

Gages for Composite Materials/Plastics

KFRP

- Gage Factor Approx. 2.1
- Applicable Linear Expansion Coefficients 1, 3, 6, 9
- Self-temperature-compensation Range 0 to 150°C

Applicable Adhesives and Operating Temperature Ranges

CC-33A: -196 to 120°C
 CC-35: -30 to 120°C
 EP-34B: -55 to 150°C



■ Foil Strain Gages for Composite Materials

The KFRP 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 against low-elasticity materials.

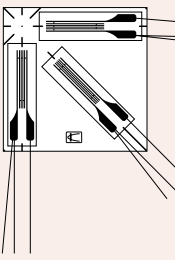
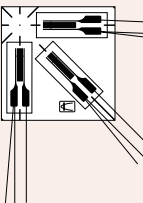
■ Types, lengths and codes of leadwire cables pre-attached to KFRP gages

Type	2 polyester-coated copper wires	3 polyester-coated copper wires	Vinyl-coated flat 2-wire cable		Vinyl-coated flat 3-wire cable		Middle-temp. 2-wire cable	Middle-temp. 3-wire cable	Fluoroplastic coated high/low-temp. 3-wire cable
	C1,D22		C1	D22	C1	D22	C1,D22		
Length									
2 cm	N2C2	N2C3							
3	N3C2	N3C3							
4	N4C2	N4C3							
5	N5C2	N5C3							
10	N10C2	N10C3							
15	N15C2	N15C3	L15C2R	L15C2S	L15C3R	L15C3S	R15C2	R15C3	F15C3
30	N30C2	N30C3	L30C2R	L30C2S	L30C3R	L30C3S	R30C2	R30C3	F30C3
50	N50C2	N50C3	L50C2R	L50C2S	L50C3R	L50C3S	R50C2	R50C3	F50C3
1 m	N1M2	N1M3	L1M2R	L1M2S	L1M3R	L1M3S	R1M2	R1M3	F1M3
2			L2M2R	L2M2S	L2M3R	L2M3S	R2M2	R2M3	F2M3
3			L3M2R	L3M2S	L3M3R	L3M3S	R3M2	R3M3	F3M3
4			L4M2R	L4M2S	L4M3R	L4M3S	R4M2	R4M3	F4M3
5			L5M2R	L5M2S	L5M3R	L5M3S	R5M2	R5M3	F5M3
6			L6M2R	L6M2S	L6M3R	L6M3S	R6M2	R6M3	F6M3
8			L8M2R	L8M2S	L8M3R	L8M3S	R8M2	R8M3	F8M3
10			L10M2R	L10M2S	L10M3R	L10M3S	R10M2	R10M3	F10M3
15			L15M2R	L15M2S	L15M3R	L15M3S	R15M2	R15M3	F15M3
20			L20M2R	L20M2S	L20M3R	L20M3S	R20M2	R20M3	F20M3
30 m			L30M2R	L30M2S	L30M3R	L30M3S	R30M2	R30M3	F30M3
Opgr. temp. range	-196 to 150°C		-10 to 80°C				-100 to 150°C		-196 to 200°C
Remarks	Twisted for 50cm and 1m long		L-6; L-9 for 6m or longer		L-7; L-10 for 6m or longer		L-11	L-12	L-3

