# **Strain Gages**



# Strain Gages

### **General Purpose**

For Waterproof & Concrete Applications For Composite Materials, PC Boards & Plastics Ultra-small Strains for High, Low Temperature High Elongation & Bending Strain Gages For Hydrogen Gas Environment Gages with a Protector Crack Gages Adhesives & Coating Agents



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# **Strain Gages**

### Strain, Stress, and Poisson's Ratio

When a material receives tensile force P, it has stress  $\sigma$  that corresponds to the applied force. In proportion to the stress, the cross section contracts and the length elongates by  $\Delta L$  from the length L the material had before receiving the tensile force (See illustration in Fig. 1) below.



The ratio of the elongation to the original length is called a tensile strain and is expressed as follows:



See the lower illustration in Fig. 1. If the material receives compressive force, it bears compressive strain expressed as follows:

$$\mathcal{E}=\frac{-\Delta L}{L}$$

For example, if tensile force makes 100 mm long material elongate by 0.01 mm, the strain initiated in the material is as follows:

$$\mathcal{E} = \frac{\Delta L}{L} = \frac{0.01}{100} = 0.0001 = 100 \ \mu m/m$$

Thus, strain is an absolute number and is expressed with a numeric value with x10<sup>-6</sup> strain,  $\mu\epsilon$  or  $\mu$ m/m suffixed.

Based on Hooke's law, the relation between stress and the strain initiated in a material by the applied force is expressed as follows:

$$\sigma = E \mathcal{E}$$
  $\sigma$ : Stress  
E: Young's modulus  
 $\mathcal{E}$ : Strain

Stress is thus obtained by multiplying strain by the Young's modulus. When a material receives tensile force P, it elongates in the axial direction while contracting in the transverse direction. Elongation in the axial direction is called longitudinal strain and contraction in the transverse direction, transverse strain. The absolute value of the ratio between the longitudinal strain and transverse one is called Poisson's ratio, which is expressed as follows:

$$\mathcal{V} = \left| \frac{\mathcal{E}_2}{\mathcal{E}_1} \right|$$

$$\mathcal{V}: \text{ Poisson's ratio}$$

$$\mathcal{E}_1: \text{ Longitudinal strain } \frac{\Delta L}{L} \text{ or } -\frac{\Delta L}{L} \text{ (See Fig. 1)}$$

$$\mathcal{E}_2: \text{ Transverse strain } -\frac{\Delta D}{D} \text{ or } \frac{\Delta D}{D} \text{ (See Fig. 1)}$$

Poisson's ratio differs depending on the material. For major industrial materials and their mechanical properties including Poisson's ratio, refer to page 9-1.

**STRAIN GAGES** 

A strain gage detects a minute dimensional change (strain) as an electric signal. By measuring strain with the gage bonded to a material or structure, the strength or safety can be known. Thus, the strain gage is used in various industries including machinery, automobile, electric, civil engineering, medical, and food.

The strain gage is also adopted as a sensing element of force, pressure, acceleration, vibration, displacement, and torque transducers used for various purposes including measurement and control of production lines.

Kyowa produced the first Japanese-made strain gages in 1951, and based on the abundant experience and technology accumulated for these years, the company manufactures a variety of high-performance, environmentally friendly strain gages.

### ■Principle of Strain Gages

Each metal has its specific resistance. If external tensile force (compressive force) increases (decreases) the resistance by elongating (contracting) it. Suppose the original resistance is R and the strain-initiated change in resistance is  $\Delta$ R. Then, the following relation is concluded:

$$\frac{\Delta R}{R} = Ks \cdot \frac{\Delta L}{L} = Ks \cdot \mathcal{E}$$

where, Ks is a gage factor, expressing the coefficient of strain gage sensitivity. General purpose strain gages use copper-nickel or nickel-chrome alloy for the resistive element, and the gage factor provided by these alloys is approximately 2.

### **Types of Strain Gages**

Types of strain gages include foil strain gage, wire strain gage, and semiconductor strain gage.

### Structure of Foil Strain Gage

The foil strain gage has metal foil photo-etched in a grid pattern on the electric insulator of the thin resin and gage leads attached, as shown in Fig. 2 below.

The strain gage is bonded to the measuring object with a dedicated adhesive. Strain occurring on the measuring site is transferred to the strain sensing element via the gage base. For accurate measurement, the strain gage and adhesive should match the measuring material and operating conditions including temperature. For the bonding method and dampproof treatment, refer to page 9-9.





## Principle of Strain Measurement

Strain initiated resistance change is extremely small. Thus, for strain measurement a Wheatstone bridge is formed to convert the resistance change to a voltage change. Suppose in Fig. 3 resistances ( $\Omega$ ) are R1, R2, R3 and R4 and the bridge voltage (V) is E. Then, the output voltage  $e_{\circ}$  (V) is obtained by the following equation:

$$e_{0} = \frac{R_{1}R_{3} - R_{2}R_{4}}{(R_{1} + R_{2})(R_{3} + R_{4})} \cdot E_{0}$$

Suppose the resistance R1 is a strain gage and it changes by  $\Delta R$  due to strain. Then, the output voltage is,

$$e_{0} = \frac{(R_{1} + \Delta R) R_{3} - R_{2}R_{4}}{(R_{1} + \Delta R + R_{2}) (R_{3} + R_{4})} \cdot E$$

If  $R_1 = R_2 = R_3 = R_4 = R$  in the initial condition,

$$\mathbf{e}_{0} = \frac{\mathbf{R}^{2} + \mathbf{R} \boldsymbol{\varDelta} \mathbf{R} - \mathbf{R}^{2}}{(2\mathbf{R} + \boldsymbol{\varDelta} \mathbf{R}) 2\mathbf{R}} \cdot \mathbf{E}$$

Since R may be regarded extremely larger than  $\varDelta R$  ,

$$\mathbf{e}_{0} \coloneqq \frac{1}{4} \cdot \frac{\boldsymbol{\bigtriangleup} \mathbf{R}}{\mathbf{R}} \cdot \mathbf{E} = \frac{1}{4} \cdot \mathbf{K} \mathbf{s} \cdot \boldsymbol{\varepsilon} \cdot \mathbf{E}$$

Thus obtained is an output voltage that is proportional to a change in resistance, i.e. a change in strain. This microscopic output voltage is amplified for analog recording or digital indication for strain measurement.



### Strain Gage Wiring System

A strain gage Wheatstone bridge is configured with a quarter, half, or full bridge according to the measuring purpose. The typical wiring systems are shown in Figs. 4, 5 and 6. For varied strain gage bridge formation systems, refer to pages 9-7, 9-8.

### Quarter bridge system (1-gage system)

With the 1-gage system, a strain gage is connected to one side of the bridge and a fixed resistor is connected to each of the other 3 sides. This system can easily be configured, and thus it is widely used for general stress or strain measurement. The 1-gage 2-wire system shown in Fig. 4-1 is largely affected by leads. Therefore, if a big temperature change is expected or if the lead wire length is long, then the 1-gage 3-wire system shown in Fig. 4-2 must be used. For the 1-gage 3-wire system, refer to "Compensation Method of Temperature Effect of Lead Wires" (page 9-4).



### •Half bridge system (2-gage system)

With the 2-gage system, 2 strain gages are connected to the bridge, one each to adjacent or opposite sides with fixed resistor inserted in the other sides. See Figs. 5-1 and 5-2. There exist the active-dummy system, where one strain gage serves as a dummy gage for temperature compensation, and the activeactive system, where both gages serve as active gages. The 2-gage system is used to eliminate strain components other than the target strain; according to the measuring purpose, 2 gages are connected to the bridge in different ways. For details, refer to "How to Form Strain Gage Bridges" (pages 9-7. 9-8).





### •Full bridge system (4-gage system)

See Fig. 6. The 4-gage system has 4 strain gages connected one each to all 4 sides of the bridge. This circuit ensures large output of strain gage transducers and improves temperature compensation as well as eliminates strain components other than the target strain. For details, refer to "How to Form Strain Gage Bridges" (pages 9-7. 9-8).



### ■Self-temperature-compensation Gages (SELCOM Gages)

When receiving a temperature change, a strain gage bonded to a measuring object generates an apparent strain due to a difference in linear expansion coefficient between the measuring object and the resistive element of the strain gage, and a thermally-induced resistance change of the gage element. The SELCOM gage has a resistance temperature coefficient of the resistive element adjusted to match with the measuring object, thereby minimizing the apparent strain.

Virtually all Kyowa's strain gages are SELCOM gages, and if bonded to suitable materials, the thermallyinduced apparent strain is within 1.8  $\mu$ m/m per °C in a temperature range of 10 to 80°C. As shown in Fig. 7, the thermally-induced apparent strain of KFG gages is within  $\mu$ m/m per °C in a temperature range of 20 to 40°C in which they are most frequently used. For the principle of SELCOM gages, refer to page 9-4. For the models and applicable materials, refer to page 1-6.



### The following are described in Technical Notes(pages from 9-1)

- · Mechanical properties of industrial materials
- $\cdot$  Linear expansion coefficients of materials
- $\cdot$  Examples of strain gage measurement
- $\cdot$  Tensile and compressive stress measurement
- Bending stress measurement
- · Equations to obtain strain on beams
- · Torsional and shearing stress measurement
- · Temperature effect of lead wires with 2-wire system
- · Effect of insulation resistance
- Resistance change of strain gages bonded to curved surfaces
- · Compensation of gage factors
- · Misalignment effect
- $\cdot$  Compensation of lead wire extension effect
- · Compensation of nonlinearity of 1-gage system
- Method of obtaining the magnitude and direction of principal stress (Rosette analysis)
- · Generating calibration values based on tip parallel resistance method.

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## Strain Gage Model Name Coding System



For choosing strain gages, refer to pages 1-7, 1-8. For special custom-made gage patterns, refer pages 1-52, 1-53. Note: Combination of codes is limited and menu options cannot freely be selected.

# Strain Gages Selection Chart

Selecting strain gage types matching to measurement purpose and environment.



For special custom-made gage patterns, refer pages 1-52, 1-53. Note: Combination of codes is limited and menu options cannot freely be selected.

**STRAIN GAGES** 



# STRAIN GAGES

# **C1-11 L1M3R**

### Gage Pattern

## Pattern of strain gages

Selecting a pattern matching the measurement application.

### E.g.

# Concentrated stress measurement

Uniaxial 5-element 90°

# Measurement of Poisson ratio D16 Biaxial 0, 90° stacked rosette, round base. Stress analysis D17 Triaxial 0, 90, and 45° stacked rosette,

round base.



Applicable Linear

**Expansion Coefficient** 

coefficient of strain

Selecting a pattern matching

the measurement application.

**Linear expansion** 

gages

### Type and Length of Lead Wire Type Cable

# Lead wire cable of strain gage

Selecting a kind of lead wire cable matching the measuring condition under environments and temperature.



### A strain gage with a lead wire for safe labor

We supply these two types:

- $\cdot$  Gages with leads only
- Gages connected to flat vinyl lead wires of required length

Gages connected to lead wires provide increases in speed and work required for adhesion. Refer to the pages for each gage for combinations of gages and lead wires.



### Stress Measurement of precast concrete such as Tetrapods<sup>®</sup>



### •Stress measurement of plastic parts



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STRAIN GAGES

# **Strain Gage Selection Chart for Each Measurement Application.**

# Metal

### **General Stress Measurement**

Measurement Environment	Models	Pages
Under general environment	KFG General-purpose Foil Strain Gages	1-18
Max. elongation 5%	KFG General-purpose Foil Strain Gages	1-18
Usable at up to 150°C	KFR Foil Strain Gages	1-27
Less coating treatment required	KFW Waterproof Foil Strain Gages	1-29
Less coating treatment required	KFWS Small-sized Waterproof Foil Strain Gages	1-30
Simply waterproofed, long-term stability	KCW Weldable Waterproof Foil Strain Gages	1-30
Simply waterproofed, rugged	KCH Foil Strain Gages with a Protector	1-45

### **Applicable to Sensing Element of Transducers**

Measurement Environment	Models	Pages
Uniaxial, High-resistance	KFG	1-24
350, 500, 1000 Ω	General-purpose Foil Strain Gages	
Uniaxial,	KFG-C15, 16	
for shearing		1-22
strain	General-purpose Foil Strain Gages	
Biaxial,	KFG-D2, 31	4.20
torque		1-20
measurement	General-purpose Foil Strain Gages	

### **Residual Stress Measurement**

Measurement Environment	Models	Pages
Installation by cutting method	KFG T-F7 General-purpose Foil Strain Gages	1-25
Installation by boring method	KFG-D28 General-purpose Foil Strain Gages	1-25

### Measurement under hydrogen gas environment

Measurement Environment	Models	Pages
Measurement under high-pressure hydrogen gas environment	<b>KFV</b> Foil Strain Gage for Hydrogen Gas Environment	1-44

### **Internal Strain Measurement**



### **Crack Gages**

Measurement Environment	Models	Pages
Measurement of the progress and propagation speed of crack	KV Crack Gages	1-46

### Measurement at High-temperature

Measurement Environment	Models	Pages
Up to 950°C	KHCX Encapsulated Strain Gages	1-38
Up to 800°C	KHCV Encapsulated Strain Gages	1-38
Up to 750°C	KHCR Encapsulated Strain Gages	1-38
Up to 750°C	KHCS Encapsulated Strain Gages	1-38
Up to 650°C	KHCM Encapsulated Strain Gages	1-38
Up to 550°C	KHC Encapsulated Strain Gages	1-38
Up to 350°C	KFU High-temperature Foil Strain Gages	1-39
Up to 350°C	KH High-temperature Foil Strain Gages	1-39
Up to 250°C	KFH High-temperature Foil Strain Gages	1-40

### Measurement at Low-temperature

Measurement Environment	Models	Pages
Measurement at	KFL	1-41
(-269°C)	Low-temperature Foil Strain Gages	

### Measurement under High Electric Field

Measurement Environment	Models	Pages
Measurement under high electric field accompanying induction noise	KFS Shielded Foil Strain Gages	1-43

# Applicable to Ultra-small Strain Measurement and Highly-Sensitive Element of Transducers

Measurement Environment	Models	Pages
Measurement of <100µm/m under less temperature change	KSP	1-36
environment	Semiconductor Strain Gages	
Measurement of <100µm/m under less temperature change environment	KSN Self-temperature-compensation Semiconductor Strain Gages	1-36
Measurement of <100µm/m under less temperature change environment	KSPL           المحلي           Ultra Linear Semiconductor Strain Gages	1-37

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# **Composite Materials, Printed Boards, and Plastics**

### General Stress Measurement

Measurement Environment	Models	Pages
Applicable linear expansion coefficient 1 to 9×10 <sup>-6</sup> /°C	KFRP         Foil Strain Gages for composite Materials	1-33
Applicable linear expansion coefficient 13×10 <sup>-6</sup> /°C	KFRS     Foil Strain Gages for Printed Boards	1-34
Applicable linear expansion coefficient 65×10 <sup>-6</sup> /°C	KFP     Foil Strain Gages for Plastics	1-35
For polyurethane and rubber	KFML         Foil Strain Gages for Low-elasticity Materials	1-35
For strain measurement inside resin	KMP Embedded Gage	1-45

# Metal, Plastics, Lumber and Rubber

### **High-elongation Gages**

Measurement Environment	Models	Pages
Max. elongation approx. 20%-30%	KFEM	1-42
Max. elongation approx. 15%	KFEL High-elongation Foil Strain Gages	1-42

# Wood (lumber), Plaster, Paper, etc.

### **General Stress Measurement**

Measurement Environment	Models	Pages
Lumber (applicable linear expansion	KFG	1_10
coefficient 5x10 <sup>-6</sup> /°C)	General-purpose Foil Strain Gages	1-13

# **Various Materials**

Measurement Environment	Models	Pages
Simultaneous measurement of strain and temperature	KFGT         Image: Constraint of the second se	1-26

# **Metal Bolts**

### Measurement of Axial Tension of Bolts

Measurement Environment	Models	A	Pages
measuring	KFG-C20	<b>U</b>	
tightening stress of bolts	General-purpose Foil Strain Gages		1-25

## Impact Strain Measurement

Measurement Environment	Models	Pages
Enable measurement with no amplifier used	KSPH	1-37

### Concentrated Stress Measurement

Measurement Environment	Models	Pages
Measurement of stress distribution at 8mm to 12mm intervals	KFG-D9, 19, 39	1-22
Measurement of stress distribution at 2mm intervals	KFR-D9, 19 Pitch: 0.5mm	1-28

# Measurement under High Magnetic Field

Measurement Environment	Models	Pages
Measurement under DC magnetic field at low temperature	KFL Low-temperature Foil Strain Gages	1-41
Measurement under DC magnetic field at middle temperature	KFR Foil Strain Gages	1-27
Measurement under DC magnetic field at high temperature	KFH High-temperature Foil Strain Gages	1-40
Measurement under DC/AC magnetic field	KFN Non-inductive Foil Strain Gages	1-43

# Concrete, Mortar, etc.

Measurement Environment	Models	Pages
Less coating treatment required	KFW Waterproof Foil Strain Gages	1-29
Less coating treatment required	KFWS	1-30
Surface strain meas. (small aggregate)	KFG General-purpose Foil Strain Gages Length: 10 to 20 mm	1-31
Surface strain meas. (large aggregate)	KC Wire Strain Gages Length: 60 to 120 mm	1-31
Internal strain measurement	KM Embedded Strain Gages	1-32
Self-shrinkage strain measurement	Concrete-embedded Strain Gages	1-32

# General stress Measurement

# **Major Properties of Kyowa Strain Gages**

	Models/ series designation		Mate	erials	Operatin ranges in	g temperature n combination	Self- temperature-	Applicable linear expansion	Strain limit at room temp.	Fatigue life at room temp.,	Damas
			Resistive element	Base	with ma after c	ajor adhesives suring (°C) *1	compensation range (℃)	coefficient (x10⁻⁰/℃)	(Approx. %) *2	approx. (Times) *3	rages
		For general purpose			<u>CC-33A</u> CC-36 EP-340 PC-600	-196 to 120 -30 to 100 -55 to 150 -196 to 150	10 to 100	5, 11, 16, 23, 27	5.0	1.2×10 <sup>7</sup>	1-18
		For sensing element of transducers			PC-600 EP-340	-196 to 150 -55 to 150	10 to 100	11, 16, 23, 27	5.0	1.2×107	1-20
	General-purpose	For concrete			<u>CC-35</u>	-30 to 120	10 to 100	11	5.0	1.2×10 <sup>7</sup>	1-31
	KFG	Concentrated stress measurement	Culvi alloy foil	Polyimide	CC-33A CC-36 EP-340 PC-600	-196 to 120 -30 to 100 -55 to 150 -196 to 150	10 to 100	11, 16, 23, 27	_	_	1-22
		Residual stress measurement			CC-33A CC-36 EP-340 PC-600	-196 to 120 -30 to 100 -55 to 150 -196 to 150	10 to 100	11, 16, 23, 27			1-25
nent		Bolt axial tension measurement			<u>EP-180</u>	Room temp. to 50	20 to 50	11	_		1-25
leasurer	Foil Strain Gages wi K	th a Temperature Sensor KFGT	CuNi alloy foil	Polyimide	CC-33A CC-36 EP-340 PC-600	-10 to 120 -10 to 100 -10 to 120 -10 to 120	10 to 100	11, 16, 23	3	1×10 <sup>6</sup>	1-26
stress m	Foil Strain Gages	Strain measurement at middle tempera- ture; for transducers	- NiCr alloy foil	Polvimide	PC-600 CC-33A EP-340	-196 to 150 -196 to 120 -55 to 150	0 to 150	11, 16, 23	2.2	1×10 <sup>6</sup>	1-27
general	KFK	Concentrated stress measurement		rolyimide	PC-600 CC-33A EP-340	-196 to 150 -196 to 120 -55 to 150	0 to 150	11, 16, 23	_	_	1-28
For	Waterproof Foil Strain Gages KFW		CuNi alloy foil	Paper base + phenol-epoxy	<u>CC-33A</u> CC-36 EP-180	- 10 to 80 -10 to 80 -10 to 80	10 to 80	11, 16, 23	2.8	3×104	1-29
	Small-sized Waterproof Foil Strain Gages KFWS		CuNi alloy foil	Polyimide	<u>CC-33A</u> EP-180	-10 to 80 -10 to 80	10 to 80	11, 16, 23	5.0	3×104	1-30
	Weldable Waterproof Foil Strain Gages KCW		NiCr alloy foil	Stainless steel	( <u>Spot we</u>	<u>lding)</u> -20 to 100	10 to 90	11	0.9	*A 1×10 <sup>6</sup>	1-30
	Wire Strain Gages KC		CuNi alloy wire	Paper base + phenol-epoxy	CC-35	-30 to 120	10 to 60	11	1.8	1.5×10⁵	1-31
	Embedded Strain Gages KM		CuNi alloy	Acrylate	(Embedi	<u>ment)</u> -10 to 70	0 to 50	11	0.3	_	1-32
	Concrete-embedded Strain Gages KMC		CuNi alloy wire	Silicone	(Embedn	nent) Room temp. to 70			0.3		1-32
erials,	Foil Strain Gages fo K	or Composite Materials KFRP	NiCr alloy foil	Polyimide	<u>EP-34B</u> CC-33A	-55 to 200 -196 to 120	0 to 150	1, 3, 6, 9	2.2	1×10 <sup>6</sup>	1-33
ite mate I rubber	Foil Strain Gages for Printed Boards KFRS		NiCr alloy foil	Polyimide	CC-33A PC-600	-196 to 120 -196 to 150	-30 to 120	13	1.6	2×10 <sup>6</sup>	1-34
compos stics and	Foil Strain Gages for Plastics KFP		CuNi alloy foil	Paper base + phenol-epoxy	EP-34B CC-33A CC-36	-20 to 80 -20 to 80 -20 to 80	10 to 80	65	3.0	1×10 <sup>6</sup>	1-35
For	Foil Strai Low-elasti K	in Gages for city Materials (FML	CuNi alloy foil	Phenol-epoxy	CC-33A	0 to 60			1.0		1-35
lent		Ultra-small strain measurement	P type Si	Paper base + phenol-epoxy	CC-33A CC-36	-50 to 120 -30 to 100		_	0.3	*A 2×10 <sup>6</sup>	1-36
easuren	Semiconductor Strain Gages KSP	For sensing element of highly sensitive transducers	P type Si	Paper base + phenol-epoxy	CC-33A CC-36	-50 to 120 -30 to 100			0.3	*A 2×10 <sup>6</sup>	1-36
train me		Ultra-small strain; 2- element, temperature- compensation type	P type Si N type Si	Paper base + phenol-epoxy	CC-33A CC-36	-50 to 120 -30 to 100	20 to 70	11	0.3	*A 2×10 <sup>6</sup>	1-36
-small str	Self-temperatu Semiconduc	ure-compensation tor Strain Gages KSN	N type Si	Paper base + phenol-epoxy	CC-33A CC-36	-50 to 120 -30 to 100	20 to 70	11, 16	0.3	*A 2×10 <sup>6</sup>	1-36
or ultra	High Semiconduct K	-output tor Strain Gages (SPH	P type Si	Paper base + phenol-epoxy	CC-33A CC-36	-50 to 120 -30 to 100			0.3	*A 2×10 <sup>6</sup>	1-37
	Ultra Semiconduct k	a Linear tor Strain Gages (SPL	P type Si	Paper base + phenol-epoxy	CC-33A CC-36	-50 to 120 -30 to 100		_	0.3	*A 2×10 <sup>6</sup>	1-37

\*1. Underlined adhesives are those used for strain limit tests at room temperature and for fatigue tests at room temperature.
\*2. Typical values with uniaxial gages. Strain limit is the mechanical limit where a difference between the strain reading and mechanical strain initiated by applying tension load exceeds 10%.
\*3. Typical values with uniaxial gages. Strain level: ±1500 µm/m; \*A: ±1000 µm/m; \*B: ±500 µm/m, \*C: ±100 µm/m.

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Notes

	Models/	Mate	erials	Operating temperature	Self- temperature-	Applicable linear	Strain limit	Fatigue life	
	series designation	Resistive element	Base	with major adhesives after curing (°C) *1	compensation range (℃)	coefficient (x10⁻⁰/℃)	(Approx. %) *2	approx. (Times) *3	Pages
	Encapsulated Strain Gages KHCX	Heat-resistant special alloy wire	Heat-resistant metal	(Spot welding) -196 to 950	25 to 950	11, 13	1.0 (950°C)	*C 1×10⁵ (950°C)	1-38
	Encapsulated Strain Gages KHCV	Heat-resistant special alloy wire	Heat-resistant metal	(Spot welding) 25 to 800		(Dynamic measurement)	1.0 (800°C)	*B 1×10 <sup>6</sup> (800°C)	1-38
plications	Encapsulated Strain Gages KHCR	Heat-resistant special alloy wire	Heat-resistant metal	( <u>Spot welding)</u> 25 to 750	25 to 750	11, 13, 16	1.0 (750°C)	*B 1×10 <sup>6</sup> (750°C)	1-38
	Encapsulated Strain Gages KHCS	Heat-resistant special alloy wire	Heat-resistant metal	( <u>Spot welding)</u> -196 to750	25 to 750	11, 13, 16	1.0 (750°C)	*B 1×10⁰ (750°C)	1-38
iture apl	Encapsulated Strain Gages KHCM	Heat-resistant special alloy wire	Heat-resistant metal	( <u>Spot welding)</u> -196 to 650	25 to 650	11, 13, 16	1.0 (650°C)	*B 1×10 <sup>6</sup> (650°C)	1-38
tempera	Encapsulated Strain Gages KHC type 20	NiCr alloy wire	Heat-resistant	(Spot welding)	Room temp.	11 16	0.8	*A 4×10 <sup>5</sup>	1-38
or high-1	Encapsulated Strain Gages KHC type 10		metal	-196 to 550	to 500	11, 10	0.5	*A 4×10⁵	
Ĕ	High-temperature Foil Strain Gages KFU	NiCr alloy foil	Polyimide	<u>PI-32</u> -196 to 350	10 to 300	11, 16, 23	1.9	*A 1.5×10⁵ (300°C)	1-39
	High-temperature Foil Strain Gages KH	NiCr alloy foil	Stainless steel	( <u>Spot welding)</u> -50 to 350	10 to 300	11, 16	0.5	*B 1×10 <sup>7</sup>	1-39
	High-temperature Foil Strain Gages KFH	NiCr alloy foil	Polyimide	PC-600         -196 to 250           EP-34B         -55 to 200           PI-32         -196 to 250	10 to 250	11, 16, 23	2.1	2×10 <sup>5</sup>	1-40
For low temp.	Low-temperature Foil Strain Gages KFL	NiCr alloy foil	Polyimide	PC-600         -269 to 150           EP-270         -269 to 30           CC-33A         -196 to 120	-196 to 50	5, 11, 16, 23	2.2	1×10 <sup>6</sup>	1-41
je strain rement	Ultrahigh-elongation Foil Strain Gages KFEM	CuNi alloy foil	Polyimide	<u>CC-36</u> -20 to 80		_	20 to 30		1-42
For larg measu	High-elongation Foil Strain Gages KFEL	CuNi alloy foil	Polyimide	<u>CC-36</u> -10 to 80		_	15	1×10 <sup>6</sup>	1-42
magnetic	Non-inductive Foil Strain Gages KFN	NiCr alloy foil	Polyimide	PC-600 -196 to 150 CC-33A -196 to 120	0 to 150	11, 16, 23	1	1×104	1-43
For antii applic	Shielded Foil Strain Gages KFS	CuNi alloy foil (120) NiCr alloy foil (350)	Polyimide	PC-600-196 to 150CC-33A-196 to 120EP-340-55 to 150	10 to 100	11, 16	0.5	1×104	1-43
For Hi-pressure H2	Foil Strain Gage for Hydrogen Gas Environment KFV	FeCr alloy foil	Polyimide	<u>PC-600</u> -30 to 80		_	_		1-44
Internal strain	Foil Strain Gages for Bending Strain Measurement KFF	CuNi alloy foil	Acrylate	<u>CC-33A</u> -50 to 80 EP-180 -50 to 80	20 to 60	11, 16, 23	0.2	*B 4×10 <sup>6</sup>	1-44
With protector	Foil Strain Gages with a Protector KCH	CuNi alloy foil	Polyimide	Protector: Stud bolt Strain gage <u>EP-340,</u> CC-33A -40 to 100		11	1	*A 1.2×10 <sup>6</sup>	1-45
Crack	Crack Gages KV	CuNi alloy foil	Paper base+ phenol-epoxy	CC-33A CC-36 PC-600		_			1-46
Notes	*1. Underlined adhesives are *2. Typical values with uniaxi initiated by applying tens *3. Twical values with uniaxi	those used for al gages. Strain ion load exceed	strain limit tests limit is the mech ds 10%.	at room temperature an nanical limit where a diffe	d for fatigue erence betwo	tests at room een the strain	temperature reading and	mechanical s	strain



STRAIN GAGES

500 μm/m; \*A: 1000 μm/m; \*B: 500 μm "З. Тур Уc g п,

# **Strain Gages with Pre-Attached Lead Cables**

Virtually all Kyowa strain gages are delivered with a lead wire cable pre-attached to ensure labor saving in gage bonding works by eliminating the need for soldering. Types and lengths of the lead wire cable selectable for each gage are as follows.

When ordering, specify the model of the strain gage and the code of the lead wire cable with a space in between.

Model of Strain Gage Code of lead wire Cable

e.g. KFG-2-120-C1-11 L1M3R

Applic of S	Applicable Models of Strain Gage KFG, KFR, KFRP, KFP, KFL, KFEL, and KFEM			KFG, KFR, KFW, KFWS, KC, KFRP, KFP, KFEL, and KFEM				
Type of lead wire Cable		Polyester-coated 2-wire copper cable	Polyester-coated 3-wire copper cable	Vinyl-coated flat 2-wire cable -10 to 80°C		Vinyl-coated flat 3-wire cable -10 to 80°C		
		-196 to 150°C	-196 to 150°C	Uniaxial	Multiaxial	Uniaxial	Multiaxial	
ole	<b>15</b> cm	N15C2	N15C3	L15C2R	L15C2S	L15C3R	L15C3S	
e cal	<b>30</b> cm	N30C2	N30C3	L30C2R	L30C2S	L30C3R	L30C3S	
wire w	<b>1</b> m	N1M2	N1M3	L1M2R	L1M2S	L1M3R	L1M3S	
eng ead	<b>3</b> m			L3M2R	L3M2S	L3M3R	L3M3S	
(*)	<b>5</b> m			L5M2R	L5M2S	L5M3R	L5M3S	
Model, etc.		Twisted in the cases of 50 cm or longer		L-6, L-9 for 6 m or longer		L-7, L-10 for 6 m or longer		
Coating colors					Red Red		Red (independent) White White	

Note: KFEL and KFEM are available only with 2-wire system.

\* For other lead wire cable lengths, contact us.

Applica of St	able Models train Gage	KFG, KF and	R, KFRP, KFL	KFN, KFS	KFRP, KFH, and KFL	KFU,	KFH
Type of lead wire cable		Middle- temperature 2-wire cable -100 to 150°C	Middle- temperature 3-wire cable -100 to 150°C	Vinyl-coated low-noise 3-wire cable -10 to 80°C	Vinyl-coated low-noise 3-wire cable -269 to 250°C	High- temperature 3-wire cable -269 to 350°C	3 strand glass-coated Ni clad copper wire RT-280°C
ble	15 cm	R15C2	R15C3	J15C3	F15C3	H15C3	B15C3
e cal	30 cm	R30C2	R30C3	J30C3	F30C3	H30C3	B30C3
th o wire	1 m	R1M2	R1M3	J1M3	F1M3	H1M3	B1M3
ead	3 m	R3M2	R3M3	J3M3	F3M3	H3M3	B3M3
(*)	<b>5 m</b> R5M2 R5M3		R5M3	J5M3	F5M3	H5M3	B5M
Model, etc.		L-11	L-12	L-13	L-3	L-17	Contact us
Coating colors		Grey Grey	Red(independent)	Red(independent)	Red(independent) Blue Blue	Black(independent) Yellow Green	Red(independent) Blue White

\* For other lead wire cable lengths, contact us.

For concentrated stress measurement. KFR are provided standard with a lead wire cable 10 cm long.
 Encapsulated strain gages are provided standard with an MI cable 2 m long and a soft cable 50 cm long.

See page 1-30 for KCW. See page 1-32 for KM. See page 1-34 for KFRS. See page 1-39 for KH.

