custom designed orders of desired specifications.

Remarks

We accept customers' request to install sensors if the drilling is already finished.  
 The thermocouples close to sensors are available to measure temperature and for correction of thermal drifts.  
 (We accept customers' request to install the thermocouples)



Measurement of piston ring displacement



Explanations

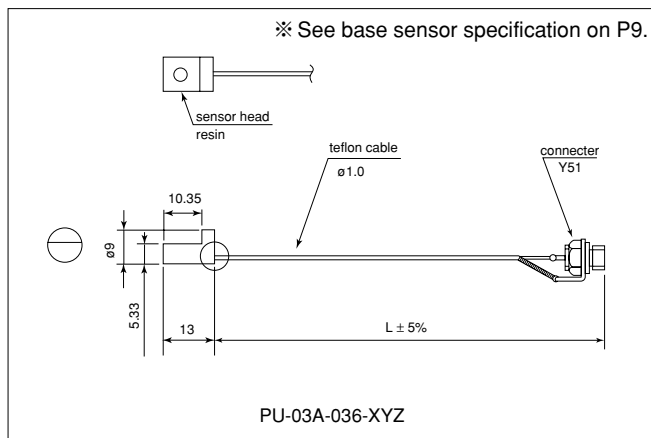
Piston ring movement (Up-and- down motion) is measured with sensors fixed on the piston land (ring groove).

Specifications

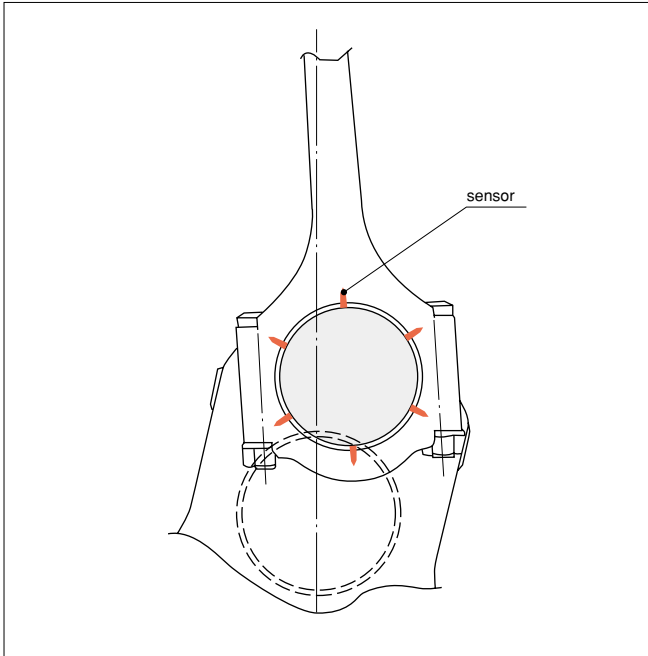
Typical conditions  
 Operating temperature: 180°C maximum  
 Measuring range: 0 to 0.15mm (within range of linearity)  
 Please contact us to place custom designed orders of desired specifications.

Remarks

Please contact us when choosing a sensor as the dimension needed varies depending on piston size.



Measurement of connecting rod bearing clearance



Explanations

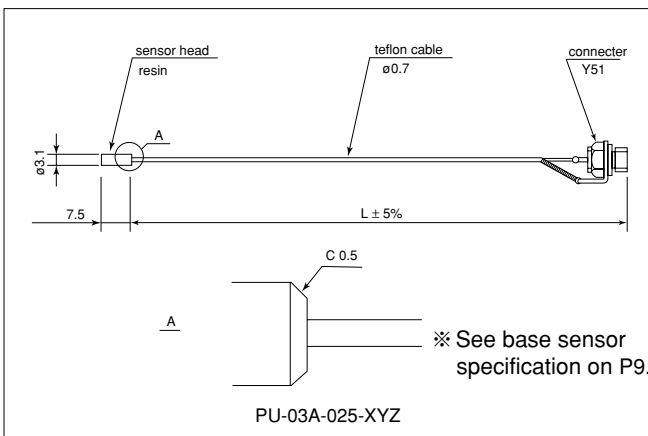
The core track of the crankshaft is analyzed by measuring the clearance between the crankpin and the connecting rod roller bearing through embedding sensors into the connecting rod roller bearing.

Specifications

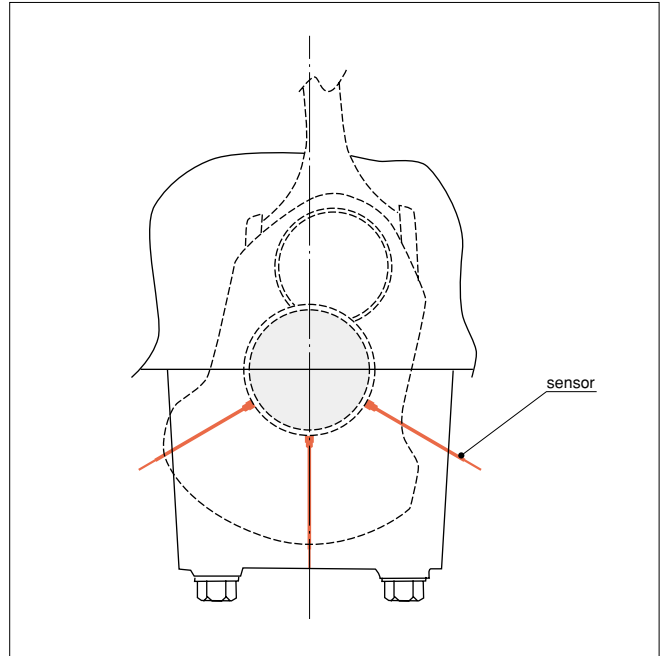
Typical conditions  
 Operating temperature: 180°C maximum  
 Measuring range: please contact us when choosing a sensor as the measuring range varies depending on the profile of the mounting holes.  
 We accept custom designed orders of desired specifications.

Remarks

The size of sensor mounting holes varies depending on the connecting rod used.  
 In case of PU-03A model probe, the measuring range (linear output) covers 0 to 500µm in a ø6 mounting hole.



Measurement of crankshaft clearance 1



Explanations

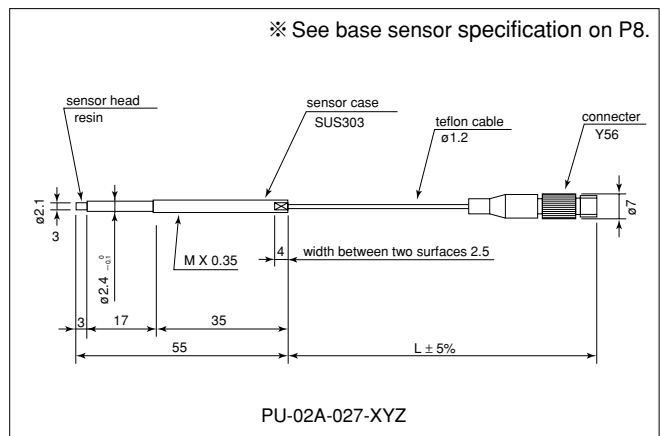
Movement and clearance of the crank journal are measured through sensors embedded in the main bearing of the crank journal.

