Gages for Composite Materials & Plastics (KFRPB)

Patterns, Gage Resistance, Gage Factor	Models	Dimensions (mm)				Remarks
		Gage (Grid)		Base		
		Length	Width	Length	Width	

●KFRPB Series Foil Strain Gages for Composite Materials

RoHS

When ordering, suffix the lead-wire cable code (see table below) to the model number with a space in between.

E.g.
For the gage with 2 polyester-coated copper wires 15 cm long
→ KFRPB-5-120-C1-1 N15C2
For the gage with a vinyl-coated flat 3-wire cable 5 m long pre-attached
→ KFRPB-5-120-D22-3 L5M3S
If no lead-wire cable code is suffixed, the gage is delivered with gage leads only. (Silver-covered copper wires 25 mm long)

The KFRPB series foil strain gages are self-temperature-compensation gages (SELCOM gages) suitable for strain measurement of composite materials such as CFRP and GFRP. The special gage pattern minimizes the effect of self-heating due to gage current and the effect of reinforcement of low-elasticity materials.
To ensure accurate measurement by avoiding the self-heating effect of gage current, consider the following:

1. Select a lower excitation voltage on a measuring instrument.
2. Active-dummy system
3. 350Ω strain gages

Applicable Adhesives

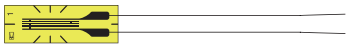
	Operating Temp. after Curing the Adhesive
CC-33A	–196 to 120°C
CC-36	–30 to 100°C
CC-35	–30 to 120°C
EP-34B	–55 to 200°C

■Types, lengths and codes of lead-wire cables pre-attached to KFRPB gages

Type / Length	2 polyester-coated copper wires	3 polyester-coated copper wires	Vinyl-coated flat 2-wire cable		Vinyl-coated flat 3-wire cable		Mid-temperature 2-wire cable	Mid-temperature 3-wire cable	Fluoroplastic coated high/low-temp. 3-wire cable
	C1, D22		C1	D22	C1	D22	C1, D22		
15 cm	N15C2	N15C3	L15C2R	L15C2S	L15C3R	L15C3S	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			L5M2R	L5M2S	L5M3R	L5M3S	R5M2	R5M3	F5M3
Operating temp.	-196 to 150°C		-10 to 80°C				-100 to 150°C		-196 to 200°C
Remarks	Twisted for ≥ 50 cm		L-6, L-9 for ≥ 6 m		L-7, L-10 for ≥ 6 m		L-11	L-12	L-3

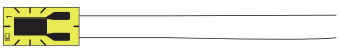
＊For other lead-wire cable lengths, contact us.

Uniaxial
Resistance: 120 Ω
Gage factor: Approx. 2.1



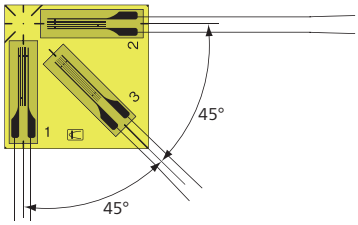
KFRPB-5-120-C1-1	5	1.4	15	5
KFRPB-5-120-C1-3				
KFRPB-5-120-C1-6				
KFRPB-5-120-C1-9				
KFRPB-2-120-C1-1	2	1.2	10	5
KFRPB-2-120-C1-3				
KFRPB-2-120-C1-6				
KFRPB-2-120-C1-9				

Uniaxial
Resistance: 350 Ω
Gage factor: Approx. 2.1



KFRPB-5-350-C1-1	5	1.5	15	5
KFRPB-5-350-C1-3				
KFRPB-5-350-C1-6				
KFRPB-5-350-C1-9				
KFRPB-2-350-C1-1	2	2.2	10	5
KFRPB-2-350-C1-3				
KFRPB-2-350-C1-6				
KFRPB-2-350-C1-9				

Triaxial, 0°/90°/45° plane arrangement
Resistance: 120 Ω
Gage factor: Approx. 2.1



Each of 3 axis may be given a different linear expansion coefficient if requested.

