

## Gages for Printed Boards

# KFRS

- Gage Factor Approx. 2.0
- Applicable Linear Expansion Coefficient 13
- Self-temperature-compensation Range -30 to 120°C

### Applicable Adhesives and Operating Temperature Ranges

CC-33A: -196 to 120°C  
PC-6: -196 to 150°C

## ■ Foil Strain Gages for Printed Boards











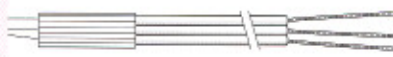
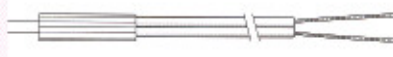


Printed boards are used for varieties of products including cellular phones, car navigation systems and digital cameras. To evaluate the mechanical and thermal characteristics of these printed boards, the KFRS gages were developed by integrating the advantageous features of KFG and KFR gages.

- Ultra-small gage bases enable bonding of these gages to components mounted on a printed board and narrow spaces on the printed board. The gage base of the uni-axial model is 1.2mm long by 1.1mm wide; that of biaxial and triaxial model is 2.5 mm<sup>2</sup>.
- The linear expansion coefficient is 13 x10<sup>-6</sup>/°C that is applicable to component-mounted PC boards.
- The self-temperature compensation range is widened to -30 to 120°C to meet heat cycle tests.

### ■ Types, lengths and codes of leadwire cables pre-attached to KFRS gages

Type	2 polyester-coated copper wires	3 polyester-coated copper wires	Vinyl-coated flat 2-wire cable		Vinyl-coated flat 3-wire cable		Middle-temperature 2-wire cable	Middle-temperature 3-wire cable
	C1, D34, D35		C1	D34, D35	C1	D34, D35	C1, D34, D35	
Length								
10 cm	N10C2	N10C3						
30	N30C2	N30C3						
1 m			L1M2R	L1M2S	L1M3R	L1M3S	R1M2	R1M3
3			L3M2R	L3M2S	L3M3R	L3M3S	R3M2	R3M3
5			L5M2R	L5M2S	L5M3R	L5M3S	R5M2	R5M3
Oprg. temp. range	-196 to 150°C		-10 to 80°C				-100 to 150°C	
Remarks			L-6		L-7		L-11	L-12

# KFRS Gages ● Uniaxial 120Ω

Pattern	Leadwire Cable - Type and Shape	Operating Temp. Range	Leadwire Length	Model
<b>KFRS-1-120-C1-13</b>   5 times enlarged view	Vinyl-coated flat 3-wire cable L-7 (L-10 for 6m or longer)	-10 to 80°C	1m	KFRS-1-120-C1-13 L1M3R
			3m	KFRS-1-120-C1-13 L3M3R
			5m	KFRS-1-120-C1-13 L5M3R
	Vinyl-coated flat 2-wire cable L-6 (L-9 for 6m or longer)	-10 to 80°C	1m	KFRS-1-120-C1-13 L1M2R
			3m	KFRS-1-120-C1-13 L3M2R
			5m	KFRS-1-120-C1-13 L5M2R
	Middle-temperature 3-wire cable L-12	-100 to 150°C	1m	KFRS-1-120-C1-13 R1M3
			3m	KFRS-1-120-C1-13 R3M3
			5m	KFRS-1-120-C1-13 R5M3
	Middle-temperature 2-wire cable L-11	-100 to 150°C	1m	KFRS-1-120-C1-13 R1M2
	3m		KFRS-1-120-C1-13 R3M2	
	5m		KFRS-1-120-C1-13 R5M2	
3 polyester-coated copper wires	-196 to 150°C	10cm	KFRS-1-120-C1-13 N10C3	
		30cm	KFRS-1-120-C1-13 N30C3	
2 polyester-coated copper wires	-196 to 150°C	10cm	KFRS-1-120-C1-13 N10C2	
		30cm	KFRS-1-120-C1-13 N30C2	
<b>KFRS-02-120-C1-13</b>   10 times enlarged view	Vinyl-coated flat 3-wire cable L-7 (L-10 for 6m or longer)	-10 to 80°C	1m	KFRS-02-120-C1-13 L1M3R
			3m	KFRS-02-120-C1-13 L3M3R
			5m	KFRS-02-120-C1-13 L5M3R
	Vinyl-coated flat 2-wire cable L-6 (L-9 for 6m or longer)	-10 to 80°C	1m	KFRS-02-120-C1-13 L1M2R
			3m	KFRS-02-120-C1-13 L3M2R
			5m	KFRS-02-120-C1-13 L5M2R
	Middle-temperature 3-wire cable L-12	-100 to 150°C	1m	KFRS-02-120-C1-13 R1M3
			3m	KFRS-02-120-C1-13 R3M3
			5m	KFRS-02-120-C1-13 R5M3
	Middle-temperature 2-wire cable L-11	-100 to 150°C	1m	KFRS-02-120-C1-13 R1M2
	3m		KFRS-02-120-C1-13 R3M2	
	5m		KFRS-02-120-C1-13 R5M2	
3 polyester-coated copper wires	-196 to 150°C	10cm	KFRS-02-120-C1-13 N10C3	
		30cm	KFRS-02-120-C1-13 N30C3	
2 polyester-coated copper wires	-196 to 150°C	10cm	KFRS-02-120-C1-13 N10C2	
		30cm	KFRS-02-120-C1-13 N30C2	