### ●L-type Lead Wire Cables

Operating Temperature Range	Models	Types	Conductor Material	Nominal Cross Section of Conductor (mm <sup>2</sup> )	Number of Strands/ Wire Diam. (mm)	Reciprocating Resistance per Meter (Ω)	Coated Wire Diameter (mm)	Unit Length (m)
Room temp. to 350°C	L-1	High-temperature lead wire	CuNi alloy	0.07	1∕¢0.30	14.20	φ0.50	50
–10 to 80°C	L-2	Vinyl-coated flat 3-wire cable	Copper	0.30	12∕¢0.18	0.12	¢2.30	100
–269 to 250°C	L-3	Fluororesin-coated high/low-temp. 3-wire cable	Silver-plated copper	0.14	7∕¢0.16	0.28	φ0.98	50
Room temp. to 350°C	L-4	High-temperature lead wire cable	Nickel-clad copper	0.20	1∕¢0.50	0.18	φ0.70	30
–10 to 80°C	L-5	Vinyl-coated flat 2-wire cable	Copper	0.50	20∕¢0.18	0.07	φ2.50	
–10 to 80°C	L-6 (*1)	Vinyl-coated flat 2-wire cable	Copper	0.08	7∕¢0.12	0.44	φ1.00	
–10 to 80°C	L-7 <sup>(*2)</sup>	Vinyl-coated flat 3-wire cable	Copper	0.08	7∕¢0.12	0.44	φ1.00	
–10 to 80°C	L-9 <sup>(*1)</sup>	Vinyl-coated flat 2-wire cable	Copper	0.11	10∕¢0.12	0.32	φ1.00	
–10 to 80°C	L-10 <sup>(*2)</sup>	Vinyl-coated flat 3-wire cable	Copper	0.11	10∕¢0.12	0.32	¢1.00	100
–100 to 150°C	L-11	Middle-temperature 2-wire cable	Silver-plated copper	0.08	7∕¢0.12	0.44	φ0.86	
–100 to 150°C	L-12	Middle-temperature 3-wire cable	Silver-plated copper	0.08	7∕¢0.12	0.44	φ0.86	
–10 to 80°C	L-13	Vinyl-coated normal-temperature low-noise 3-wire cable	Tin-plated copper	0.09	7∕¢0.13	0.46	φ3.50	
–50 to 90°C	50 to 90°C L-14 Chloroprene-coated normal-temperature low-noise 4-wire cable		Tin-plated copper	0.08	7∕¢0.12	0.48	φ4.00	
–269 to 250°C	L-15	Fluoroplastic-coated high/low-temp. low-noise 3-wire cable	Silver-plated copper	0.08	7∕¢0.12	0.48	φ2.50	
–269 to 250°C	L-16	Fluoroplastic-coated high/low-temp. low-noise 4-wire cable	Silver-plated copper	0.08	7∕¢0.12	0.48	φ3.30	10
–269 to 350°C	L-17	High/low-temperature 3-wire cable	Nickel-plated copper	0.07	1∕¢0.30	0.50	φ0.38	30

\*1. These models have a suffix R, W, G, Y or B indicating the coating color; red, white, green, yellow or black. e.g. L-6B: Black vinyl coated. \*2. These models have a suffix WR, WL or WY indicating the stripe color; red, blue or yellow on white vinyl coating. e.g.

L-7WR: Red stripes on white coating.

**STRAIN GAGES** 

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STRAIN GAGES

# **Examples of vinyl-coated flat wire to connect gages**



General Purpose

# **General-purpose Foil Strain Gages KFG**

### General-purpose Foil Strain Gages in KFG Series



The KFG series gages use polyimide resin for the base approx. 13  $\mu$ m thick, ensuring excellent flexibility. Besides indoor measurement, the outstanding moisture resistance lets them effectively perform outdoor measurement. Unless directly exposed to water drop, no coating treatment is required.

### Applicable Adhesives and Operating Temperature Range after Curing

CC-33A: -196 to 120°C (-10 to 80°C with vinyl-coated cable attached) CC-35: -30 to 120°C (-10 to 80°C with vinyl-coated cable attached) CC-36: -30 to 100°C (-10 to 80°C with vinyl-coated cable attached) EP-340: -55 to 150°C (-10 to 80°C with vinyl-coated cable attached) PC-600: -196 to 150°C (-10 to 80°C with vinyl-coated cable attached)

### Notes on pre-attached lead wire cables

- Standard color of the 2-wire cable pre-attached to uniaxial gages is red (R). If desired, a white, green, yellow or black cable can be pre-attached.
- Standard 3-wire cable pre-attached to uniaxial gages has red stripes. If desired, the red stripes can be changed to blue or yellow stripes.
- In the case of a triaxial gage, 2-wire cables are color-coded with red, white and green stripes for 0°, 90° and 45°, respectively and 3-wire cables, with red, yellow and blue stripes for 0°, 90° and 45°, respectively. The letter code is S in common.

Types	Polyester-coated 2-wire copper cable	Polyester-coated 3-wire copper cable	Vinyl-coated flat 2-wire cable Vinyl-coated flat		Vinyl-coated flat 3-wire cable		Middle-temperature 2-wire cable	Middle-temperature 3-wire cable	
Length *	C1,C2,C3,C15, C16,D1,D2,D3, D4,D6,D9,D16, D17,D19,D28, D29 and D31	C1,C2,C3, C15,C16, D1,D4,D9, D16,D17,D19, D28 and D31	C1,C2,C3, C15,C16, D9 and D19	D1,D4, D16,D17, D28,D29, D39	C1,C2,C3, C15,C16, D2,D9,D19 and D31	D1,D4, D16,D17, D28 and D39	C1,C2,C3, C15,C16, D1,D4,D9, D16,D17,D19, D28 and D39	C1,C2,C3, C15,C16, D1,D2,D4,D9, D16,D17,D19, D28,D31 and D39	
15 cm	N15C2	N15C3	L15C2R	L15C2S	L15C3R	L15C3S	R15C2	R15C3	
30 cm	N30C2	N30C3	L30C2R	L30C2S	L30C3R	L30C3S	R30C2	R30C3	
1 m	N1M2	N1M3	L1M2R	L1M2S	L1M3R	L1M3S	R1M2	R1M3	
3 m			L3M2R	L3M2S	L3M3R	L3M3S	R3M2	R3M3	
5 m			L5M2R	L5M2S	L5M3R	L5M3S	R5M2	R5M3	
Oprg. temp. range **	–196 to	o 150°C		-10 to	0 80°C		-100 to 150°C		
Remarks	Twisted for 50 cm or long	ger (With some exception)	L-6, L-9 for 6	m or longer	L-7, L-10 for	6 m or longer	L-11	L-12	

### ■Types, lengths and codes of lead wire cables pre-attached to KFG series gages

\* For other lead wire cable lengths, contact us.

\*\* Oprg. temp. range: Operating temperature range

When ordering, suffix the lead wire cable code to the model number with a space in between.

### E.g.

KFG-5-120-C1-11	N10C3 for the gage with a polyester-coated 3-wire copper cable 15 cm long $$ $-$	→ (	KFG-5-120-C1-11	N15C3
KFG-5-120-C1-11	L5M2R for the gage with a vinyl-coated flat 2-wire cable 5 m long —	→ (	KFG-5-120-C1-11	L5M2R
KFG-5-120-D17-11	L5M3S for the gage with a vinyl-coated flat 3-wire cable 5 m long —	→	KFG-5-120-D17-11	L5M3S
KFG-5-120-C1-11	R5M3 for the gage with a middle-temperature 3-wire cable 5 m long $-$	→ (	KFG-5-120-C1-11	R5M3
KFG-5-120-D17-11	R5M2 for the gage with a middle-temperature 2-wire cable 5 m long $-$	→ (	KFG-5-120-D17-11	R5M2

If no lead wire cable code is suffixed, the gage is delivered with gage leads only (Silver-clad copper wires 25 mm long)

For the types of lead wire cables, refer to page 1-15 and 1-16.

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**General Purpose** 

# General-purpose Foil Strain Gages KFG

Pattorne		Corresponds	D	Dimensio			
Fallens, Gago Posistanco, Gago Factor	Models	to the Material	G	rid	Ba	ise	Remarks
Gage Resistance, Gage Factor		Base color	Length	Width	Length	Width	
<b>Uniaxial</b> Silver-clad copper gage leads 25mm long Resistance: $120 \Omega$		● Co	mmon s	teel			
Gage factor: Approx. 2.1		🛑 Sta	ainless st	eel			
		🔵 Alı	uminum				
		– Ma	agnesiun	n alloy			
		(Lir	near expan	sion coeffic	ient based o	on the base	color to distinguish)
KFG-30-120-C1	KFG-30-120-C1-11	•					
	KFG-30-120-C1-16		2.0			5.0	
	KFG-30-120-C1-23		30	3.3	37	5.2	
*Figure is KFG-30-120-C1-11	KFG-30-120-C1-27						
KFG-20-120-C1	KFG-20-120-C1-11						
	KFG-20-120-C1-16		20	5	28	8	
	KFG-20-120-C1-23			-		-	
*Figure is KFG-20-120-C1-16	KFG-20-120-C1-27						
KFG-10-120-C1	KFG-10-120-C1-11						
	KFG-10-120-C1-10		10	3	16	5.2	
*Figure is KFG-10-120-C1-23	KFG-10-120-C1-23						
KFG-6-120-C1	KFG-6-120-C1-11						
	KFG-6-120-C1-16	- i	-	. –			
*Eigure is KEG-6-120-C1-27	KFG-6-120-C1-23		6	1.7	10	3.4	
Hgure 13 Kl G-0-120-C1-27	KFG-6-120-C1-27						
KFG-5-120-C1	KFG-5-120-C1-5						For lumber
	KFG-5-120-C1-11						
*Figure is KEC E 120 C1 11	KFG-5-120-C1-16		5	1.4	9.4	2.8	
Hgule is KrG-5-120-C1-11	KFG-5-120-C1-23						
	KFG-5-120-C1-27						
KFG-4N-120-C1	KFG-4N-120-C1-11						
	KFG-4N-120-C1-16		4	0.7	8	1.4	
*Figure is KFG-4N-120-C1-16	KFG-4N-120-C1-23						
KFG-3-120-C1	KFG-3-120-C1-11						
	KFG-3-120-C1-16		_				
*Figure is KFG-3-120-C1-23	KFG-3-120-C1-23		3	1.3	7.4	2.8	
5	KFG-3-120-C1-27						
KFG-2-120-C1	KFG-2-120-C1-5						For lumber
	KFG-2-120-C1-11						
*Eigure is KEG-2-120-C1-27	KFG-2-120-C1-16		2	1.2	6.3	2.8	
	KFG-2-120-C1-23						
KEC 201 420 C4	KFG-2-120-C1-27						
KFG-2N-120-C1	KFG-2N-120-C1-11						
	KFG-2N-120-C1-73		2	0.84	5.3	1.4	
*Figure is KFG-2N-120-C1-11	KFG-2N-120-C1-27						
KFG-1-120-C1	KFG-1-120-C1-11						
	KFG-1-120-C1-16						
*Figure is KEG-1-120-C1-16	KFG-1-120-C1-23		1	1.1	4.8	2.4	
	KFG-1-120-C1-27						
KFG-1N-120-C1	KFG-1N-120-C1-11						
	KFG-1N-120-C1-16		1	0.65	42	14	
*Figure is KFG-1N-120-C1-23	KFG-1N-120-C1-23			5.05	1.2	1	
KEC 02 420 C4	KFG-1N-120-C1-27	•					
KFG-U3-12U-C1	KFG-03-120-C1-11						
	KFG-03-120-C1-16		0.3	1.4	3.5	2.4	
*Figure is KFG-03-120-C1-27	KFG-03-120-C1-23						
KFG-02-120-C1	KFG-02-120-C1-27						
	KFG-02-120-C1-16						
	KFG-02-120-C1-23		0.2	1.4	3.3	2.4	
*Figure is KFG-02-120-C1-11	KFG-02-120-C1-27						

# **General-purpose Foil Strain Gages KFG**



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**General Purpose** 

# **General-purpose Foil Strain Gages KFG**



A min. qty 10 PC.

**General Purpose** 

# General-purpose Foil Strain Gages KFG



# General-purpose Foil Strain Gages KFG

Patterns,		Corresponds		imensi	ons (mm)	Remarks
Gage Resistance, Gage Factor	Models	Material	Gi	id	Base	Remarks
		End color	Length	Width	Length Width	
Uniavial 3500 gagos						
Uniaxial 35002 gages						
Resistance: $350 \Omega$						
Gage factor. Approx. 2.1						
	KEG-5-350-C1-11					
	KEG-5-350-C1-16					
	KEG 5 250 C1 22		5	2	9.4 4.2	
	KFG-5-350-C1-23					
	KEG 2 250 C1 11					
	KEG 2 250 C1 16					
	KEG 2 250 C1 22		3	2	7.4 4.2	
	KEC 2 250 C1 27					
	KFG-3-350-C1-27					
	KFG-2-350-C1-11					
	KFG-2-350-C1-10		2	2	6.3 4.2	
	KFG-2-550-C1-25					
	KFG-2-550-C1-27					
	KFG-1-550-C1-11					
	KFG-1-350-C1-16		1	2	4.8 3.4	
*Figure is KEG-5-350-C1-11	KFG-1-350-C1-23					
	KFG-1-350-C1-27					
Biavial 3500 gages 0°/90° stacke	ad rosette					
Besistance: 350 0						
Gage factor: Approx 2.1						
	KFG-5-350-D16-11					
	KFG-5-350-D16-16		F	2	411	
	KFG-5-350-D16-23		5	2	φΠ	
90°	KFG-5-350-D16-27					
	KFG-3-350-D16-11					
	KFG-3-350-D16-16					
	KFG-3-350-D16-23		3	2	φ10	
	KFG-3-350-D16-27					
	KFG-2-350-D16-11					
	KFG-2-350-D16-16					
	KFG-2-350-D16-23		2	2	φ10	
	KFG-2-350-D16-27					
	KFG-1-350-D16-11					
	KFG-1-350-D16-16					
	KFG-1-350-D16-23		1	1.8	φ8	
*Figure is KFG-5-350-D16-16	KFG-1-350-D16-27					
Triaxial 350Ω gages, 0°/90°/45° s	tacked rosette					
Resistance: 350 Ω						
Gage factor: Approx. 2.1						
	KFG-5-350-D17-11					
45°	KFG-5-350-D17-16		5	2	<i>ф</i> 11	
	KFG-5-350-D17-23		5	2	ψΠ	
45°	KFG-5-350-D17-27					
	KFG-3-350-D17-11					
	KFG-3-350-D17-16		2	2	<i>d</i> 10	
	KFG-3-350-D17-23		3	2	φισ	
	KFG-3-350-D17-27					
	KFG-2-350-D17-11					
	KFG-2-350-D17-16	•	2	2	440	
	KFG-2-350-D17-23		2	2	φīυ	
	KFG-2-350-D17-27					
	KFG-1-350-D17-11					
	KFG-1-350-D17-16				10	
	KFG-1-350-D17-23		1	1.8	φ8	
*Figure is KFG-5-350-D17-27	KFG-1-350-D17-27					

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# STRAIN GAGES

**General Purpose** 

# **General-purpose Foil Strain Gages KFG**



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**General Purpose** 

# General-purpose Foil Strain Gages KFG

Detterres		Corresponds	Dimer	nsions (mm)	
Gage Resistance, Gage Factor	Models	to the Material	Grid	Base	Remarks
auge resistance, auge ractor		End color	Length Wid	th Length Width	
•KEG Series Foil Strain Gag	es with Gage Ter	minal			
		dwith	+ - +	minalanabla	ana tauch
	connection/disconnec	tion of th	a gage ter he lead wire	minai enable cable They are	suitable for
Uniaxial	residual stress measure	ement w	ith the cutti	ng method. A cl	ip equipped
Resistance: 120 Ω	dedicated cable T-C26	(Vinyl-coa	ated, 2 m lor	ng) is optionally a	vailable.
Gage factor: Approx. 2.1	Applicable Adhesives	and One	ating Tomp	erature Range a	fter Curina
	PC-600: -196 to 150°C	CC-36.	-30 to 100%	c	iter curing
	CC-33A: -196 to 120°C	EP-340:	-55 to 150°	C	
	CC-35: -30 to 120°C			-	
	KEC 2 120 C1 11 T E7				d0 11
T-C26	KFG-2-120-C1-16 T-F7		7 17	63 78	Polyester-coated
(When the clin-equipped dedicated cable is used	KFG-2-120-C1-23 T-F7		2 1.2	0.5 2.0	15 mm long
the operating temperature range of each adhesive	KFG-1-120-C1-11 T-F7				φ0.14
after curing is –10 to 80°C.)	KFG-1-120-C1-16 T-F7	•	1 1.1	4.8 2.4	Polyester-coated
*Figure is KFG-2-120-C1-11 T-F7	KFG-1-120-C1-23 T-F7				15 mm long
Biaxial, 0°/90° stacked rosette					
Resistance: 120 Ω					
Gage factor: Approx. 2.1	KFG-2-120-D16-11 T-F7				<i>φ</i> 0.14
	KFG-2-120-D16-16 T-F7		2 1.2	φ8	Polyester-coated copper cable
King J	KFG-2-120-D16-23 T-F7				15 mm long
90°	KFG-1-120-D16-11 T-F7				Ø0.14 Polvester-coated
*Figure is KEG-2-120-D16-16 T-E7	KFG-1-120-D16-16 I-F7		1 1.1	φ5	copper cable
	KFG-1-120-D10-231-F7				15 mm long
Iriaxial, 0°/90°/45° stacked roset	te				
Gage factor: Approx. 2.1	KEG-2-120-D17-11 T-E7				<i>ф</i> 0 14
	KFG-2-120-D17-16 T-F7		2 12	<i>ф</i> 8	Polyester-coated
	KFG-2-120-D17-23 T-F7		2 1.2	φΰ	15 mm long
45	KFG-1-120-D17-11 T-F7				φ0.14
45° \	KFG-1-120-D17-16 T-F7	•	1 1.1	φ5	Polyester-coated
*Figure is KFG-2-120-D17-23 T-F7	KFG-1-120-D17-23 T-F7				15 mm long
●KFG Series Foil Strain Gage	es for Boring Met	hod			
Triavial 0º/135º/00º	Designed to measure re	ridual str	acc releaced	by the bering me	thod
Resistance: 120 $\Omega$			ess released	by the boning me	
Gage factor: Approx. 2.1	Applicable Adhesives	and Oper	rating Temp	erature Range a	fter Curing
135°	CC-33A: -196 to 120°C	EP-340:	-55 to 150°	C	
	CC-35: -30 to 120°C	PC-620:	-196 to 150	°C	
	CC-36: -30 to 100°C				
	KFG-3-120-D28-11				
	KFG-3-120-D28-16		3 2	<i>ф</i> 19 8	Gage center
135°	KFG-3-120-D28-23			φ 15.0	diameter 10.8
90°	KFG-3-120-D28-27				
	KFG-1.5-120-D28-11				
refer to page 1-18.	KFG-1 5-120-D28-10		1.5 1.3	φ12	Gage center diameter 5 5
*Figure is KFG-3-120-D28-27	KFG-1.5-120-D28-27				diameter 515
•KEG Series Foil Strain Gas	as for Measuring	Avial	Tonsion	of Bolts	
	If it is difficult to be a l				
	If it is difficult to bond a tightening stress these	strain gag	ge to the sur	face of a polt for i	neasuring the
Uniaxial	hole, 2 mm diameter,	, bored f	rom the to	p head of the b	olt. They are
Resistance: 120 Ω	applicable to materials h	aving a lir	near expansio	on coefficient of 1	1μm/m per °C.
Gage factor: Approx. 1.9	¢0.14 Polyester-coated copp	per cable 5 i	mm long		
	Applicable Adhesives	and Oper	rating Temp	erature Range a	fter Curing
	EP-180 Normal tempera	ature to 50	٥°C		A min. gtv 5 PC.
	Options Dedicated gag	e termina	l		
Length from the tip of base	Model Dimensions Base	naterial Co	nductor materia	Remarks	
to the center of grid	T-F29 Outer: $\phi 6$		Coppor foil	For holt gages	
KFG-3 : 2.7mm	Inner: $\phi 2.5$	s choxà	Cohhei 1011	1 of boil gages	T-F29
KFG-1.5 : 1.75mm	KFG-3-120-C20-11		3 app.	6 11.5 Ø1.9	Bore diameter 2
	KFG-1.5-120-C20-11		1.5 app.	.6 5 φ1.9	Bore diameter 2

# General-purpose Foil Strain Gages KFGT

Patterns, Gage Resistance, Gage Factor	Models	Dimensi Grid Length Width	Remarks					
●KFGT Series Foil Strain Gag	ges with A Temperature	e Sensor						
Uniaxial 3-wire system Polyester-coated copper lead wire 1 m long each Resistance: $120 \Omega$ Gage factor: Approx. 2.1 Temperature sensor: T-type thermocouple Accuracy: Within 1.5 °C	In the KFGI gages are foil strain gages incorporating a 1-type thermocouple for simultaneous measurement of strain and temperature. They ensure not only efficient strain measurement under environments where temperature change or temperature gradient requires simultaneous measurement of strain and temperature but also highly precise compensation of thermally-induced apparent strain. It is recommended to use Kyowa data logger UCAM-60B as a mating instrument.							
	Applicable Adhesives and Ope	rating Temper	ature Range a	fter Curing				
	CC-33A: -10 to 120°C CC-35: CC-36: -10 to 100°C EP-340:	-10 to 120°C -10 to 120°C						
	KFGT-5-120-C1-11 N1M3 KFGT-5-120-C1-16 N1M3 KFGT-5-120-C1-23 N1M3 KFGT-5-120-C1-27 N1M3	- 5 2.1	10 4.5	Standard accessories: lead wire stopper to prevent the gage from damaging Pre-attached lead wire				
	KFGT-2-120-C1-11 N1M3 KFGT-2-120-C1-16 N1M3 KFGT-2-120-C1-23 N1M3 KFGT-2-120-C1-27 N1M3	- 2 1.8	7 4.5	1-m long Extension lead wire are optionally available. A min. qty 5 PC.				
Gage lead 1 conne Gage lead 1 conne Sensing point of T-type thermocouple	ected Lead stopper T- T- G G G G G G G G G G G G	type thermocouple Cu type thermocouple CuNi age lead 2' (Green) age lead 2 (Green) age lead 1 (Red) dered	⊕ (Brown) ⊖ (Gold)					
*Figure is KFGT-5-120-C1-11 N1M3		Options Exte	ension Lead Wir	e Cables				
		Models Dir Lengt	nensions (mm) h Width Thickness P	Qty er case Remarks				
		NT-1M         1000           NT-2M         2000           NT-4M         4000	7.2 1.2	With gage 5 terminal T-F25				

# **General-purpose Foil Strain Gages KFR**

		Patterns	5,		Models		Dimensio	ons (mm) Base	Remarks
	Gage	e Resistance, G	Gage Factor		Wodels		Length Width	Length Width	- nemarks
<ul> <li>KFR Series Foil Strain Gages         The KFR series foil strain gages are durable and easy-to-use high-g strain gages. The gage element is sandwiched between heat-resize polyimide base and cover, thereby letting them exhibit is performance in a wide temperature range.     </li> <li>Applicable Adhesives and Operating Temperature Range after Cu PC-600: -196 to 150°C CC-33A: -196 to 120°C CC-35: -30 to 120°C CC-36: -30 to 100°C EP-340: -55 to 150°C     </li> <li>Types, lengths and codes of lead wire cables pre-attached to KFR gages         *3-wire system is available only for gage of 2 mm and 5mm     </li> </ul>								<ul> <li>high-grade</li> <li>at-resistant</li> <li>hibit high</li> <li>after Curing</li> <li>to 120°C</li> </ul>	
	Types	Polyester-coated 2-wire copper cable	Polyester-coated 3-wire copper cable*	Vinyl-coated fl	at 2-wire cable	Vinyl-coate	d flat 3-wire cable	Middle-temperature 2-wire cable	Middle-temperature 3-wire cable
	Length	C1,	D25	C1	D25	C1	D25	C1,	D25
	15 cm	N15C2	N15C3	115C2R	115025	115C3R	115035	P15C2	R15C3

1 m	N1M2	N1M3	L1M2R	L1M2S	L1M3R	L1M3S	R1M2	R1M3			
3 m			L3M2R	L3M2S	L3M3R	L3M3S	R3M2	R3M3			
5 m			L5M2R	L5M2S	L5M3R	L5M3S	R5M2	R5M3			
Oprg. temp. range	-196 to	150°C		-10 to	o 80°C		-100 to 150°C				
Remarks	Twisted for 50	cm or longer	L-6, L-9 for 6	m or longer	6 m or longer	L-11	L-12				
	Second se Second second sec										

L30C2S

N30C3

L30C2R

When ordering, suffix the lead wire cable code to the model number with a space in between. (Except for 02N, D9 & D19) E.g. KFR-5-120-C1-11 for the gage with a polyester-coated 3-wire copper cable 30 cm long  $\rightarrow$  KFR-5-120-C1-11 N30C3 KFR-5-120-D25-11 for the gage with a vinyl-coated flat 3-wire cable 5 m long → KFR-5-120-D25-11 L5M3S If no lead wire cable code is suffixed, the gage is delivered with gage leads only (Silver-clad copper wires 25 mm long).

### Uniaxial

\*Figure is KFR-1-120-D25-11

30 cm

Resistance: 120  $\Omega$ Gage factor: Approx. 2.1 (KFR 02N: Approx. 1.9)

N30C2

Except for KFR-02N, these KFR series gages are also available with the gage resistance of  $350\Omega$ . The size is slightly different from  $120\Omega$  gages.

L30C3R

L30C3S

R30C2

R30C3

	KFR-5-120-C1-11					
	KFR-5-120-C1-16	5	2.5	10	3.7	
	KFR-5-120-C1-23					
	KFR-2-120-C1-11					
	KFR-2-120-C1-16	2	2.5	6	3.7	
	KFR-2-120-C1-23					
	KFR-1-120-C1-11					
	KFR-1-120-C1-16	1	1.5	4	2.7	
	KFR-1-120-C1-23					
	KFR-05-120-C1-11					
	KFR-05-120-C1-16	0.5	1.4	3.3	2.7	
	KFR-05-120-C1-23					
	KFR-02-120-C1-11					
	KFR-02-120-C1-16	0.2	1	2.5	2.2	
	KFR-02-120-C1-23					
	KFR-02N-120-C1-11 N10C2					With polyester-coated
	KFR-02N-120-C1-16 N10C2	0.2	0.9	1.6	1.2	diameter by 10 cm
*Figure is KFR-5-120-C1-11	KFR-02N-120-C1-23 N10C2					long each
<b>Triaxial 0°/90°/45°</b> Resistance: 120 Ω Gage factor: Approx. 2.1	These KFR series gages are also ave The size is slightly different from 1	ailable w 20Ω gag	ith the g es.	age resis	stance o	f 350Ω.
	KFR-1-120-D25-11					
<b>1</b> 45°	KFR-1-120-D25-16	1	1.5	¢	68	A min. qty 5 PC.
	KFR-1-120-D25-23					

0.5

1.4

φ7.5

KFR-05-120-D25-11 KFR-05-120-D25-16

KFR-05-120-D25-23

**General Purpose** 

A min. qty 5 PC.

# General-purpose Foil Strain Gages KFR

Patterns, Gage Resistance, Gage Factor		Models	Dime Grid Length Wic	nsions (mm Ba th Length	ı) se Width	Remarks			
<b>Uniaxial 5-element, for concentrated stress measurement</b> Resistance: 120 Ω Gage factor: Approx. 1.95									
Pitch 0.5	Pitch 0.5	Pitch 0.5       Note : When measuring with dynamic strain instruments and signal conditioners, this results in 1 measurement for each element. Measurement using 2 element or more at the same time is not possible.         Note : Since the gage resistance is 120±15Ω (deviation among 5-element is 5Ω), each element requires an external resistor with the same resistance when connected to the measuring instrument.							
D9	D19	KFR-015-120-D9-11 N10C2 KFR-015-120-D9-16 N10C2 KFR-015-120-D9-23 N10C2	0.15 0.3	4 6	3	P (Pitch) 0.5 mm A min. qty 5 PC.			
*Figure is KFR-015-120-D *Figure is KFR-015-120-D	9-11 N10C2(Left) 19-11 N10C2(Right)	KFR-015-120-D19-11 N10C2 KFR-015-120-D19-16 N10C2 KFR-015-120-D19-23 N10C2	0.15 0.4	5 6	3	P (Pitch) 0.5 mm A min. qty 5 PC.			

# Waterproof Strain Gages KFW

Dattorns			[	Dimensi	sions (mm)			
Gage Resistance Gage Factor		Models		G	rid	Ba	se	Remarks
				Length	Width	Length	Width	
●KFW Series Waterproof F	oil Strain The KFW se waterproof. or underwar insulation re under an un resin is flexik Applicable CC-33A: -10	Gages ries foil strain ga The waterproo ter measuremen sistance shows v derwater pressu ble enough to er Adhesives an to 80°C CC- aths and codes	iges ha f struct it mere virtually re of a able ea d <b>Ope</b> 36: -10 of lead	ve the s ure ena ly by be no de pproxin asy bon <b>crating</b> 0 to 80° wire ca	surface of ables the eing bon terioration nately 10 ding to of <b>Tempe</b> C EP	covered v se gage: ded to n on even a ) MPa. In curved su erature -180: -110 -attache	with a sp s to serv neasurin after 10 addition addition addition after serv after serv adto KFV	pecial resin for re for outdoor g objects. The 0 hours of use h, the covering <b>after Curing</b> C W series gages
	Types	Vinyl-coated fl	at 2-wire	cable		Vinyl-coa	ted flat 3-	wire cable
When ordering, suffix the lead wire cable code (See table at the right)							2)	5
to the model number with a space	Length	C1	D1	6, D17		C1		D16, D17
in between.	15 cm	L15C2R	L1	5C2S		L15C3R		L15C3S
E.g.	30 cm	L30C2R	L3	0C2S		L30C3R		L30C3S
KFW-5-120-C1-11 L2M2R	1 m	L1M2R	L1	M2S		L1M3R		L1M3S
for the gage with a vinyl-coated flat 2-wire cable 2 m long	3 m	L3M2R	L3	M2S		L3M3R		L3M3S
KFW-5-120-D17-11 L5M3S	5 m	L5M2R	L5	M2S		L5M3R		L5M3S
for the gage with a vinyl-coated flat	Oprg. temp. range	L C L O fan C		-	10 to 80°C	17110		
3-wire cable 5 m long		L-6, L-9 101 6		ger		L-7, L-10		brionger
Uniaxial	0°, 90°, and 4 45°, respectiv The following	15°, respectively and rely. 9 models with the	l 3-wire (	e cables, v	vith red, ye	allow and	blue strip	es for 0°, 90°, and ith a vinyl-coated
Gage factor: Approx. 2.1	flat 3-wire cal KFW-5-12 KFW-5-12	ble 1 m long pre-a 0-C1-11 L1M3R 0-C1-16 L1M3R	ttached	5	2	30	17	5
	KFW-5-12	0-C1-23 L1M3R		5	2	50	12	
	KFW-2-12 KFW-2-12 KFW-2-12	0-C1-11 L1M3R 0-C1-16 L1M3R 0-C1-23 L1M3R		2	2.3	30	12	
Biaxial, 0°/90° stacked rosette Resistance: 120 Ω Gage factor: Approx. 2.1	The following flat 3-wire cal KFW-5-12 KFW-5-12 KFW-5-12	y models with the ble 1 m long pre-a 0-D16-11 L1M3S 0-D16-16 L1M3S 0-D16-23 L1M3S	lead wir ttached	e cable o 5	code L1M 2	3R are de 21	livered w 18	ith a vinyl-coated A min. qty 5 PC.
	KFW-2-12 KFW-2-12 KFW-2-12	0-D16-11 L1M3S 0-D16-16 L1M3S 0-D16-23 L1M3S		2	1.4	21	18	A min. qty 5 PC.
Triaxial, 0°/90°/45° stacked rose Resistance: 120 Ω Gage factor: Approx. 2.1	The following flat 3-wire cal KFW-5-12 KFW-5-12 KFW-5-12	y models with the ble 1 m long pre-a 0-D17-11 L1M3S 0-D17-16 L1M3S 0-D17-23 L1M3S 0-D17-11 L1M3S	lead wir ttached	e cable o 5	code L1M 2	3R are de 21	livered w 18	ith a vinyl-coated A min. qty 5 PC.
45°	KFW-2-12 KFW-2-12 KFW-2-12	0-D17-16 L1M3S 0-D17-16 L1M3S 0-D17-23 L1M3S		2	1.4	21	18	A min. qty 5 PC.