Specifications

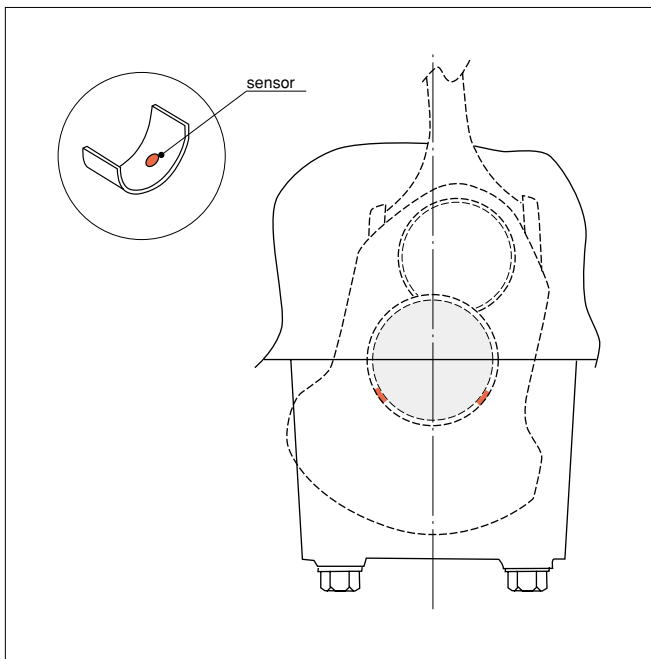
Typical conditions  
 Operating temperature: 180°C maximum  
 Measuring range: 0 to 0.5mm (within range of linearity)  
 Please contact us to place custom designed orders of desired specifications.

Remarks

Please contact us when choosing a sensor, as the profile of the mounting holes varies depending on the size of the crankshaft.



Measurement of crankshaft clearance 2



Explanations

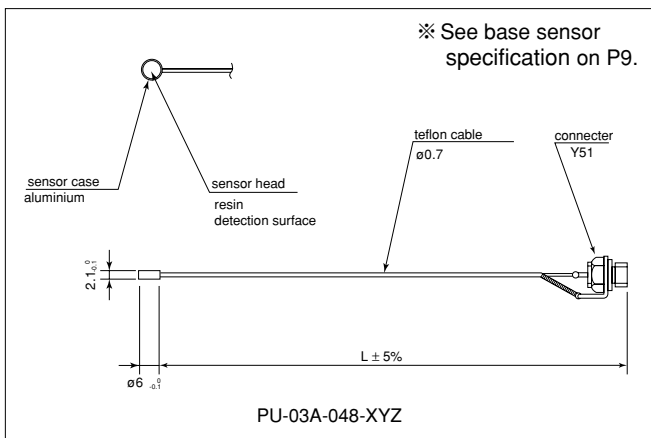
The movement and clearance of the crankshaft is measured through thin sensors embedded in the main bearing of the crankshaft.

Specifications

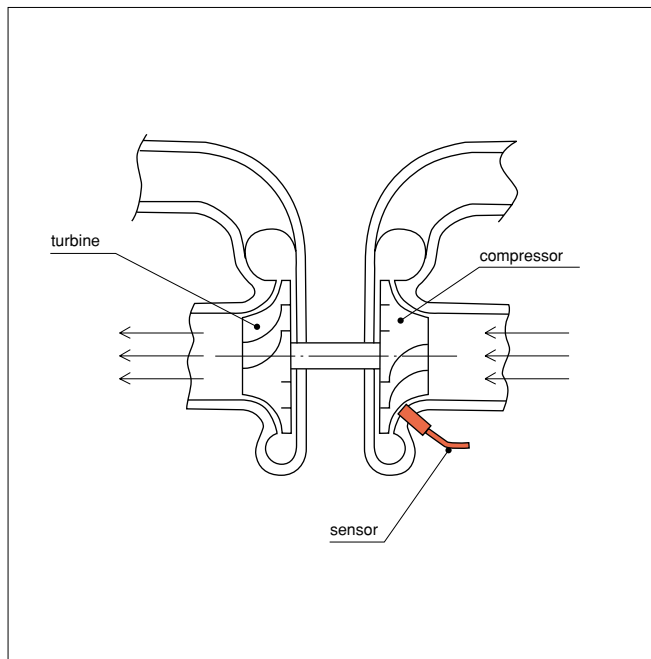
Typical conditions  
 Operating temperature: 180°C maximum  
 Measuring range: please contact us when choosing a sensor, as the measuring range varies depending on the profile of the mounting holes.  
 Please contact us to place custom designed orders of desired specifications.

Remarks

Please contact us when choosing a sensor, as the profile of the mounting holes varies depending on the size of the main bearing used.



Measurement of turbo turbine and compressor rotating speeds



Explanations

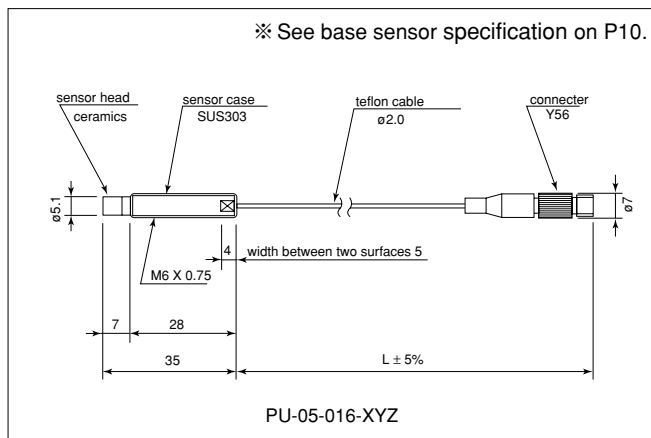
The rotation is measured with fixed sensors facing the blades of the turbine turbine and the compressor. The vibration is also measured with fixed sensors facing axis.

Specifications

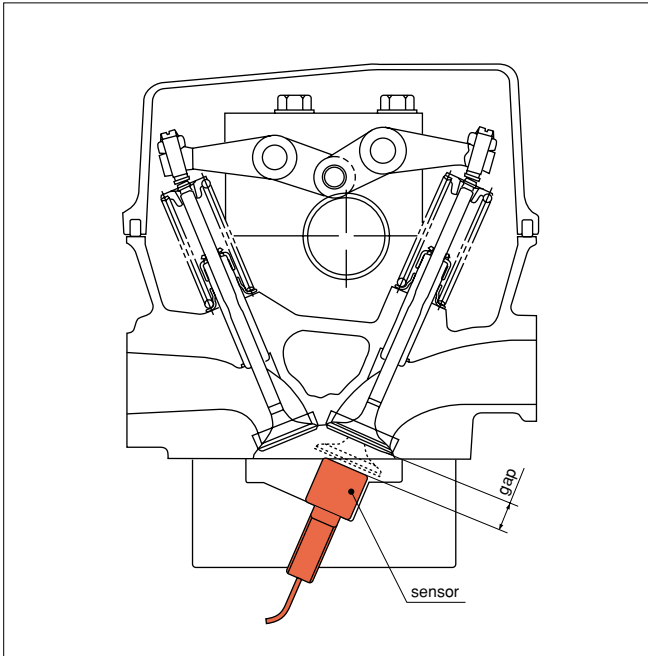
Typical conditions  
 Operating temperature: 200°C maximum  
 Measuring range: DC to 20kHz  
 Please contact us to place custom designed orders of desired specifications

Remarks

Please contact us when choosing a sensor, as the sensor varies used depending on the turbine size and distance where sensor is installed.  
 We can also provide sensors for higher temperature and frequencies than above specifications.