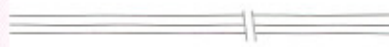

### Uniaxial

- Base Size 4 x 1.4 mm
- Gage Length 1 mm
- Gage Resistance 120Ω
- Pieces per Pack 10

### Uniaxial

- Base Size 1.2 x 1.1 mm
- Gage Length 0.2 mm
- Gage Resistance 120Ω
- Pieces per Pack 10

# KFRS Gages ● Biaxial 120Ω/Triaxial 120Ω

Pattern	Leadwire Cable - Type and Shape	Operating Temp. Range	Leadwire Length	Model	
<b>KFRS-02-120-D34-13</b>   5 times enlarged view  <b>Biaxial, 0°/90°</b> ● Base Size 2.5 x 2.5 mm ● Gage Length 0.2 mm ● Gage Resistance 120Ω ● Pieces per Pack 5	Vinyl-coated flat 3-wire cable L-7 (L-10 for 6m or longer) 	-10 to 80°C	1m	KFRS-02-120-D34-13 L1M3S	
			3m	KFRS-02-120-D34-13 L3M3S	
			5m	KFRS-02-120-D34-13 L5M3S	
		Vinyl-coated flat 2-wire cable L-6 (L-9 for 6m or longer) 	-10 to 80°C	1m	KFRS-02-120-D34-13 L1M2S
		3m		KFRS-02-120-D34-13 L3M2S	
		5m		KFRS-02-120-D34-13 L5M2S	
		Middle-temperature 3-wire cable L-12 	-100 to 150°C	1m	KFRS-02-120-D34-13 R1M3
		3m		KFRS-02-120-D34-13 R3M3	
		5m		KFRS-02-120-D34-13 R5M3	
		Middle-temperature 2-wire cable L-11 	-100 to 150°C	1m	KFRS-02-120-D34-13 R1M2
		3m		KFRS-02-120-D34-13 R3M2	
		5m		KFRS-02-120-D34-13 R5M2	
		3 polyester-coated copper wires 	-196 to 150°C	10cm	KFRS-02-120-D34-13 N10C3
				30cm	KFRS-02-120-D34-13 N30C3
		2 polyester-coated copper wires 	-196 to 150°C	10cm	KFRS-02-120-D34-13 N10C2
		30cm		KFRS-02-120-D34-13 N30C2	
<b>KFRS-02-120-D35-13</b>   10 times enlarged view  <b>Triaxial, 0°/90°/45°</b> ● Base Size 2.5 x 2.5 mm ● Gage Length 0.2 mm ● Gage Resistance 120Ω ● Pieces per Pack 5	Vinyl-coated flat 3-wire cable L-7 (L-10 for 6m or longer) 	-10 to 80°C	1m	KFRS-02-120-D35-13 L1M3S	
			3m	KFRS-02-120-D35-13 L3M3S	
			5m	KFRS-02-120-D35-13 L5M3S	
		Vinyl-coated flat 2-wire cable L-6 (L-9 for 6m or longer) 	-10 to 80°C	1m	KFRS-02-120-D35-13 L1M2S
		3m		KFRS-02-120-D35-13 L3M2S	
		5m		KFRS-02-120-D35-13 L5M2S	
		Middle-temperature 3-wire cable L-12 	-100 to 150°C	1m	KFRS-02-120-D35-13 R1M3
		3m		KFRS-02-120-D35-13 R3M3	
		5m		KFRS-02-120-D35-13 R5M3	
		Middle-temperature 2-wire cable L-11 	-100 to 150°C	1m	KFRS-02-120-D35-13 R1M2
		3m		KFRS-02-120-D35-13 R3M2	
		5m		KFRS-02-120-D35-13 R5M2	
		3 polyester-coated copper wires 	-196 to 150°C	10cm	KFRS-02-120-D35-13 N10C3
				30cm	KFRS-02-120-D35-13 N30C3
		2 polyester-coated copper wires 	-196 to 150°C	10cm	KFRS-02-120-D35-13 N10C2
		30cm		KFRS-02-120-D35-13 N30C2	