D

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For Waterproof & Concrete Applications

# Waterproof Strain Gages KFWS & KCW

Patterns				Dimen	sions (mm)	_
Gage Resistance, Gage Factor		Models		Grid	Base	Remarks
				Length Widt	th Length Wid	th
●KFWS Series Small-Sized V	Waterpro The KFWS outdoor or The waterp bonded to Applicable CC-33A: -10	series foil strain of underwater strain roof resin is as th a curved surface of <b>Adhesives an</b> 0 to 80°C CC-	gages n mea in as 1 of 10 d Op 36: -1	iages are small-size isurement wh I.3 mm, makir mm diameter. erating Tem 0 to 80°C	ed waterproof g ere gage bondir ng them flexible <b>perature Ran</b> EP-180: -10 to 8	ages suitable for ng space is limited. enough to be <b>ge after Curing</b> 80°C
	Types, ler	igths and codes o	of lead	l wire cables p	re-attached to K	FWS series gages
	Types	Vinyl-coated fla	at 2-wir	re cable	Vinyl-coated fla	t 3-wire cable
When ordering, suffix the lead wire		C1		D16	<u> </u>	D16
cable code (See table at the right)	Length			15.025		115.025
in between.	15 cm	LISC2R	L	30025	LISC3R	130035
	1 m	L1M2R	1	1M2S	LIMIR	
E.g.	3 m	L3M2R	1	3M2S	L3M3R	L3M3S
KFWS-2N-120-C1-11 L3M2R	5 m	L5M2R	L	-5M2S	L5M3R	L5M3S
ior the gage with a vinyl-coated flat 2-wire cable 3 m long	Oprg. temp. range			-10 to 8	0°C	
2-wire cable 5 milong	Remarks	L-6, L-9 for 6	m or lo	nger	L-7, L-10 for 6	m or longer
<b>Uniaxial</b> Resistance: 120 Ω Gage factor: Approx. 2.1	* For othe	r lead wire cab	le ler ead wir	ngths, conta re cable code L5	<mark>ct us.</mark> M3R are delivered	with a vinyl-coated
	flat 3-wire ca	ble 5 m long pre-at	tached			
	KFWS-2N-	120-C1-11 L5M3R				
L	KFWS-2N	120-C1-16 L5IVI3R		2 0.84	1 15 6	
	flat 3-wire ca KFWS-2-1 KFWS-2-1 KFWS-2-1	20-D16-11 L5M3S 20-D16-16 L5M3S 20-D16-16 L5M3S 20-D16-23 L5M3S	ached.	2 1.2	15 12	10
				Dimon		
Patterns,		Models		Dimen	sions (mm)	Pomarks
Gage Resistance, Gage Factor		wodels		Length Widt	th Length Wid	th
				Lengen wia		
•KCW Series Weldable Wat When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between.	The KCW s any coatin are availak type endur Mounting N Types, le	Foil Strain ( eries foil strain g treatment foi ole in 2 types: G res a water pres Method and Operan ngths and codes	Gage gages r use 10 wi sure c ating s of le	es s are weldab under high j th 1 gage an of approxima Temperature F ead wire cable	le gages, which pressure or un id G14S with 4 itely 10 MPa. Range Spot weld <b>es pre-attache</b> d	n do not require der water. They gages. The G10 ing –20 to 100°C <b>d to KCW gages</b>
E.g.	Types			3 strand chloro	prene wire	
If connecting 5 m of 3 strand chloroprene	Length			G10		
coated wire to KCW-5-120-G10-11	15 cm			G15C3	S	
	30 cm			G30C3	S	
	1 m			G1M3	S	
Uniaxial 1 element	3 m			G3M3	S	
With 3 strand chloroprene wire Resistance: 120 Ω	5 m			G5M3 -20 to 10	S IO°C	
Gage factor: Approx. 2.2	* For othe	r lead wire cab	le ler	ngths, conta	ct us.	
, , , , , , , , , , , , , , , , , , , ,	The followin	g type is for 3 m of	3 strai	nd chloroprene	wire.	Min. radius
Matarial: CLIC204						

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For Waterproof & Concrete Applications

# Gages for Concrete KFG & KC

			Dim	nensi	ons (mm	ı)	
Gage Resistance, Gage Factor		Models	Grid	1: -1+1-	Ba	se	Remarks
			Length W	/idth	Length	Width	
•KFG Series General-purpo	Se FOII St	rain Gages	nos with a	cuita	hla laad	wire ca	ble for strain
*For the types and lengths of lead wire cables, refer to page 1-15 and 1-16.	Applicable (With viny)	nt of concrete. Adhesives and Ope -coated flat cable)	rating Ter	nper	ature R	ange at	fter Curing
	Notes on pre-at Standard cold yellow or blac Standard 3-w be changed to In the case of respectively a in common.	to 80°C ttached lead wire cables or of the 2-wire cable pre-attached. k cable can be pre-attached to uni b blue or yellow stripes. a blaxial gage, 2-wire cables nd 3-wire cables, with red an	ached to unia axial gages ha s are color-coc id yellow strip	xial ga as red s ded wit es for (	ges is red (I stripes (R). I th red and D° and 90°,	R). If desired, f desired, f white strip respective	ed, a white, green, the red stripes can pes for 0° and 90°, ely. Letter code is S
UNIAXIAI Resistance: 120 Ω Gage factor: Approx. 2.1	• In the case of 90°, and 45°, respectively. L The following	a triaxial gage, 2-wire cable respectively and 3-wire cab etter code is S in common. models with the lead wire	cable code L	, yellov 1M3F	v and blue are delive	stripes fo ered with	a vinyl-coated flat
	3-wire cable 1	m long pre-attached.	20	2 2	27	F 2	
	KFG-30-12	20-C1-11 L1M3R	30	5.5	37	5.2	
	KFG-10-12	0-C1-11 L1M3R	10	3	16	5.2	
Biaxial, 0°/90° stacked rosette	The following 3-wire cable 1 KFG-10-12 tte Resista Gage f	D Ω pprox. 2.1 model with the lead wire m long pre-attached. :0-D16-11 L1M3S ince: 120 Ω actor: Approx. 2.1	cable code l 10	L1M35 3	5 is deliver	ed with a	a vinyl-coated flat
45°	The following 3-wire cable 1	model with the lead wire	cable code l	L1M3	5 is deliver	ed with a	a vinyl-coated flat
45°	The following 3-wire cable 1 KFG-10-12	model with the lead wire m long pre-attached. 20-D17-11 L1M3S	cable code l	L1M35 3	δ is deliver φ2	ed with a	a vinyl-coated flat
45°	The following 3-wire cable 1 KFG-10-12	model with the lead wire m long pre-attached. 10-D17-11 L1M3S	cable code l 10	L1M39	δ is deliver φ2	ed with a	a vinyl-coated flat
Patterns,	The following 3-wire cable 1 KFG-10-12	model with the lead wire m long pre-attached. 0-D17-11 L1M3S Models	10 10 Grid	L1M39	5 is deliver \$\phi 2 \$\phi 2 \$\pi 2	ed with a 1 1) se	a vinyl-coated flat Remarks
Patterns, Gage Resistance, Gage Factor	The following 3-wire cable 1 KFG-10-12	model with the lead wire m long pre-attached. 0-D17-11 L1M3S Models	10 10 Grid Length W	11M39 3 11ensi	5 is deliver $\phi$ 2 ons (mm Ba Length	ed with a 1 <b>)</b> se Width	a vinyl-coated flat Remarks
Patterns, Gage Resistance, Gage Factor •KC Series Wire Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between.	The following 3-wire cable 1 KFG-10-12 Featuring a suitable for with the ga aggregate i Applicable CC-35: -30 t Types, ler	Models Models a longer gage length mean strain measurer ge length over 3 time selected for the purp Adhesives and Ope o 120°C ngths and codes of lea	To cable code l 10 Dim Grid Length W a, the KC so ment of co is longer th pose. rating Ter d wire cab	11M3: 3 <b>nensi</b> <b>idth</b> eries ncret nan t <b>mper</b> <b>lles p</b>	5 is deliver 0 ons (mm Ba Length gages a te under he maxin rature R re-attach	ed with a se Width re wire test. Us mum di ange a ned to K	Remarks e strain gages wally, a model ameter of the fter Curing C series gages
Patterns, Gage Resistance, Gage Factor •KC Series Wire Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KC-120-120-A1-1115M2R	The following 3-wire cable 1 KFG-10-12 Featuring a suitable for with the ga aggregate i Applicable CC-35: -30 t Types, ler Types	Models Models Models a longer gage length mean strain measurer ge length over 3 times selected for the purp Adhesives and Ope o 120°C ngths and codes of lea Vinyl-coated flat 2-wi	10 Dim Grid Length W b, the KC so ment of co to longer th pose. rating Ten rating Ten d wire cable	11M3: 3 /idth eries ncrei nan ti mper	5 is deliver 0000 (mm 0000 (mm 0000 Ba 1000	ed with a (1 ) se Width re wire test. Us mum di ange a ned to K ated flat 3	Remarks e strain gages wally, a model ameter of the fter Curing C series gages
Patterns, Gage Resistance, Gage Factor •KC Series Wire Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KC-120-120-A1-11 L5M2R for the gage with a vinyl-coated flat	The following 3-wire cable 1 KFG-10-12 Featuring a suitable for with the ga aggregate i Applicable CC-35: -30 t Types, ler Types Length	Models Models Models a longer gage length mean strain measurer ge length over 3 times s selected for the purp Adhesives and Ope o 120°C ngths and codes of lea	10 Dim Grid Length W a, the KC so ment of co is longer th pose. rating Ter ad wire cab	11M3: 3 //idth eries ncret nan ti mper lles p A1	5 is deliver 0 ons (mm Ba Length gages a te under he maxin rature R re-attach Vinyl-co	ed with a 1 3) se Width re wire test. Us mum di ange a ned to K ated flat 3	Remarks e strain gages wally, a model ameter of the fter Curing C series gages swire cable
Patterns, Gage Resistance, Gage Factor • KC Series Wire Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KC-120-120-A1-11 L5M2R for the gage with a vinyl-coated flat 2-wire cable 5 m long	The following 3-wire cable 1 KFG-10-12 Featuring a suitable for with the ga aggregate i Applicable CC-35: -30 t Types, ler Types Length 15 cm	Models Models Models a longer gage length mean strain measurer ge length over 3 time s selected for the purp o Adhesives and Ope o 120°C ngths and codes of lea Vinyl-coated flat 2-wi	The cable code of the code of	11M3: 3 <b>inensia</b> <b>/idth</b> eries ncret mper <b>iles p</b> A1	5 is deliver 0 ons (mm Ba Length gages a te under he maxin rature R re-attack Vinyl-co	ed with a 1 se Width re wire test. Us mum di ange a ned to K ated flat 3 L15C3R	Remarks e strain gages ually, a model ameter of the fter Curing C series gages swire cable
Patterns, Gage Resistance, Gage Factor •KC Series Wire Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KC-120-120-A1-11 L5M2R for the gage with a vinyl-coated flat 2-wire cable 5 m long If no lead wire cable code is suffixed	The following 3-wire cable 1 KFG-10-12 Featuring a suitable for with the ga aggregate i Applicable CC-35: -30 t Types, ler Types Length 15 cm 30 cm	Models Models a longer gage length mean strain measurer ge length over 3 time s selected for the purp Adhesives and Ope o 120°C ngths and codes of lea Vinyl-coated flat 2-wi L15C2R L30C2R	a cable code l 10 Dim Grid Length W a, the KC so ment of co as longer th pose. rating Ter rating Ter ad wire cable	11M3: 3 internsion internet inte	5 is deliver 0 ons (mm Ba Length gages a ie under he maxin rature R re-attach Vinyl-co	ed with a (1) se Width rre wire test. Us mum di ange a ned to K ated flat 3 L15C3R L30C3R	Remarks e strain gages wally, a model ameter of the fter Curing C series gages swire cable
Patterns, Gage Resistance, Gage Factor •KC Series Wire Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KC-120-120-A1-11 L5M2R for the gage with a vinyl-coated flat 2-wire cable 5 m long If no lead wire cable code is suffixed, the gage is delivered with only gage	The following 3-wire cable 1 KFG-10-12 Featuring a suitable for with the ga aggregate i Applicable CC-35: -30 t Types, ler Types, ler Types Length 15 cm 30 cm 1 m	Models Models Models a longer gage length mean strain measurer ge length over 3 times selected for the purp Adhesives and Ope o 120°C ngths and codes of lea Vinyl-coated flat 2-wi L15C2R L30C2R L1M2R	Dim 10 Dim Grid Length W a, the KC soment of co to longer th pose. rating Ter rating Ter d wire cable	11M3: 3 reensii /idth eries ncret han t mper lles p A1	5 is deliver 0 ons (mm Ba Length gages a te under he maxin rature R re-attach Vinyl-co	ed with a (1 ) se Width re wire test. Us mum di ange a hed to K ated flat 3 L15C3R L30C3R L1M3R	Remarks e strain gages wally, a model ameter of the fter Curing C series gages wire cable
Patterns, Gage Resistance, Gage Factor • KC Series Wire Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KC-120-120-A1-11 L5M2R for the gage with a vinyl-coated flat 2-wire cable 5 m long If no lead wire cable code is suffixed, the gage is delivered with only gage leads (Silver-clad copper wires 25 mm	The following 3-wire cable 1 KFG-10-12 Featuring a suitable for with the ga aggregate i Applicable CC-35: -30 t Types, ler Types, ler Types Length 15 cm 30 cm 1 m 3 m	Models Models Models Models a longer gage length mean strain measurer ge length over 3 times selected for the purp Adhesives and Ope o 120°C ngths and codes of lea Vinyl-coated flat 2-wi L15C2R L30C2R L1M2R L3M2R	a cable code l 10 Dim Grid Length W a, the KC so ment of co iso longer th pose. rating Ter ad wire cable	11M3: 3 7 7 7 7 7 7 7 7 7 7 7 7 7	5 is deliver 0 ons (mm Ba Length gages a te under he maxin rature R re-attach Vinyl-co	ed with a se Width re wire test. Us mum di ange a hed to K ated flat 3 L15C3R L30C3R L1M3R	Remarks e strain gages ually, a model ameter of the fter Curing C series gages s-wire cable
Patterns, Gage Resistance, Gage Factor PAtterns, Gage Resistance, Gage Factor OKC Series Wire Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KC-120-120-A1-11 L5M2R for the gage with a vinyl-coated flat 2-wire cable 5 m long If no lead wire cable code is suffixed, the gage is delivered with only gage leads (Silver-clad copper wires 25 mm long each).	The following 3-wire cable 1 KFG-10-12 Featuring a suitable for with the ga aggregate i Applicable CC-35: -30 t Types, ler Types, ler 15 cm 30 cm 1 m 3 m 5 m	Models Models Models Models A longer gage length mean strain measurer ge length over 3 time s selected for the purp Adhesives and Ope o 120°C ngths and codes of lea Vinyl-coated flat 2-wi L15C2R L30C2R L1M2R L3M2R	a cable code l 10 Dim Grid Length W a, the KC so ment of co is longer th cose. rating Ter ad wire cable ire cable	11M3: 3 7 7 7 7 7 7 7 7 7 7 7 7 7	5 is deliver 0 ons (mm Ba Length gages a te under he maxin rature R re-attach Vinyl-co	ed with a se Width re wire test. Us mum di ange a hed to K ated flat 3 L15C3R L30C3R L1M3R L3M3R	Remarks e strain gages ually, a model ameter of the fter Curing C series gages swire cable
A5° A5° A5° A5° A5° A5° A5° A5°	The following 3-wire cable 1 KFG-10-12 Featuring a suitable for with the ga aggregate i Applicable CC-35: -30 t Types, ler CC-35: -30 t Types, ler 15 cm 30 cm 1 m 3 m 5 m Opg. temp. range	Models Models Models a longer gage length mean strain measurer ge length over 3 time s selected for the purp Adhesives and Ope o 120°C ngths and codes of lea Vinyl-coated flat 2-wi L15C2R L30C2R L1M2R L3M2R L5M2R	a cable code l 10 Dim Grid Length M a, the KC so ment of co so longer th cose. rating Ter ad wire cable ire cable -10 -10	11M3: 3 internsion internsi	5 is deliver 0 ons (mm Ba Length gages a te under he maxin rature R re-attach Vinyl-co	ed with a in se Width re wire test. Us mum di ange a hed to K ated flat 3 L15C3R L30C3R L1M3R L3M3R L5M3R	Remarks e strain gages sually, a model ameter of the fter Curing C series gages survire cable
Patterns, Gage Resistance, Gage Factor Patterns, Gage Resistance, Gage Factor <b>•KC Series Wire Strain Gages</b> When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KC-120-120-A1-11 L5M2R for the gage with a vinyl-coated flat 2-wire cable 5 m long If no lead wire cable code is suffixed, the gage is delivered with only gage leads (Silver-clad copper wires 25 mm long each). Uniaxial Perinteneo: 120.0	The following 3-wire cable 1 KFG-10-12 Featuring a suitable for with the ga aggregate i Applicable CC-35: -30 t Types, ler Types, ler Types, ler 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. range Remarks	Models Models Models a longer gage length mean strain measured ge length over 3 times selected for the purp Adhesives and Ope o 120°C ngths and codes of lea Vinyl-coated flat 2-wi L15C2R L30C2R L1M2R L3M2R L5M2R L-6, L-9 for 6 m or 1	-10 -10 -10 -10 -10 -10 -10	11M3: 3 rensi /idth eries ncret han t les p A1 A1 to 80%	S is deliver	ed with a (1 (1) se Width re wire test. Us mum di ange a ned to K ated flat 3 L15C3R L30C3R L1M3R L3M3R L5M3R 0 for 6 m	Remarks e strain gages ually, a model ameter of the fter Curing C series gages B-wire cable
Patterns,         Gage Resistance, Gage Factor         OKC Series Wire Strain Gages         When ordering, suffix the lead wire         cable code (See table at the right)         to the model number with a space         in between.         E.g.         KC-120-120-A1-11 L5M2R         for the gage with a vinyl-coated flat         2-wire cable 5 m long         If no lead wire cable code is suffixed,         the gage is delivered with only gage         leads (Silver-clad copper wires 25 mm         long each).         Uniaxial         Resistance: 120 Ω         Gage factor: Approx 2.1	The following 3-wire cable 1 KFG-10-12 Featuring a suitable for with the ga aggregate i Applicable CC-35: -30 t Types, ler Types, ler Types, ler 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. range Remarks * For othe KC-120-12	Models Models Models Models Models Models Models Models Models Models Models Models Models Models Models Models Models Models Models Selected for the purp Adhesives and Ope o 120°C Ngths and codes of lea Vinyl-coated flat 2-wi L15C2R L30C2R L1M2R L3M2R L5M2R L-6, L-9 for 6 m or I Mart L3M2R L6, L-9 for 6 m or I	-10 -10 -10 -10 -10 -10 -10 -10	11M3: 3 <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inensi</b> <b>inens</b>	5 is deliver 0 ons (mm Ba Length gages a te under he maxin rature R re-attach Vinyl-co L-7, L-1 t us. 132	ed with a 1 se Width re wire test. Us mum di ange a hed to K ated flat 3 L15C3R L3C3R L3C3R L3M3R L5M3R 0 for 6 m	Remarks e strain gages ually, a model ameter of the fter Curing C series gages s-wire cable or longer
Patterns, Gage Resistance, Gage Factor <b>OKC Series Wire Strain Gages</b> When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between.         E.g.         KC-120-120-A1-11 L5M2R         for the gage with a vinyl-coated flat 2-wire cable 5 m long         If no lead wire cable code is suffixed, the gage is delivered with only gage leads (Silver-clad copper wires 25 mm long each).         Uniaxial Resistance: 120 Ω Gage factor: Approx. 2.1	The following 3-wire cable 1 KFG-10-12 Featuring a suitable for with the ga aggregate i Applicable CC-35: -30 t Types, ler CC-35: -30 t Types, ler Types, ler Suitable for with the ga aggregate i Applicable CC-35: -30 t Types, ler Suitable for With the ga aggregate i Applicable CC-35: -30 t Types, ler Types Length 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. range Remarks * For othe KC-120-12 KC-80-120	Models Mo	a cable code l 10 Dim Grid Length W a, the KC soment of coss is longer th pose. rating Ter id wire cable ad wire cable -10 onger ngths, co 120 84	L1M3: 3 vidth eries ncret han ti mper les p A1 L0.80°( ntac 0.6 0.6	5 is deliver 0 ons (mm Ba Length gages a te under he maxin rature R re-attack Vinyl-co C L-7, L-1 t us. 132 95	ed with a se Width re wire test. Us mum di ange a hed to K ated flat 3 L15C3R L30C3R L3M3R L3M3R 0 for 6 m 6 8	Remarks e strain gages ually, a model ameter of the fter Curing C series gages wire cable or longer
45°         45°         A5°         A5°	The following 3-wire cable 1 KFG-10-12 Featuring a suitable for with the ga aggregate i Applicable CC-35: -30 t Types, ler CC-35: -30 t Types, ler Types, ler 15 cm 30 cm 1 m 3 m 5 m Opr, temp. range Remarks * For othe KC-120-12 KC-80-120	Models Mo	a cable code l 10 Dim Grid Length M a, the KC so ment of co is longer th cose. rating Ter ad wire cable ad wire cable -10 onger ngths, co 120 84 67	L1M3: 3 vidth eries ncrei nan ti mper les p A1 A1 L 0.6 0.6 0.6 0.6	5 is deliver 0 ons (mm Ba Length gages a te under he maxin rature R re-attach Vinyl-co L-7, L-1 t us. 132 95 80	ed with a se Width re wire test. Us mum di ange a hed to K ated flat 3 L15C3R L30C3R L1M3R L3M3R 0 for 6 m 6 8 7.5	Remarks e strain gages sually, a model ameter of the fter Curing C series gages wire cable or longer

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For Waterproof & Concrete Applications

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# Gages for Concrete KM & KMC

Dottorne		Dimensions (mi	m)	
Gage Resistance, Gage Factor	Models	Grid B	ase	Remarks
		Length Width Length	hWidth	
•KM Series Embedded Stra	in Gages			
	The KM series gages are de	signed to be embe	edded in	mortar or
When ordering, suffix the lead wire	better adhesion to mortar or	the like the KM se	rios gago	s. To ensure
cable code (See table at the right)	specially treated surface. The	v also provido suita	hlo wate	es leature a
to the model number with a space	and elastic modulus for the in	tended nurnose		erprooffiess
In between.				
E.g.	Operating Temperature Range	e −10 to 70°C		
KM-120-120-H2-11 W5M3		and wine cohier and	ناممام مغغ	
for the gage with a vinyl-coated flat	Types, lengths and codes of	ead wire cables pre-a	attacheu	to Kivi gages
3-wire cable 5 m long	Types KM-30	View	KM-120	
	2-wire cable	Viny 3.	-wire cable	
	Length H1		HZ	
	1 m Y1M2		W1M3	
	3 m Y3M2		W3M3	
	5 m Y5M2		W5M3	
Uniaxial foil strain gages with	Oprg. temp. range	-10 to 70°C		
vinyl-coated flat 2-wire cable	* For other lead wire cable le	noths, contact us.		
Resistance: 120 $\Omega$	i for other lead whe cable lea	igins, contact as.		
Gage factor: Approx. 1.8				
	The following model with the lead wir	e cable code Y1M2 is deliv	ered with a	vinyl-coated flat
	2-wire cable 1 m long pre-attached.			
	KM-30-120-H1-11 Y1M2	30×9×3		A min. qty 1 PC.
Uniaxial foil strain gages with v Resistance: 120 Ω Gage factor: Approx. 2.0.	inyl-coated flat 3-wire cable			
Uniaxial foil strain gages with v Resistance: 120 Ω Gage factor: Approx. 2.0.	The following model with the lead wire	cable code W1M3 is deliv	ered with a	vinyl-coated flat
Uniaxial foil strain gages with v Resistance: 120 Ω Gage factor: Approx. 2.0.	The following model with the lead wire 3-wire cable 1 m long pre-attached.	cable code W1M3 is deliv 120×15×5	ered with a	vinyl-coated flat A min. qty 1 PC.
Uniaxial foil strain gages with v Resistance: 120 Ω Gage factor: Approx. 2.0.	The following model with the lead wire 3-wire cable 1 m long pre-attached.	cable code W1M3 is deliv 120×15×5	ered with a	vinyl-coated flat A min. qty 1 PC.
Uniaxial foil strain gages with v Resistance: 120 Ω Gage factor: Approx. 2.0.	inyl-coated flat 3-wire cable	cable code W1M3 is deliv 120×15×5 <b>Dimensions (m</b> i	ered with a	vinyl-coated flat A min. qty 1 PC.
Uniaxial foil strain gages with v Resistance: 120 Ω Gage factor: Approx. 2.0.	inyl-coated flat 3-wire cable	cable code W1M3 is deliv 120×15×5 Dimensions (mi Grid B	ered with a	vinyl-coated flat A min. qty 1 PC. Remarks
Uniaxial foil strain gages with v Resistance: 120 Ω Gage factor: Approx. 2.0.	inyl-coated flat 3-wire cable	cable code W1M3 is deliv 120×15×5 Dimensions (mi Grid B Length Width Length	ered with a m) iase h Width	vinyl-coated flat A min. qty 1 PC. Remarks
Uniaxial foil strain gages with v Resistance: 120 Ω Gage factor: Approx. 2.0.	The following model with the lead wire 3-wire cable 1 m long pre-attached. KM-120-120-H2-11 W1M3 Models bedded Strain Gages	cable code W1M3 is deliv 120×15×5 Dimensions (mi Grid B Length Width Length	ered with a m) ase h Width	vinyl-coated flat A min. qty 1 PC. Remarks
Uniaxial foil strain gages with v Resistance: 120 Ω Gage factor: Approx. 2.0. Patterns, Gage Resistance, Gage Factor •KMC Series Concrete-Em	inyl-coated flat 3-wire cable  The following model with the lead wire 3-wire cable 1 m long pre-attached.  KM-120-120-H2-11 W1M3  Models  Models  The KMC series gages are de self-stress of cemented mate self-stress of cemented mate self-shrinkage and high-fluid They are also used effectively to Usually, a T-type thermocouple series gages of H4 type do not are equipped with a built-in the	cable code W1M3 is deliv 120×15×5 Dimensions (mr Grid B Length Width Length signed to measure s rials. They enable m ity concrete immedia o check for cracks of c is installed near the c : require such the ins ermocouple.	ered with a m) ase h Width self-shrin easurem ately aftr cemented gage, whi stallation	vinyl-coated flat A min. qty 1 PC. Remarks hkage and ent of the er placing. d materials. le the KMC since they
Uniaxial foil strain gages with v Resistance: 120 Ω Gage factor: Approx. 2.0. Patterns, Gage Resistance, Gage Factor •KMC Series Concrete-Em Uniaxial wire strain gages with vinyl-coated flat 3-wire cable 3 m long Resistance: 120 Ω	inyl-coated flat 3-wire cable  The following model with the lead wire 3-wire cable 1 m long pre-attached.  KM-120-120-H2-11 W1M3  Models  bedded Strain Gages  The KMC series gages are de self-stress of cemented mate self-shrinkage and high-fluid They are also used effectively to Usually, a T-type thermocouple series gages of H4 type do not are equipped with a built-in the Normal temperature to 70°C	cable code W1M3 is deliv 120×15×5 Dimensions (mi Grid B Length Width Length signed to measure st rials. They enable m ity concrete immedi. to check for cracks of c is installed near the c require such the inser ermocouple.	ered with a m) ase h Width self-shrin easurem ately afte cemented gage, whi stallation	vinyl-coated flat A min. qty 1 PC. Remarks hkage and ent of the er placing. d materials. le the KMC since they A min. qty 1 PC.
Uniaxial foil strain gages with v Resistance: 120 Ω Gage factor: Approx. 2.0.	inyl-coated flat 3-wire cable  The following model with the lead wire 3-wire cable 1 m long pre-attached.  KM-120-120-H2-11 W1M3  Models  bedded Strain Gages  The KMC series gages are de self-stress of cemented mate self-shrinkage and high-fluid They are also used effectively to Usually, a T-type thermocouple series gages of H4 type do not are equipped with a built-in the Normal temperature to 70°C	cable code W1M3 is deliv 120×15×5 Dimensions (mi Grid B Length Width Length signed to measure s rials. They enable m ity concrete immedia to check for cracks of co is installed near the co require such the inst ermocouple.	ered with a m) ase h Width self-shrin easurem ately afte cemented gage, whi stallation	A min. qty 1 PC. Remarks Remarks hkage and tent of the er placing. d materials. le the KMC since they A min. qty 1 PC.
Uniaxial foil strain gages with v Resistance: 120 Ω Gage factor: Approx. 2.0. Patterns, Gage Resistance, Gage Factor •KMC Series Concrete-Em Uniaxial wire strain gages with vinyl-coated flat 3-wire cable 3 m long Resistance: 120 Ω	inyl-coated flat 3-wire cable  The following model with the lead wire 3-wire cable 1 m long pre-attached.  KM-120-120-H2-11 W1M3  Models  Models  bedded Strain Gages  The KMC series gages are de self-stress of cemented mate self-shrinkage and high-fluid They are also used effectively to Usually, a T-type thermocouple series gages of H4 type do not are equipped with a built-in the Normal temperature to 70°C  The KMC series gages are available on 3 m long pre-attached.	signed to measure strials. They enable mediate immediate for cracks of concernent to the installed near the concernent to couple.	ered with a m) ase h Width self-shrin easurem ately afte cementeo gage, whi stallation	Normalized flat A min. qty 1 PC. Remarks A min. qty 1 PC. A min. qty 1 PC.
Uniaxial foil strain gages with v Resistance: 120 Ω Gage factor: Approx. 2.0. Patterns, Gage Resistance, Gage Factor •KMC Series Concrete-Em Uniaxial wire strain gages with vinyl-coated flat 3-wire cable 3 m long Resistance: 120 Ω	inyl-coated flat 3-wire cable  The following model with the lead wire 3-wire cable 1 m long pre-attached.  KM-120-120-H2-11 W1M3  Models  bedded Strain Gages  The KMC series gages are de self-stress of cemented mate self-shrinkage and high-fluid They are also used effectively to Usually, a T-type thermocouple series gages of H4 type do not are equipped with a built-in the Normal temperature to 70°C  The KMC series gages are available on 3 m long pre-attached.  KMC-70-120-H3	cable code W1M3 is deliv 120×15×5 Dimensions (mi Grid B Length Width Length signed to measure a rials. They enable m ity concrete immedia to check for cracks of co is installed near the co require such the inse ermocouple. y with a vinyl-coated flat 3 80×10×2	ered with a m) ase h Width self-shrin easurem ately afte cemented gage, whi stallation	Normal States St

# **Gages for Composite Materials & Plastics KFRP**

	Dotto	rnc				[	Dimensio	ns (n	nm)	
Gag	Patte • Resistance	rns, 9 Gage Fact	or	Мо	dels	G	rid		Base	Remar
dag	enesistance	e, dage ract				Length	Width	Leng	th Width	
hen orc ble cod the mo betwee J. FRP-5-12 r the ga wire cop FRP-5-12 r the ga wire cab no lead v ge is del ver-clad	dering, suffi le (See tab odel numbo en. 20-C1-1 N15 age with pc per cable 15 20-D22-3 L5 ge with a v le 5 m long vire cable co livered with copper wire	ix the lead w le at the rig er with a sp SC2 Dyester-coa 5 cm long M3S inyl-coated pre-attached de is suffixed, gage leads o s 25 mm long	vire The pht) (SEL ace such self low To e gag ted 1. S v flat 2. A l 3. 3 the only App ) CC-3	KFRP series f COM <sup>®</sup> gage h as CFRP an -heating du -elasticity ma ensure accur e current, co elect a lowe oltage select ctive-dummy 50Ω strain ga <b>blicable Adh</b> 33A: -196 to	foil strain g s) suitable d GFRP. Th le to gage aterials. rate measu nsider the f r bridge ex ion. y system ages esives and 120°C C	ages are sel for strain m e special ga current ar rement by ollowing: citation vol Operating C-35: -30 to	f-temper easurem ige patte id the e avoiding tage if t <b>Temper</b> o 120°C	ature ent c ern n ffect the he an	e-compens of composi- ninimizes t of reinfor self-heatin mplifier all e Range aff	ation gag te materia he effect rcement o ng effect o ows brid <u>o</u> t <b>er Curing</b>
Types	, lengths a	nd codes of	CC-3	cables pre-a	ttached to	F-34B: -55 to	s 200°C			-
Types	2polyester-coated copper wires	3polyester-coated copper wires	Vinyl-coated f	lat 2-wire cable	Vinyl-coated f	lat 3-wire cable	Middle-tempe 2-wire cat	rature N ble	Aiddle-temperature 3-wire cable	Huoroplastic coat high/low-temp
								=		
Longth	C1.	D22	C1	D22	C1	D22			C1, D22	
15 cm	N15C2	N15C3	115C2R	115025	115C3R	115C3S	R15C2		R15C3	F15C3
30 cm	N30C2	N30C3	L30C2R	L30C2S	L30C3R	L30C3S	R30C2		R30C3	F30C3
1 m	N1M2	N1M3	L1M2R	L1M2S	L1M3R	L1M3S	R1M2		R1M3	F1M3
3 m			L3M2R	L3M2S	L3M3R	L3M3S	R3M2		R3M3	F3M3
5 m		45005	L5M2R	L5M2S	L5M3R	L5M3S	R5M2		R5M3	F5M3
Oprg. temp. range	-196 to	o 150°C		-10 to	80°C	6 m or lan	-1	00 to	150°C	-196 to 200°
* For o niaxial	ther lead v	vire cable l	engths, co K	ntact us. FRP-5-120-C1-	1					
sistance: ge factor	120 Ω : Approx. 2.1			FRP-5-120-C1-3 FRP-5-120-C1-4 FRP-5-120-C1-4 FRP-2-120-C1-4	3 6 9	5	1.4	15	5	
			K K K	FRP-2-120-C1- FRP-2-120-C1- FRP-2-120-C1- FRP-2-120-C1-	5 9	2	1.2	10	5	
niaxial sistance: 3 ge factor	350 Ω : Approx. 2.1		K K K	FRP-5-350-C1- FRP-5-350-C1-3 FRP-5-350-C1-6 FRP-5-350-C1-6	1 3 5 9	5	1.5	15	5	
			K K K	FRP-2-350-C1- FRP-2-350-C1-3 FRP-2-350-C1-6 FRP-2-350-C1-6	1 3 5 9	2	2.2	10	5	
	0°/90°/4	5°	K	FRP-2-350-C1-9	9					
riaxial, esistance: age factor	120 Ω : Approx. 2.1		Each K K K	of 3 axis may b FRP-5-120-D22 FRP-5-120-D22 FRP-5-120-D22 FRP-5-120-D22	be given a dif -1 -3 -6	ferent linear e	xpansion of 1.4	coeffi 19	cient if reque 19	sted.