Measurement of the valve lifting level 1



Explanations

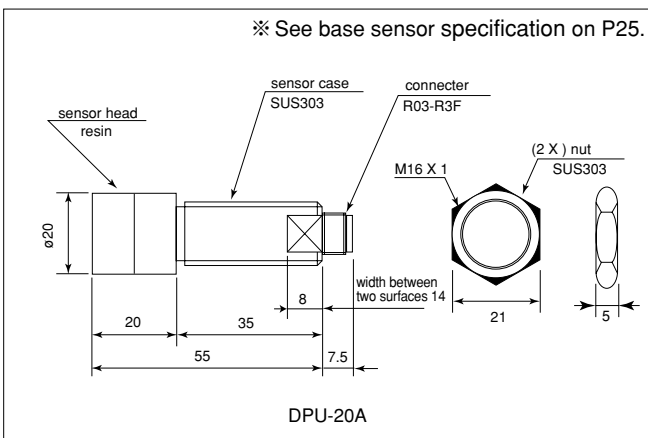
The valve lifting level is measured without processing the valve

Specifications

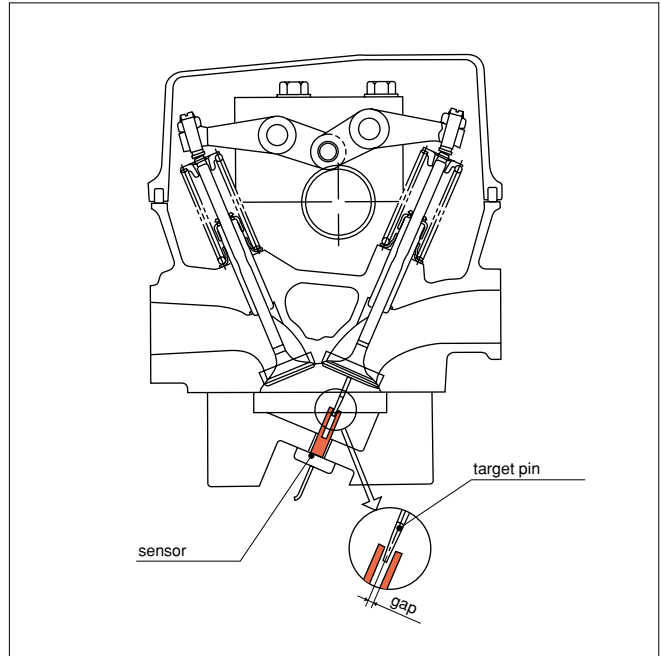
Typical conditions  
 Operating temperature: 80°C maximum  
 Measuring range: 0 to 8mm  
 Please contact us to place custom designed orders of desired specifications.

Remarks

The valve lifting level can be measured without changing the weight of the valve, but the firing operation isn't allowed due to the fixed sensor within the combustion chamber.



Measurement of the valve lifting level 2



Explanations

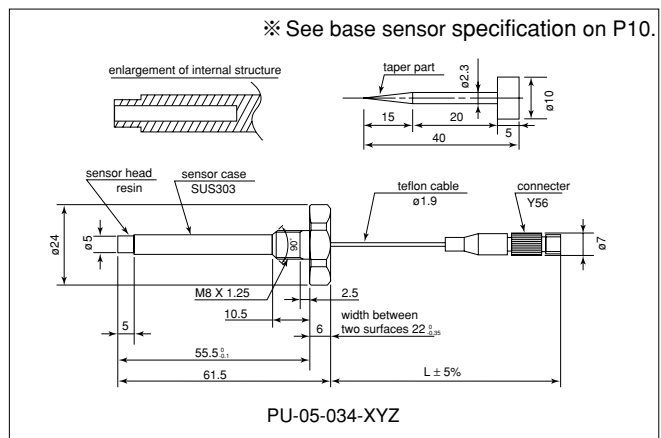
The multiple valve lifting levels are measured at the same time with a miniature sensor in the combustion chamber.

Specifications

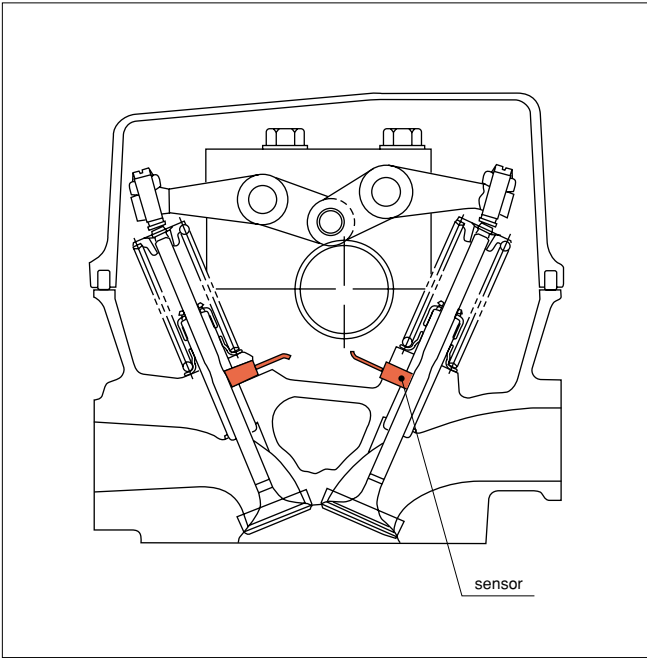
Typical conditions  
 Operating temperature: 180°C maximum  
 Measuring range: 0 to 15mm  
 Please contact us to place custom designed orders of desired specifications.

Remarks

This measuring method required a target pin (see figure below) to be installed onto the target but enables long stroke measurement using GAP SENSOR. This method can also used in a harsh environment (e.g. in oil) that GAP-SENSOR is durable to.



**Measurement of the valve lifting level 3**



**Explanations**

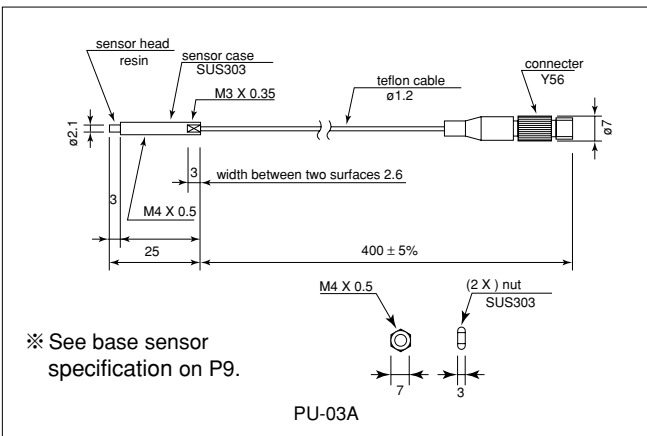
The multiple valve lifting levels are measured at the same time by fixing the multiple sensors on the multiple valve guides.

**Specifications**

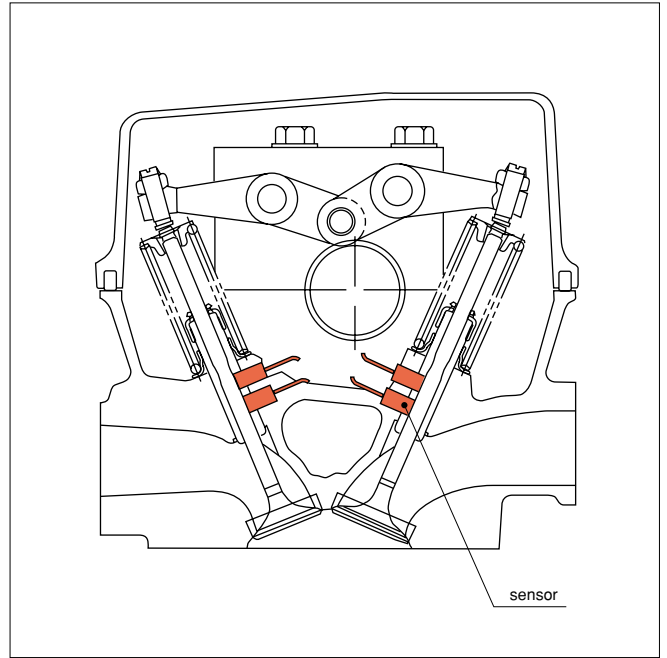
Typical conditions  
 Operating temperature: 180°C maximum  
 Measuring range: 0 to 8mm  
 Please contact us to place custom designed orders of desired specifications.

**Remarks**

The miniature sensor permits the measurement of valve lift during the firing movement by adopting the taper processing to a part of the valve stem.