KFRPB-5-120-D22-1	5	1.4	19	19
KFRPB-5-120-D22-3				
KFRPB-5-120-D22-6				
KFRPB-5-120-D22-9				
KFRPB-2-120-D22-1	2	1.2	15	15
KFRPB-2-120-D22-3				
KFRPB-2-120-D22-6				
KFRPB-2-120-D22-9				

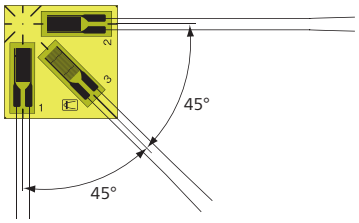
10 gages/ pkg

Gages for Composite Materials & Plastic (KFRPB & KFRS)

Patterns, Gage Resistance, Gage Factor	Models	Dimensions (mm) Gage (Grid) Length	Gage (Grid) Width	Base Length	Base Width	Remarks

Triaxial, 0°/90°/45° plane arrangement

Resistance: 350 Ω
Gage factor: Approx. 2.1



Each of 3 axis may be given a different linear expansion coefficient if requested.

KFRPB-5-350-D22-1	5	1.5	19	19
KFRPB-5-350-D22-3				
KFRPB-5-350-D22-6				
KFRPB-5-350-D22-9				
KFRPB-2-350-D22-1	2	2.2	15	15
KFRPB-2-350-D22-3				
KFRPB-2-350-D22-6				
KFRPB-2-350-D22-9				

Patterns, Gage Resistance, Gage Factor	Models	Dimensions (mm) Gage (Grid) Length	Gage (Grid) Width	Base Length	Base Width	Remarks

●KFRS Series Foil Strain Gages for Printed Boards

RoHS

When ordering, suffix the lead-wire cable code (see table below) to the model number with a space in between.

E.g.
For the gage with 3 polyester-coated copper wires 10-cm long pre-attached
→ KFRS-02-120-C1-13 N10C3
For the gage with a vinyl-coated flat 3-wire cable 5 m long pre-attached
→ KFRS-05-120-D35-13 L5M3S

PCB are used for varieties of products including cellular phones, car navigation systems and digital cameras. The gages are the self-temperature-compensation gages (SELCOM gages) for evaluating them.

- Dimensions of gage base (bondable space to mounted components and narrow parts) 1.2 mm long by 1.1 mm wide (uniaxial), 2.5 mm long by 2.5 mm wide (Biaxial or triaxial)
- Linear expansion coefficient of 13 x 10^{-6}/°C, suitable for component-mounted board
- Self-temperature-compensation range is made as wide as –30 to 120°C to satisfy thermal cyclic tests of PCB.

Applicable Adhesives

	Operating Temp. after Curing the Adhesive
CC-33A	–196 to 120°C
CC-36	–30 to 100°C
PC-600	–196 to 150°C

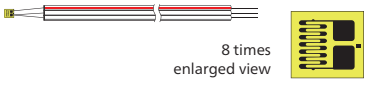
■Types, lengths and codes of lead-wire cables pre-attached to KFRS gages

Type / Length	2 polyester-coated copper wires	3 polyester-coated copper wires	Vinyl-coated flat 2-wire cable		Vinyl-coated flat 3-wire cable		Mid-temperature 2-wire cable	Mid-temperature 3-wire cable
	C1, D34, and D35		C1	D34, D35	C1	D34, D35	C1, D34, and D35	
10 cm	N10C2	N10C3	——	——	——	——	——	——
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
Operating temp.	-196 to 150°C		-10 to 80°C				-100 to 150°C	
Remark	Twisted for ≥ 50 cm		L-6		L-7		L-11	L-12

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

Uniaxial

Resistance: 120 Ω
Gage factor: Approx. 2.0

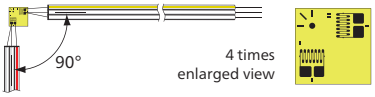


The following models are delivered with a vinyl-coated flat 3-wire cable 1 m long pre-attached.

KFRS-1-120-C1-13 L1M3R	1	0.65	4	1.4
KFRS-02-120-C1-13 L1M3R	0.2	0.8	1.2	1.1

Biaxial, 0°/90° plane arrangement

Resistance: 120 Ω
Gage factor: Approx. 2.0

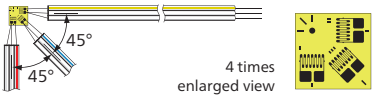


The following model is delivered with a vinyl-coated flat 3-wire cable 1 m long pre-attached.

KFRS-02-120-D34-13 L1M3S	0.2	0.8	2.5	2.5	5 gages/ pkg

Triaxial, 0°/90°/45° plane arrangement

Resistance: 120 Ω
Gage factor: Approx. 2.0



The following model is delivered with a vinyl-coated flat 3-wire cable 1 m long pre-attached.

KFRS-02-120-D35-13 L1M3S	0.2	0.8	2.5	2.5	5 gages/ pkg

10 gages/ pkg unless otherwise specified.