KFRP-2-120-D22-6

KFRP-2-120-D22-9

45°

# Gages for Composite Materials & Plastic KFRP & KFRS -34

	Dattarna					Dimensi	ons (mm)	
Gage B	Patterns, Resistance Ga	age Factor		Models		Grid	Base	Remarks
Gugen	(csistance, de	ige ractor			Le	ength Width	Length Wie	dth
riaxial, 0° esistance: 35	<b>°/90°/45°</b> <sup>0 Ω</sup>							
age factor: A	pprox. 2.1		Each of 3 a	xis may be give	n a different l	inear expansior	n coefficient if	requested.
	····		KFRP-5-3	350-D22-1				
	8		KFRP-5-3	350-D22-3		F 4 F	10 1	2
	3		KFRP-5-3	350-D22-6		5 1.5	19 1	9
1	45		KFRP-5-3	350-D22-9				_
	X		KFRP-2-3	350-D22-1				
4	.5°		KFRP-2-3	350-D22-3		2 2.2	15 1	5
			KFRP-2-3	350-D22-0				
						Dimonsi		
	Patterns,			Models	_	Grid	ons (mm) Base	Bomarks
Gage R	Resistance, Ga	age Factor		wodels	Le	ength Width	Length Wig	dth
KFRS S	eries Foil	Strain Ga	ages for	Printed B	oards			
Nhen orde	ering, suffix t	he lead wire	Printed bo	oards are used	d for varieti	es of product	ts including	cellular phones,
able code	e (See table a	at the right)	car naviga	tion systems	and digital	cameras. To e	evaluate the	mechanical and
o the mod	del number v	with a space	thermal c	haracteristic	cs of these	printed boa	ards, the KF	RS gages were
n betweer	า.		developed	l by integratin	ig the advar	ntageous feat	ures of KFG	and KFR gages.
.g.			Dimension	ns of gage base	(bondable sp	ace to mounted	d components	and narrow parts)
KFRP-02-12	20-C1-13 N10	)C3	1.2 mm lo	ong by 1.1 mm v	vide (uniaxial)	, 2.5 mm long b	y 2.5 mm wide	e (biaxial or triaxial)
or the gag	e with a poly	ester-coated	Linear exp	pansion coefficie	ent of 13 x 10	<sup>-6</sup> /°C, suitable fo	or component-	mounted board
8-wire co	pper cable	10-cm long	• Self-temp	erature-compe /clic tests of prir	nsation rang ited boards	e is made as v	wide as -30 t	o 120°C to satisfy
ore-attache	d			,				
	u							
KFRP-5-120	0-D35-13 L5N	/135	Applicabl	e Adhesives	and Opera	ting Temper	rature Rang	e after Curing
KFRP-5-120 or the gag	0-D35-13 L5N Je with a viny	//3S /l-coated flat	Applicabl CC-33A: -1	<b>e Adhesives</b> 196 to 120°C	and Opera CC-36: -3	ting Temper 80 to 100°C	rature Rang PC-600: -1	e after Curing 96 to 150°C
KFRP-5-120 or the gag -wire cable	0-D35-13 L5M ge with a viny e 5 m long pre	<mark>//35</mark> /l-coated flat e-attached	Applicabl CC-33A: -1	e Adhesives 196 to 120°C	and Opera CC-36: -3	<b>ting Temper</b> 80 to 100°C	rature Rang PC-600: -1	e after Curing 96 to 150°C
KFRP-5-120 or the gag wire cable	0-D35-13 L5M ge with a viny e 5 m long pre	A3S VI-coated flat e-attached	Applicabl CC-33A: -1 wire cables	e Adhesives 196 to 120°C pre-attache	and Opera CC-36: -3	ting Temper 30 to 100°C	rature Rang PC-600: -1	e after Curing 96 to 150°C
KFRP-5-120 For the gag B-wire cable	0-D35-13 L5N ge with a viny e 5 m long pre engths and c	A3S /l-coated flat e-attached codes of lead	Applicabl CC-33A: -1 wire cables	e Adhesives 196 to 120°C pre-attache	and Opera CC-36: -3 d to KFRS g	ting Temper 80 to 100°C Jages	PC-600: -1	e after Curing 96 to 150°C
KFRP-5-120 For the gag -wire cable Types, le	0-D35-13 L5N ge with a viny e 5 m long pre engths and c Polyester-coated 2-wire copper cable	A3S vl-coated flat e-attached odes of lead	Applicabl CC-33A: -1 wire cables Vinyl-coated fi	e Adhesives 196 to 120°C pre-attachee lat 2-wire cable	and Opera CC-36: -3 d to KFRS <u>c</u> Vinyl-coated	ting Temper 30 to 100°C Jages I flat 3-wire cable	PC-600: -1 Middle-tempera 2-wire cable	e after Curing 96 to 150°C ature Middle-temperature 3-wire cable
KFRP-5-120 For the gag -wire cable Types, le	0-D35-13 L5N ge with a viny e 5 m long pre engths and c Polyester-coated 2-wire copper cable	A35 vl-coated flat e-attached odes of lead Polyester-coated 3-wire copper cable	Applicabl CC-33A: -1 wire cables Vinyl-coated fl	e Adhesives 196 to 120°C pre-attacher lat 2-wire cable	and Opera CC-36: -3 d to KFRS <u>c</u> Vinyl-coated	ting Temper 30 to 100°C gages I flat 3-wire cable	PC-600: -1 Middle-tempera 2-wire cable	e after Curing 96 to 150°C ture Middle-temperature 3-wire cable
KFRP-5-120 for the gag 8-wire cable Types, le Types	0-D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable	A3S /l-coated flat e-attached odes of lead Polyester-coated 3-wire copper cable	Applicabl CC-33A: -1 wire cables Vinyl-coated fl	e Adhesives 196 to 120°C pre-attacher lat 2-wire cable	and Opera CC-36: -3 d to KFRS <u>c</u> Vinyl-coatec	ting Temper 30 to 100°C gages I flat 3-wire cable	PC-600: -1 Middle-tempera 2-wire cable	e after Curing 96 to 150°C
KFRP-5-120 for the gag B-wire cable Types, le Types	0-D35-13 L5N ge with a viny e 5 m long pre- engths and co Polyester-coated 2-wire copper cable C1, D34,	A35 /l-coated flat -attached odes of lead Polyester-coated 3-wire copper cable and D35	Applicabl CC-33A: -1 wire cables Vinyl-coated fl	e Adhesives 196 to 120°C pre-attached lat 2-wire cable D34, D35	and Opera CC-36: -3 d to KFRS g Vinyl-coated	ting Temper 30 to 100°C gages I flat 3-wire cable D34, D35	PC-600: -1 Middle-tempera 2-wire cable	e after Curing 96 to 150°C ture Middle-temperature 3-wire cable
KFRP-5-120 or the gag 3-wire cable Types, le Types Length	0-D35-13 L5N ge with a viny e 5 m long pre engths and c Polyester-coated 2-wire copper cable C1, D34, N10C2	A3S /l-coated flat e-attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3	Applicabl CC-33A: -1 wire cables Vinyl-coated fl	e Adhesives 196 to 120°C pre-attacher lat 2-wire cable D34, D35	and Opera CC-36: -3 d to KFRS <u>c</u> Vinyl-coatec C1	ting Temper 30 to 100°C jages I flat 3-wire cable D34, D35	And the second s	e after Curing 96 to 150°C ture Middle-temperature 3-wire cable
KFRP-5-12( or the gag 8-wire cable Types, le Types Length 10 cm 30 cm	0-D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2	A3S /l-coated flat e-attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3	Applicabl CC-33A: -1 wire cables Vinyl-coated fl	e Adhesives 196 to 120°C pre-attache lat 2-wire cable D34, D35	and Opera CC-36: -3 d to KFRS <u>c</u> Vinyl-coatec C1	ting Temper 30 to 100°C gages I flat 3-wire cable	And the second s	e after Curing 96 to 150°C ture Middle-temperature 3-wire cable
KFRP-5-12( or the gag 8-wire cable Types, le Types Length 10 cm 30 cm 1 m	0-D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2	A3S /l-coated flat e-attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 L1M2R	e Adhesives 196 to 120°C pre-attachee lat 2-wire cable D34, D35	and Opera CC-36: -3 d to KFRS c Vinyl-coated C1	ting Temper 30 to 100°C gages I flat 3-wire cable D34, D35 L1M3S	Antiperson of the second secon	e after Curing 96 to 150°C ture Middle-temperature 3-wire cable 034, and D35 R1M3
KFRP-5-12( or the gag 3-wire cable Types, le Types Length 10 cm 30 cm 1 m 3 m	0-D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2	A3S /l-coated flat e-attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 C1 L1M2R L3M2R	e Adhesives 196 to 120°C pre-attachee lat 2-wire cable D34, D35 L1M25 L3M25	and Opera CC-36: -3 d to KFRS g Vinyl-coated C1 C1 L1M3R L3M3R	ting Temper 30 to 100°C Jages I flat 3-wire cable D34, D35 D34, D35 L1M3S	Arrian Sector Contraction Cont	e after Curing 96 to 150°C Middle-temperature 3-wire cable 034, and D35 R1M3 R3M3
KFRP-5-12( for the gag B-wire cable Types, le Types Length 10 cm 30 cm 1 m 3 m	0-D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2	A3S /l-coated flat -attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 4508C	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 C1 L1M2R L3M2R L5M2R	e Adhesives 196 to 120°C pre-attached lat 2-wire cable D34, D35 L3M25 L3M25	and Opera CC-36: -3 d to KFRS g Vinyl-coated C1 L1M3R L3M3R L5M3R	ting Temper 30 to 100°C jages I flat 3-wire cable D34, D35 D34, D35 L1M3S L3M3S L5M3S	rature Rang PC-600: -11 Middle-tempera 2-wire cable C1, D C1, D C1	e after Curing 96 to 150°C
KFRP-5-12( or the gag 3-wire cable ■Types, le Types Length 10 cm 30 cm 1 m 3 m 5 m 使用温度範囲	C1, D34, N10C2 N30C2 -196 to	A3S /l-coated flat -attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 0 0 0 0 0 0 0 0 0 0 0 0 0	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 C1 L1M2R L3M2R L5M2R	e Adhesives 196 to 120°C pre-attacher lat 2-wire cable D34, D35 L1M2S L3M2S L5M2S -10 to	and Opera CC-36: -3 d to KFRS <u>c</u> Vinyl-coatec C1 L1M3R L3M3R L5M3R	ting Temper 80 to 100°C gages I flat 3-wire cable D34, D35 L1M35 L1M35 L3M35 L5M35	rature Rang PC-600: -11 Middle-tempera 2-wire cable C1, D C1, D C1, D R1M2 R3M2 R5M2	e after Curing 96 to 150°C
KFRP-5-120 or the gag 3-wire cable ■ Types, le Types Length 10 cm 30 cm 1 m 3 m 使用温度範囲 備考	0-D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2 -196 to	A3S /I-coated flat e-attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 0 150°C	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 C1 L1M2R L3M2R L5M2R	e Adhesives 196 to 120°C pre-attachee lat 2-wire cable D34, D35 L34, D35 L1M2S L3M2S L5M2S -10 to -6	and Opera CC-36: -3 d to KFRS <u>c</u> Vinyl-coated C1 C1 L1M3R L3M3R L5M3R	ting Temper 80 to 100°C gages I flat 3-wire cable D34, D35 L1M35 L1M35 L3M35 L5M35	rature Rang         PC-600: -1'         Middle-temperative cable         2-wire cable         C1, D         C1, D         R1M2         R3M2         R5M2         -10         L-11	e after Curing 96 to 150°C
KFRP-5-120 or the gag 3-wire cable ■Types, le Types Length 10 cm 30 cm 1 m 3 m 使用温度範囲 備 考 * For othe	C1, D34, N10C2 N30C2 C1, D34, N10C2 C1, D34, C1, D34, N10C2 N30C2 C1, D34, C1, D34, N10C2 C1, D34, C1,	A3S Al-coated flat e-attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 0 0 0 0 0 0 0 0 0 0 0 0 0	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 C1 L1M2R L3M2R L5M2R L5M2R	e Adhesives 196 to 120°C pre-attachee lat 2-wire cable D34, D35 D34, D35 L1M2S L3M2S L5M2S -10 to -6	and Opera CC-36: -3 d to KFRS <u>c</u> Vinyl-coated C1 C1 L1M3R L3M3R L5M3R	ting Temper 30 to 100°C gages I flat 3-wire cable D34, D35 D34, D35 L1M35 L3M35 L3M35 L5M35	rature Rang         PC-600: -11         Widdle-temperative         2-wire cable         2-wire cable         C1, D         C1, D         R3M2         R5M2         -100         L-11	e after Curing 96 to 150°C ture Middle-temperature 3-wire cable 034, and D35 034, and D35 R1M3 R3M3 R5M3 00 to 150°C L-12
KFRP-5-12( or the gag 3-wire cable Types, le Types Length 10 cm 30 cm 1 m 3 m 5 m 使用温度範囲 備考 * For othe Uniaxial	Cl, D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable Cl, D34, N10C2 N30C2 -196 to er lead wire Resis	A3S Al-coated flat e-attached odes of lead Polyester-coated 3wire copper cable and D3S N10C3 N30C3 0 0 0 0 0 0 0 0 0 0 0 0 0	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 C1 L1M2R L3M2R L5M2R L5M2R L5M2R	e Adhesives 196 to 120°C pre-attachee lat 2-wire cable D34, D35 L3M25 L3M25 L5M25 -10 to -6	and Opera CC-36: -3 d to KFRS c Vinyl-coated C1 C1 L1M3R L3M3R L5M3R	ting Temper 30 to 100°C Jages I flat 3-wire cable D34, D35 D34, D35 L3M35 L3M35 L5M35	Arture Rang PC-600: -11 Middle-tempera 2-wire cable C1, D C1, D C1	e after Curing 96 to 150°C
KFRP-5-12( or the gag 3-wire cable Types, le Types Length 10 cm 30 cm 1 m 3 m 使用温度範囲 備考 * For othe Uniaxial	C1, D34, N10C2 N30C2 C1, D34, N10C2 N30C2 C1, D34, N10C2 N30C2 C1, D34, N10C2 N30C2 C1, D34, C1, D34,	A3S Al-coated flat e-attached odes of lead Polyester-coated 3-wire copper cable and D3S N10C3 N30C3 0 0 0 0 0 0 0 0 0 0 0 0 0	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 C1 L1M2R L3M2R L5M2R L5M2R L5M2R	e Adhesives 196 to 120°C pre-attachee lat 2-wire cable D34, D35 L1M2S L3M2S L5M2S -10 to -6 US.	and Opera CC-36: -3 d to KFRS c Vinyl-coated C1 L1M3R L3M3R L5M3R	ting Temper 30 to 100°C Jages I flat 3-wire cable D34, D35 L3M35 L3M35 L-7	Arature Rang PC-600: -11 Middle-tempera 2-wire cable C1, D C1, D C1, D R1M2 R3M2 R5M2 -10 L-11	e after Curing 96 to 150°C
KFRP-5-12( or the gag S-wire cable Types, le Types Length 10 cm 30 cm 1 m 3 m 5 m 使用温度範囲 備考 * For othe Uniaxial	C1, D34, N10C2 N30C2 C1, D34, C1, D34, N10C2 C1, D34, C1, D1, D1, D1, D1, D1, D1, D1, D1, D1, D	A3S Al-coated flat e-attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 0 0 0 0 0 0 0 0 0 0 0 0 0	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 C1 L1M2R L3M2R L3M2R L5M2R L5M2R L5M2R	e Adhesives 196 to 120°C pre-attached lat 2-wire cable D34, D35 L1M25 L3M25 L5M25 -10 to -6 US.	and Opera CC-36: -3 d to KFRS g Vinyl-coated C1 L1M3R L3M3R L5M3R 280°C	ting Temper 30 to 100°C jages Iflat 3-wire cable D34, D35 D34, D35 L3M35 L5M35 L-7 cable code L1M	rature Rang         PC-600: -1'         2-wire cable         2-wire cable         C1, D         C1, D         R1M2         R3M2         C10         L-11         I3R are deliver	e after Curing 96 to 150°C
KFRP-5-12( or the gag 3-wire cable Types, le Length 10 cm 30 cm 1 m 3 m 5 m 使用温度範囲 備考 XFor othe Uniaxial	C1, D34, N10C2 N30C2 C1, D34, C1, D34, N10C2 N30C2 C1, D34, C1, D34, C1	A3S A-coated flat -attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 0 0 0 0 0 0 0 0 0 0 0 0 0	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 C1 L1M2R L3M2R L5M2R L5M2R L5M2R L5M2R L5M2R L5M2R L5M2R L5M2R L5M2R L5M2R	e Adhesives 196 to 120°C pre-attacher lat 2-wire cable D34, D35 L1M2S L3M2S L5M2S -10 to -6 US.	and Opera CC-36: -3 d to KFRS g Vinyl-coated C1 L1M3R L3M3R L5M3R o 80°C	ting Temper 30 to 100°C jages Iflat 3-wire cable D34, D35 L1M35 L1M35 L5M35 L-7 cable code L1M	rature Rang PC-600: -11 Middle-tempera 2-wire cable C1, D C1, D C	e after Curing 96 to 150°C
KFRP-5-12( or the gag B-wire cable Types, le Types Length 10 cm 30 cm 1 m 3 m 5 m 使用温度範囲 備考 * For othe Uniaxial	C1, D34, Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2 -196 to er lead wire Resis Gage	A3S A-coated flat -attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 150°C cable length stance: 120 Ω e factor: Approx	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 L1M2R L3M2R L3M2R L5M2R L5M2R L5M2R L5M2R L2M2R L3	e Adhesives 196 to 120°C pre-attacher lat 2-wire cable D34, D35 L1M2S L3M2S L5M2S -10 to -6 US.	and Opera CC-36: -3 d to KFRS <u>c</u> Vinyl-coated C1 L1M3R L3M3R L5M3R b80°C	ting Temper 30 to 100°C Jages If lat 3-wire cable 0 0 0 0 0 0 0 0 0 0 0 0 0	rature Rang         PC-600: -11         Middle-temperative cable         2-wire cable         C1, D         C1, D         R1M2         R3M2         R5M2         -10         13R are deliver         4       1.         1.2       1.	e after Curing 96 to 150°C
KFRP-5-120 or the gag B-wire cable Types, le Types Length 10 cm 30 cm 1 m 30 cm 1 m 3 m 使用温度範囲 備考 * For othe Uniaxial	0-D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2 -196 to er lead wire Resis Gage 8 enlargec	A3S A-coated flat -attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 150°C cable length stance: 120 Ω e factor: Approx	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 C1 L1M2R L3M2R L3M2R L5M2R L5M2R L5M2R L5M2R L2M2R L3M2R L5M2R L2M2R L2M2 L1M2R L3M2R L3M2R L3M2R L3M2R L5M2R	e Adhesives 196 to 120°C pre-attachee lat 2-wire cable D34, D35 L1M2S L3M2S L5M2S -10 to -6 US.	and Opera CC-36: -3 d to KFRS <u>c</u> Vinyl-coated C1 L1M3R L3M3R L5M3R b80°C	ting Temper 30 to 100°C Jages Iflat 3-wire cable D34, D35 L1M35 L1M35 L3M35 L5M35 L5M35 Cable code L1M 1 0.65 0.2 0.8	rature Rang         PC-600: -11         2-wire cable         2-wire cable         C1, D         C1, D         R3M2         R5M2         -100         L-11         13R are deliver         4       1.         1.2       1.	e after Curing 96 to 150°C ture Middle-temperature 3-wire cable 034, and D35 034, and D35 034, and D35 010 to 150°C L-12 ed with a vinyl-coated 4 1
KFRP-5-12( or the gag B-wire cable Types, le Types Length 10 cm 30 cm 1 m 30 cm 1 m 3 m 使用温度範囲 備考 * For othe Uniaxial	o-D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2 -196 to er lead wire Resis Gage 8 enlargec	A3S A-coated flat -attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 (150°C) Cable length stance: 120 Ω e factor: Approx. Stance: 120 Ω e factor: Approx.	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 L1M2R L3M2R L3M2R L5M2R L3M2R L5M2R L3	e Adhesives 196 to 120°C pre-attachee lat 2-wire cable D34, D35 L1M2S L3M2S L5M2S -10 to -6 US.	and Opera CC-36: -3 d to KFRS <u>c</u> Vinyl-coated C1 L1M3R L3M3R L5M3R b 80°C	ting Temper 80 to 100°C gages Iflat 3-wire cable D34, D35 L-7 cable code L1M 1 0.65 0.2 0.8	rature Rang         PC-600: -11         Middle-temperative         2-wire cable         C1, D         C1, D         R3M2         R3M2         L-11         I3R are deliver         4         1.2         1.2	e after Curing 96 to 150°C ture Middle-temperature 3-wire cable 034, and D35 034, and D35 034, and D35 0 to 150°C L-12 ed with a vinyl-coated 4 1
KFRP-5-12( or the gag 3-wire cable Types, le Types Length 10 cm 30 cm 1 m 30 cm 1 m 3 m 5 m 使用温度範囲 備 考 Halle States Halle Halle States Halle Halle States Halle	o-D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2 -196 to er lead wire Resis Gage 8 enlargec	A35 A-coated flat -attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 0 150°C cable length stance: 120 Ω e factor: Approx times Hyper Alexandree times	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 L1M2R L3M2R L3M2R L5M2R L3M2R L5M2R L3	e Adhesives 196 to 120°C pre-attachee lat 2-wire cable D34, D35 L1M2S L3M2S L5M2S -10 to -6 US.	and Opera CC-36: -3 d to KFRS c Vinyl-coated C1 L1M3R L3M3R L5M3R b 80°C	ting Temper 30 to 100°C jages Iflat 3-wire cable D34, D35 L3M35 L3M35 L5M35 L5M35 L-7 cable code L1M 1 0.65 0.2 0.8	rature Rang         PC-600: -11         Middle-temperative         2-wire cable         C1, D         C1, D         R3M2         R5M2         L-11         I3R are deliver         4       1.         1.2       1.	e after Curing 96 to 150°C ture Middle-temperature 3-wire cable 034, and D35 034, and D35 034, and D35 0 to 150°C L-12 ed with a vinyl-coated 4 1
KFRP-5-12( or the gag 3-wire cable Types, le Types Length 10 cm 30 cm 1 m 30 cm 1 m 3 m 使用温度範囲 備考 * For othe Uniaxial	o-D35-13 L5N ge with a viny a 5 m long pre- angths and c Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2 -196 to er lead wire Resis Gage 8 enlargec 0°/90° Resis	A3S Al-coated flat e-attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 0 150°C cable length stance: 120 Ω e factor: Approx times stance: 120 Ω e factor: Approx	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 L1M2R L3M2R L3M2R L5M2R L5M2R L5M2R L5M2R L5M2R L C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1	e Adhesives 196 to 120°C pre-attachee lat 2-wire cable D34, D35 L1M2S L3M2S L5M2S -10 to -6 US. ng models with 120-C1-13 L1M	and Opera CC-36: -3 d to KFRS c Vinyl-coated C1 L1M3R L3M3R L5M3R b 80°C	ting Temper 30 to 100°C jagges Iflat 3-wire cable D34, D35 L1M35 L1M35 L3M35 L5M35 L5M35 L-7 cable code L1M 1 0.65 0.2 0.8	rature Rang PC-600: -11 Middle-tempera 2-wire cable 2-wire cable C1, D C1, D C	e after Curing 96 to 150°C
KFRP-5-120 or the gag B-wire cable Types, le Types Length 10 cm 30 cm 1 m 30 cm 1 m 3 m 5 m 6 cm 2 cm 2 cm 1 m 3 m 5 m 6 cm 2 cm 2 cm 2 cm 2 cm 2 cm 2 cm 2 cm 2	o-D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2 -196 to er lead wire Resis Gage 8 enlargec 0°/90° Resis	A3S A-coated flat e-attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 0 0 0 0 0 0 0 0 0 0 0 0 0	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 C1 L1M2R L3M2R L3M2R L5M2R L3M2R L5M2R L5M2R L5M2R L2 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1	e Adhesives 196 to 120°C pre-attachee lat 2-wire cable D34, D35 L1M2S L3M2S L5M2S -10 to -6 US.	and Opera CC-36: -3 d to KFRS c Vinyl-coated C1 L1M3R L3M3R L5M3R b 80°C the lead wire re-attached. 3R 13R	ting Temper 30 to 100°C Jages Iflat 3-wire cable D34, D35 L3M3S L5M3S L-7 cable code L1M <u>1</u> 0.65 0.2 0.8	Anide temperative Range         PC-600: -11         Anide temperative response         2-wire cable         C1, D         C1, D         C1, D         R1M2         R3M2         R5M2         L-11         I3R are deliver         13R are deliver         I3R are deliver	e after Curing 96 to 150°C
KFRP-5-120 or the gag B-wire cable Types, le Types Length 10 cm 30 cm 1 m 30 cm 1 m 3 m 5 m 6 cm 2 cm 2 cm 1 m 3 m 5 m 6 cm 2 cm 2 cm 2 cm 2 cm 2 cm 2 cm 2 cm 2	o-D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2 -196 to er lead wire Resis Gage 8 enlargec 0°/90° Resis Gage	A3S A-coated flat e-attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 0 0 0 0 0 0 0 0 0 0 0 0 0	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 C1 L1M2R L3M2R L3M2R L5M2R L3M2R L5M2R L5M2R L5M2R L2 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1	e Adhesives 196 to 120°C pre-attachee lat 2-wire cable D34, D35 L1M2S L3M2S L5M2S -10 to -6 US. -0 to -6 US. -10 to -10 t	and Opera CC-36: -3 d to KFRS c Vinyl-coated C1 L1M3R L3M3R L5M3R L5M3R a 80°C the lead wire re-attached. 3R 13R the lead wire re-attached. M3S	ting Temper 30 to 100°C Jages Iflat 3-wire cable D34, D35 D34, D35 L3M35 L3M35 L5M35 L5M35 L5M35 Cable code L1M <u>1</u> 0.65 0.2 0.8	rature Rang         PC-600: -11         2-wire cable         2-wire cable         C1, D         C1, D         C1, D         R1M2         R3M2         R5M2         L-11         I3R are deliver         13R are deliver         2.5         2.5	e after Curing 96 to 150°C ture Middle-temperature 3-wire cable 034, and D35 044, and D35 044, and D35 054, and D35 0 to 150°C 1-12 ed with a vinyl-coated 4 1 ed with a vinyl-coated 5 A min. qty 5 PC.
KFRP-5-12( or the gag B-wire cable Types, le Types Length 10 cm 30 cm 1 m 3 m 5 m 使用温度範囲 備考 * For othe Uniaxial Biaxial, 0	o-D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2 -196 to er lead wire Resis Gago enlargec 0°/90° Resis Gago 4 enlargec	A3S A-coated flat e-attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 0 0 0 0 0 0 0 0 0 0 0 0 0	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 C1 L1M2R L3M2R L3M2R L5M2R L5M2R L5M2R L5M2R L5M2R L2 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1	e Adhesives 196 to 120°C pre-attached lat 2-wire cable D34, D35 L1M25 L3M25 L5M25 -10 to -6 US. -10 to -6 US. -10 to -10 to -10 to -11 to -11 to -11 to -11 to -12	and Opera CC-36: -3 d to KFRS g Vinyl-coated C1 L1M3R L3M3R L5M3R 580°C the lead wire re-attached. 3R 13R the lead wire re-attached. M3S	ting Temper 30 to 100°C Jages Iflat 3-wire cable 0 034, 035 0 0	PC-600: -11         Middle-tempera         2-wire cable         C1, D         C1, D         R1M2         R3M2         R1M2         R3M2         L-11         13R are deliver         13R are deliver         2.5       2.	e after Curing 96 to 150°C ture Middle-temperature 3-wire cable 034, and D35 1 1 1 1 1 1 1 1 1 1 1 1 1
KFRP-5-12( or the gag B-wire cable Types, le Types Length 10 cm 30 cm 1 m 3 m 5 m 使用温度範囲 備考 * For othe Uniaxial Biaxial, 0	o-D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2 -196 to er lead wire Resis Gago 0°/90° Resis Gago 4 enlargec 0°/90°/45°	A3S A-coated flat -attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 A 150°C Cable length stance: 120 Ω e factor: Approx times b view Castance: 120 Ω e factor: Approx times times Augustance: Capper cable Castance: Castance: Capper cable Castance: Capper cable Castance: Capper cable Castance: Castance:	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 C1 L1M2R L3M2R L3M2R L3M2R L5M2R L3M2R L5M2R L3M2	e Adhesives 196 to 120°C pre-attached lat 2-wire cable D34, D35 L1M25 L3M25 L5M25 -10 to -6 US.	and Opera CC-36: -3 d to KFRS ( Vinyl-coated C1 L1M3R L3M3R L5M3R 580°C the lead wire re-attached. 3R 13R the lead wire re-attached. M3S	ting Temper 30 to 100°C Jages Iflat 3-wire cable 034, D35 04 034, D35 04 034, D35 04 034, D35 04 034, D35 04 034, D35 04 034, D35 04 034, D35 04 034, D35 04 034, D35 04 04 04 04 04 04 04 04 04 04	PC-600: -11         Middle-tempera         2-wire cable         C1, D         C1, D         R1M2         R3M2         C1, D         I3R are deliver         1.2         1.3R are deliver         2.5         2.5	e after Curing 96 to 150°C
KFRP-5-12( or the gag B-wire cable Types, le Types Length 10 cm 30 cm 1 m 30 cm 1 m 3	o-D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2 -196 to er lead wire Resis Gage 8 enlargec 0°/90° Resis Gage 8 enlargec 0°/90°/45°	A3S A-coated flat -attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 150°C cable length stance: 120 Ω e factor: Approx times time	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 L1M2R L3M2R L3M2R L5M2R L5M2R L5M2R L5M2R L5M2C L C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1	e Adhesives 196 to 120°C pre-attacher lat 2-wire cable D34, D35 L1M2S L3M2S L5M2S -10 to -6 US. able 1 m long p 20-C1-13 L1M3 -120-C1-13 L1M3 -120-C1-13 L1M3 -120-D34-13 L1	and Opera CC-36: -3 d to KFRS c Vinyl-coated C1 L1M3R L3M3R L5M3R b80°C the lead wire re-attached. 3R 13R the lead wire re-attached. 3R	ting Temper 30 to 100°C Jages If lat 3-wire cable 0 034, D35 0 0 0 034, D35 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	PC-600: -11         Middle-temperative cable         2-wire cable         C1, E         C1, E         R1M2         R3M2         C1, E         I3R are deliver         1.2         1.3R are deliver         2.5         2.5         2.5         2.5	e after Curing 96 to 150°C
KFRP-5-12( or the gag B-wire cable Types, le Types Length 10 cm 30 cm 1 m 30 cm 1 m 3	o-D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2 -196 to er lead wire Resis Gage 0°/90° Resis Gage 0°/90° Resis Gage 0°/90°/45°	A3S A-coated flat -attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 150°C cable length stance: 120 Ω e factor: Approx times times times Cage factor Resistance: Gage factor	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 C1 L1M2R L3M2R L5M2R L5M2R L5M2R C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1	e Adhesives 196 to 120°C pre-attacher lat 2-wire cable D34, D35 L1M2S L3M2S L5M2S -10 to -6 US. ng models with able 1 m long p 20-C1-13 L1M3 -120-C1-13 L1M3 -120-	and Opera CC-36: -3 d to KFRS <u>c</u> Vinyl-coatec C1 L1M3R L3M3R L5M3R b80°C the lead wire re-attached. 3R 13R the lead wire re-attached. M3S	ting Temper 30 to 100°C Jages If lat 3-wire cable D34, D35 L1M35 L1M35 L3M35 L5M35 L5M35 L2M35 Cable code L1M 1 0.65 0.2 0.8	rature Rang         PC-600: -11         2-wire cable         2-wire cable         C1, D         C1, D         C1, D         R3M2         R5M2         -100         L-11         13R are deliver         13R are deliver         2.5       2.         13R are deliver         13R are deliver	e after Curing 96 to 150°C
KFRP-5-12( or the gag B-wire cable Types, le Types Length 10 cm 30 cm 1 m 30 cm 1 m 3 m 5 m 使用温度範囲 備 考 For othe Uniaxial	o-D35-13 L5N ge with a viny e 5 m long pre- engths and c Polyester-coated 2-wire copper cable C1, D34, N10C2 N30C2 -196 to er lead wire Resis Gage 0°/90° Resis Gage 0°/90° Resis Gage 0°/90° A5°	A3S A-coated flat -attached odes of lead Polyester-coated 3-wire copper cable and D35 N10C3 N30C3 150°C cable length stance: 120 Ω e factor: Approx times times times times Aview Cage factor Approx times times times times times times times	Applicabl CC-33A: -1 wire cables Vinyl-coated fl C1 C1 L1M2R L3M2R L5M2R L5M2R C C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C1 C	e Adhesives 196 to 120°C pre-attacher lat 2-wire cable D34, D35 L1M25 L3M25 L5M25 -10 tr -6 US. ng models with 1 able 1 m long p 20-C1-13 L1M3 -120-C1-13 L1M3 -120-D34-13 L1 ng models with 1 able 1 m long p -120-D34-13 L1	and Opera CC-36: -3 d to KFRS <u>c</u> Vinyl-coated C1 L1M3R L3M3R L5M3R b 80°C the lead wire re-attached. 3R 13R the lead wire re-attached. M3S	ting Temper 30 to 100°C 33 34 34, D35 34 35 34 43 57 57 57 57 57 57 57 57 57 57	PC-600: -11         Middle-temperative         2-wire cable         C1, D         C1, D         R1M2         R3M2         R5M2         -100         L-11         13R are deliver         13R are deliver         2.5         2.5         13R are deliver         2.5         2.5         2.5         2.5         2.5         2.5         2.5	e after Curing 96 to 150°C

