

ε **AW-Series** (AWM, AWMD, AWH, AWHU, AW, AWC)
Weldable Strain Gauges

These strain gauges have strain sensing elements fully encapsulated in corrosion-resisting metal tubes made of stainless steel or Inconel (except AW-6-350). The strain gauge backings are also made of the same material, and the gauges are installed by spot welding to metal specimens using a dedicated spot welder.

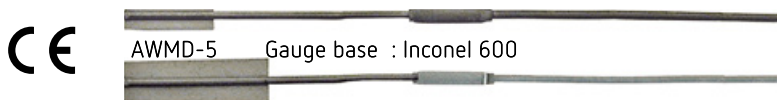
■ TYPE

AWM -196~+300° C Quarter bridge 3-wire



AWM-8-1A Gauge base : Inconel 600
AWM-8-1B Gauge base : SUS304

AWMD -196~+800° C for dynamic strain Full bridge



AWMD-5 Gauge base : Inconel 600
AWMD-8 Gauge base : Inconel 600

AWH -196~+600° C for static strain Full bridge
-196~+650° C for dynamic strain



AWH-4-7A/AWH-8-7A Gauge base: Inconel 600
AWH-4-7B/AWH-8-7B Gauge base: SUS304

AW-6 -196~+300° C Quarter bridge 3-wire



AW-6-350-11-4FB01LT

AWHU -196~+800° C Full bridge



AWHU-5 Gauge base: Inconel 600
AWHU-8 Gauge base: Inconel 600



AW SERIES CODING SYSTEM

| ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ |
|------|----|----|---|----|----|------|---------|
| AWM | -8 | -1 | B | | -2 | | -17.0 |
| AWMD | -5 | - | A | KM | -2 | (6F) | -1.6Hz* |
| AWMD | -8 | - | A | | -2 | | -1.6Hz* |
| AWH | -8 | -7 | A | | -2 | | -11.0 |
| AWHU | -5 | -9 | A | KM | -2 | (6F) | -12.7 |

*: High-pass filter only for AWMD Either one available among 1.6, 7.2 or 16Hz.

| ①Type | ②Gauge length | ③Temperature compensation range | ④Gauge base*1 | ⑤Option |
|--|--------------------|--|---|---|
| AWM : static/dynamic 300°C | 8 : 8mm | 0 : -196°C ~ RT 1 : RT ~ +300°C | A : Inconel 600 Applicable thermal expansion coefficient of 11ppm/°C or closer B : SUS304 Applicable thermal expansion coefficient of 17ppm/°C or closer | E: Ground earth F: Compression fittings K: Narrow gauge width W=3mm (excluding AWHU) M: Small junction type of sleeve B Φ 2.0mm L=20mm AWHU and AWMD-5 are normally provided with small junction P: NDIS type plug attached*2 R: Bend of gauge backing or pipe Z: Filter-less (AWMD) |
| AWMD : dynamic only 800°C | 5 : 5mm 8 : 8mm | 2 : RT ~ +350°C 3 : RT ~ +400°C | | |
| AWH : static 600°C dynamic 650°C | 4 : 4mm 8 : 8mm | 4 : RT ~ +450°C 5 : RT ~ +500°C 6 : RT ~ +550°C | | |
| | | 7 : RT ~ +600°C 8 : RT ~ +650°C 9 : RT ~ +800°C 10 : Others | | |
| AWHU : static/dynamic 800°C | 5 : 5mm 8 : 8mm | NB1: Dynamic use AWMD is not applicable. NB2: RT Room temperature | | |

| ⑥MI cable | ⑦Supplied cable length | ⑧Temperature compensation materials or High-pass filter |
|--|--|--|
| 2 : Φ1.6mm 2m Core cable of heat-resistive copper | No marks: Φ 4.1mm shielded vinyl cable of 0.5m Except for standard length, required length is given in bracket Example: 4.5m long to (4.5) (6F) Φ 1.6mm shielded fluoroethylene propylene cable (FEP) of 0.5m for AWHU-5/-8, AWMD-5 Except for standard length, required length is given after suffix 6F. Example: 4.5m long to (6F4.5) | Materials available for temperature-compensation 10.9: SUS430 or equivalent 11.0: Mild steel (ferritic) or equivalent 12.7: INCONEL 600 or equivalent 17.0: SUS304 or equivalent High-pass filter for only AWMD 1.6Hz 7.2Hz 16Hz |