**Measurement of valve guide clearance and displacement**



**Explanations**

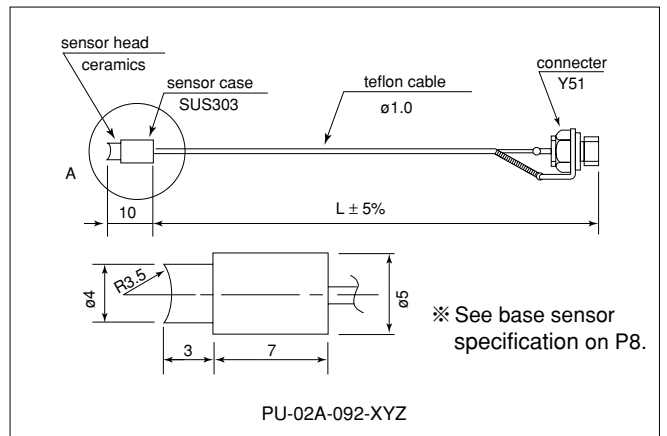
The clearance between the valve stem and the valve guide is measured by mounting multiple sensors on the valve guide.

**Specifications**

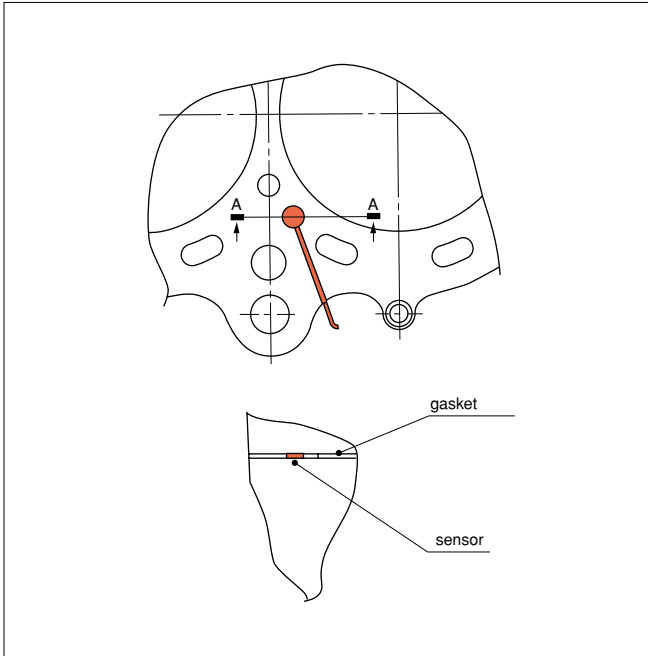
Typical conditions  
 Operating temperature: 180°C maximum  
 Measuring range: 0 to 0.3 mm  
 Please contact us to place custom designed orders of desired specifications.

**Remarks**

Please contact us to place orders for specific R shaped sensors depending on valve size and mounting place. Firing movement is possible in this measuring method.



**Measurement of gasket displacement 1**



**Explanations**

The clearance displacement between the gasket and the cylinder head, or The gasket and the cylinder block are measured by mounting the thin sensor by mounting the thin sensor on the cylinder gasket.

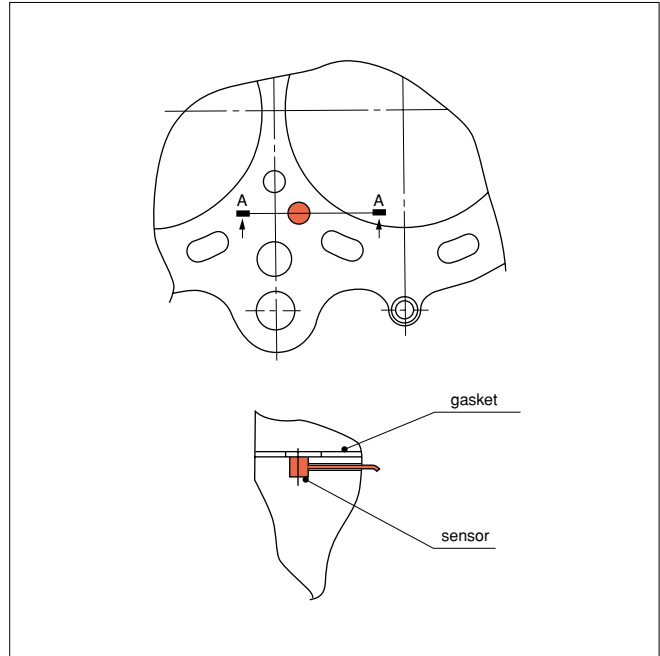
**Specifications**

Typical conditions  
 Operating temperature: 180°C maximum  
 Measuring range: 0 to 0.2 mm  
 Please contact us to place custom designed orders of desired specifications.

**Remarks**

Please contact us when choosing a sensor, as the sensor size varies depending on thickness of the gasket.  
 The gasket is more than 1.2mm thick.

**Measurement of gasket displacement 2**



**Explanations**

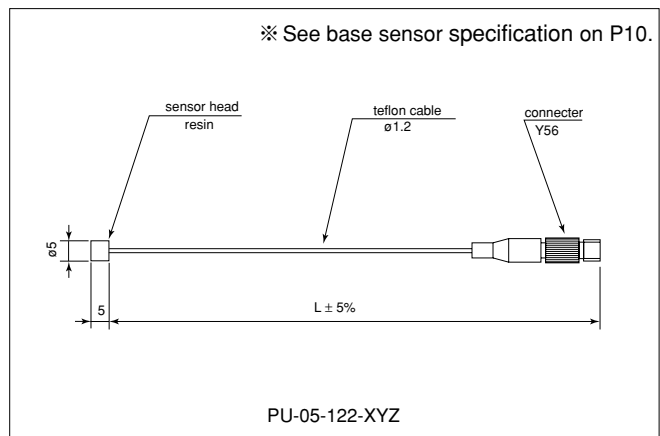
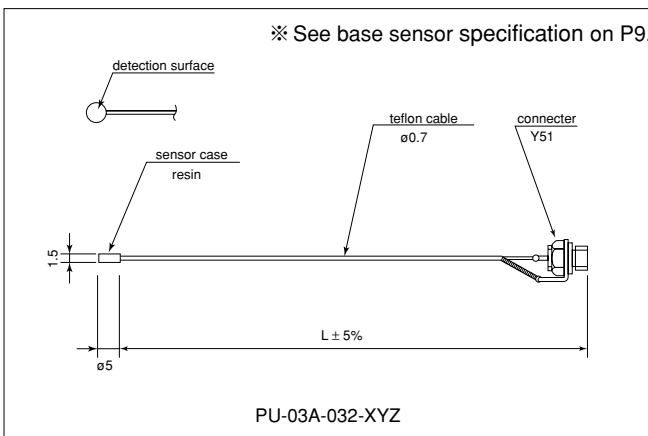
The displacement of clearance between the cylinder block and the cylinder head is measured mounting a sensor on the cylinder block, and by drilling the gasket installed a sensor on the cylinder block.

**Specifications**

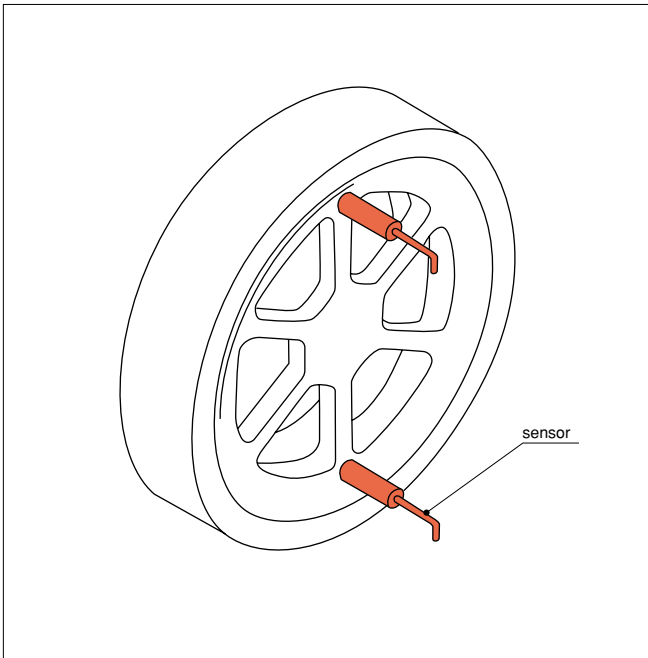
Typical conditions  
 Operating temperature: 180°C maximum  
 Measuring range: 0 to 2 mm  
 Please contact us to place custom designed orders of desired specifications.