D

# **Gages for Plastics KFP**

Patterns.				Dime	ensions (mm)	
Gage Resistance, Gage Factor		Models		Grid	Base	Remarks
				Length Wi	dth  Length  Wic	th
●KFP Series Foil Strain Gage	<b>es for Pl</b> a The KEP ser	astics	sprow	vide an annli	cable linear expa	nsion coefficient
	of 65 x 10 <sup>-6</sup> such as acry	/°C, which makes /lic resin.	s then	n suitable fo	r strain measure	ment of plastics
	Applicable CC-33A: -20	Adhesives and to 80°C CC-35:	Ope -20	rating Tem to 80°C	perature Rang	e after Curing
	CC-36: -20	to 80°C EP-34E	3: -20	to 80°C		
	When bond with CC-33, For S-9B, co	ling the KFP gage A, use S-9B surface ntact us.	to a d treat	ifficult-to-bo ment agent	nd materials such in combination.	as polyethylene
When ordering suffix the lead wire	■Types, le	ngths and code	s of le	ead wire ca	bles pre-attach	ed to KFP gages
cable code (See table at the right) to the model number with a space in between.	Турез	Polyester-coated 2-wire copper cable	Poly 3-wire	ester-coated e copper cable	Vinyl-coated flat 2-wire cable	Vinyl-coated flat 3-wire cable
Eq						
KFP-5-120-C1-65 N10C3	Length \			C	1	
for the gage with a polyester-coated	15 cm	N15C2		N15C3	L15C2R	L15C3R
3-wire copper cable 10 cm long	30cm	N30C2		N3UC3	L3UC2R	L3UC3R
If no lead wire cable code is suffixed, the	3 m	1411012			L 3M2R	LISMBR
gage is delivered with gage leads only (Silver dad copper wires 25 mm long)	5 m				L5M2R	L5M3R
(Silver-clad copper wires 25 min long).	Oprg. temp. range	-196 t	o 80°C		-10 te	≥ 80°C
	Remarks	Twisted for 50	) cm or	longer	L-6, L-9 for 6 m or longer	L-7, L-10 for 6 m or longer
Uniaxial	* For othe	er lead wire cab	le lei	ngths, cont	tact us.	
Kesistance: $120 \Omega$ Gage factor: Approx 2.1				5 .		
	KEP-5-12	)-C1-65		5 2	5 13 5	)
	KFP-2-12	D-C1-65		2 2	2 10 4.	7
Uniaxiai 350- gage						
Gage factor: Approx. 2.1						
	KFP-5-35	D-C1-65		5 2.	6 13 5.2	2
	KFP-2-35	D-C1-65		2 2.	4 10 5.2	2
Gage for Low-elast	ticity	Materia	als	KFM	L	
Pottorne				Dime	ensions (mm)	
Gage Resistance, Gage Factor		Models		Grid	Base	Remarks
				Length Wie	dth Length Wic	lth
•KFML Foil Strain Gage for	Low-ela	asticity Mat	eria	ls		
	The KFML enabling low Young	foil strain gag strain measurer g's moduli.	e us nent	es a base v of rubber	with extremel or the similar	y low rigidity, materials with
Uniaxial 350Ω gage Resistance: 350 Ω Gage factor: Approx. 2.0	Applicable	e Adhesives and o 60°C CC-36	Ope : 0 to	rating Tem 60°C	perature Range	e after Curing
				_		
	KFML-5-3	50-C1		5 4	33 7	

# Gages for Ultra-small Strain Measurement KSP & KSN

Dattarra		Dir	mensio	ons (mn	n)	
Gage Resistance Gage Factor	Models	Grio	d	Ba	ise	Remarks
auge nesistance, auge ractor		Length V	Width	Length	Width	
KSP Series Semiconducto	r Strain Gages					
-	The KSP series gages are stable	-perform	ance s	semicor	nductor	strain gages
	usable for general stress measu	rement a	and tra	insduce	rs. The	F2 type has a
Uniaxial	half-bridge formed with 2-	-elemen and is si	nt, po uitable	sitive a for str	and ne	gative, for
Resistance: $120 \Omega$	steel products.	1 4110 13 30			anninea	asurement of
Gage factor. Approx. 120	Applicable Adhesives and Ope	rating Te	emper	ature R	ange a	fter Curing
(200).	CC-33A: -50 to 120°C CC-36:	-30 to 100	°C.		-	-
	KSP-2-120-E3	2	0.25	5	3	
Uniaxial Resistance: 120 Ω Gage factor: Approx. 120						
	KSP-2-120-E4	2	0.26	7.7	4	
Uniavial 3500 gage		-	0.20			
Resistance: 350 Ω						
Gage factor: Approx. 120						
	KSP-6-350-E4	6	0.27	13	5	
Uniaxial 3500 gage		-			-	
Resistance: 350 $\Omega$						
Gage factor: Approx. 150						
<u>۲. ۲.</u>	KSP-1-350-E4	1	0.25	6.6	4	
Uniaxial 1000Ω gage						
Resistance: 1000 Ω						
Gage factor: Approx. 160						
C C	KSP-2-1K-E4	2	0.25	7.7	4	
Uniaxial. 2-element						
Resistance: 120 Ω						
Gage factor: Approx. 225			n0 83			
Gage factor: Approx. 225	KSP-3-120-F2-11	3	n0.83 p0.47	10	4	A min. qty 2 PC.
Gage factor: Approx. 225	KSP-3-120-F2-11	3	n0.83 p0.47	10	4	A min. qty 2 PC.
Resistance: 120 Ω Gage factor: Approx. 225	KSP-3-120-F2-11 Models	3 Dir	n0.83 p0.47 <b>mensic</b>	10 ons (mn	4 n)	A min. qty 2 PC.
Patterns, Gage Resistance, Gage Factor	KSP-3-120-F2-11 Models	3 Dir Grid Length	n0.83 p0.47 mensio d Width	10 ons (mn Ba Length	4 n) se Width	A min. qty 2 PC.
Patterns, Gage Resistance, Gage Factor	KSP-3-120-F2-11 Models	3 Dir Grid Length	n0.83 p0.47 mensio d Width	10 ons (mn Ba Length	4 n) se Width	A min. qty 2 PC.
Patterns, Gage Resistance, Gage Factor	KSP-3-120-F2-11 Models ure-compensation Semi	3 Din Grid Length V condu	n0.83 p0.47 mensid d Width	10 ons (mn Ba Length Strair	4 n) ise Width	A min. qty 2 PC. Remarks
Patterns, Gage Resistance, Gage Factor	KSP-3-120-F2-11 Models Ure-compensation Semi The KSN series gages use an n control the resistance tempera	3 Dir Grid Length V conductor ture coef	n0.83 p0.47 mensio d Width ctor icon fo	10 ons (mn Ba Length Strair or the r	4 n) se Width n Gag	A min. qty 2 PC. Remarks es e element to
Patterns, Gage Resistance, Gage Factor	KSP-3-120-F2-11 Models Ure-compensation Semi The KSN series gages use an n control the resistance tempera to the linear expansion coef	3 Dir Grid Length V conductor o-type sili ture coef fficient o	n0.83 p0.47 mensio d Width ctor icon fo fficien of the	10 ons (mn Ba Length Strair or the r t of the measu	4 ise Width Gag resistive mater iring o	A min. qty 2 PC. Remarks e element to ial according bject. Thus,
Patterns, Gage Resistance, Gage Factor	KSP-3-120-F2-11 Models Ure-compensation Semi The KSN series gages use an n control the resistance tempera to the linear expansion coef thermally-induced resistance ch	3 Dir Grid Length V conduct a-type sili ture coef fficient o lange is m	n0.83 p0.47 mensio d Width ctor ficon for fficien of the ninimized	10 Dons (mn Ba Length Strair or the r t of the measu zed.	4 m) se Width mater resistive mater ring o	A min. qty 2 PC. Remarks es e element to ial according bject. Thus,
Patterns, Gage Resistance, Gage Factor  •KSN Series Self-temperato Uniaxial	KSP-3-120-F2-11 Models URE-compensation Semi The KSN series gages use an n control the resistance tempera to the linear expansion coef thermally-induced resistance ch Applicable Adhesives and Ope	3 Dir Grid Length V conduct Intype sili ture coef fficient o nange is m erating Te	n0.83 p0.47 mensio d Width ctor ficon fo ficien of the ninimizen	10 Dons (mn Ba Length Strair or the r t of the measu zed. ature R	4 n) se Width Gag resistive mater iring o ange a	A min. qty 2 PC. Remarks e element to ial according bject. Thus, fter Curing
Gage factor: Approx. 225         Patterns,         Gage Resistance, Gage Factor         •KSN Series Self-temperate         Uniaxial         Resistance: 120 Ω         Gage factor: Approx. –100	KSP-3-120-F2-11 Models URE-compensation Semi The KSN series gages use an n control the resistance tempera to the linear expansion coef thermally-induced resistance ch Applicable Adhesives and Ope CC-33A: -50 to 120°C CC-36:	J Dir Grid Length V conduct ture coet fficient o hange is m trating Te -30 to 100	n0.83 p0.47 mensio d Width ctor icon fo fficien of the ninimizemper o°C	10 Dons (mn Ba Length Strair or the r t of the measu zed. rature R	4 n) se Width resistive mater uring o ange a	A min. qty 2 PC. Remarks e element to ial according bject. Thus, fter Curing
Gage factor: Approx. 225         Patterns,         Gage Resistance, Gage Factor         •KSN Series Self-temperate         Uniaxial         Resistance: 120 Ω         Gage factor: Approx100	KSP-3-120-F2-11 Models Ure-compensation Semi The KSN series gages use an n control the resistance tempera to the linear expansion coef thermally-induced resistance ch Applicable Adhesives and Ope CC-33A: -50 to 120°C CC-36:	J Dir Grid Length V conduct ture coefficient of lange is m erating Te -30 to 100	n0.83 p0.47 mensio d Width ctor ficon fo fficien of the ninimizemper o°C	10 Dons (mn Ba Length Strair or the r t of the measu zed. rature R	4 Width Gag resistive mater uring o ange a	A min. qty 2 PC. Remarks e element to ial according bject. Thus, fter Curing
Gage factor: Approx. 225         Patterns,         Gage Resistance, Gage Factor         •KSN Series Self-temperate         Uniaxial         Resistance: 120 Ω         Gage factor: Approx100	KSP-3-120-F2-11 Models Ure-compensation Semi The KSN series gages use an n control the resistance tempera to the linear expansion coef thermally-induced resistance ch Applicable Adhesives and Ope CC-33A: -50 to 120°C CC-36:	3 Dir Grid Length V conduct officient of ange is m crating Te -30 to 100	n0.83 p0.47 mension d Width ctor ficien of the ninimiz emper 0°C	10 Dons (mn Ba Length Strair or the r t of the measu zed. rature R	4 Width Gag mater iring o ange a	A min. qty 2 PC. Remarks e element to ial according bject. Thus, fter Curing
Gage factor: Approx. 225         Patterns, Gage Resistance, Gage Factor         •KSN Series Self-temperate         Uniaxial         Resistance: 120 Ω         Gage factor: Approx. –100         Lipiaxial	KSP-3-120-F2-11 Models Ure-compensation Semi The KSN series gages use an n control the resistance tempera to the linear expansion coef thermally-induced resistance ch Applicable Adhesives and Ope CC-33A: -50 to 120°C CC-36: - KSN-2-120-E3-11 KSN-2-120-E3-16	3 Dir Grid Length V o-type sili ture coef fficient o hange is m erating Te -30 to 100	n0.83 p0.47 mension d Width ctor icon fo fficien of the ninimizemper o°C 0.3	10 Dons (mn Ba Length Strair or the r t of the measu zed. ature R	4 n) se Width n Gag resistive mater iring o ange a 3	A min. qty 2 PC. Remarks e element to ial according bject. Thus, fter Curing
Gage factor: Approx. 225         Patterns,         Gage Resistance, Gage Factor         •KSN Series Self-temperate         Uniaxial         Resistance: 120 Ω         Gage factor: Approx100         Uniaxial         Note: 120 Ω         Gage factor: Approx100         Uniaxial         Resistance: 120 Ω         Gage factor: Approx100	KSP-3-120-F2-11 Models Ure-compensation Semi The KSN series gages use an m control the resistance tempera to the linear expansion coef thermally-induced resistance ch Applicable Adhesives and Ope CC-33A: -50 to 120°C CC-36: - KSN-2-120-E3-11 KSN-2-120-E3-16	3 Dir Gric Length V conduc on-type sili ture coef fficient o bange is m erating Te -30 to 100	n0.83 p0.47 mension d Width ctor icon for fricien of the ninimizemper of 0.3	10 Dons (mn Ba Length Strair or the r t of the measu zed. ature R	4 n) ise Width resistive mater iring o ange a 3	A min. qty 2 PC. Remarks e element to ial according bject. Thus, fter Curing
Gage factor: Approx. 225         Patterns,         Gage Resistance, Gage Factor         Patterns,         Gage Resistance, Gage Factor         OKSN Series Self-temperate         Uniaxial         Resistance: 120 Ω         Gage factor: Approx. –100         Uniaxial         Resistance: 120 Ω         Gage factor: Approx. –100	KSP-3-120-F2-11 Models Ure-compensation Semi The KSN series gages use an m control the resistance tempera to the linear expansion coef thermally-induced resistance ch Applicable Adhesives and Ope CC-33A: -50 to 120°C CC-36: - KSN-2-120-E3-11 KSN-2-120-E3-16	J Dir Gric Length V conduc I-type sili ture coef fficient o hange is m erating Te -30 to 100	n0.83 p0.47 mension d Width ctor icon for fficien of the ninimizemper of 0.3	10 ons (mn Ba Length Strair or the r t of the measu zed. ature R	4 n) se Width resistive mater iring o ange a 3	A min. qty 2 PC. Remarks e element to ial according bject. Thus, fter Curing
Gage factor: Approx. 225         Patterns,         Gage Resistance, Gage Factor         •KSN Series Self-temperate         Uniaxial         Resistance: 120 Ω         Gage factor: Approx100         Uniaxial         Resistance: 120 Ω         Gage factor: Approx100         Image factor: Approx100	KSP-3-120-F2-11 Models Ure-compensation Semi The KSN series gages use an m control the resistance tempera to the linear expansion coeft thermally-induced resistance ch Applicable Adhesives and Ope CC-33A: -50 to 120°C CC-36: - KSN-2-120-E3-11 KSN-2-120-E3-16 KSN-2-120-E4-11 KSN-2-120-E4-16	J Dir Grid Length V conduct Intype sili ture coef ficient o nange is m rrating Te -30 to 100 2	n0.83 p0.47 mension d Width ctor ficien of the ninimi: emper %C 0.3	10 ons (mn Ba Length Strair or the r t of the measu zed. ature R 5 7.7	4 n) se Width resistive mater uring o ange a 3	A min. qty 2 PC. Remarks e element to ial according bject. Thus, fter Curing A min. qty 4 PC.
Gage factor: Approx. 225         Patterns,         Gage Resistance, Gage Factor         •KSN Series Self-temperate         Uniaxial         Resistance: 120 Ω         Gage factor: Approx100         Uniaxial         Resistance: 120 Ω         Gage factor: Approx100         Uniaxial         Resistance: 120 Ω         Gage factor: Approx100         Uniaxial         Uniaxial         Uniaxial         Uniaxial         Uniaxial	KSP-3-120-F2-11 Models Ure-compensation Semi The KSN series gages use an n control the resistance tempera to the linear expansion coef thermally-induced resistance ch Applicable Adhesives and Ope CC-33A: -50 to 120°C CC-36: - KSN-2-120-E3-11 KSN-2-120-E3-16 KSN-2-120-E4-11 KSN-2-120-E4-16	J Dir Grid Length V conduct ture coefficient of ange is m trating Te -30 to 100 2 2	n0.83 p0.47 mension d Width ctor ficon fo ficon ficon fo ficon ficon ficon ficon ficon ficon ficon ficon ficon ficon ficon fic	10 ons (mn Ba Length Strair or the r t of the measu zed. sature R 5 7.7	4 width a Gag resistive resistive ange a 3 4	A min. qty 2 PC.  Remarks  e element to ial according bject. Thus,  fter Curing  A min. qty 4 PC.
Resistance: 120 Ω         Gage factor: Approx. 225         Patterns,         Gage Resistance, Gage Factor         OKSN Series Self-temperate         Uniaxial         Resistance: 120 Ω         Gage factor: Approx. –100         Diniaxial         Resistance: 120 Ω         Gage factor: Approx. –100         Uniaxial         Resistance: 120 Ω         Gage factor: Approx. –100         Uniaxial         Resistance: 120 Ω         Gage factor: Approx. –100         Uniaxial         Resistance: 120 Ω         Gage factor: Approx. –100	KSP-3-120-F2-11 Models Ure-compensation Semi The KSN series gages use an n control the resistance tempera to the linear expansion coef thermally-induced resistance ch Applicable Adhesives and Ope CC-33A: -50 to 120°C CC-36: - KSN-2-120-E3-11 KSN-2-120-E3-16 KSN-2-120-E4-11 KSN-2-120-E4-16	3 Dir Grid Length V a-type sili ture coef fficient o hange is m erating Te -30 to 100 2	n0.83 p0.47 mensio d Width ctor ficon fo ficon ficon fo ficon fo ficon fo ficon ficon fo ficon ficon ficon ficon ficon ficon ficon ficon ficon ficon ficon ficon ficon ficon ficon ficon f	10 Dons (mn Ba Length Strain or the r t of the r measu zed. sature R 5 7.7	4 width a Gag resistive imater iring o ange a 3	A min. qty 2 PC.  Remarks  e element to ial according bject. Thus,  fter Curing  A min. qty 4 PC.
Resistance: 120 Ω         Gage factor: Approx. 225         Patterns, Gage Resistance, Gage Factor         Methods and the second se	KSP-3-120-F2-11 Models Ure-compensation Semi The KSN series gages use an n control the resistance tempera to the linear expansion coef thermally-induced resistance ch Applicable Adhesives and Ope CC-33A: -50 to 120°C CC-36: - KSN-2-120-E3-11 KSN-2-120-E3-16 KSN-2-120-E4-11 KSN-2-120-E4-16	3 Dir Grid Length V o-type sili ture coef fficient o hange is m prating Te -30 to 100 2 2	n0.83 p0.47 mension d Width ctor icon fo fficien of the ninimizemper o°C 0.3	10 ons (mn Ba Length Strair or the r t of the measu zed. ature R 5 7.7	4 Width n Gag resistive imater iring o ange a 3	A min. qty 2 PC.  Remarks  e element to ial according bject. Thus,  fter Curing  A min. qty 4 PC.  Oxygen-free tin-plated
Gage factor: Approx. 225         Patterns, Gage Resistance, Gage Factor         ●KSN Series Self-temperate         Uniaxial         Resistance: 120 Ω         Gage factor: Approx100         Imaxial         Resistance: 120 Ω         Gage factor: Approx100	KSP-3-120-F2-11 Models Ure-compensation Semi The KSN series gages use an m control the resistance tempera to the linear expansion coef thermally-induced resistance ch Applicable Adhesives and Ope CC-33A: -50 to 120°C CC-36: KSN-2-120-E3-11 KSN-2-120-E3-16 KSN-2-120-E4-11 KSN-2-120-E4-16 KSN-2-120-E4-16	3 Dir Gric Length V -type sili ture coef fficient o hange is m trating Te -30 to 100 2 2	n0.83 p0.47 mension d Width ctor icon for fricien of the ninimizemper oc 0.3 0.3	10 ons (mn Ba Length Strair or the r t of the measu zed. ature R 5 7.7	4 (Width n Gag resistive mater iring o ange a 3 4	A min. qty 2 PC.  Remarks  es e element to ial according bject. Thus,  fter Curing  A min. qty 4 PC.  Oxygen-free tin-plated copper wires 40 mm long each
Resistance: 120 Ω         Gage factor: Approx. 225         Patterns,         Gage Resistance, Gage Factor         ●KSN Series Self-temperate         Uniaxial         Resistance: 120 Ω         Gage factor: Approx100         Imaxial         Resistance: 120 Ω         Gage factor: Approx110	KSP-3-120-F2-11 Models Ure-compensation Semi The KSN series gages use an m control the resistance tempera to the linear expansion coef thermally-induced resistance ch Applicable Adhesives and Ope CC-33A: -50 to 120°C CC-36: - KSN-2-120-E3-11 KSN-2-120-E3-16 KSN-2-120-E4-11 KSN-2-120-E4-16 KSN-2-120-E5-11 KSN-2-120-E5-11 KSN-2-120-E5-16	3 Dir Gric Length V conduc ture coef ficient o hange is m trating Te -30 to 100 2 2	n0.83 p0.47 mension d Width ctor icon for fricien of the ninimizer of the ninimizer 0.3 0.3	10 ons (mn Ba Length Strair or the r t of the measu zed. ature R 5 7.7	4 Note: Second	A min. qty 2 PC.  Remarks  e element to ial according bject. Thus,  fter Curing  A min. qty 4 PC.  Oxygen-free tin-plated copper wires 40 mm long each
Resistance: 120 Ω         Gage factor: Approx. 225         Patterns,         Gage Resistance, Gage Factor         •KSN Series Self-temperate         Uniaxial         Resistance: 120 Ω         Gage factor: Approx100 $\boxed{120 \Omega}$ Gage factor: Approx110         Biaxial, 0°/90°         Resistance: 120 Ω         Gage factor: Approx110	KSP-3-120-F2-11 Models Ure-compensation Semi The KSN series gages use an m control the resistance tempera to the linear expansion coef thermally-induced resistance ch Applicable Adhesives and Ope CC-33A: -50 to 120°C CC-36: - KSN-2-120-E3-11 KSN-2-120-E3-16 KSN-2-120-E4-11 KSN-2-120-E4-16 KSN-2-120-E4-16	3 Dir Grid Length V conduct I-type siliture coef ficient of ange is m rrating Te -30 to 100 2 2 2	n0.83 p0.47 mension d Width ctor icon for fricien of the ninimi: emper 0.3 0.3	10 Dons (mn Ba Length Strair or the r t of the measu zed. ature R 5 7.7	4 Note: Second	A min. qty 2 PC.  Remarks  e element to ial according bject. Thus,  fter Curing  A min. qty 4 PC.  Oxygen-free tin-plated copper wires 40 mm long each
Resistance: 120 Ω         Gage factor: Approx. 225         Patterns,         Gage Resistance, Gage Factor <b>OKSN Series Self-temperate</b> Uniaxial         Resistance: 120 Ω         Gage factor: Approx100 <b>Uniaxial</b> Resistance: 120 Ω         Gage factor: Approx100 <b>Uniaxial</b> Resistance: 120 Ω         Gage factor: Approx100 <b>Uniaxial</b> Resistance: 120 Ω         Gage factor: Approx100 <b>Diaxial</b> Resistance: 120 Ω         Gage factor: Approx110 <b>Biaxial, 0°/90°</b> Resistance: 120 Ω         Gage factor: Approx100	KSP-3-120-F2-11 Models Ure-compensation Semi The KSN series gages use an m control the resistance tempera to the linear expansion coeft thermally-induced resistance che Applicable Adhesives and Ope CC-33A: -50 to 120°C CC-36: - KSN-2-120-E3-11 KSN-2-120-E3-16 KSN-2-120-E4-11 KSN-2-120-E4-16 KSN-2-120-E4-16	J Dir Gric Length V conduc I-type sili ture coef ficient o lange is m rrating Te -30 to 100 2 2 2	n0.83 p0.47 mension d Width ctor ficon for ficien of the ninimi: emper 0.3 0.3	10 Dons (mn Ba Length Strair or the r t of the measu zed. sature R 5 7.7	4 Nise Width resistive resistive range a 3 4	A min. qty 2 PC.  Remarks  e element to ial according bject. Thus,  fter Curing  A min. qty 4 PC.  Oxygen-free tin-plated copper wires 40 mm long each
Resistance: 120 Ω         Gage factor: Approx. 225         Patterns,         Gage Resistance, Gage Factor         OKSN Series Self-temperate         Uniaxial         Resistance: 120 Ω         Gage factor: Approx100         Imaxial         Resistance: 120 Ω         Gage factor: Approx110         Biaxial, 0°/90°         Resistance: 120 Ω         Gage factor: Approx110	KSP-3-120-F2-11         Models         ure-compensation Semi         The KSN series gages use an n         control the resistance tempera         to the linear expansion coef         thermally-induced resistance ch         Applicable Adhesives and Ope         CC-33A: -50 to 120°C         CC-33A: -50 to 120°C         KSN-2-120-E3-11         KSN-2-120-E3-16         KSN-2-120-E4-16         KSN-2-120-E5-11         KSN-2-120-E5-16	3 Dir Grid Length V conduct ortype siliture coef fficient of ange is m rrating Te -30 to 100 2 2 2	n0.83 p0.47 mension d Width ctor ficon for ficien of the ninimi: emper 0.3 0.3 0.3	10 ons (mn Ba Length Strair or the r t of the measu zed. ature R 5 7.7	4 Nise Width Gag resistive resistive ange a 3 4 -	A min. qty 2 PC.
Resistance: 120 Ω         Gage factor: Approx. 225         Patterns,         Gage Resistance, Gage Factor <b>●KSN Series Self-temperate</b> Uniaxial         Resistance: 120 Ω         Gage factor: Approx100         Imaxial         Resistance: 120 Ω         Gage factor: Approx100         Imaxial         Resistance: 120 Ω         Gage factor: Approx100         Imaxial         Resistance: 120 Ω         Gage factor: Approx110         Imaxial         Resistance: 120 Ω         Gage factor: Approx110         Imaxial         Resistance: 120 Ω         Gage factor: Approx110         Imaxial         Of the interaction         Imaxial         Resistance: 120 Ω         Gage factor: Approx100         90°         Gage factor: Approx100	KSP-3-120-F2-11         Models         ure-compensation Semi         The KSN series gages use an n         control the resistance tempera         to the linear expansion coef         thermally-induced resistance ch         Applicable Adhesives and Ope         CC-33A: -50 to 120°C         CC-33A: -50 to 120°C         KSN-2-120-E3-11         KSN-2-120-E3-16         KSN-2-120-E4-11         KSN-2-120-E5-11         KSN-2-120-E5-16         KSN-2-120-F3-11         KSN-2-120-F3-16	3 Dir Grid Length V conduct on-type silit ture coefficient of nange is m crating Te -30 to 100 2 2 2 2	n0.83 p0.47 mensio d Width ctor ficen fo ficen of the ninimi: emper 0.3 0.3 0.3	10 ons (mn Ba Length Strair or the r t of the measu zed. sature R 5 7.7	4 width ange a ange a 3 4	A min. qty 2 PC.
Resistance: 120 Ω         Gage factor: Approx. 225         Patterns,         Gage Resistance, Gage Factor         ●KSN Series Self-temperate         Uniaxial         Resistance: 120 Ω         Gage factor: Approx100         Imaxial         Resistance: 120 Ω         Gage factor: Approx110         Biaxial, 0°/90°         Resistance: 120 Ω         Gage factor: Approx110         90°         Uniaxial 350Ω gages         Parietance: 350Ω	KSP-3-120-F2-11         Models         ure-compensation Semi         The KSN series gages use an n         control the resistance tempera         to the linear expansion coef         thermally-induced resistance the         Applicable Adhesives and Ope         CC-33A: -50 to 120°C         CC-33A: -50 to 120°C         KSN-2-120-E3-11         KSN-2-120-E3-16         KSN-2-120-E4-11         KSN-2-120-E4-16         KSN-2-120-E5-11         KSN-2-120-E5-16         KSN-2-120-F3-11         KSN-2-120-F3-16	3 Dir Grid Length V conduct on-type silit ture coef fficient of ange is m rrating Te -30 to 100 - 2 - 2 - 2	n0.83 p0.47 mensio d Width ctor ficen fo ficen of the ninimiz emper 0.3 0.3 0.3	10 ons (mn Ba Length Strair or the r t of the measu zed. ature R 5 7.7	4 width ange a ange a 3 4	A min. qty 2 PC.
Resistance: 120 Ω         Gage factor: Approx. 225         Patterns,         Gage Resistance, Gage Factor         ●KSN Series Self-temperate         Uniaxial         Resistance: 120 Ω         Gage factor: Approx100         Imaxial         Resistance: 120 Ω         Gage factor: Approx110         Imaxial         Resistance: 120 Ω         Gage factor: Approx110         Imaxial         Gage factor: Approx110         Imaxial         Gage factor: Approx100	KSP-3-120-F2-11         Models         ure-compensation Semi         The KSN series gages use an n         control the resistance tempera         to the linear expansion coef         thermally-induced resistance the         Applicable Adhesives and Ope         CC-33A: -50 to 120°C         CC-33A: -50 to 120°C         KSN-2-120-E3-11         KSN-2-120-E3-16         KSN-2-120-E4-11         KSN-2-120-E5-11         KSN-2-120-E5-16         KSN-2-120-F3-11         KSN-2-120-F3-16	3 Dir Gric Length V conduc -type sili ture coef fficient o ange is n erating Te -30 to 100 2 2 2 2	n0.83 p0.47 mension d Width ctor icon for fricien of the ninimizemper 0.3 0.3 0.3	10 ons (mn Ba Length Strair or the r t of the measu zed. ature R 5 7.7	4 width ange a 3 4	A min. qty 2 PC.
Resistance: 120 Ω         Gage factor: Approx. 225         Patterns,         Gage Resistance, Gage Factor <b>OKSN Series Self-temperatu</b> Uniaxial         Resistance: 120 Ω         Gage factor: Approx100         Imaxial         Resistance: 120 Ω         Gage factor: Approx110         Imaxial         Or age factor: Approx100         Imaxial         Gage factor: Approx100         Imaxial         Source: 350 Ω         Gage factor: Approx100	KSP-3-120-F2-11         Models         Ure-compensation Semi         The KSN series gages use an montrol the resistance temperator the linear expansion coefficient of the resistance of thermally-induced resistance of thermally-induced resistance of thermally-induced resistance of thermally-induced resistance of the KSN-2-120-E3-11         KSN-2-120-E3-11         KSN-2-120-E3-16         KSN-2-120-E4-11         KSN-2-120-E5-11         KSN-2-120-E5-16         KSN-2-120-F3-11         KSN-2-120-F3-16         KSN-2-120-F3-16	3 Dir Gric Length V conduc -type sili ture coef ficient o ange is m rrating Te -30 to 100 - 2 - 2 - 2	n0.83 p0.47 mension d Width ctor icon for fricien of the ninimizer 0.3 0.3 0.3	10 ons (mn Ba Length Strair or the r t of the measu zed. ature R 5 7.7	4 Width Gag resistiva ange a 3 4	A min. qty 2 PC.