*1: Select code A for thermal expansion coefficient of 11ppm/°C or closer, or B for coefficient of 17ppm/°C

*2: For option code P, NDIS plug is attached to the end of cables following Temperature-compensation board or High-pass filter.



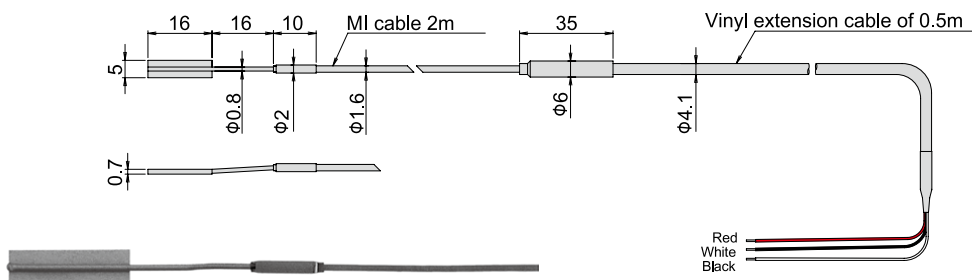
AWM-8

The AWM is usable up to 300°C for both static and dynamic strain measurement. The backing material is available in Inconel 600 or SUS304 which should be selected according to the test specimen material.

| Type | Gauge length (mm) | Gauge base Dimension (mm) | Materials | Operating temperature (°C) | Temperature compensation range (°C) | Test specimen | Applicable coefficient of linear thermal expansion ($\times 10^{-6}/^{\circ}\text{C}$) | Resistance in (Ω) |
|-----------------|-------------------|---------------------------|-------------|---------------------------------------|-------------------------------------|-----------------------|--|----------------------------|
| AWM-8-1A-2-11.0 | 8 | L16xW5xT0.7 | Inconel 600 | For static/dynamic use -196~+300°C | Room-temperature ~ +300°C | Mild steel equivalent | 11 $\times 10^{-6}/^{\circ}\text{C}$ | 120 |
| AWM-8-1B-2-17.0 | | | SUS304 | | | SUS304 equivalent | 17 $\times 10^{-6}/^{\circ}\text{C}$ | |

Leadwire 1.6 mm dia. MI cable 2 m, 4.1 mm dia. shielded vinyl cable 0.5 m (Quarter bridge with 3-wire)
Minimum order quantity is 1 strain gauge.

External dimensions



AWMD-5 / AWMD-8

The AWMD is applicable up to 800°C and it is dedicated to dynamic strain measurement. A high pass filter is a standard accessory. Using the high pass filter, unnecessary direct current component or low frequency component (thermal output, drift etc.) in the measurement signals can be neglected.

| Type | Gauge length (mm) | Gauge base Dimension (mm) | Materials | Operating temperature (°C) | Temperature compensation range (°C) | Test specimen | Applicable coefficient of linear thermal expansion ($\times 10^{-6}/^{\circ}\text{C}$) | Resistance in (Ω) |
|-------------------------------------|-------------------|---------------------------|-------------|--------------------------------|-------------------------------------|------------------------|--|----------------------------|
| AWMD-5-AKM-2(6F)-1.6Hz [*] | 5 | L10xW3xT0.7 | Inconel 600 | for dynamic use -196~+800°C | N/A | Inconel 600 equivalent | 12 $\times 10^{-6}/^{\circ}\text{C}$ | 60 |
| AWMD-8-A-A-2-1.6Hz [*] | 8 | L16xW5xT0.7 | Inconel 600 | | | | | 120 |