**Remarks**

Please contact us when choosing a sensor, as the sensor size varies depending on thickness of the gasket. The gasket is more than 1.2mm thick.



Measurement of wheel balance



Explanations

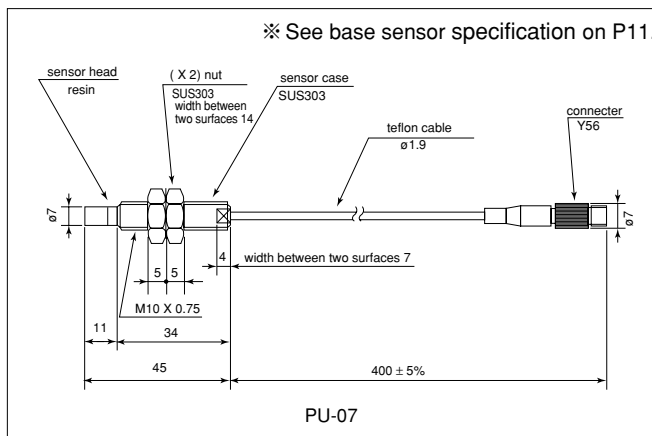
Rotational balance of the wheel is measured with the sensor located close to the wheel target.

Specifications

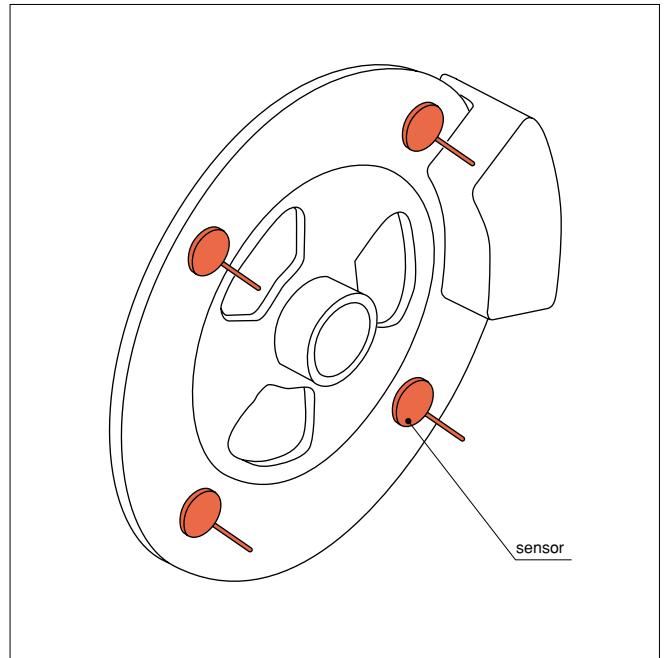
Typical conditions  
 Operating temperature: 120°C maximum  
 Measuring range: 0 to 3 mm  
 Please contact us to place custom designed orders of desired specifications.

Remarks

Please contact us when choosing a sensor, as the sensor size varies depending on the measuring points.



Measurement of brake disk surface instability



Explanations

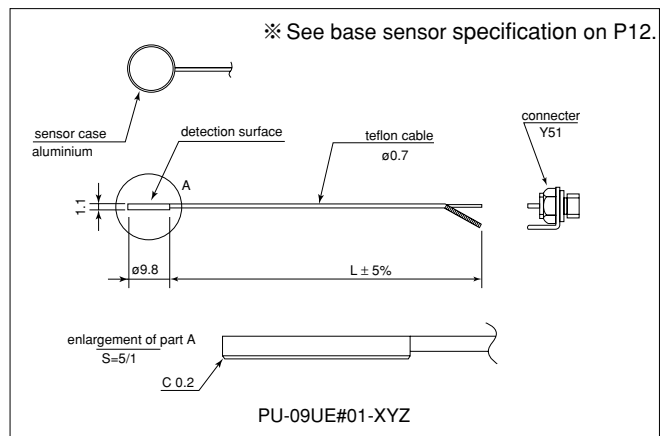
Surface run-out caused during the rotation of brake disk is measured by a gap sensor facing the brake disk surface.

Specifications

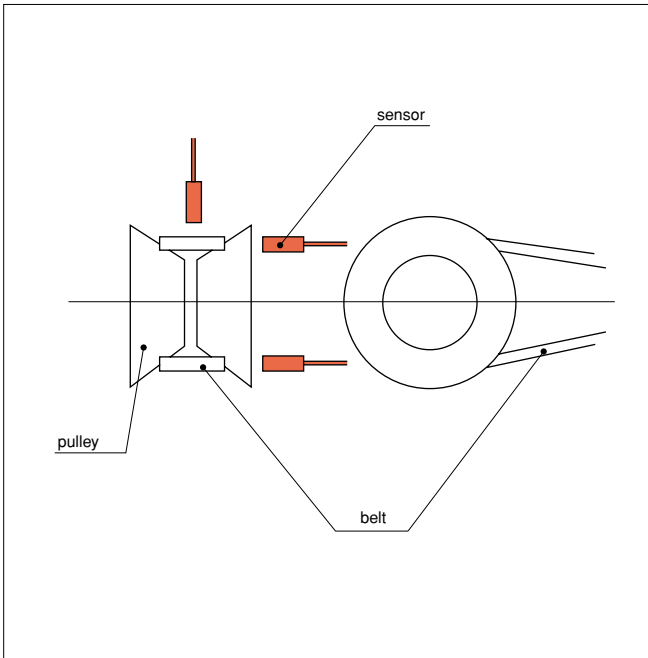
Typical conditions  
 Operating temperature: 140°C maximum  
 Measuring range: 0.6 to 2.6 mm  
 Please contact us to place custom designed orders of desired specifications.

Remarks

Please contact us for sensors for higher temperature resistance than that of the above specifications.



Measurement of pulley and belt vibration



Explanations

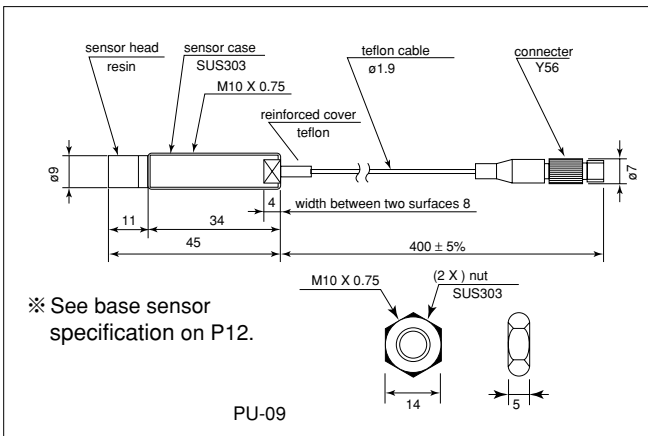
Vibrations of the pulley and the belt are measured by a sensor located close to the pulley and belt of CVT automatic type.