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# **Gages for Ultra-small Strain Measurement KSPH & KSPL**

Patterns, Gage Resistance, Gage Factor	Models	Dimensi Grid Length Width	ons (mm) Base Length Width	Remarks
<b>•</b> KSPH Series High-output S	Semiconductor Strain G	iages		
Uniaxial 2000Ω gage Resistance: 2000 Ω Gage factor: Approx. 170	The KSPH series gages have the making high bridge voltage app <b>Applicable Adhesives and Ope</b> CC-33A: -50 to 120°C CC-36: -	e resistance es licable to obtai <b>rating Temper</b> -30 to 100°C	oecially increas n high output v r <b>ature Range af</b>	ed, thereby oltage. <b>ter Curing</b>
	KSPH-4-2K-E4	4 0.73	11 4	
Uniaxial 10000Ω gage Res Gag	istance: 10000 Ω ge factor: Approx. 170			
	KSPH-9-10K-E4	9 0.58	16 5	
Patterns, Gage Resistance, Gage Factor	KSPH-9-10K-E4 Models	9 0.58 Dimensi Grid Length Width	16 5 ons (mm) Base Length Width	Remarks
Patterns, Gage Resistance, Gage Factor	KSPH-9-10K-E4 Models ductor Gage	9 0.58 Dimension Grid Length Width	16 5 ons (mm) Base Length Width	Remarks
Patterns, Gage Resistance, Gage Factor •KSPL Ultra Linear Semicon Uniaxial 60Ω gage Resistance: 60 Ω	KSPH-9-10K-E4 Models ductor Gage The KSPL gage features a super strain in a comparatively wide sensing element of transducers.	9 0.58 Dimension Grid Length Width rior linearity of e range, there	16 5 ons (mm) Base Length Width resistance cha by making it su	<b>Remarks</b> nge against uitable as a
Patterns, Gage Resistance, Gage Factor •KSPL Ultra Linear Semicon Uniaxial 60Ω gage Resistance: 60 Ω Gage factor: Approx. 90	KSPH-9-10K-E4 Models ductor Gage The KSPL gage features a super strain in a comparatively wide sensing element of transducers. Applicable Adhesives and Ope CC-33A: -50 to 120°C CC-36: -	9 0.58 Dimensi Grid Length Width rior linearity of e range, there rating Temper -30 to 100°C	16 5 ons (mm) Base Length Width resistance cha by making it su ature Range at	Remarks nge against uitable as a iter Curing
Patterns, Gage Resistance, Gage Factor •KSPL Ultra Linear Semicon Uniaxial 60Ω gage Resistance: 60 Ω Gage factor: Approx. 90 	KSPH-9-10K-E4 Models ductor Gage The KSPL gage features a super strain in a comparatively wide sensing element of transducers. Applicable Adhesives and Ope CC-33A: -50 to 120°C CC-36: - KSPL-7-60-E4	9 0.58 Dimensi Grid Length Width rior linearity of e range, there rating Temper -30 to 100°C 7 0.28	16 5 ons (mm) Base Length Width resistance cha by making it su rature Range af 14 5	Remarks nge against uitable as a ter Curing

# **Encapsulated Strain Gages**

### • Encapsulated Strain Gages Hermetically sealed weldable strain gages are consist of sensing part and cable. **MI Cable length codes** and optional accessories

E.g. 1) KHCS-10-120-G12-11 C5M for KHCS with 5 m long MI cable. 2) KHCS-10-120-G12-11 C2MV for KHCS with 2 m long MI cable and a bridge adapter pre-attached.

Options

### Bridge box DB-120A/L

DB-120A

Connect KHCV or KCW to form a Wheatstone bridge



Cable : terminated a NDIS connector. Dimensions: 60 x 42 x 25 mm Weight: Approx. 600 g (including cable)

DB-120L (Compact plug-in type) Cable: Removable type 5 m long, terminated a NDIS connector. Dimensions: 60 × 20 × 20 mm Weight: Approx. 60 g (Excluding cable)

### the soft cable to prevent erroneous wring and ensures **Compression fitting** labor saving. For fixing MI cables. Quarter bridge adapter When ordering, specify it. Normal direction pression fitting Reverse direction Measuring instr

When ordering, specify the model together with code of the desired MI cable length, suffixed with a space in between. The suffix may include codes of the optional bridge adapter and compression fitting (See table below.) In all case, the length of soft cable is 50 cm (For extension, contact us).

MI cable length	Code of MI cable length	Bridge adapter pre-attached A	Compression fitting B	A & B
1m	C1M	C1MV	C1MF	C1MFV
2m (Std.)	C2M	C2MV	C2MF	C2MFV
3m	C3M	C3MV	C3MF	C3MFV
4m	C4M	C4MV	C4MF	C4MFV
5m	C5M	C5MV	C5MF	C5MFV
6m	C6M	C6MV	C6MF	C6MFV
8m	C8M	C8MV	C8MF	C8MFV
10m	C10M	C10MV	C10MF	C10MFV

### Sensing part (2-element)

### Flange MgO Dummy element Sheath tube Active element

### Half bridge adapter Equipped with optimum ¢1.7 temperature compensation Soft cable resistors for the operating ridge adapter Transparent heat-shrink tube temperature range. When delivered, it is per-attached to



A dedicated adapter to the KHCV, enables easy selection of the cutoff frequency (1.6, 7.23, 16 Hz, and flat) as well as easy connection to the measuring instrument to prevent erroneous wring.



# Encapsulated Gages KHCX, KHCV, KHCR, KHCS, KHCM, and KHC

Detterme		Dimens	ions (mm)	
Patterns, Gage Resistance, Gage Factor	Models	Gage length	Flange	Remarks
		5 5	Length Width	
950°C (Static/dynamic)	Resistance: 120Ω. Gage factor (950°C	C): Approx. 1.5.	Material: Inconel 6	600 (NCF 600)
Uniaxial, 2-element,	Installation Method and Operating Temperature Range	Spot welding	: -196 to 950°C	
temperature-compensation type	The following models with the stan with MI cable 2m long and soft cab	ndard lead wire ble 0.5m long pr	cable code C2M a e-attached	re delivered
	KHCX-10-120-G13-11 C2MV KHCX-10-120-G13-13 C2MV	10 -	20 3	Min. radius of curvature R75
800°C (Dynamic) ●KHCV Encapsulated Gage	Resistance: 120Ω. Gage factor (800°C	C): Approx. 1.2.	Material: Inconel 6	00 (NCF 600)
Uniaxial, 1-element active	Installation Method and Operating Temperature Range	Spot welding	: 25 to 800°C	
	The following models with the stan with MI cable 2m long and soft cab	ndard lead wire ble 0.5m long pr	cable code C2M a e-attached	re delivered
	KHCV-5-120-G17 C2MV	5 –	10 3	Min. radius of curvature R15
750°C (Static/dynamic)	Resistance: 120Ω. Gage factor (750°C	C): Approx. 1.2.	Material: Inconel	600 (NCF 600)
•KHCR Encapsulated Gage	Installation Method and Operating Temperature Range	Spot welding	: 25 to 750°C	
temperature-compensation type	The following models with the stand with MI cable 2m long and soft cable	dard lead wire ca e 0.5m long pre-	able code C2M are attached	delivered
	KHCR-5-120-G16-11 C2MV			Min_radius of
	KHCR-5-120-G16-13 C2MV KHCR-5-120-G16-16 C2MV	5 –	10 3	curvature R15
Dynamic Strain Measurement at 750°C <b>●KHCS Series</b>	Resistance: 120Ω. Gage factor (750°)	C): Approx. 1.8.	Material: Inconel 6	500 (NCF 600)
Encapsulated Gages for Static	Operating Temperature Range	Spot welding	: –196 to 750°C	
Uniaxial, 2-element, temperature-compensation type	The following models with the stand MI cable 2 m long and soft cable 0.5	dard lead wire ca m long pre-atta	able code C2M are ched.	delivered with
	KHCS-10-120-G12-11 C2MV	10 -	20 3	Min. radius of
	KHCS-10-120-G12-16 C2MV	10	20 5	curvature R20
Dynamic Strain Measurement at 650°C ●KHCM Series Encapsulated Gages for Static	Resistance: 120Ω. Gage factor (650°C approx. 1.4 for gage length 5 mm. M Installation Method and	C): Approx. 1.8 fo laterial: Inconel Spot welding	or gage length 10 r 600 (NCF 600) : –196 to 650°C	nm,
Uniaxial, 2-element,	The following models with the stand	dard lead wire ca	able code C2M are	delivered with
temperature-compensation type	MI cable 2 m long and soft cable 0.5	m long pre-atta	ched.	Min. radius of
	KHCM-5-120-G15-(11, 13, 16) C2M		10 3	curvature R15 Min_radius of
	кнсм-10-120-G15-(11, 13, 16) С2	10 -	20 3	curvature R20
<b>550°C (Dynamic) 500°C(Stati</b> <b>•KHC Encapsulated Gage</b> Uniaxial, 2-element, temperature-compensation type	<b>c)</b> Installation Method and Operating Temperature Range	Spot welding	: −196 to 550°C	
Resistance: 120 Ω Gage factor (500°C) : Approx. 1.75 for gage length 20 mm Approx. 1.5 for gage length 10 mm Material: Inconel 600 (NCE 600)	The following models with the stanc MI cable 2 m long and soft cable 0.5	lard lead wire ca m long pre-atta	able code C2M are ched.	delivered with
	KHC-20-120-G8-(11, 13, 16) C2MV	20 –	30 4	Min. radius of curvature R25
	KHC-10-120-G8-(11, 13, 16) C2MV	10 -	16.5 4	Min. radius of curvature R20
Uniaxial, 2-element, temperature Resistance: 120 $\Omega$ Gage factor (500°C), approx. : 1.75 for gage length 20 mm, 1.5 for gage length 10 mm Material: SUS 321	-compensation type The following models with the stanc MI cable 2 m long and soft cable 0.5	lard lead wire ca m long pre-atta	able code C2M are ched.	delivered with
	KHC-20-120-G9-(11, 13, 16) C2MV	20 –	30 5	Min. radius of curvature R25
	KHC-10-120-G9-(11, 13, 16) C2MV	10	16.5 5	Min. radius of curvature R20

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# High-temperature Gages KFU & KH

Dattama			Dime	nsions	; (mm)	
Patterns,		Models	Grid		Base	Remarks
Gage Resistance, Gage Factor			Length Wie	th Le	ngth Width	
		Chuelin Company (2			3	
•KFU Series High-temperat	The base is made of N characteris Note) Please E.g. 72 hours	made of highly heat- iCr alloy foil, thereby tics over a wide tempe use KFU for a short perior or less at 350 °C, 360 hou	resistant po letting the l erature rang d test. urs or less at 3 a on the condition	lyimide KFU se e. 00 °C,	e and the ga ries gage exł	ge element is nibit superior
When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space	Applicable Ac	lhesives and Operating Ten	nperature Range after Curing PI-32 –196 to 350°C ead wire cables pre-attached to KFU dades			
in between.	Turner	High/low-tomp 3-wi	re cable	Glass-co	ated cable of 3 Ni	clad copper wires
-	Types	nigh/low-temp. 5-wi		and D17		
E.g.	1E am	1115.62	CI, DI0,		D1562	
for the gage with a high/low-temperature	20 cm	HIDCS			BISCS	
3-wire cable 5 m long pre-attached	30 CIII	H30C5			BING	
KFU-5-120-C1-11 B5M3	2 m				BIIVIS	
for the gage with a glass-coated Ni-clad	5 m				DSIVIS	
3-wire copper cable 5 m long pre-attached		106 to 250°C			Normal tomp t	0.280°C
If no lead wire cable code is suffixed the	Opry. temp. range	-190103500			Contact l	0 280 C
gage is delivered with an Advanced	Kemarks	L-17			Contact t	15
ribbon cable only (25 mm long).	* For othe These gages are	r lead wire cable ler e also available with 350Ω gag	e resistance, wit	h a slight	difference in size	from 120Ω gages
Uniaxial	KFU-5-120	)-C1-11				
Resistance: 120 $\Omega$ Gage factor: Approx 1.85 (At 350 °C)	KFU-5-120	)-C1-16	5 2.	5	10 3.7	
	KFU-5-120	D-C1-23		_		
	KFU-2-120	0.01.16	2 2	-	c	
	KFU-2-120		Ζ Ζ.	C	0 5.7	
Piavial 0° (00° stacked resotte						
Resistance: 120.0	These gages are	also available with 3500 dad	e resistance wit	h a slight	difference in size	from 1200 gages
Gage factor: Approx. 1.85 (At 350 °C )	KELL-5-120		c resistance, wit	nu silgin		nonn 12032 gages
	KFU-5-120	)-D16-16	5 1	1	<i>d</i> 11	
	KFU-5-120	)-D16-23	J 1.	4	ψΠ	
	KFU-2-120	)-D16-11				
90°	KFU-2-120	)-D16-16	2 1	2	<i>φ</i> 8	
	KFU-2-120	)-D16-23				
Triaxial, 0°/90°/45° stacked rose	tte					
Resistance: 120 Ω	These gages are	e also available with 350Ω gag	e resistance, wit	h a slight	difference in size	from 120Ω gages
Gage factor: Approx. 1.85 (At 350 °C )	KFU-5-120	)-D17-11				
	KFU-5-120	)-D17-16	5 1	4	<i>ф</i> 11	
A5°	KFU-5-120	)-D17-23			ψΠ	
	KFU-2-120	)-D17-11				
45°	KFU-2-120	)-D17-16	2 1	2	<i>d</i> 8	
	KFU-2-120	D-D17-23				
D. //			Dime	nsions	(mm)	
Patterns,		Models	Grid		Base	Remarks
Gage Resistance, Gage Factor			Length Wie	dth Le	ngth Width	
OKH Series High temperate		train Gages (25	() ()			
When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g.	The metal b Installation M Time indic 24 hours or Types, le	Action Cages (52) hase enables easy mou Method and Operating Te ators (changes deper less at 350 °C, 72 hour ngths and codes of l	inting with a imperature Ra inding on u rs or less at 3 ead wire ca	a comp inge S sage c 00 °C ables p	oact spot weld pot welding onditions) pre-attached	der. −50 to 350°C I to KH gages
KH-5-350-G4-11 D5M3	Types	Glass-coa	ted cable of 3	Ni-plate	d copper wires	
for the gage with a glass-coated cable	Length		G	4		
of 3-twisted Ni-plated copper wire 5 m	15 cm		D15	C3		
Uniavial	30 cm		D30	C3		
Resistance: 350 Ω	1 m		D1N	13		
Gage factor: Approx. 2.0 (At 350 °C )	3 m		D3N	13		
······································	5 m		D5N	13		
······	Oprg. temp. range		-50 to	350°C		
If no cable code is suffixed, the gage is	*For othe	r lead wire cable lei	ngths, con	tact us	5.	
delivered with an Advanced ribbon cable	KH-5-350-	G4-11	E ,		20 0	A min at EDC
only (25 mm long)	KH-5-350-	G4-16	5		δ δ	A min. qly 5 PC.
						A min. qty 10 PC.

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■ ♀ STRAIN GAGES

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Ultra-small Strains for High, Low Temperature

# High-temperature Gages KFH

Pattorps				Dimensi	ons (mr	n)	
Gage Resistance Gage Factor		Models	G	rid	Ba	ase	Remarks
			Length	Width	Length	Width	
•KEH Sories High tempera	tura Fail (	Strain Canac (		、 、			
•KFH Series High-tempera	ture Foil s	Strain Gages (A	250 C	)			
	The base is r	nade of highly heat-	resistan	t polyim	nide and	the gag	ge element is
	made of Ni	Cr alloy foil, thereby	ensurin	g less th	nermal o	output a	nd excellent
	temperature	e characterístics.					
	Appropriat	e adhesives and op	erating	tempe	rature i	range,	
	time/temp	for curing.				-	
	(It changes	depending on the	conditio	on.)			
	PC-600: -196	to 250°C					
		ours or less at 250 °C					
	EP-34B: -55 t 120	o 200°C hours or less at 200 °	C				
	PI-32: -196 to	n 250°C	C				
	24 hou	urs or less at 250 °C					
		orths and codes of	aad wir	o cablo	s nro-at	tachod	to KEH gages
When ordering suffix the lead wire				e cable.	spie-au	itacheu	to Kill gages
cable code (See table at the right)	Types	High/low-temp. 3-wire cable	Glass	-coated ca Ni-clad	able	Fluorop high/	lastic-coated low-temp.
to the model number with a space			3-wire	e copper o	able	3-v	vire cable
in between.			_		-	-	
F.g.	Length		1	C1, D25			
KFH-5-120-C1-11 for the gage with a	15 cm	H15C3		B15C3		F	15C3
high/low-temperature 3-wire cable	30 cm	H30C3		B30C3		F	-30C3
5m long pre-attached.	1 m	H1M3		B1M3		F	1M3
$\rightarrow$ KFH-5-120-C1-11 H5M3	3 m	H3M3		B3M3		F	3M3
If we lead wine calls and is sufficient		H5M3		B5M3		F	5M3
If no lead wire cable code is suffixed, the gage is delivered with an advanced	5 m	Hama				-196 to 250°C	
If no lead wire cable code is suffixed, the gage is delivered with an advanced ribbon cable only(25mm long)	5 m Oprg. temp. range	-196 to 250°C	Norma	l temp. to	250°C	-196	5 to 250°C
If no lead wire cable code is suffixed, the gage is delivered with an advanced ribbon cable only(25mm long)	5 m Oprg. temp. range Remarks * For other	-196 to 250°C L-17	Norma c	temp. to Contact us	250°C	-196	6 to 250°C
If no lead wire cable code is suffixed, the gage is delivered with an advanced ribbon cable only(25mm long)	5 m Oprg. temp. range Remarks * For other These gages a size from 120	-196 to 250°C L-17 r lead wire cable le are also available with Ω gages.	Normal	i temp. to Contact us contac age resis	250°C t us. tance, w	-196 vith a slig	L-3
If no lead wire cable code is suffixed, the gage is delivered with an advanced ribbon cable only(25mm long) Uniaxial Resistance: 120 Ω Gage factor: Approx, 1.9 (At 250 °C)	5 m Opg.temp.range Remarks * For other These gages a size from 120 KFH-5-120	-196 to 250°C L-17 r lead wire cable le are also available with Ω gages. -C1-11	Normal congths, 350Ω ga	contact us	t us.	-196 vith a slig	ht difference in
If no lead wire cable code is suffixed, the gage is delivered with an advanced ribbon cable only(25mm long) Uniaxial Resistance: 120 Ω Gage factor: Approx. 1.9 (At 250 °C )	5 m Opg.temp.range Remarks * For other These gages a size from 120 KFH-5-120- KFH-5-120-	-196 to 250°C L-17 r lead wire cable le are also available with Ω gages. -C1-11 -C1-16 -C1-22	Norma c engths, 350Ω ga 5	i temp. to Contact us contac age resis 2.5	t us. tance, w	-196 vith a slig 3.7	ht difference in
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If no lead wire cable code is suffixed, the gage is delivered with an advanced ribbon cable only(25mm long) Uniaxial Resistance: 120 Ω Gage factor: Approx. 1.9 (At 250 °C )	5 m Oppg.temp.range Remarks * For other These gages a size from 120 KFH-5-120- KFH-5-120- KFH-2-120- KFH-2-120- KFH-2-120- KFH-2-120- KFH-2-120- KFH-1-120- KFH-1-120- KFH-1-120- KFH-1-120- KFH-1-120- KFH-1-120- KFH-05-120 KFH-05-120 KFH-05-120 KFH-05-120 KFH-05-120	-196 to 250°C L-17 r lead wire cable lead are also available with Ω gages. -C1-11 -C1-16 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-24 -C1-26 -C1-23 -C1-26 -C1-27 -C1-26 -C1-27 -C1-26 -C1-27 -C	Normal c engths, 350Ω ga 5 2 2 1 0.5 0.2	contact us contact us age resis 2.5 2.5 1.5 1.4 1.4	250°C t us. tance, w 10 6 4 3.3 2.5	-196 vith a slig 3.7 3.7 2.7 2.7 2.2	5 to 250°C           L-3           ht difference in           10           10           10           10           10           10           10           10           10           10
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If no lead wire cable code is suffixed, the gage is delivered with an advanced ribbon cable only(25mm long) Uniaxial Resistance: 120 Ω Gage factor: Approx. 1.9 (At 250 °C ) Triaxial, 0°/90°/45° Resistance: 120 Ω Gage factor: 10 (At 250 °C )	5 m Oppg.temp.range Remarks * For other These gages a size from 120 KFH-5-120- KFH-5-120- KFH-5-120- KFH-2-120- KFH-2-120- KFH-1-120- KFH-1-120- KFH-1-120- KFH-05-120- KFH-05-120- KFH-02-120- KFH-	-196 to 250°C L-17 r lead wire cable lead are also available with Ω gages. -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-12 -C1-23 -C1-11 -C1-23 -C	Normal c engths, 350Ω ga 5 2 1 0.5 0.2	Itemp. to       Contact us       Contact       age resis       2.5       2.5       1.5       1.4       1	250°C t us. tance, w 10 6 4 3.3 2.5	-196 vith a slig 3.7 3.7 2.7 2.7 2.2 vith a slip	ht difference in 10 10 10 10 10 10 ht difference in
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If no lead wire cable code is suffixed, the gage is delivered with an advanced ribbon cable only(25mm long)	5 m Oppg.temp.range Remarks * For other These gages a size from 120 KFH-5-120- KFH-5-120- KFH-5-120- KFH-2-120- KFH-2-120- KFH-2-120- KFH-2-120- KFH-2-120- KFH-2-120- KFH-1-120- KFH-05-120 KFH-05-120 KFH-05-120 KFH-05-120 KFH-05-120 KFH-05-120 KFH-05-120 KFH-05-120 KFH-05-120 KFH-05-120 KFH-05-120 KFH-120-	-196 to 250°C L-17 r lead wire cable lead are also available with Ω gages. -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-23 -C1-11 -C1-23 -C1-23 -C1-11 -C1-23 -C1-23 -C1-23 -C1-11 -C1-23 -C	Normal c engths, 350Ω ga 5 2 1 0.5 0.2 350Ω ga 350Ω ga	Itemp. to       contact us       contact       age resis       2.5       2.5       1.5       1       age resis       1.5       1.5       1.5	250°C t us. tance, w 10 6 4 3.3 2.5 tance, w	-190 vith a slig 3.7 3.7 2.7 2.7 2.2 vith a slig	ht difference in 10 10 10 10 10 10 A min. qty 5 PC.
If no lead wire cable code is suffixed, the gage is delivered with an advanced ribbon cable only(25mm long) Measure 120 Ω Gage factor: Approx. 1.9 (At 250 °C)	5 m Oppg.temp.range Remarks * For other These gages a size from 120 KFH-5-120- KFH-5-120- KFH-5-120- KFH-2-120- KFH-2-120- KFH-2-120- KFH-2-120- KFH-2-120- KFH-1-120- KFH-1-120- KFH-05-120 KFH-05-120 KFH-02-120 KFH-02-120 KFH-02-120 KFH-02-120 KFH-02-120 KFH-120-	-196 to 250°C L-17 r lead wire cable lead are also available with Ω gages. -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-23 -C1-11 -C1-23 -C	Normal c engths, 350Ω ga 5 2 1 0.5 0.2 350Ω ga 1	Itemp. to       contact us       contact       age resis       2.5       2.5       1.5       1.4       1       age resis       1.5       1.5	250°C t us. tance, w 10 6 4 3.3 2.5 tance, w	-194 vith a slig 3.7 3.7 2.7 2.7 2.2 vith a slig	ht difference in 10 10 10 10 10 10 10 A min. qty 5 PC.
If no lead wire cable code is suffixed, the gage is delivered with an advanced ribbon cable only(25mm long) <b>Uniaxial</b> Resistance: 120 Ω Gage factor: Approx. 1.9 (At 250 °C) <b>Triaxial, 0°/90°/45°</b> Resistance: 120 Ω Gage factor: Approx. 1.9 (At 250 °C) <b>Uniaxial</b> <b>Uniaxial</b> <b>Uniaxial</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Comparison</b> <b>Compariso</b>	5 m Oppg.temp.range Remarks * For other These gages a size from 120 KFH-5-120 KFH-5-120 KFH-2-120 KFH-2-120 KFH-2-120 KFH-1-120 KFH-1-120 KFH-05-120 KFH-02-120	-196 to 250°C L-17 r lead wire cable lead are also available with Ω gages. -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-16 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-23 -C1-11 -C1-23 -C1-11 -C1-23 -C1-23 -C1-23 -C1-23 -C1-11 -C1-23 -C	Normal c engths, 350Ω ga 5 2 1 0.5 350Ω ga 350Ω ga 1 0.5	Itemp. to         contact us         contact         age resis         2.5         2.5         1.5         1.4         1         age resis         1.5         1.5         1.5         1.5         1.4         1         1.5         1.4	250°C t us. tance, w 10 6 4 3.3 2.5 tance, w	-196 vith a slig 3.7 3.7 2.7 2.7 2.2 vith a slig \$8 7.5	ht difference in 10 10 10 10 10 10 A min. qty 5 PC. A min. qty 5 PC.

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Ultra-small Strains for High, Low Temperature

# Low-temperature Gages KFL

	Dimensions (mm)								
Patterns,	Models				Grid	Base	Pomarks		
Gage Resistance, Gage Factor		woders		Long		Dase	Remarks		
				Leng					
KFL Series Low-temperatu	re Foil S	Strain Gao	aes						
-	The agae e	lement is mad	₽ le of NiCr		which exhi	hits excellent o	haracteristics		
	under low-	temperature	environn	nent	s and is sand	wiched betwe	en polvimide		
	films. Thus,	the KFL serie	s gages a	ire su	uitable for st	rain measurer	nent of tanks		
	and vessels	containing lo	w-tempe	ratu	re liquids suc	h as LNG and I	.PG.		
	Applicable	e Adhesives a	and Ope	ratin	g Temperat	ure Range af	ter Curing		
	EP-270: –26	59 to 30 °C, PC	-600: –26	9 to	150 °C, CC-33	A: –196 to 120	)°C		
When ordering, suffix the lead wire	Types, ler	noths and cod	es of lead	l win	e cables pre-a	attached to KF	L series gages		
cable code (See table at the right)	 	- <b>j</b>							
to the model number with a space	Types	Polyester-coated 2-wire copper cable	Polyester-co 3-wire coppe	ated r cable	Middle-temperature 2-wire cable	<ol> <li>Middle-temperature.</li> <li>3-wire cable</li> </ol>	Huoroplastic-coated		
In between.							3-wire cable		
F.a.	Length				C1, D25				
KEL-5-120-C1-11 E5M3	15 cm	N15C2	N15C3	3	R15C2	R15C3	F15C3		
for the gage with a fluororesin-coated	30 cm	N30C2	N30C3	3	R30C2	R30C3	F30C3		
high/low-temperature 3-wire cable 5 m	1 m	N1M2	N1M3		R1M2	R1M3	F1M3		
long pre-attached	3 m				R3M2	R3M3	F3M3		
If no lead wire cable code is suffixed.	5 m				R5M2	R5M3	E5M3		
the gage is delivered with gage leads	Opra temp rango	_ 106 + 2	150°C		100+	0 150°C	-269 to 150°C		
only (Silver-clad copper wires 25 mm	Remarke	Twisted for EC		or	-1001	1 12	205 10 150 0		
long each).	Remarks	TWISTED TOT SC	· · · ·		L-11	L-12	L-5		
	* For othe	er lead wire o	cable ler	ngth	s, contact u	s.			
Gage factor: Approx. 2.1									
	KFL-30-35	50-C1-5		30	) 2.7	36 5.2	Mainly for lumber		
	KFL-30-35	50-C1-11					Mainly for concrete		
Uniaxial									
Resistance: 120 Q									
Gage factor: Approx. 2.1	These gages	are also availa	ble with 3	50 <b>Ω</b>	gage resistan	ce, with a slight	difference in		
	size from 12	$0\Omega$ gages.							
	KFL-5-120	)-C1-11							
	KFL-5-120	)-C1-16		5	2.5	10 3.7			
	KFL-5-120	)-C1-23							
	KFL-2-120	)-C1-11							
	KFL-2-120	)-C1-16		2	2.5	6 3.7			
	KFL-2-120	)-C1-23							
	KEL 1 120	)-C1-16		4	1 -	4 27			
	KFL-1-120	)-C1-23		1	1.5	4 2.7			
	KFL-05-13	20-C1-11							
	KFL-05-12	20-C1-16		0	5 1 /	33 27			
	KFL-05-12	20-C1-23		0.3	. 1.4	J.J Z.I			
	KFL-02-12	20-C1-11			_				
	KFL-02-12	20-C1-16		0.2	2 1	25 22			
	KFL-02-12	20-C1-23		0.2	- '	2.5 2.2			
Iriaxial, 0°/90°/45°									
Resistance: 120 02									
Gage lactor. Approx. 2.1	Those man		-لە: مام	2500			at difforce as in		
	inese gages	are also availa	ible with	350(	2 gage resista	nce, with a slig	in almerence in		
		032 yayes.							
45°	KEL 1 120	16			1 -	4.0	A min at EDC		
45°	KEL-1-120	-025-73		1	1.5	φδ	A min. qly 5 PC.		
	KFL-1-120	0-D25-11							
	KFL-05-12	20-D25-16		0	5 1 /	<i>ф</i> 75	A min aty 5 PC		
	KFL-05-12	20-D25-23		0.1	, 1.4	ψ1.5	A mini. quy 3 FC.		
		~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~							

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**High-elongation** 

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# High-elongation Gages KFEM & KFEL