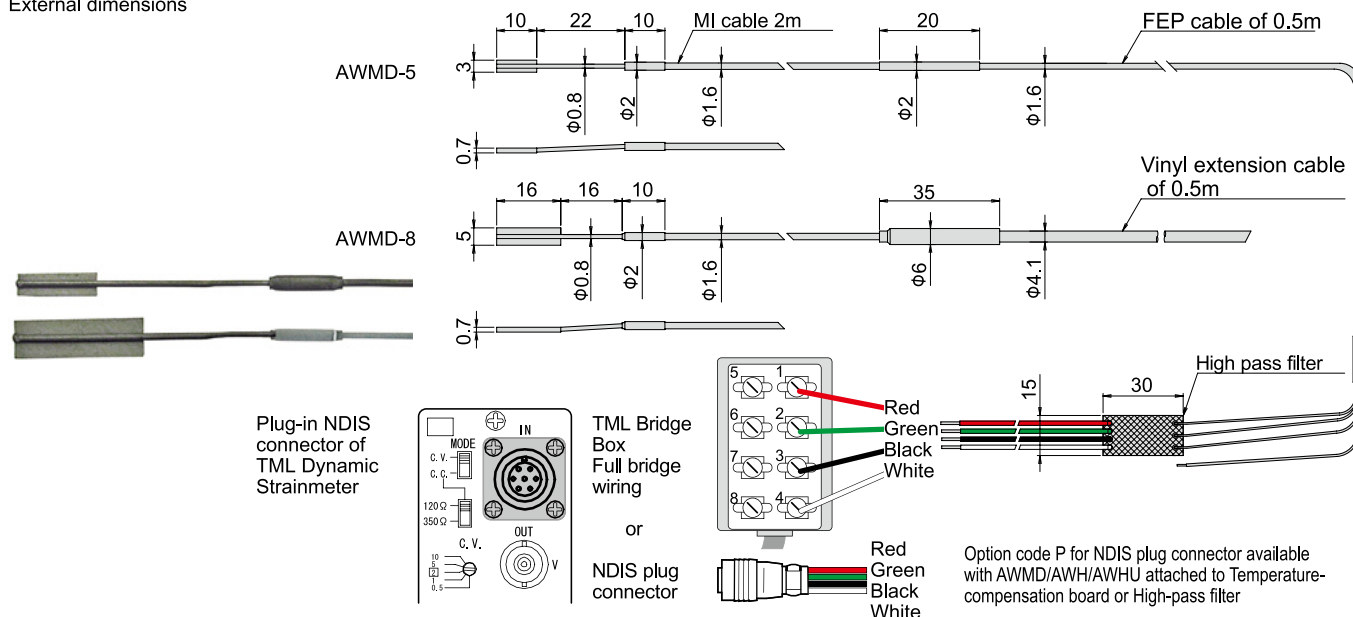
*: High-pass filter only for AWMD Either one available among 1.6, 7.2 or 16Hz.

Leadwire AWMD-5 : 1.6 mm dia. MI cable 2 m, 1.6 mm dia. shielded fluorinated resin (FEP) cable 0.5 m (Full bridge)

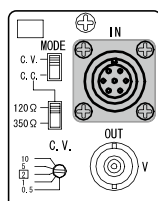
AWMD-8 : 1.6 mm dia. MI cable 2 m, 4.1 mm dia. shielded vinyl cable 0.5 m (Full bridge)

Minimum order quantity is 1 strain gauge.