Specifications

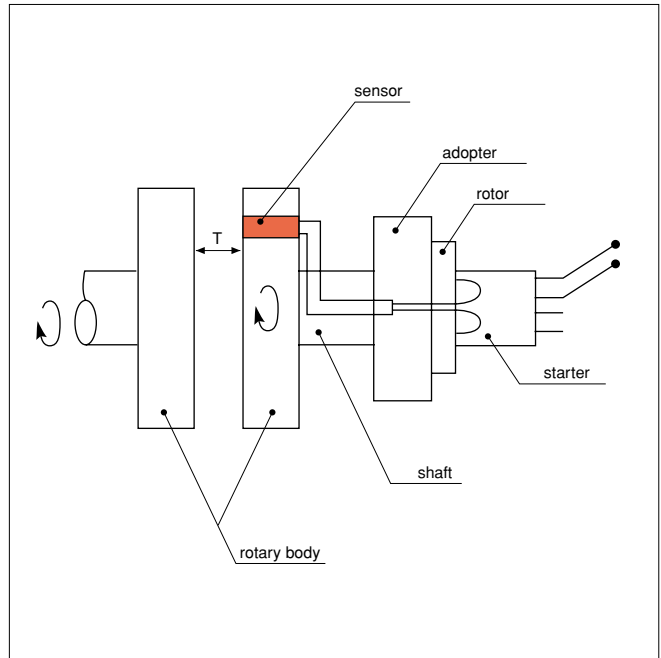
Typical conditions  
 Operating temperature: 120°C maximum  
 Measuring range: 0 to 4 mm  
 Please contact us to place custom designed orders of desired specifications.

Remarks

Please contact us when choosing a sensor, as the sensor need to match vibration amplitude of the belt pulley.



Measurement example for applying the slip ring



Explanations

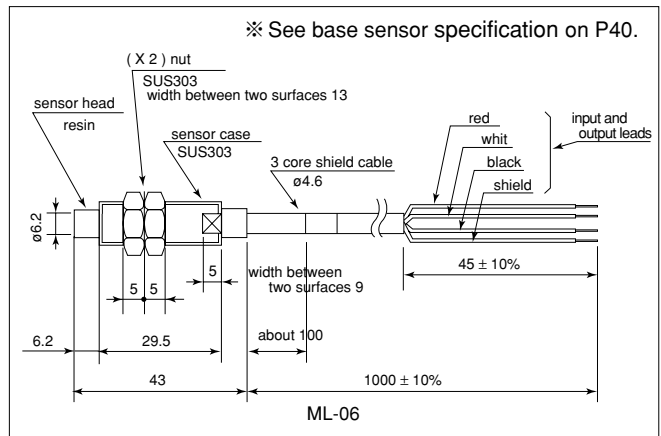
The slip ring can be applied for measurement if a sensor located on the rotary body.

Specifications

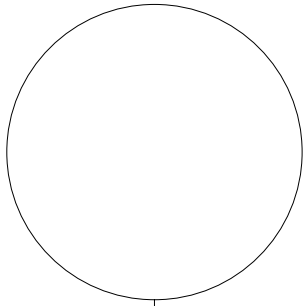
Typical conditions  
 Operating temperature: 105°C maximum  
 Measuring range: 0 to 2 mm  
 Please contact us to place custom designed orders of desired specifications.

Remarks

Our ML-06 type sensor protects signals from noises in spite of applying the slip ring.







## ■ Options

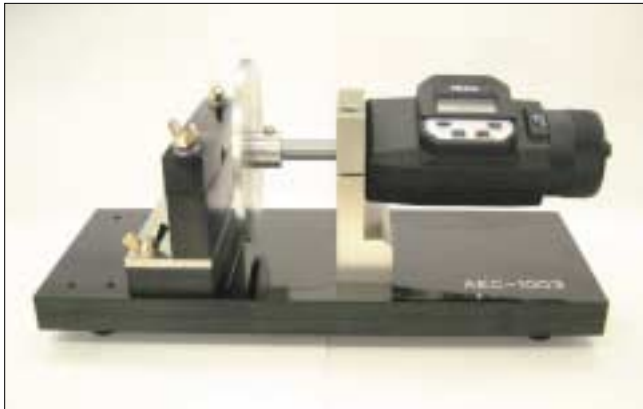
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Calibrator AEC-1002/1003/1004  
Digital compensating amplifier AEC-55DS  
Hermetic seal  
Slip ring  
DC-DC converter  
Automatic seismic wave recording system ADCS-02  
Non contact film thickness gage  
3 axis Handy vibration sensor EV-05

## Option

### Calibrator AEC-1002/1003/1004

The Calibrator facilitates the measurement of output characteristics



**AEC-1003**  
 Calibration range: 0 to 50 mm  
 Minimum scale indication: 1  $\mu$ m (digitally displayed)



**AEC-1002**  
 Calibration range: 0 to 25 mm  
 Minimum scale indication: 10  $\mu$ m



**AEC-1004**  
 Calibration range: 0 to 25 mm  
 Minimum scale indication: 1  $\mu$ m (digitally displayed)

### Digital compensating amplifier AEC-55DS

After the nonlinear output voltage area which is out of measurement range of GAP-SENSOR is digitally processed with this compensating amplifier, the useable measurement range will be about doubled compared to that of the standard sensor system. It is possible to almost completely eliminate temperature drift (change in output due to temperature) by entering the temperature data.



## Option

### Hermetic seal

Available for purchase of hermetic seal for GAP-SENSOR as optional part to be used under various environmental conditions.

Please contact us on trying to measure electrical output from the inner region of airtight containers (including water, oil, or chemicals), pressure chambers or vacuum containers.



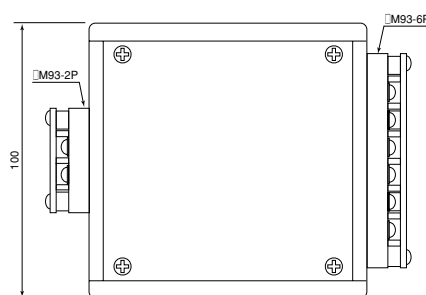
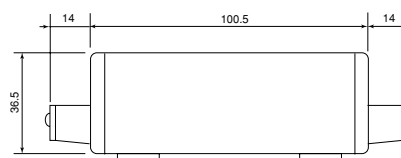
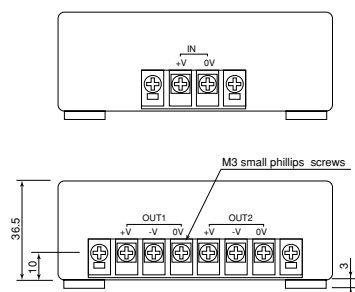
### Slip ring

This optional part is suitable for an application where GAP-SENSOR is mounted to the rotating body. There are several types, characterized by different rotating speed and number of poles, to cope with diversified service conditions. Please contact us for selection.



### DC-DC converter

If this DC-DC converter is used, GAP-SENSOR can be powered through a battery. When it is necessary to mount the sensor to an automobile for on-board experiments, this optional circuit is the optimum choice for such an application.



## Option

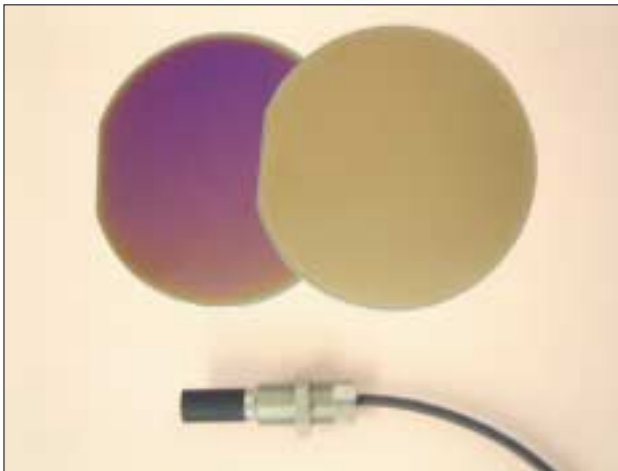
### Automatic seismic wave recording system ADCS-02

This compact seismic measuring system consists of a three-axis accelerometer and a notebook PC.

The Windows-based software allows easy data processing. The system also supports GPS clock and data communications. Other remarkable features are the low price and the multi-functionality .