					Dimensio	Dimensions (mm)			
Patterns,		Models			Grid			Remarks	
Gage Resistance, Gage Factor		Models		Leng	th Width	Lenat	h Width	Remarks	
•KFEM Series High-elongation Foil Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KFEM-5-120-C1 L10M2R for the gage with a vinyl-coated flat 2-wire cable 10 m long pre-attached	KFEM ser plastic reg rupture i (polyethy Measure Laminate property Foil mate Applicable	ies ultrahigh-e gion on structu tests of metal lene, polyprop ment of 20% to e protruded fror , making the gag erial has an impr Adhesive and Op	longati res and s (Stee /lene). 30% ma n the tip ges hard oved elo erating T	ion foil l are su el, stai o f gag l to pee ongatio <b>Femper</b> a	l gages ca uitable for inless ste deformatic ge base ens el off. on property ature Range	in mean large el, alu on poss sures in y and is e after o	asure stra strain me uminum) sible nproved a s hard to d Curing CC-	in in elastic 1 easurement ( and plastic dhesive isconnect. -36 –20 to 80°C	
If no lead wire cable code is suffixed, the gage is delivered with gage leads		olvester-coated 2-wire cor	ner cable	Vinvl-coa	ated flat 2-wir	e cable	Vinvl-coated	flat 3-wire cable	
only (Silver-clad copper wires 25 mm	l an ath	C1 D34 and D	35			с сал.с С	1		
iong each). *Strain limit of 20% to 30% is ensured for	15 cm	N15C2			L15C2R			5C3B	
simple tension applied to the gage bonded	30 cm	N30C2			130C2R		13	IOC3R	
alloy (A1050) at normal temperature.	1 m	N1M2			L1M2R		11	M3R	
*Strain limit will be down under the following conditions.	3 m	IN TIVIZ			L3M2R		13	M3R	
• In case of bonding to hard-to bond	5 m				L5M2R		15	M3R	
materials such as aluminum alloy (A7075) and plastics(polypropylene)	Oprg. temp. range	-10 to 80°C				-10 to	80°C		
<ul> <li>In case of the targets have discontinuous distortion or any crack on its surface</li> </ul>	Remarks T	Twisted for 50 cm or	lonaer	L-6, I-9	for 6 m or lo	onger	L-7, L-10 fc	or 6 m or longer	
<ul> <li>In case of measurement at High/low</li> </ul>	V For att		able !-				- , - , - , - , - , - , - , - , - , - ,		
temperature.		ler lead wire d	able le	enguis	s, contact	Lus.			
UNIAXIAI Resistance: 120 O	KFEM-10	0-120-C1		10.0	) 2.5	17.5	4.5		
Gage factor: Approx. 2.0	KFEM-5-	120-C1		5.0	1.5	11.5	3.0		
	KFEIVI-2-	120-01		2.0	1.5	8.5 7.0	2.5		
					Dimensio		2.5		
Patterns,		Models		-	Crid	ons (m	im) Raso	Pomarka	
Gage Resistance, Gage Factor	Models			Grid Length Width Lon			Base Rem		
•KFEL Series High-elongation	Develope KFEL serie	d to measure s	strain ir	Lengt n elast asure	th Width ic to plast strain as	<mark>Lengt</mark> tic reg large	h Width lion on st as 10%	ructures, the	
•KFEL Series High-elongation Foil Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space is between	Develope KFEL series simple ter Applicable Types, I	d to measure s es foil gages o ision strain. Adhesive and Op engths and co	strain ir an me erating T des of le	Lengt n elast asure Temper ead wi	th Width ic to plast strain as ature Rang ire cables	Lengt tic reg large e after pre-a	h Width ion on st as 10% Curing CC- ttached to	ructures, the to 15% with -36 –10 to 80% o KFEL gages	
•KFEL Series High-elongation Foil Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between.	Develope KFEL seri simple ter Applicable Types, I	d to measure s es foil gages o nsion strain. Adhesive and Op engths and co <sup>s</sup> Polyester-coated 2-wire copper cable	erating T des of love vi	Lengt n elast asure Temper ead wi inyl-coat 2-wire c	th Width ic to plast strain as ature Rang ire cables ted flat cable	Lengt tic reg large e after pre-a	h Width ion on st as 10% Curing CC- ttached to Vinyl-co 3-wire	ructures, the to 15% with -36 –10 to 80% o KFEL gages ated flat e cable	
•KFEL Series High-elongation Foil Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KEEL-5-120-C1 L10M2B	Develope KFEL seri simple ter Applicable Types, I	d to measure s es foil gages o ision strain. Adhesive and Op engths and co <sup>s</sup> Polyester-coated 2-wire copper cable C1, D34, and D35	erating 1 des of lovi c1	Lengt n elast asure Temper ead wi inyl-coat 2-wire c	th Width ic to plast strain as rature Rang ire cables ted flat cable	Lengt tic reg large e after pre-a	h Width ion on st as 10% Curing CC- ttached to Vinyl-co 3-wire	ructures, the to 15% with -36 –10 to 80% o KFEL gages ated flat e cable D34, D35	
•KFEL Series High-elongation Foil Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KFEL-5-120-C1 L10M2R for the gage with a fluororesin-coated	Develope KFEL seri simple ter Applicable Types, I Type Length	d to measure s es foil gages o nsion strain. Adhesive and Op engths and co s Polyester-coated 2-wire copper cable C1, D34, and D35 N15C2	erating T des of L Vi C1 L15C2	Lengt n elast asure Temper ead wi inyl-coat 2-wire of	th Width ic to plast strain as rature Rang ire cables ted flat cable D34, D35	Lengt tic reg large e after pre-a	h Width ion on st as 10% Curing CC- ttached to Vinyl-co 3-wire C1	ructures, the to 15% with -36 –10 to 80% o KFEL gages ated flat e cable D34, D35 L15C35	
•KFEL Series High-elongation Foil Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KFEL-5-120-C1 L10M2R for the gage with a fluororesin-coated flat 2-wire cable 10 m long pre-attached	Develope KFEL seri simple ter Applicable Types, I Type Length 15 cm 30 cm	d to measure s es foil gages o sion strain. Adhesive and Op engths and coo s Polyester-coated 2-wire copper cable C1, D34, and D35 N15C2 N30C2	erating T des of L C1 L15C2 L30C2	Lengt n elast asure Tempera ead wi inyl-coat 2-wire o	th Width ic to plass strain as ature Rang ire cables D34, D35 L15C2S L30C2S	Lengt tic reg large e after pre-a	h Width jion on st as 10% <sup>-</sup> Curing CC- ttached to Vinyl-co 3-wire C1 L15C3R L30C3R	ructures, the to 15% with -36 –10 to 80% D KFEL gages ated flat e cable D34, D35 L15C35 L30C35	
•KFEL Series High-elongation Foil Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KFEL-5-120-C1 L10M2R for the gage with a fluororesin-coated flat 2-wire cable 10 m long pre-attached KFEL-5-120-D35 L5M3S	Develope KFEL seri simple ter Applicable Types, I Type Length 15 cm 30 cm	d to measure ses foil gages of sion strain. Adhesive and Op engths and cor s Polyester-coated 2-wire copper cable C1, D34, and D35 N15C2 N30C2 N1M2	erating T des of le vi L15C2 L30C2	Lengt n elast asure Temper ead wi inyl-coat 2-wire c	th Width ic to plast strain as ature Rang ire cables ted flat cable D34, D35 L15C2S L30C2S L1M2S	Lengt tic reg large e after pre-a	h Width ion on st as 10% - Curing CC- ttached to Vinyl-co 3-wire C1 15C3R 10C3R	ructures, the to 15% with -36 –10 to 80% o KFEL gages ated flat e cable D34, D35 L15C35 L30C35 L1M35	
•KFEL Series High-elongation Foil Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KFEL-5-120-C1 L10M2R for the gage with a fluororesin-coated flat 2-wire cable 10 m long pre-attached KFEL-5-120-D35 L5M3S for the gage with a vinyl-coated flat 2 wire cable 5 m long pre strached	Develope KFEL series simple ter Applicable Types, I Type Length 15 cm 30 cm 1 m 3 m	d to measure ses foil gages on strain. Adhesive and Opengths and constrains and constrains and constrains and constrains and constraint of the second	erating T des of la vi L15C2 L30C2 L1M2F L3M2F	Lengt n elast asure Temper ead wi inyl-coat 2-wire c	th Width ic to plast strain as ature Rang ire cables ted flat cable D34, D35 L15C2S L30C2S L1M2S L3M2S	Lengt tic reg large e after pre-a	h Width ion on st as 10% - Curing CC- ttached to Vinyl-co 3-wire C1 L15C3R L30C3R L1M3R L3M3R	ructures, the to 15% with -3610 to 80% o KFEL gages ated flat cable D34, D35 L15C35 L30C35 L1M35 L3M35	
•KFEL Series High-elongation Foil Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KFEL-5-120-C1 L10M2R for the gage with a fluororesin-coated flat 2-wire cable 10 m long pre-attached KFEL-5-120-D35 L5M3S for the gage with a vinyl-coated flat 3-wire cable 5 m long pre-attached If no lead wire cable code is suffixed.	Develope KFEL series simple ter Applicable Types, I Type Length 15 cm 30 cm 1 m 3 m 5 m	d to measure ses foil gages of sion strain. Adhesive and Op engths and cor <sup>s</sup> Polyester-coated 2-wire copper cable C1, D34, and D35 N15C2 N30C2 N1M2	train ir an me erating 1 des of 1 Uitsc2 L15c2 L30c2 L1M2F L3M2F	Lengt n elast asure Temper ead wi inyl-coat 2-wire c R R R R	th Width ic to plast strain as ature Rang ire cables ire cables D34, D35 L15C2S L30C2S L30C2S L1M2S L3M2S L5M2S	Lengt tic reg large e after pre-a	h Width ion on st as 10% - Curing CC- ttached to Vinyl-co 3-wire C1 L15C3R L30C3R L1M3R L3M3R L5M3R	ructures, the to 15% with 36 –10 to 80% D KFEL gages ated flat cable D34, D35 L15C35 L30C35 L1M35 L3M35 L5M35	
•KFEL Series High-elongation Foil Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KFEL-5-120-C1 L10M2R for the gage with a fluororesin-coated flat 2-wire cable 10 m long pre-attached KFEL-5-120-D35 L5M3S for the gage with a vinyl-coated flat 3-wire cable 5 m long pre-attached If no lead wire cable code is suffixed, the gage is delivered with gage leads only (Silverclad conner wires 25 mm	Develope KFEL seri simple ter Applicable Types, I Type Length 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. rang Remarks	d to measure s es foil gages o sion strain. Adhesive and Op engths and coo s Polyester-coated 2-wire copper cable C1, D34, and D35 N15C2 N30C2 N1M2	train ir an me erating 1 des of lo vi L15C2 L30C2 L1M2F L3M2F L5M2F	Lengt n elast asure ead wi inyl-coat 2-wire R R R R R R	th Width ic to plast strain as ature Rang ire cables ted flat cable D34, D35 L15C2S L30C2S L1M2S L3M2S L5M2S -10 to 80°C n or longer	Lengt tic reg large e after pre-a	h Width ion on st as 10% Curing CC- ttached to Vinyl-co 3-wire C1 L15C3R L30C3R L3M3R L5M3R L-7, L-10 for 6	ructures, the to 15% with -36 –10 to 80% o KFEL gages ated flat e cable D34, D35 L15C3S L30C3S L1M3S L3M3S L5M3S	
•KFEL Series High-elongation Foil Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KFEL-5-120-C1 L10M2R for the gage with a fluororesin-coated flat 2-wire cable 10 m long pre-attached KFEL-5-120-D35 L5M3S for the gage with a vinyl-coated flat 3-wire cable 5 m long pre-attached if no lead wire cable code is suffixed, the gage is delivered with gage leads only (Silver-clad copper wires 25 mm long each).	Develope KFEL seris simple ter Applicable Types, I Type Length 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. rang Remarks	d to measure ses foil gages of sion strain. Adhesive and Opengths and cores of sector of the sector	erating 1 des of lo vi L15C2 L30C2 L1M2F L3M2F L5M2F L-6, L-	Lengt n elast asure ead wi inyl-coat 2-wire c R R R R R R R	th Width ic to plast strain as ature Rang ire cables ire cables D34, D35 L15C2S L30C2S L30C2S L30C2S L30C2S -10 to 80°C n or longer	Lengt tic reg large e after pre-a	h Width ion on st as 10% - Curing CC- ttached to Vinyl-co 3-wire C1 L15C3R L30C3R L1M3R L3M3R L3M3R L5M3R	ructures, the to 15% with -36 -10 to 80% o KFEL gages ated flat cable D34, D35 L15C35 L30C35 L1M35 L3M35 L5M35 Smorlonger	
•KFEL Series High-elongation Foil Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between. E.g. KFEL-5-120-C1 L10M2R for the gage with a fluororesin-coated flat 2-wire cable 10 m long pre-attached KFEL-5-120-D35 L5M3S for the gage with a vinyl-coated flat 3-wire cable 5 m long pre-attached If no lead wire cable code is suffixed, the gage is delivered with gage leads only (Silver-clad copper wires 25 mm long each).	Develope KFEL series simple ter Applicable Types, I Length 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. rang Remarks * For oth Note: Beside treated with	d to measure ses foil gages on strain. Adhesive and Opeengths and coores of the service opper cable C1, D34, and D35 N15C2 N30C2 N1M2 N1M2 N1M2 N1M2 N1M2 N1M2 N1M2 N1M	erating 1 des of le vi L15C2 L30C2 L1M2F L3M2F L5M2F L5M2F L5M2F L5M2F	Lengt n elast asure Temper ead wi inyl-coat 2-wire of R R R -9 for 6 m engths ent S-9B	th Width ic to plast strain as ature Rang ire cables ted flat D34, D35 L15C2S L30C2S L30C2S L30C2S L3M2S L3M2S L3M2S L5M2S -10 to 80°C n or longer s, contact sandpaper, t if the gage	Lengt tic reg large e after pre-a	h Width ion on st as 10% Curing CC- ttached to Vinyl-co 3-wire C1 L15C3R L30C3R L30C3R L3M3R L3M3R L-7, L-10 for 6 e bonding si led to hard-	ructures, the to 15% with 36 –10 to 80% o KFEL gages ated flat cable D34, D35 L15C3S L30C3S L1M3S L3M3S L3M3S L5M3S	
<ul> <li>•KFEL Series High-elongation Foil Strain Gages</li> <li>When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between.</li> <li>Eg.</li> <li>KFEL-5-120-C1 L10M2R</li> <li>for the gage with a fluororesin-coated flat 2-wire cable 10 m long pre-attached KFEL-5-120-D35 L5M3S</li> <li>for the gage with a vinyl-coated flat 3-wire cable 5 m long pre-attached If no lead wire cable code is suffixed, the gage is delivered with gage leads only (Silver-clad copper wires 25 mm long each).</li> <li>Uniaxial Resistance: 120 Ω Gage factor: Approx. 2.1</li> </ul>	Develope KFEL seri simple ter Applicable Types, I Type Length 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. rang Remarks * For oth Note: Beside treated with such as poly S-9B and bo	d to measure s es foil gages o sion strain. Adhesive and Op engths and coo s Polyester-coated 2-wire copper cable C1, D34, and D35 N15C2 N30C2 N1M2 Twistedfor 50 morlonger es the usual surface the surface treat rethylene and poly onding conditions	erating 1 des of lo vi L15C2 L30C2 L1M2F L3M2F L5M2F L5M2F L5M2F L5M2F L5M2F L5M2F L5M2F L5M2F L5M2F L5M2F L5M2F L5M2F L5M2F L5M2F	Lengt n elast asure Temper ead wi inyl-coat 2-wire of R R R -9 for 6 n engths ent s-9B is pecial	th Width ic to plast strain as ature Rang ire cables ted flat cable D34, D35 L15C2S L30C2S L1M2S L3M2S L5M2S -10 to 80°C n or longer s, contact sandpaper, t if the gage , bond the c	Lengt tic reg large e after pre-a u u u u u u u u u u u u u u u u u u u	h Width ion on st as 10% <sup></sup> Curing CC- ttached to Vinyl-co 3-wire C1 115C3R 130C3R 1433 1433 1433 1433 1433 1433 1433 1433 1433 1433 1433 1433 1433 1433 1434 1435 1	ructures, the to 15% with -36 –10 to 80% o KFEL gage: ated flat e cable D34, D35 L15C3S L30C3S L1M3S L3M3S L5M3S 5 m or longer urface should b to-bond plastic esive CC-36. Fo	
<ul> <li>•KFEL Series High-elongation Foil Strain Gages</li> <li>When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between.</li> <li>E.g.</li> <li>KFEL-5-120-C1 L10M2R</li> <li>for the gage with a fluororesin-coated flat 2-wire cable 10 m long pre-attached KFEL-5-120-D35 L5M3S</li> <li>for the gage with a vinyl-coated flat 3-wire cable 5 m long pre-attached If no lead wire cable code is suffixed, the gage is delivered with gage leads only (Silver-clad copper wires 25 mm long each).</li> <li>Uniaxial</li> <li>Resistance: 120 Ω</li> <li>Gage factor: Approx. 2.1</li> </ul>	Develope KFEL seri simple ter Applicable Types, I Type Length 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. rang Remarks * For oth Note: Beside treated with such as poly S-9B and bo	d to measure ses foil gages of sion strain. Adhesive and Opeengths and constrains. Adhesive and Opeengths and constrains. S Polyester-coated 2-wire copper cable C1, D34, and D35 N15C2 N30C2 N1M2 I Wisted for 50 morlonger Twisted for 50 morlonger The surface treat retatted by and in a constraint of the surface treat retatted by and the surface treat retatted by and the surface treat retatted by a constraint of the surface	erating T des of lo vi L15C2 L30C2 L1M2F L3M2F L5M2F L-6, L cable le treatme ment age propylen for other	Lengt n elast asure Temper ead wi inyl-coat 2-wire 2-wire R R R R R R R R R R R R R	th Width ic to plast strain as ature Rang ire cables ted flat cable D34, D35 L15C2S L30C2S L1M2S L3M2S L5M2S -10 to 80°C n or longer s, contact sandpaper, t if the gage , bond the <u>c</u> materials, co	Lengt tic reg large e after pre-a u u u u u u u u u u u u u u u u u u u	h Width ion on st as 10% Curing CC- ttached to Vinyl-co 3-wire C1 L15C3R L30C3R L1M3R L3M3R L3M3R L5M3R L-7, L-10 for e led to hard- ing the adh Is. 3.5	ructures, the to 15% with -36 –10 to 80% o KFEL gages ated flat e cable D34, D35 L15C3S L30C3S L1M3S L5M3S L5M3S 5 m or longer urface should bi to-bond plastic esive CC-36. Fo	
<ul> <li>•KFEL Series High-elongation Foil Strain Gages</li> <li>When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between.</li> <li>E.g.</li> <li>KFEL-5-120-C1 L10M2R</li> <li>for the gage with a fluororesin-coated flat 2-wire cable 10 m long pre-attached</li> <li>KFEL-5-120-D35 L5M3S</li> <li>for the gage with a vinyl-coated flat 3-wire cable 5 m long pre-attached If no lead wire cable code is suffixed, the gage is delivered with gage leads only (Silver-clad copper wires 25 mm long each).</li> <li>Uniaxial</li> <li>Resistance: 120 Ω</li> <li>Gage factor: Approx. 2.1</li> </ul>	Develope KFEL seri simple ter Applicable Types, I Type Length 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. rang Remarks * For oth Note: Beside treated with such as poly S-9B and bo KFEL-5-1 KFEL-2-1	d to measure ses foil gages of sion strain. Adhesive and Opengths and constrains. Sengths and constrains. C1, D34, and D35 N15C2 N15C2 N16C2 N1M2 Invisted for 50 cm or longer Ses the usual surface the surface treat techylene and poly ponding conditions 120-C1	erating T des of lo vi c1 L15C2 L30C2 L1M2F L3M2F L5M2F L5M2F L5M2F L5M2F L5M2F L5M2F L5M2F L5M2F L5M2F L5M2F L5M2F L5M2F	Lengt n elast asure ead wi inyl-coat 2-wire c 2-wire c 2-	th Width ic to plast strain as ature Rang ire cables ted flat cable D34, D35 L15C2S L30C2S L30C2S L1M2S L3M2S L5M2S -10 to 80°C n or longer s, contact s, contact s, bond the g materials, cc 2.1 2.1	Lengt tic reg large e after pre-a pre-a c u u u u u u u u u u u u u u u u u u	h Width ion on st as 10% Curing CC- ttached to Vinyl-co 3-wire C1 L15C3R L30C	ructures, the to 15% with -36 –10 to 80% o KFEL gages ated flat e cable D34, D35 L15C3S L30C3S L1M3S L3M3S L5M3S 5 m or longer urface should bi to-bond plastic esive CC-36. Fo	
<ul> <li><b>KFEL Series High-elongation</b> Foil Strain Gages</li> <li>When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between.</li> <li>Eg.</li> <li><b>KFEL-5-120-C1 L10M2R</b></li> <li>for the gage with a fluororesin-coated flat 2-wire cable 10 m long pre-attached KFEL-5-120-D35 L5M3S</li> <li>for the gage with a vinyl-coated flat 3-wire cable 5 m long pre-attached If no lead wire cable code is suffixed, the gage is delivered with gage leads only (Silver-clad copper wires 25 mm long each).</li> <li><b>Uniaxial</b> Resistance: 120 Ω Gage factor: Approx. 2.1</li> </ul>	Develope KFEL series simple ter Applicable Types, I Type Length 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. rang Remarks * For oth Note: Beside treated with such as poly S-9B and bo KFEL-5-1 KFEL-2-1	d to measure e es foil gages o sion strain. Adhesive and Op engths and co constrains Polyester-coated 2-wire copper cable C1, D34, and D35 N15C2 N30C2 N1M2 Twisted for 50 cm or longer over lead wire of es the usual surface the surface treat ethylene and poly onding conditions 120-C1	erating 1 des of le vi L15C2 L30C2 L1M2F L5M2F L5M2F L5M2F L5M2F L5M2F	Lengt n elast asure Temper ead wi inyl-coat 2-wire of a R R R -9 for 6 n engths nt with s ent S-9B le. Then, -5 for 2	th Width ic to plast strain as ature Rang ire cables ted flat D34, D35 L15C2S L30C2S L1M2S L3M2S L5M2S -10 to 80°C n or longer s, contact sandpaper, t if the gage , bond the <u>c</u> materials, co 2.1 2.1	Lengt tic reg large e after pre-a u u u u u u u u u u u u u u u u u u u	h Width ion on st as 10% <sup>-</sup> Curing CC- ttached to Uinyl-co 3-wire C1 15C3R 10C3R 1M3R 13M3R 13M3R 13M3R 1-7, L-10 for 6 e bonding si led to hard- ing the adh is. 3.5 4	ructures, the to 15% with 36 –10 to 80% o KFEL gage ated flat cable D34, D35 L15C35 L30C35 L1M35 L3M35 L5M35 5 m or longer urface should b to-bond plastic esive CC-36. For	
<ul> <li>•KFEL Series High-elongation Foil Strain Gages</li> <li>When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between.</li> <li>E.g.</li> <li>KFEL-5-120-C1 L10M2R</li> <li>for the gage with a fluororesin-coated flat 2-wire cable 10 m long pre-attached</li> <li>KFEL-5-120-D35 L5M3S</li> <li>for the gage with a vinyl-coated flat 3-wire cable 5 m long pre-attached If no lead wire cable code is suffixed, the gage is delivered with gage leads only (Silver-clad copper wires 25 mm long each).</li> <li>Uniaxial</li> <li>Resistance: 120 Ω</li> <li>Gage factor: Approx. 2.1</li> </ul>	Develope KFEL series simple ter Applicable Types, I Type Length 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. rang Remarks * For oth Note: Beside treated with such as poly S-9B and boo KFEL-5-1 KFEL-5-1	d to measure eses foil gages of sion strain. Adhesive and Openstrain. Adhesive and Openstrain. Adhesive and Openstrain. C1,D34, and D35 N15C2 N30C2 N1M2 Twistedfor 50 cm or longer C1,D34, and D35 N15C2 N1M2 Twistedfor 50 cm or longer C1,D34, and D35 N15C2 N1M2 C1,D34, and D35 C1,D34, and D35 C1,D34, and D35 C1,D34, and D35 C1,D34, and D35 C1,D34, and D35 C1,D34 C1,D34, and D35 C1,D34	erating 1 des of le vi L15C2 L30C2 L1M2F L5M2F L5M2F L5M2F L5M2F L5M2F	Lengt n elast asure Temper ead wi inyl-coat 2-wire of R R R -9 for 6 m engths nt with s ent S-9B ie. Then, special 5 2	th Width ic to plast strain as ature Rang ire cables ted flat D34, D35 L15C2S L30C2S L30C2S L30C2S L30C2S L30C2S L30C2S C001aC1 sandpaper, t if the gage bond the g materials, co 2.1 2.1	Lengt tic reg large e after pre-a u u u u u u u u u u u u u u u u u u u	h Width ion on st as 10% f Curing CC- ttached to Vinyl-co 3-wire C1 115C3R L30C3R L30C3R L3M3R L3M3R L3M3R L-7, L-10 for 6 e bonding st led to hard- ing the adh is. 3.5 4	ructures, t to 15% w -36 –10 to 8 o KFEL gag D34, D35 L15C3S L30C3S L1M3S L3M3S L5M3S 5 m or longer urface should to-bond plas esive CC-36.	



KFEL-5-120-D35

KFEL-2-120-D35

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2.1

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Non-magnetoresistive Gages

# Non-magnetoresistive Strain Gages KFN & KFS

Patterns, Gage Resistance, Gage Factor		Models	Gi Length	Dimens rid Width	ions (mr Ba Length	n) ase Width	Remarks
•KFN Series Non-inductive Foil Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space	The gage magnetor induction. strain under Applicable Temperatu	element is made of esistant effect; als I hus, the KFN series of AC magnetic enviro Adhesives and Ope re Range after Curin noths and codes of J	of a sp o, the foil str ments rating ng	ecial a shape ain gag s. PC-600 CC-33/	lloy wh is desig es can a 0: -196 t A: -196 t	ich pr ned to ccurat o 150°C o 120°C	ovides less o eliminate ely measure
in between.		rigeris and codes of i			s pre-at		to Kin gages
<b>F</b>	Types	Vin	yl-coated	low-noise	e 3-wire ca	ble	
E.g. KENI-5-350-C9-11 ISM3	Length			C9, D20			
for the gage with a low-noise	15 cm			J15C3			
vinyl-coated 3-wire cable 5 m long	1 m			11142			
pre-attached	2 m						
f no lead wire cable code is suffixed.	5 m						
he gage is delivered with 2				10 to 80%	-		
olyester-coated copper wires 10 cm	Bemarks			1 13	-		
ng each.	i Terriar K3			L-15			
Iniaxial 3500 gages	* For othe	r lead wire cable le	ngths,	contac	t us.		
esistance: 350 Ω	KFN-5-350	-C9-11	_				
age factor: Approx. 2.0	KFN-5-350	-C9-16	5	6.6	12	10	
	KFN-5-350	-C9-23					
	KFN-2-350	-C9-11				_	
	KFN-2-350	-C9-16	2	3.5	6	5	
	KFIN-2-330	-C3-23					
	KFN-2-350 KFN-2-350 KFN-2-350	-D20-11 -D20-16 -D20-23	2	3.5	11	6	A min. qty 5 PC.
				Dimons	ions (mr	2)	
Patterns,		Models	G	rid		250	Romarks
		Wodels	Length	Midth	Length	Width	Remarks
Gage Resistance, Gage Factor			Lende	I WIGUI	Lengen		
Gage Resistance, Gage Factor <b>DKFS Series Shielded</b> <b>Foil Strain Gages</b> Vhen ordering, suffix the lead wire able code (See table at the right) b the model number with a space	The KFS ser whole body site, noise is Applicable Temperatu	ies foil strain gages a /. Thus, if a large cu prevented from enter Adhesives and Ope re Range after Curin	are shie rrent flo ering th rating ng	elded by ows to o ne meas PC-600 CC-334 EP-340	the cop or arour uring cir : -196 to A: -196 to : -55 to	oper fo nd the g cuit. o 150°C 150°C	il covering the gage bonding
Gage Resistance, Gage Factor •KFS Series Shielded Foil Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space n between.	The KFS ser whole body site, noise is Applicable Temperatu	ies foil strain gages a /. Thus, if a large cur prevented from enter Adhesives and Ope re Range after Curin ngths and codes of la	are shie rrent fle ering th rating ng ead wir	elded by ows to o ne meas PC-600 CC-334 EP-340 re cable	the cop or arour uring cir : -196 to : -55 to s pre-att	oper fo nd the g cuit. o 150°C o 120°C 150°C tached	il covering the gage bonding to KFS gages
Gage Resistance, Gage Factor •KFS Series Shielded Foil Strain Gages When ordering, suffix the lead wire table code (See table at the right) o the model number with a space n between.	The KFS ser whole body site, noise is Applicable Temperatu	ies foil strain gages a /. Thus, if a large cur prevented from enter Adhesives and Ope re Range after Curin ngths and codes of h Vin	are shie rrent flo ering th rating ng ead win	elded by ows to o ne meas PC-600 CC-334 EP-340 re cable	the cop or arour uring cir : -196 to : -196 to : -55 to s pre-att	oper fo nd the g cuit. o 150°C o 120°C 150°C tached	il covering the gage bonding to KFS gages
Gage Resistance, Gage Factor •KFS Series Shielded Foil Strain Gages When ordering, suffix the lead wire table code (See table at the right) to the model number with a space n between. E.g. KFS-5-120-J1 J5M3	The KFS ser whole body site, noise is Applicable Temperatu Types, let Types Length	ies foil strain gages a y. Thus, if a large cu prevented from enter Adhesives and Ope re Range after Curin ngths and codes of la Viny	are shie rrent flo ering th rating ng ead win	elded by ows to o ne meas PC-600 CC-334 EP-340 re cable Iow-noise	the cop or arour uring cir : -196 to : -196 to : -55 to s pre-att	oper fo nd the g cuit. o 150°C o 120°C 150°C tached ble	il covering the gage bonding to KFS gages
Gage Resistance, Gage Factor •KFS Series Shielded Foil Strain Gages When ordering, suffix the lead wire table code (See table at the right) to the model number with a space n between. E.g. KFS-5-120-J1 J5M3 for the gage with a low-noise	The KFS ser whole body site, noise is Applicable Temperatur Types, leu Types, leu Length 15 cm	ies foil strain gages a y. Thus, if a large cu prevented from enter Adhesives and Ope re Range after Curin ngths and codes of la Ving	are shie rrent flo ering th rating ng ead win yl-coated	elded by ows to o e meas PC-600 CC-334 EP-340 re cable low-noise J1 J15C3	the cop or arour uring cir : -196 to : -196 to : -55 to s pre-att	oper fo nd the g cuit. o 150°C o 120°C 150°C tached ble	il covering the gage bonding to KFS gages
Gage Resistance, Gage Factor •KFS Series Shielded Foil Strain Gages When ordering, suffix the lead wire table code (See table at the right) to the model number with a space n between. E.g. KFS-5-120-J1 J5M3 for the gage with a low-noise rinyl-coated 3-wire cable 5 m long pre-attached	The KFS ser whole body site, noise is Applicable Temperatu Types, let Types, let Length 15 cm 30 cm	ies foil strain gages a y. Thus, if a large cu prevented from ent Adhesives and Ope re Range after Curin ngths and codes of la Vin	are shie rrent fle rating th rating ng ead wir	elded by ows to o he meas PC-600 CC-33/ EP-340 re cable low-noise J1 J15C3 J30C3	the cop or arour uring cir : -196 td : -196 td : -55 to s pre-atl 3 3-wire ca	oper fo nd the g cuit. o 150°C 120°C 150°C tached ble	il covering the gage bonding to KFS gages
Gage Resistance, Gage Factor <b>CKFS Series Shielded</b> <b>Foil Strain Gages</b> When ordering, suffix the lead wire table code (See table at the right) o the model number with a space n between. g. KFS-5-120-J1 J5M3 or the gage with a low-noise rinyl-coated 3-wire cable 5 m long ore-attached f no lead wire cable code is suffixed,	The KFS ser whole body site, noise is Applicable Temperatu Types, leu Types, leu Length 15 cm 30 cm 1 m	ies foil strain gages a /. Thus, if a large cu prevented from ent Adhesives and Ope re Range after Curin ngths and codes of la Vin	are shie rrent fle ering th rating ng ead wir	elded by ows to o he meass PC-600 CC-33/ EP-340 re cable low-noise J1 J15C3 J30C3 J1M3	the cop or arour uring cir : -196 to : -55 to s pre-att a -wire ca	oper fo ad the g cuit. o 150°C 120°C 150°C tached ble	to KFS gages
Gage Resistance, Gage Factor •KFS Series Shielded Foil Strain Gages When ordering, suffix the lead wire table code (See table at the right) to the model number with a space n between. E.g. KFS-5-120-J1 J5M3 for the gage with a low-noise rinyl-coated 3-wire cable 5 m long pre-attached f no lead wire cable code is suffixed, he gage is delivered with 2 polyester-coated copper wires 25 mm	The KFS ser whole body site, noise iss Applicable Temperatur Types, let Types, let United to the series Length 15 cm 30 cm 1 m 3 m	ies foil strain gages a /. Thus, if a large cu prevented from ente Adhesives and Ope re Range after Curin ngths and codes of le Vin	are shie rrent fl ering th rating ng ead win yl-coated	elded by ows to o he meass PC-600 CC-33/ EP-340 re cable J1 J15C3 J30C3 J1M3 J3M3	the cop or arour uring cir : -196 to : -196 to : -55 to s pre-att	oper fo ad the g cuit. o 150°C 150°C tached ble	to KFS gages
Gage Resistance, Gage Factor •KFS Series Shielded Foil Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space n between. E.g. KFS-5-120-J1 J5M3 For the gage with a low-noise vinyl-coated 3-wire cable 5 m long pre-attached f no lead wire cable code is suffixed, the gage is delivered with 2 bolyester-coated copper wires 25 mm ong each.	The KFS ser whole body site, noise is Applicable Temperatur Types, let Types, let Types Length 15 cm 30 cm 1 m 3 m 5 m	ies foil strain gages a /. Thus, if a large cu prevented from ente Adhesives and Ope re Range after Curin ngths and codes of le Vin	are shie rrent fl ering th rating ng ead win yl-coated	elded by ows to o he meass PC-600 CC-33/ EP-340 re cable J1 J15C3 J30C3 J1M3 J3M3 J5M3	the cop or arour uring cir : -196 to : -196 to : -55 to s pre-att	oper fo nd the cuit. o 150°C o 120°C 150°C <b>iached</b> ble	to KFS gages
Gage Resistance, Gage Factor •KFS Series Shielded Foil Strain Gages When ordering, suffix the lead wire table code (See table at the right) to the model number with a space n between. E.g. KFS-5-120-J1 J5M3 for the gage with a low-noise rinyl-coated 3-wire cable 5 m long pre-attached f no lead wire cable code is suffixed, the gage is delivered with 2 polyester-coated copper wires 25 mm ong each.	The KFS ser whole body site, noise is Applicable Temperatu Types, leu Types, leu Types Length 15 cm 30 cm 1 m 3 m 5 m	ies foil strain gages ( . Thus, if a large cu prevented from ent Adhesives and Ope re Range after Curin ngths and codes of la Vin	are shie rrent flo ering th rating ng ead win yl-coated	elded by ows to o he meas PC-600 CC-33/ EP-340 re cable Juw-noise J1 J15C3 J30C3 J1M3 J3M3 J5M3	the cop or arour uring cir : -196 tr : -196 tr : -55 to s pre-att	oper fo nd the cuit. o 150°C o 120°C 150°C <b>iached</b>	to KFS gages
Gage Resistance, Gage Factor •KFS Series Shielded Foil Strain Gages When ordering, suffix the lead wire table code (See table at the right) o the model number with a space n between. E.g. KFS-5-120-J1 J5M3 or the gage with a low-noise vinyl-coated 3-wire cable 5 m long ore-attached f no lead wire cable code is suffixed, he gage is delivered with 2 polyester-coated copper wires 25 mm ong each. Jniaxial tesistance: 120.0	The KFS ser whole body site, noise is Applicable Temperatu Types, let Types, let Types Length 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. range Remarks	ies foil strain gages a /. Thus, if a large cur prevented from enter Adhesives and Ope re Range after Curin ngths and codes of la Vin	are shie rrent flo ering th rating ng ead win yl-coated	elded by ows to o ne meas PC-600 CC-33/ EP-340 re cable low-noise J1 J15C3 J30C3 J1M3 J3M3 J5M3 -10 to 80% L-13	the cop or arour uring cir : -196 to A: -196 to : -55 to s pre-att	oper fo nd the cuit. o 150°C o 120°C 150°C tached ble	to KFS gages
Gage Resistance, Gage Factor  •KFS Series Shielded Foil Strain Gages  When ordering, suffix the lead wire table code (See table at the right) to the model number with a space n between.  g.  KFS-5-120-J1 J5M3 For the gage with a low-noise vinyl-coated 3-wire cable 5 m long ore-attached f no lead wire cable code is suffixed, the gage is delivered with 2 boolyester-coated copper wires 25 mm ong each.  Jniaxial Resistance: 120 Ω Gage factor: Approx. 2.1	The KFS ser whole body site, noise is Applicable Temperatur Types, let Types, let 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. range Remarks	ies foil strain gages a y. Thus, if a large cur prevented from enter Adhesives and Ope re Range after Curin ngths and codes of h Ving Ving Ving r lead wire cable le	are shie rrent fle rrating the rating ead win yl-coated	elded by ows to o ne meas PC-600 CC-33/ EP-340 re cable low-noise J1 J15C3 J30C3 J1M3 J3M3 J5M3 -10 to 80% L-13	t us.	oper fo ad the g cuit. o 150°C tached ble	to KFS gages
Gage Resistance, Gage Factor •KFS Series Shielded Foil Strain Gages When ordering, suffix the lead wire table code (See table at the right) to the model number with a space n between. E.g. KFS-5-120-J1 J5M3 for the gage with a low-noise vinyl-coated 3-wire cable 5 m long ore-attached f no lead wire cable code is suffixed, the gage is delivered with 2 bolyester-coated copper wires 25 mm ong each. Jniaxial Resistance: 120 Ω Gage factor: Approx. 2.1	The KFS ser whole body site, noise is Applicable Temperatur Types, leu Types, leu Length 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. range Remarks * For othe	ies foil strain gages a y. Thus, if a large cur prevented from enter Adhesives and Ope re Range after Curin ngths and codes of la Viny r lead wire cable le	are shie rrent fle rrating the rating ead win yl-coated ngths,	elded by ows to one meass PC-600 CC-33/ EP-340 re cable low-noise J1 J15C3 J30C3 J1M3 J3M3 J5M3 -10 to 80% L-13 contac	t us.	oper fo ad the g cuit. o 150°C tached ble	to KFS gages
Gage Resistance, Gage Factor  • KFS Series Shielded Foil Strain Gages  When ordering, suffix the lead wire table code (See table at the right) to the model number with a space n between.  E.g. KFS-5-120-J1 J5M3 For the gage with a low-noise vinyl-coated 3-wire cable 5 m long ore-attached f no lead wire cable code is suffixed, the gage is delivered with 2 bolyester-coated copper wires 25 mm ong each.  Jniaxial Resistance: 120 Ω Gage factor: Approx. 2.1	The KFS ser whole body site, noise is Applicable Temperatur Types, leu Types, leu 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. range Remarks * For othe KFS-5-120	ies foil strain gages a y. Thus, if a large cu prevented from enternation Adhesives and Ope re Range after Curin ngths and codes of la Viny r lead wire cable le J1-11 	are shie rrent fle rrent fle rating the rating ead win yl-coated ngths,	elded by ows to one meas PC-600 CC-33/ EP-340 re cable low-noise J1 J15C3 J30C3 J1M3 J3M3 J5M3 -10 to 80% L-13 contac	t us.	oper fo ad the g cuit. o 150°C tached ble	to KFS gages
Gage Resistance, Gage Factor <b>OKFS Series Shielded</b> Foil Strain Gages  When ordering, suffix the lead wire able code (See table at the right) of the model number with a space in between.  .g.  KFS-5-120-J1 J5M3 or the gage with a low-noise inyl-coated 3-wire cable 5 m long re-attached for lead wire cable code is suffixed, he gage is delivered with 2 olyester-coated copper wires 25 mm ong each.  Jniaxial esistance: 120 Ω age factor: Approx. 2.1	The KFS ser whole body site, noise is Applicable Temperatu Types, let Types, let 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. range Remarks * For othe KFS-5-120 KFS-5-120	ies foil strain gages a y. Thus, if a large cur prevented from enter Adhesives and Ope re Range after Curin ngths and codes of la Viny r lead wire cable le J1-11 J1-16 -11-23	are shie rrent fle rrent fle rating the rating ead win yl-coated yl-coated ngths,	elded by ows to one meas PC-600 CC-33/ EP-340 re cable low-noise J1 J15C3 J30C3 J1M3 J3M3 J5M3 -10 to 80°C L-13 contac	t us.	pper fo ad the g cuit. a 150°C ble ble 10	il covering the gage bonding to KFS gages
Gage Resistance, Gage Factor  •KFS Series Shielded Foil Strain Gages  When ordering, suffix the lead wire table code (See table at the right) to the model number with a space n between.  E.g. KFS-5-120-J1 J5M3 For the gage with a low-noise rinyl-coated 3-wire cable 5 m long ore-attached f no lead wire cable code is suffixed, the gage is delivered with 2 bolyester-coated copper wires 25 mm ong each.  Jniaxial Resistance: 120 Ω Gage factor: Approx. 2.1	The KFS ser whole body site, noise is Applicable Temperatu Types, let Types, let 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. range Remarks * For othe KFS-5-120 KFS-5-120	ies foil strain gages a y. Thus, if a large cur prevented from enter Adhesives and Ope re Range after Curin ngths and codes of la Ving r lead wire cable le J1-11 J1-16 J1-23	ngths,	elded by ows to o he meas PC-600 CC-33/ EP-340 re cable low-noise J1 J15C3 J30C3 J1M3 J3M3 J5M3 -10 to 80°C L-13 contac	t us.	pper fo ad the g cuit. a 150°C ble ble 10	il covering the gage bonding to KFS gages
Gage Resistance, Gage Factor  •KFS Series Shielded Foil Strain Gages  When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space in between.  E.g. KFS-5-120-J1 J5M3 for the gage with a low-noise vinyl-coated 3-wire cable 5 m long ore-attached f no lead wire cable code is suffixed, the gage is delivered with 2 polyester-coated copper wires 25 mm ong each.  Uniaxial Resistance: 120 Ω Gage factor: Approx. 2.1  Friaxial 350Ω gage Resistance: 3500 Gage factor: Approx. 24	The KFS ser whole body site, noise is Applicable Temperatu Types, leu Types, leu Types, leu Types Length 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. range Remarks * For othe KFS-5-120 KFS-5-120 000000 2.0	ies foil strain gages a y. Thus, if a large cur prevented from enternation Adhesives and Opere re Range after Curin hgths and codes of land Ving r lead wire cable le J1-11 J1-16 J1-23	ngths,	elded by ows to o he meas PC-600 CC-33/ EP-340 re cable low-noise J1 J15C3 J30C3 J1M3 J3M3 J5M3 -10 to 80° L-13 contac 1.4	t us.	pper fo ad the g cuit. a 150°C 120°C 150°C tached ble	il covering the gage bonding to KFS gages
Gage Resistance, Gage Factor •KFS Series Shielded Foil Strain Gages When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space n between. E.g. KFS-5-120-J1 J5M3 for the gage with a low-noise vinyl-coated 3-wire cable 5 m long ore-attached f no lead wire cable code is suffixed, the gage is delivered with 2 polyester-coated copper wires 25 mm ong each. Uniaxial Resistance: 120 Ω Gage factor: Approx. 2.1 Friaxial 350Ω gage Resistance: 350 Gage factor: Approx. 2.1	The KFS ser whole body site, noise is Applicable Temperatu Types, leu Types, leu 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. range Remarks * For othe KFS-5-120 KFS-5-120	ies foil strain gages a y. Thus, if a large cur prevented from enternation Adhesives and Opere re Range after Curin hgths and codes of land ving r lead wire cable le J1-11 J1-16 J1-23	ngths,	elded by ows to o he meas PC-600 CC-33/ EP-340 re cable low-noise J1 J15C3 J30C3 J1M3 J3M3 J5M3 -10 to 80° L-13 contac 1.4	t us.	pper fo nd the g cuit. o 150°C 150°C tached ble	li covering the gage bonding to KFS gages
Gage Resistance, Gage Factor  • KFS Series Shielded Foil Strain Gages  When ordering, suffix the lead wire cable code (See table at the right) to the model number with a space n between.  E.g. KFS-5-120-J1 J5M3 for the gage with a low-noise vinyl-coated 3-wire cable 5 m long ore-attached f no lead wire cable code is suffixed, the gage is delivered with 2 polyester-coated copper wires 25 mm ong each. Uniaxial Resistance: 120 Ω Gage factor: Approx. 2.1  Friaxial 350Ω gage Resistance: 350 Gage factor: Approx. 2.1	The KFS ser whole body site, noise is Applicable Temperatur Types, let Types, let Types, let Types, let Types, let Solution Types, let Solution Types, let Solution Types, let Solution Solution KFS-5120 KFS-5120 KFS-5120 KFS-5120	ies foil strain gages a J. Thus, if a large cur prevented from enti- Adhesives and Ope re Range after Curin ngths and codes of la Vin r lead wire cable le J1-11 J1-16 J1-23	ngths,	elded by ows to o he meas PC-600 CC-33/ EP-340 re cable low-noise J1 J15C3 J30C3 J1M3 J3M3 J5M3 -10 to 80% L-13 contac	t us.	pper fo nd the cuit. o 150°C 120°C tached ble	il covering the gage bonding to KFS gages
Gage Resistance, Gage Factor  • KFS Series Shielded Foil Strain Gages  When ordering, suffix the lead wire table code (See table at the right) to the model number with a space n between.	The KFS ser whole body site, noise is Applicable Temperatu Types, let Types, let 15 cm 30 cm 1 m 3 m 5 m Oprg. temp. range Remarks * For othe KFS-5-120 KFS-5-120 KFS-5-120	ies foil strain gages a /. Thus, if a large cur prevented from enter Adhesives and Opere re Range after Curin ngths and codes of la Ving r lead wire cable le J1-11 J1-16 J1-23 J1-11 J1-11	ngths,	elded by ows to o he meas PC-600 CC-33/ EP-340 re cable low-noise J1 J15C3 J30C3 J1M3 J3M3 J5M3 -10 to 80°( L-13 contac 1.4	t us.	pper fo od the g cuit. o 150°C 120°C 150°C iached ble 10 10	il covering the gage bonding to KFS gages to KFS gages Polyester-coated copper lead wires Shield wire 25 mm long