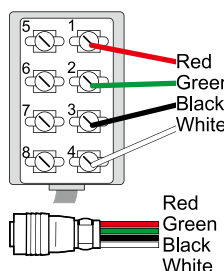
External dimensions



Plug-in NDIS connector of TML Dynamic Strainmeter



TML Bridge Box Full bridge wiring
or
NDIS plug connector



Option code P for NDIS plug connector available with AWMD/AWH/AWHU attached to Temperature-compensation board or High-pass filter



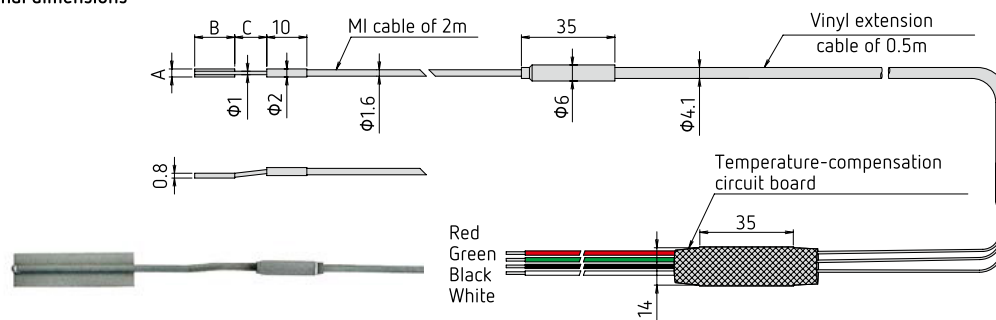
AWH-4 / AWH-8

The backing material of these gauges is available in either of Inconel 600 or stainless steel to be selected according to the material to be measured. The sensing part has half bridge configuration with active element and dummy element, and it is measured in full bridge method using the attached temperature compensation circuit board. This gauge is applicable to static measurement in temperature up to 600°C and applicable to dynamic measurement up to 650°C.

| Type | Gauge length (mm) | Gauge base Dimension (mm) | Materials | Operating temperature (°C) | Temperature compensation range (°C) | Test specimen | Applicable coefficient of linear thermal expansion ($\times 10^{-6}/^{\circ}\text{C}$) | Resistance in (Ω) |
|-----------------|-------------------|---------------------------|-------------|---|---|-----------------------|--|----------------------------|
| AWH-4-7A-2-11.0 | 4 | L10xW3xT0.8 | Inconel 600 | static : $-196\sim+600^{\circ}\text{C}$ dynamic : $-196\sim+650^{\circ}\text{C}$ | static : RT $\sim+600^{\circ}\text{C}$ dynamic : N/A | Mild steel equivalent | $11\times 10^{-6}/^{\circ}\text{C}$ | 60 |
| AWH-4-7B-2-17.0 | | | SUS304 | | | SUS304 equivalent | $17\times 10^{-6}/^{\circ}\text{C}$ | |
| AWH-8-7A-2-11.0 | 8 | L16xW5xT0.8 | Inconel 600 | | | Mild steel equivalent | $11\times 10^{-6}/^{\circ}\text{C}$ | |
| AWH-8-7B-2-17.0 | | | SUS304 | | | SUS304 equivalent | $17\times 10^{-6}/^{\circ}\text{C}$ | |

Leadwire 1.6 mm dia. MI cable 2 m, 4.1 mm dia. shielded vinyl cable 0.5 m (Full bridge)
Minimum order quantity is 1 strain gauge.

External dimensions



| Type | A | B | C |
|-------|---|----|----|
| AWH-4 | 3 | 10 | 8 |
| AWH-8 | 5 | 16 | 16 |