### Non contact film thickness gage

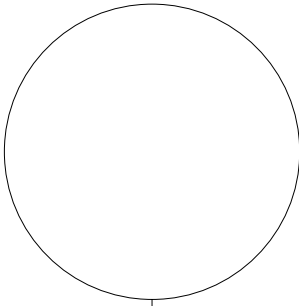


This gage uses the innovative measuring technique and measures the film thickness in nano meters without contact with the target. It also supports the film thickness detection for high-resistance metals whose measurement is currently considered impossible. The measurable metals include copper, aluminum, gold, silver, tungsten, titanium, TiN, tantalum, and TaN.

### Handy vibration sensor EV-05

A three-axis accelerometer is housed in a compact case (110 (W) X 153 (D) X 53.1 (H) mm). This sensor can measure vibrations of up to  $\pm 2$  G and can also be connected to a PC. The battery-powered design allows easy carrying. (When the separate AC power supply is connected, continued measurement is available.) This option is suitable for vibration measurement on elevators, escalators, automobiles, and constructions such as buildings and bridges, as well as vibration monitoring in precision part manufacturing plants.





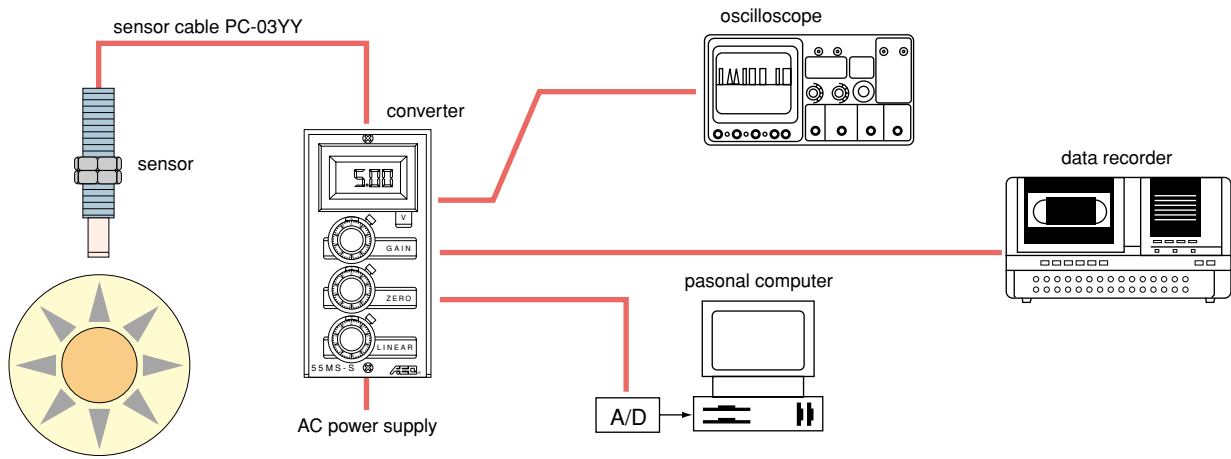
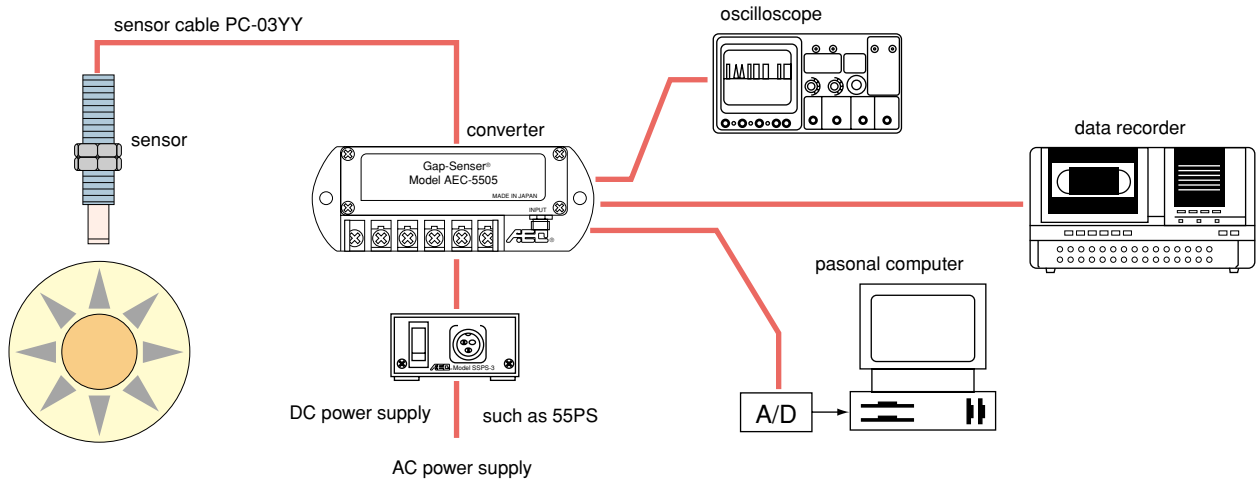
## ■ Technical Data

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Connection of Measuring System as an Example  
Operating principle  
Material, dimensions, and profile of target  
Adjustment of output  
Sensor mounting  
Glossary

# Technique Data

## Connection of Measuring System as an Example

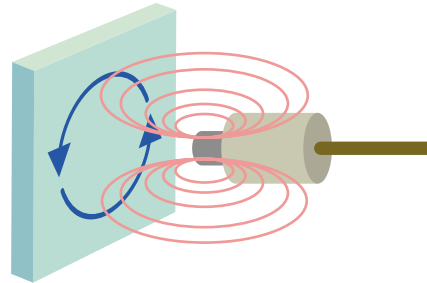


## Technique Data

### Operating principle

GAP-SENSOR is generally called "an eddy current displacement sensor". A high-frequency current is supplied to the coil inside the sensor head to generate a high-frequency electromagnetic field.

When the target (a conductive or magnetic substance) approaches this electromagnetic field, an eddy current is generated on the surface of the target and the sensor coil impedance is changed. The sensor system detects the change in oscillation strength resulting from this phenomenon to identify the relationship between displacement and voltage.



### Material, dimensions, and profile of target

#### Change in output characteristics due to material

GAP-SENSOR works as long as the target is metallic. Note that both the sensitivity and the measuring range are dependent on the material of the target.

#### Dimensions of target

It is recommended that the relative surface area of the target should be at least twice as large as that of the sensor coil. When the surface area of the target is less than this size, the sensitivity is decreased. If the target is powder, laminated material (when measured at its cross section), or a wire bundle, the sensitivity is decreased as well, and at worst the measurement may be impossible.

#### Thickness of target

When the thickness of the target is 0.2 mm or more, the sensitivity is not affected by the thickness.

(For the copper and aluminum foil, the minimum thickness is 70  $\mu\text{m}$ .)

#### Profile of target

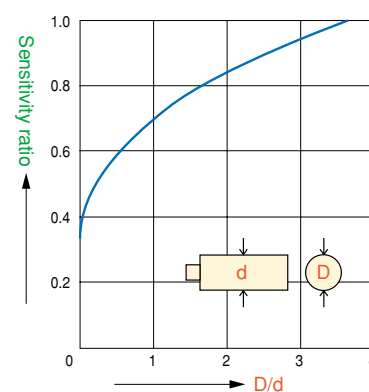
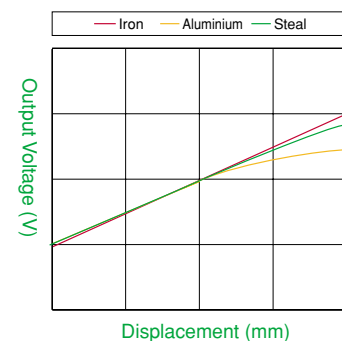
When the target is cylindrical (e.g., shaft) and its diameter is at least 3.5 times as large as the sensor coil, the sensitivity is not affected by the profile of the target. Should this ratio be one to one, the sensitivity is decreased to about 70 %.