# **STRAIN GAGES**

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# Gages for High-pressure Hydrogen Gas Environment KFV

Patterns, Gage Resistance, Gage Factor	Models	Dimensi Grid Length Width	ons (mm) Base Length Width	Remarks					
KFV Foil Strain Gage for Hydrogen Gas Environment									
<b>Uniaxial 350Ω gages</b> Resistance: 350 Ω Gage factor: Approx. 2.5	KFV is a foil strain gage that e high-pressure hydrogen gas en foil strain gages has the electric effect, thereby disabling stab receives less electric resistance of stable strain measurement. Applicable Adhesives and Ope PC-600: -30 to 80°C	nables stable s vironment. The resistance char le strain meas change due to h erating Temper	train measure e metal foil of c nged by receivir urement. KFV nydrogen, there ature Range a	ment under onventional ng hydrogen strain gage eby enabling fter Curing					
	equest the leafle ere.	t and read thore	Polyester-coated						
	KFV-2-350-C1	2 3.2	6 5	A min. qty 2 PC.					

# **Bending Strain Measuring Gages KFF**

Patterns, Gage Resistance, Gage Factor	Models	Dimensions (mm) Grid Base Length Width Length Width	Remarks						
•KFF Series Foil Strain Gages for Bending Strain Measurement									
<b>Uniaxial 350Ω gages</b> Resistance: 350 Ω Gage factor: Approx. 2.1	The KFF series foil strain gages have one each sensing element on both the upper and lower sides of the thick plastic base. Thus, if a gage cannot be bonded directly to the inside of the measuring object as in the case of measuring stress due to internal pressure in high-pressure vessels or stress measurement in box structures such as bridge girders, the KFF series gages can be bonded to the surface to obtain strain at the rear.								
	Applicable Adhesives and Ope CC-33A: -50 to 80°C EP-180: -	rating Temperature Range a 50 to 80℃	fter Curing						
	KFF-30-350-C11-11								
	KFF-30-350-C11-16	30×7×1	A min. qty 5 PC.						
	KFF-30-350-C11-23								
	KFF-30-350-C12-11								
	KFF-30-350-C12-16	30×7×2	A min. qty 5 PC.						
	KFF-30-350-C12-23								

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# **Gages with a Protector KCH**

### **•**KCH Series Foil Strain Gages with a protector



The unique design simplifies gage bonding, wiring and moisture-proofing work in the field. In addition, the metal case protects the strain gage and significantly improves reliability compared with conventional gages. Using stud bolts and adhesive, the gages can be mounted to the bottom and side plate of tank for strain measurement, to a hopper or tank for weight measurement, to the shaft of a truck for tare weight measurement or in any similar applications where the gages need to be protected against moisture, water or small stones. (Patented)

Applicable Adhesives and Operating Temperature Range after Curing EP-340: -40 to 100°C CC-33A: -40 to 100°C

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<b>Relay Cables</b> (for KCH-5A-BJ/SJ) (Option)									
Models	TN-29	TN-30	TN-31	TN-32	TN-33				
Cable length	2 m	3 m	7 m	10 m	12 m				
Cable cover length	1.5 m 2.5 m 6.5 m 9.5 m 11.5								
Remarks	With wa the othe	aterproof o er end is ba	connector ared.	jack (R04	J6-F6.8);				

Models	KCH-5A-B,KCH-5A-BJ	KCH-5A-S,KCH-5A-SJ	KCH-5A-1	KCH-5A-2	KCH-5A-3
Types	Bridge (for bending)	Bridge(for shearing)	Uniaxial	Biaxial, 0/90° stacked rosette	Triaxial, 0/90/45° stacked rosette
Gage Length	2 mm	2 mm	5 mm	5 mm	5 mm
Resistance	350 Ω	350 Ω	350 Ω	350 Ω	350 Ω
Gage Pattern					
System	4-gage system	4-gage system	3-wire system	3-wire system	2-wire system
Cable	KCH-5A-B and S come with 4-conductor (0.3 mm <sup>2</sup> ) (abl long, and bared at the ti flexible vinyl-shielded 4-cc m long (cable cover 1.75 m (that of cable cover 10.2 waterproof connector p cables TN-29 to 33 are sep	special flexible vinyl-shielded e, 6.8-mm diameter by 10-m p; KCH-5A-BJ and SJ, with inductor (0.3 mm <sup>2</sup> ) cable, 2 i long) by 6.3 mm diameter mm) and terminated with lug (R04-P6-M6.8). Relay arately sold.	Comes with special flexible vinyl-shielded 4-conductor (0.3 mm <sup>2</sup> ) cable, 6.8 mm diameter by 10 m long, and bared at the tip.	Come with special fl 6-conductor (0.3 r diameter by 10 m long	exible vinyl-shielded nm²) cable, 6.8 mm g and bared at the tip.

# **Embedded Gage KMP**

•KMP Embedded Gage Developed by Mitsubishi Electric Corp. and commercialized by Kyowa Electronic Instruments Co., Ltd.

Embedded in resin, the KMP gage measures cure-shrinkage and internal strain. The compact design enables embedment in shaped resins and is suitable for internal stress measurement of products made by combining epoxy resin and metal.

(Approx. 7000 kgf/mm<sup>2</sup>)



Model	KMP-8-H3-L100
Gage resistance	1200
Gage factor	Approx. 2.0
Length of sensing element	1 mm
Apparent Young modulus	Approx. 70 GPa
Operating temperature range	20 to 150°C
Built-in thermocouple	K (¢ 0.1 mm)

# **Crack Gages KV**



**STRAIN GAGES** 

# Adhesives and Bonding Tools

To obtain good measurement results, the strain gage must be bonded completely to the measuring object. Thus, it is important to select a suitable adhesive for the materials of measuring object and gage base and for measuring requirements.

		Models	Types	Operating Temperatu Range (°C)	<sup>rre</sup> Major Applicable Materials	Curing Requirements
	AND GOOD AND AND AND AND AND AND AND AND AND AN	CC-33A	Instantaneous adhesive cured at normal temperature	-196 to 120	<ul> <li>Metals (Steel, stainless steel, copper, aluminum alloys A1050, A2024, etc.)</li> <li>Plastics (acrylate, vinyl chloride, nylon, etc.)</li> <li>Composite materials (CFRP, GFRP, printed board, etc.)</li> <li>Rubber</li> </ul>	Apply finger pressure (100 to 300 kPa) for 15 to 60 seconds. Then, leave the gage as it is for 1 hour. The finger pressure application time differs depending on temperature and humidity conditions. The lower the temperature and humidity, the longer the finger pressure application time required.
	STRAM GAGE STRAM GAGE STRAM GAGE	CC-35	Instantaneous adhesive cured at normal temperature	-30 to 120	•Concrete •Mortar •Lumber	Apply finger pressure (100 to 300 kPa) for 30 to 60 seconds. Then, leave the gage as it is for 1 hour or more. The finger pressure application time differs depending on temperature and humidity conditions. The lower the temperature and humidity, the longer the finger pressure application time required.
	TRAN GAGE	CC-36	Instantaneous adhesive cured at normal temperature	-30 to 100	Metals (Steel, stainless steel, copper, aluminum alloys A1050, A2024, A7075, magnesium alloy, etc.)     Plastics (acrylate, vinyl chloride, nylon, polypropylene, etc.)     Composite materials (CFRP, GFRP, PCB, etc.)     Concrete     Mortar     Lumber     Rubber	Apply finger pressure (100 to 300 kPa) for 30 to 60 seconds. Then, leave the gage as it is for 1 hour or more. The finger pressure application time differs depending on temperature and humidity conditions. The lower the temperature and humidity, the longer the finger pressure application time required.
		EP-270	Cured at room temperature	-269 to 30	•Metals (Stainless steel, aluminum alloy, etc.)	Apply pressure (50±20 kPa) for 24 hours at approx. 25°C
		EP-340	Cured at normal temperature or by heating	-55 to 150	•Metals (Stainless steel, aluminum alloy, etc.)	Apply pressure (100±50 kPa) for 24 hours at approx. 25°C or for 2 hours at 80°C. Pressing is possible with tape.
		EP-34B	Cured at normal temperature or by heating	-55 to 200	<ul> <li>Metals (Steel, stainless steel, copper, aluminum alloy, etc.)</li> <li>Plastics (acrylate, PVC, etc.)</li> <li>Composite materials (CFRP, GFRP, printed board, etc.)</li> </ul>	Apply pressure (30 to 50 kPa) for 24 hours at approx. 25°C or for 2 hours at 80°C. Pressing is possible with tape.
		EP-180	Cured at normal temperature or by heating	-50 to 100	<ul> <li>Metals (Steel, stainless steel, copper, aluminum alloy, etc.)</li> <li>Plastics (acrylate, PVC, etc.)</li> </ul>	Apply pressure (50 to 100 kPa) for 48 hours at approx. 25°C 12 hours at 40°C 3 hours at 80°C If used in bolt gages, then refer to the bolt gage instruction manual
		PC-600	Cured by heating	-269 to 250	•Metals (Steel, stainless steel, copper, aluminum alloy, etc.)	Apply Pressure (150 to 300 kPa) for 1 hour at 80°C, 2 hours at 13 0°C and then, 2 hours at 150°C
ſ	strain gage cement pj-32 = xvoxx	PI-32	Cured by heating	-296 to 350	•Metals (Steel, stainless steel, copper, aluminum alloy, etc.)	Apply pressure (200 to 500 kPa) for 1 hour at 100°C, 2 hours at 200°C and then, heat for 2 hours at the operating temperature with the pressure removed. If it is difficult to heat to 200°C, 2 h at 200°C may be changed to 5 h at 160°C with all other conditions followed.

Note: The stated operating temperature range is for the adhesive only, and may differ depending on combinations with gages. When using, read the attached instruction manual carefully.

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# STRAIN GAGES

Adhesives & Coating Agents

**Export controlled product:** [Air transport prohibited]: Product which falls under the Aviation Law, and for which air transport is prohibited.

Ingredients	Capacity	Features	Major Applicable Gages
1 type of cyanoacrylate liquid	2g×1 or 2g×5	<ul> <li>Suitable for bonding general-purpose gages, such as KFG and KFR, which are used for general stress measurement at normal temperature of 20 to 80°C.</li> <li>Quick curing time and stable bonding of various materials in a wide range of temperature and humidity ranges.</li> <li>Quick curing ensures smooth bonding works.</li> <li>Enables measurement in approximately 1 hour from bonding.</li> </ul>	KFG, KFGT, KFR, KFW, KFRP, KFRS, KFP, KFML, KSP, KSN (excl. E5) KSPH, KSPL, KFL, KFN, KFS, KFF, KCH, KV
1 type of cyanoacrylate liquid	2g×1 or 2g×5	<ul> <li>High viscosity makes it suitable for bonding to porous materials such lumber and concrete.</li> <li>Suitable for bonding a gage to porous materials such as concrete for general stress measurement at normal temperature of 20 to 80°C.</li> </ul>	KFG, KFGT, KFR, KC, KFRP, KFP
1 type of cyanoacrylate liquid	2g×1 or 2g×5	<ul> <li>Suitable for bonding a high-elongation gage such as KFEM and KFEL at normal temperature of 20 to 80°C.</li> <li>Suitable for bonding to hard-to bond materials such as aluminum alloy (A7075) and magnesium alloy.</li> <li>High peeling resistance, high impact resistance and less aging deterioration of bonding strength</li> </ul>	KFEM, KFEL, KFG, KFGT, KFR, KFW, KFWS, KFRP, KFRS, KFP, KFML, KSP, KSN (cscl. E5) , KSPH, KSPL, KFF, KV
2 types of liquid mixed,	50 g Main agent: 25 g Curing agent: 25 g	•Suitable for bonding gages for strain measurement at very low temperature.	KFL
2 types of liquid mixed,	30 g Main agent: 6 g x 4 Curing agent: 1.5 g x 4	•Suitable for bonding gages for strain measurement at middle temperature.	KFG, KFR, KFGT KFF, KFS
2 types of epoxy liquid mixed	30 g Main agent: 5.6 g x 4 Curing agent: 2.1 g x 4	•Suitable for strain measurement at middle temperature and for bonding gages for transducers.	KFRP, KFP, KFH
2 types of epoxy liquid mixed	30 g Main agent: 18 g Curing agent: 12 g	<ul> <li>Low viscosity makes it suitable for bonding gages (KFG-C20) embeddable in bolts.</li> </ul>	KFG (C20) , KFW, KFWS, KFF
1 heating type of phenol liquid	100 g	•Suitable for strain measurement at low, middle and high temperature and for bonding gages for transducers.	KFG, KFR, KFH KFL, KFN, KFS
1 heating type of polyimide liquid	20 g	•Suitable for bonding gages for strain measurement at high temperature.	KFU, KFH

Note: \* Strain gages and adhesives are not included. Please prepare them separately.

### •GTK-77 Tool Kit

This kit includes almost all tools, gage terminals, solder and other expendables required for gage bonding work.

### Contents

Tool box, screwdriver set, tweezers (2 PC.), nippers, radio pliers, tape measure (2 m), stainless steel scale, protractor, sandpaper (#100, #320, 3 PC. each), soldering iron tip cleaner, knife, utility knife, scriber, soldering iron (40 W), compasses, marking pencil, mending tape, pencils (4H, 6H, 2 PC. each), scissors, cotton swabs, clean paper, high-temperature solder, flux for high-temperature solder, heat-resistant glass tube, gage terminals (T-P1, T-P4, T-P5, T-P6, T-P7, T-P8, T-P9, T-P10, T-F2, T-F3, T-F7, T-F8, T-F10, T-F13, T-F17, T-F25, T-F28, T-H11, and T-R9), hair dryer (1200 W), insulation vinyl tape, table tap (2.5 m), soldering iron (ANTEX), silicon rubber (10 PC.), fluoroplastic sheet (10 PC.)

Note: The power supply about the electric goods is Japanese specification of 100 VAC.



### ●GTK-55 Tool Kit 💷

Portable and includes almost all items required for gage bonding work

Contents

Tool box, tweezers (2 PC.), nippers, radio pliers, stainless steel scale, sandpaper (#180, #320, #600, and #1000, 4 PC. each), utility knife, scriber, 4H pencils (3 PC.), tape, scissors, small scissors, cotton swabs, clean paper, gage terminals (T-F7, T-F17) vinyl tape, silicone rubber(10 PC.), fluoroplastic sheet (10 PC.), polyethylene sheet (SKF-28284, 100 PC.), gage presser (G-MATE-B, 1 PC.)

## Gage Pressers

### Gage Presser G-MATE

The G-MATE can apply pressure to a bonded strain gage continuously until the adhesive is cured. It consists of a frame equipped with a strong ferrite magnet to firmly fix the object under testing and a pressure disk equipped with silicon sponge rubber and coil spring to apply constant pressure to the strain gage.



G-MATE-B

CE

Description	Models	Application		
Gage Mate	G-MATE-B	For normal temperature (up to approx. 80 °C)		
High-temperature Gage Mate	G-MATE-H	For high temperature (up to approx. 150 °C)		
A min. qty 6 PC.				

# Compact Spot Welder

### **•**GW-3C Compact Spot Welder

Developed to mount encapsulated strain gages such as the KHCS and KHCD and to fix high-temperature lead wires and thermocouples, the GW-3C is an easy-to-use welder providing an increased welding capability and allowing continuously variable setting of welding energy.



**Adhesives & Coating Agents** 

# Gage Terminals and Other Accessories

### •T-type Gage Terminals

A gage terminal is applied to the connection between a strain gage and lead wire to protect the gage leads. It prevents the strain gage from receiving force and the gage leads from breaking or peeling off if the lead wire is pulled to some extent.

	Models		Dimensions (mm) (W x L x t)	Base Material	Conductor Material	Qty per Pack	Operating Temperature Range (°C)	Recom- mended Adhesive	Remarks
		T-F2B ໜ	5-pole 14×55×0.1 1-pole 14×11×0.1	Glass epoxy	Copper foil	20 sheets (5 poles/ sheet)	-196 to 120	CC-33A EP-34B	
		T-F3B ໜ	5-pole 14×65×0.1 1-pole 14×13×0.1	Glass epoxy	Copper	20 sheets	-196 to 120	CC-33A EP-34B	For 3-wire system
	LAJ . LAJ . LAJ . LAJ . LAJ		5-pole 14×65×0.15 1-pole 14×13×0.15	Glass epoxy + double-coated adhesive tape	foil	sheet)	-30 to 50	Not required	Self-bonding
	<b>.</b>	T-F7B ໜ	5-pole 6x25x0.1 1-pole 6x5x0.1	Glass epoxy	Copper	20 sheets	-196 to 120	CC-33A EP-34B	Compact
		T-F17B ໜ	5-pole 6x25x0.15 1-pole 6x5x0.15	Glass epoxy + double-coated adhesive tape	foil	sheet)	-30 to 50	Not required	Self-bonding
		T-F8B ໜ	5-pole 4×30×0.1 1-pole 4×6×0.1	Glass epoxy	Copper foil	20 sheets (5 poles/ sheet)	-196 to 120	CC-33A EP-34B	
type		T-F10B ໜ	15×50×0.1	Glass epoxy	Copper foil	10 sheets	-196 to 120	CC-33A EP-34B	Mainly for 5-element gages
Foil		T-F23	5-pole 14×55×0.1 1-pole 14×11×0.1						
	******	T-F24	5-pole 9x40x0.1 1-pole 9x8x0.1	Polyimide	Copper foil	20 sheets (5 poles/ sheet)	–196 to 200, –196 to 120 with CC-33A	CC-33A EP-34B	For high temperature, compact
	-	T-F25	5-pole 6x25x0.1 1-pole 6x5x0.1						
	_	T-F26	5-pole 14×55×0.1 1-pole 14×11×0.1		Copper foil	20 sheets (5 poles/ sheet)	-196 to 350	PI-32	For high temperature
	<b>T-F27</b>	T-F27	5-pole 9x40x0.1 1-pole 9x8x0.1	Polyimide					
		T-F28	5-pole 6x25x0.1 1-pole 6x5x0.1						
		T-F29 ໜ	Outer: φ6 Inner: φ2.5	Glass epoxy	Copper foil	20 sheets	-196 to 120	EP-180, 340 CC-33A EP-34B	For measuring axial tension of bolts
		T-P1	14×10×4	Styrol	Tin-plated	20 PC.	-30 to 80	CC-33A	
		T-P4	14×10×4.5	Styrol + double-coated adhesive tape	wire		-30 to 50	Not required	Self-bonding
	e e	T-P5	6×6×2	ABS	Tin-plated	20 PC	-30 to 120	CC-33A	Compact
type	<u>سر ل</u> ے لیے ت	T-P6	6×6×2.5	ABS + double-coated adhesive tape	wire	2010.	-30 to 50	Not required	Self-bonding
Mold		T-P7	15×10×4	ABS	Tin-plated	40 PC	-30 to 80	CC-33A	For 3-wire system
		T-P8	15×10×4.5	ABS + double-coated adhesive tape	wire		-30 to 50	Not required	Self-bonding
		T-P9	6x5x4	Heat-resistant styrol	Tin-plated	40.55	201.00	CC 224	Compact
	<b>_</b>	T-P10	6x5x6	Heat-resistant styrol + rubber	wire	40 PC.	-30 to 90	UC-33A	Rubber on the rear

STRAIN GAGES



# **Coating Agents**

Coating agents are applied to gages and gage terminals to prevent gages from adsorbing moisture in outdoor or long-term measurement.



Models	C-1B	C-4	C-5	AK-22	VMTAP	ARALDITE-T,-C	HAMATITE-Y	KE-4898W
Туре	Hot-melt type	Hot-melt type	Rubber solvent type	Special clay	Press-fitting rubber type	2-liquid type (1:1)	Rubber solvent type	Silicon solvent type
Operating Temp. Range	–30 to 40°C	–50 to 60°C	–269 to 60°C	–196 to 170°C	–30 to 80°C	–50 to 100°C	–20 to 70°C	–50 to 200°C
Curing Requirements	Heat-melted & cured at room temp.	Heat-melted & cured at room temp.	Melted & dried at room temp. 12 h.	Press-fitted	Press-fitted	24 h at room temp.	Melted & dried at room temp. 12 h.	Melted & dried at room temp. 12 h.
Moisture & Water- proofness	O	$\bigcirc$	$\bigcirc$	O	$\bigcirc$	$\bigtriangleup$	0	$\bigtriangleup$
Mechanical Protection	$\bigtriangleup$	$\bigtriangleup$	$\bigtriangleup$	$\bigtriangleup$	$\bigtriangleup$	$\bigcirc$	$\bigtriangleup$	$\bigtriangleup$
Oil Resistance	$\bigtriangleup$	$\bigtriangleup$	$\bigtriangleup$	$\bigtriangleup$	$\bigtriangleup$	$\bigcirc$	$\bigtriangleup$	$\bigtriangleup$
Alcohol Resistance	0	0	0	0	0	0	0	0
Toluene Resistance	×	×	×	×	×	$\bigcirc$	×	×
Alkalescent Resistance	0	0	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigtriangleup$	$\bigtriangleup$
Weak-acid Resistance	0	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigtriangleup$	$\bigtriangleup$
Content	500 g	500 g	100 g	500 g	38mm×6m	T:170 g C:1.8 kg	1.5 kg	100 g
Material	Paraffin wax	Microcrystalline wax	Butyl rubber	Butyl rubber+ inorganic additive	Butyl rubber	Ероху	Chloroprene rubber	Silicon
Color	White	White	Light yellow	Dark green	Black	Main agent: Light milk white Curing agent: Light yellow	Black	Milk white
Features	Can be applied with a brush after melting through heating. Suitable for underlayer of multilayer coating.	Excellent cohe- siveness makes it suitable for application to wall surface.	Minimal restriction in ultra-low temperature applications.	The clay-like shape ensures easy coating work. Operating temp. range is wide.	The tape shape facilitates coating work.	Highly effective mechanical protection makes it suitable for upper layer of multilayer coating.	Suitable for final finish of multi- layer coating.	Highly heat- resistant coating agent.
Product name	C-1B	C-4	C-5	AK 22	VMTAPE	ARALDITE	HAMATITE-Y	KE-4898-W

 $\bigcirc$  : Excellent  $\bigcirc$  : Rather excellent

 $\triangle$  : Rather inferior

× ∶ Inferior

\*When using, read the attached Instruction Manual carefully.

# **Accessories for High-temperature Gages**



### **●**HTG Series Accessories for High-temperature Gages

Description	Models	Specifications	Qty
High-temperature solder	HTG-S-B	Fusion temperature: 309°C Maximum operating temperature: 300°C	40 cm long bar x 2
Flux for high-temperature solder	HTG-S-F	Ingredients: Inorganic acid + alcohol	20 g
Heat-resistant glass tube	HTG-G-TUBE	Inner diameter: 1.5 mm Length: 1 m	10 PC.
Heat-resistant Teflon tape	HTG-T-TAPE	Heat resistance: 200°C Width: 12.7 mm	32.9 m long
Heat-resistant glass tape	HTG-G-TAPE	Heat resistance: 350°C Width: 25 mm	33 m long

\*The heat resistance of  $350^\circ$ C for the heat-resistant glass tape are applied to a short-term operation.

STRAIN GAGES

**Custom-designed Gages** 

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# **Custom-designed Gages**



# **Custom-designed Gages for Transducers**

# Strain Gages for Transducers

Being excellent in its nonlinearity & repeatability, strain gages not only can be used to test strain, but also be used to make transducers.

The strain gages have been used for making our strain gage transducers, therefore the transducers are high reliability.

We provide various strain gages for our customers to make their own transducers to test load, force, pressure, torque, etc.

The patterns below are some examples. For details, please contact us.



**Custom-designed Gages**