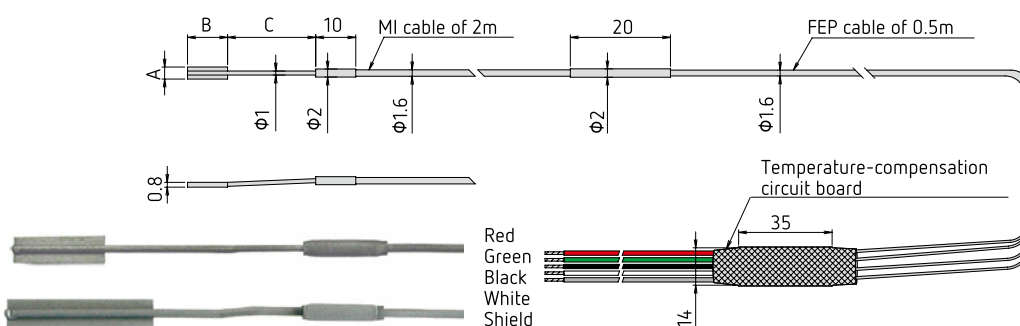
AWHU-4 / AWHU-8

These gauges can be used in temperature up to 800°C for both static and dynamic measurement. However, owing to the construction of the sensing element, measurement is recommended in temperature at 600°C or above. The sensing part has half bridge configuration with active element and dummy element, and it is measured in full bridge method using the attached temperature compensation circuit board. Since these gauges have small backings and thin sleeves and cables as standard specifications, they are applicable to narrow and/or curved areas.

| Type | Gauge length (mm) | Gauge base Dimension (mm) | Materials | Operating temperature (°C) | Temperature compensation range (°C) | Test specimen | Applicable coefficient of linear thermal expansion ($\times 10^{-6}/^{\circ}\text{C}$) | Resistance in (Ω) |
|------------------------|-------------------|---------------------------|-------------|---|---|------------------------|--|----------------------------|
| AWHU-5-9AKM-2(6F)-12.7 | 5 | L10xW3xT0.8 | Inconel 600 | For static/dynamic use $-196\sim+800^{\circ}\text{C}$ | Room-temperature $\sim+800^{\circ}\text{C}$ | Inconel 600 equivalent | $11\times 10^{-6}/^{\circ}\text{C}$ | 60 |
| AWHU-8-9AKM-2(6F)-12.7 | 8 | L16xW3xT0.8 | | | | | | 120 |

Leadwire 1.6 mm dia. MI cable 2 m, 1.6 mm dia. shielded fluorinated resin (FEP) cable 0.5 m (Full bridge)
Minimum order quantity is 1 strain gauge.

External dimensions



| Type | A | B | C |
|--------|---|----|----|
| AWHU-5 | 3 | 10 | 22 |
| AWHU-8 | 3 | 16 | 16 |

Note

Our AWH and AWHU series strain gauges are adjusted to make the thermal output as small as possible in consideration of the material to be measured, the MI cable length and the range of measurement temperature. These strain gauges will be supplied on made-to-order basis except AWH-4-7A-2-11.0 and AWH-8-7A-2-11.0.

* Lead wire lengths other than the standard length are available on request. (Made to order: MI cable length is in increments of 1 meter. Vinyl cable length is in increments of 0.5 meters.)

AW-6-350

These gauges have corrosion-resisting stainless steel backing with thickness of 0.08mm. They are easily installed by using the dedicated spot welder W-50RC. are suited for strain measurement in high temperature up to 300°C, for measurement of specimen to which adhesion is not applicable or for long term measurement.

| Type | Gauge length (mm) | Gauge base | | Operating temperature (°C) | Temperature compensation range (°C) | Test specimen | Applicable coefficient of linear thermal expansion ($\times 10^{-6}/^{\circ}\text{C}$) | Resistance in (Ω) |
|---------------------|-------------------|----------------|-----------|----------------------------|-------------------------------------|---------------|--|----------------------------|
| | | Dimension (mm) | Materials | | | | | |
| AW-6-350-11-4FB01LT | 6 | L24xW5 | SUS304 | -196~+300°C | +10 ~ +100°C | Mild steel | 11 $\times 10^{-6}/^{\circ}\text{C}$ | 350 |

Leadwire $\Phi 0.2\text{mm}$ Twisted cross-linked fluorinated resin (PTFE) sheathed leadwire of 0.1m standard (Quarter bridge with 3-wire)

* Lead wire lengths other than the standard length are available on request. (Made to order.)

Minimum order quantity is 5 strain gauges .

External dimensions