#### Run-out phenomenon

In the measurement of axis vibrations, the output that does not correspond to true value may be observed. This event is called "run-out phenomenon". The mechanical run-out attributable to scratches, unevenness and elliptical or eccentric surfaces can be prevented by corrective machining.

For the electrical run-out observed in the measurement of axis vibrations on magnetic substances, particularly steel products, the causes are not simple, and it has been considered that electrical run-out is caused by the remaining magnetism, uneven crystalline structure, and dispersed surface quench hardness of the steel material. Different countermeasures as shown below may be needed depending on the measurement objective.

- Demagnetizing the target axis after machining.
- Lining copper sheet around the target axis and machining the target axis.
- Decreasing the compressive stress from the target axis.
- Changing the target from steel to copper or any other appropriate material.



## Technique Data

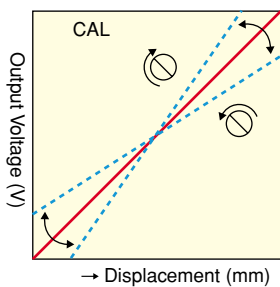
### Adjustment of output

The output characteristics of GAP-SENSOR vary depending on the material or profile of the target. However, it is possible to maximize the performance of the sensor through adjustment of sensitivity.

### Adjustment of GAP-SENSOR output (55 series sensor)

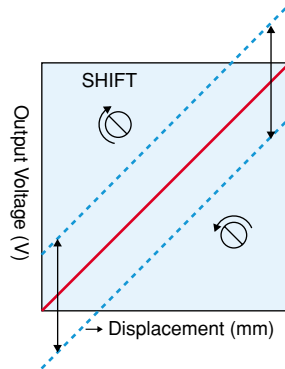
#### CAL (GAIN)

Able to adjust the optimum conversion between the output voltage and the displacement with the sensitivity volume.



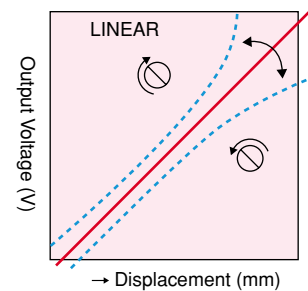
#### SHIFT (ZERO)

Able to adjust the shift of the output voltage without changing the sensitivity.



#### LINEAR

Compensations for the linearity range of output. When the linearity has been adjusted, readjustment of sensitivity and shift is needed.



### Adjustment procedure

#### 0-5 V output model (55015/5502A/5503A) (55MS-S)

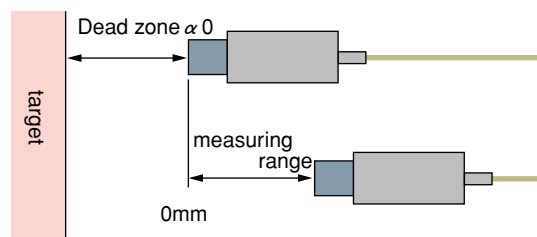
- ① Set the clearance between the sensor and target to 0 mm and adjust the voltage to 0 V with SHIFT.
- ② Set the clearance between the sensor and target to the value equivalent to 1/2 full scale and adjust the voltage to 1/2 full-scale voltage with GAIN
- ③ Set the clearance between the sensor and target to the value equivalent to full scale and adjust the linearity to full-scale voltage with LINEAR
- ④ If LINEAR is operated later, go to Step (1) and repeat the adjustment. If LINEAR is not operated, the adjustment procedure is completed.

#### ±5 V output model (5505/5507/5509/5514/5520/5530/5540) (55MS-M/55MS-L)

- ① Set the clearance between the sensor and target to the value equivalent to 1/2 full scale plus  $\alpha$  0 and adjust the voltage to 0 V with SHIFT.
- ② Set the clearance between the sensor and target to the value equivalent to 1/4 full scale plus  $\alpha$  0 and adjust the voltage to -2.5 V with GAIN
- ③ Set the clearance between the sensor and target to the value equivalent to 3/4 full scale plus  $\alpha$  0 and adjust the linearity to +2.5 V with LINEAR
- ④ If LINEAR is used later, go to Step (1) and repeat the adjustment. If LINEAR is not used, the adjustment procedure is complete

### Dead zone ( $\alpha$ 0)

GAP-SENSOR (except for some models) has a dead zone ( $\alpha$  0). The dead zone refers to the distance where the sensor output does not show the linearity on the section between the sensor and target. In our brochures, the measuring distance of 0 mm includes  $\alpha$  0.





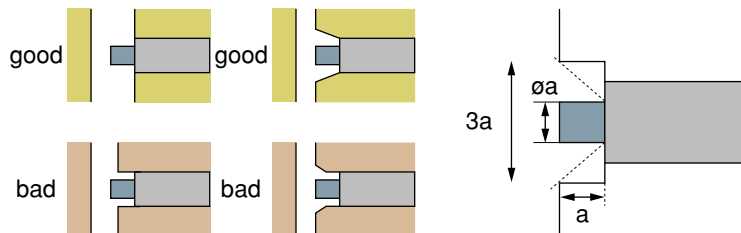
## Technique Data

# Sensor mounting

### Surrounding environment

When a metallic material other than the target exists close to the sensing surface of GAP-SENSOR or the sensor is embedded into a metallic component, enough distance should be provided between the relevant metal and the sensor as shown below.

Note: This rule does not apply to our PF series sensors. Please contact us for details.

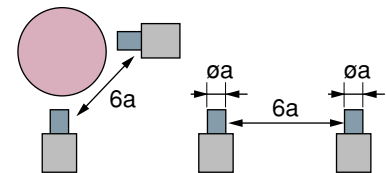


Generally, the distance equivalent to the sensor diameter (i.e.,  $a$ ) is needed in the longitudinal direction and a cutout three times as large as the sensor diameter (i.e.,  $3a$ ) is needed in the radial direction.

When GAP-SENSOR is used under special conditions such as limited mounting space, or extreme temperatures or pressures, special design may be needed. Please contact us.

### Interference between sensors

When multiple sensors are closely mounted in the multi-channel simultaneous measurement, the sensors interfere with each other to cause errors in the result. It is recommended to provide enough distance between sensors (generally six times as large as the sensor diameter) to avoid interference, to use different types of sensors, or to use an interference preventive converter. Please contact us.



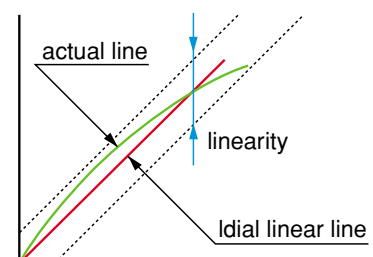
## Glossary

### Resolution

Even when the target is at a standstill, the voltage changes minutely due to the residual noise in the converter. It can be said that lower noise provides higher resolution and thus improves measuring accuracy. We measure the noise level at the half-scale point of the sensor measuring distance, and convert it into displacement to define the resulting value as resolution. (Note that the values on the brochures are based on the system equipped with our power supply.)

### Linearity

The output voltage of the displacement sensor is proportional to the distance. However, the line plotted from actual measurements deviates from the ideal line. The difference between actual and ideal lines is expressed in percentage relative to the full scale of the sensor. (The values on the brochures are based on the room temperature.)



### Measuring range

This range refers to the coverage in which the sensor can measure the target. The distance from the target to the sensor is proportional to the voltage output within this range. Thanks to our special sensor design, it is possible to measure the target beyond the specified measuring range by changing the sensitivity.

### Frequency characteristics

Frequency characteristics refer to the frequency band in which vibrations, displacements, and rotating speeds of the target can be measured with GAP-SENSOR.

### Temperature characteristics

The sensor sensitivity depends on the surrounding temperature, which is called temperature drift.

The temperature drift means sensitivity change per  $1^{\circ}\text{C}$ .

The PF series sensors feature minimum temperature drift among our GAP-SENSOR products.