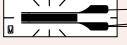

KFRP Gages ● Uniaxial 120Ω

Pattern	Leadwire Cable – Type and Shape	Operating Temp. Range	Leadwire Length	Model	
KFRP-5-120-C1-1 3 6 9 Uniaxial ● Base Size 15 x 5 mm ● Gage Length 5 mm ● Gage Resistance 120Ω ● Pieces per Pack 10	 Vinyl-coated flat 3-wire cable L-7 (L-10 for 6m or longer)	-10 to 80°C	1m	KFRP-5-120-C1-1 L1M3R	
			3m	KFRP-5-120-C1-1 L3M3R	
			5m	KFRP-5-120-C1-1 L5M3R	
		Vinyl-coated flat 2-wire cable L-6 (L-9 for 6m or longer)	-10 to 80°C	1m	KFRP-5-120-C1-1 L1M2R
				3m	KFRP-5-120-C1-1 L3M2R
				5m	KFRP-5-120-C1-1 L5M2R
		Middle-temperature 3-wire cable L-12	-100 to 150°C	1m	KFRP-5-120-C1-1 R1M3
				3m	KFRP-5-120-C1-1 R3M3
				5m	KFRP-5-120-C1-1 R5M3
		Middle-temperature 2-wire cable L-11	-100 to 150°C	1m	KFRP-5-120-C1-1 R1M2
				3m	KFRP-5-120-C1-1 R3M2
				5m	KFRP-5-120-C1-1 R5M2
		Fluoroplastic-coated high/low-temp. 3-wire cable L-3	-196 to 200°C	1m	KFRP-5-120-C1-1 F1M3
				3m	KFRP-5-120-C1-1 F3M3
				5m	KFRP-5-120-C1-1 F5M3
	3 polyester-coated copper wires	-196 to 150°C	30cm	KFRP-5-120-C1-1 N30C3	
			50cm	KFRP-5-120-C1-1 N50C3	
			50cm•1m	1m	KFRP-5-120-C1-1 N1M3
	2 polyester-coated copper wires	-196 to 150°C	30cm	KFRP-5-120-C1-1 N30C2	
			50cm	KFRP-5-120-C1-1 N50C2	
			50cm•1m	1m	KFRP-5-120-C1-1 N1M2
	Silver-clad copper wires	-196 to 200°C	25mm	KFRP-5-120-C1-1	
KFRP-2-120-C1-1 3 6 9 Uniaxial ● Base Size 10 x 5 mm ● Gage Length 2 mm ● Gage Resistance 120Ω ● Pieces per Pack 10	 Vinyl-coated flat 3-wire cable L-7 (L-10 for 6m or longer)	-10 to 80°C	1m	KFRP-2-120-C1-1 L1M3R	
			3m	KFRP-2-120-C1-1 L3M3R	
			5m	KFRP-2-120-C1-1 L5M3R	
		Vinyl-coated flat 2-wire cable L-6 (L-9 for 6m or longer)	-10 to 80°C	1m	KFRP-2-120-C1-1 L1M2R
				3m	KFRP-2-120-C1-1 L3M2R
				5m	KFRP-2-120-C1-1 L5M2R
		Middle-temperature 3-wire cable L-12	-100 to 150°C	1m	KFRP-2-120-C1-1 R1M3
				3m	KFRP-2-120-C1-1 R3M3
				5m	KFRP-2-120-C1-1 R5M3
		Middle-temperature 2-wire cable L-11	-100 to 150°C	1m	KFRP-2-120-C1-1 R1M2
				3m	KFRP-2-120-C1-1 R3M2
				5m	KFRP-2-120-C1-1 R5M2
		Fluoroplastic-coated high/low-temp. 3-wire cable L-3	-196 to 200°C	1m	KFRP-2-120-C1-1 F1M3
				3m	KFRP-2-120-C1-1 F3M3
				5m	KFRP-2-120-C1-1 F5M3
	3 polyester-coated copper wires	-196 to 150°C	30cm	KFRP-2-120-C1-1 N30C3	
			50cm	KFRP-2-120-C1-1 N50C3	
			50cm•1m	1m	KFRP-2-120-C1-1 N1M3
	2 polyester-coated copper wires	-196 to 150°C	30cm	KFRP-2-120-C1-1 N30C2	
			50cm	KFRP-2-120-C1-1 N50C2	
			50cm•1m	1m	KFRP-2-120-C1-1 N1M2
	Silver-clad copper wires	-196 to 200°C	25mm	KFRP-2-120-C1-1	

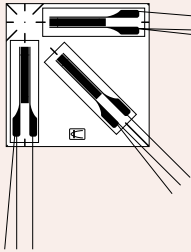
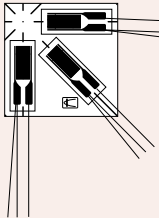
KFRP Gages ● Triaxial 120Ω

Pattern	Leadwire Cable – Type and Shape	Operating Temp. Range	Leadwire Length	Model	
 <p>KFRP-5-120-D22-1</p> <p>3 6 9</p> <p>Triaxial, 0°/90°/45°</p> <ul style="list-style-type: none"> ● Base Size 19 x 19 mm ● Gage Length 5 mm ● Gage Resistance 120Ω ● Pieces per Pack 10 	Vinyl-coated flat 3-wire cable L-7 (L-10 for 6m or longer)	-10 to 80°C	1m	KFRP-5-120-D22-1 L1M3S	
				3m	KFRP-5-120-D22-1 L3M3S
				5m	KFRP-5-120-D22-1 L5M3S
		Vinyl-coated flat 2-wire cable L-6 (L-9 for 6m or longer)	-10 to 80°C	1m	KFRP-5-120-D22-1 L1M2S
				3m	KFRP-5-120-D22-1 L3M2S
				5m	KFRP-5-120-D22-1 L5M2S
		Middle-temperature 3-wire cable L-12	-100 to 150°C	1m	KFRP-5-120-D22-1 R1M3
				3m	KFRP-5-120-D22-1 R3M3
				5m	KFRP-5-120-D22-1 R5M3
		Middle-temperature 2-wire cable L-11	-100 to 150°C	1m	KFRP-5-120-D22-1 R1M2
				3m	KFRP-5-120-D22-1 R3M2
				5m	KFRP-5-120-D22-1 R5M2
		Fluoroplastic-coated high/low-temp. 3-wire cable L-3	-196 to 200°C	1m	KFRP-5-120-D22-1 F1M3
				3m	KFRP-5-120-D22-1 F3M3
				5m	KFRP-5-120-D22-1 F5M3
	3 polyester-coated copper wires	-196 to 150°C	30cm	KFRP-5-120-D22-1 N30C3	
			50cm	KFRP-5-120-D22-1 N50C3	
			50cm·1m	1m	KFRP-5-120-D22-1 N1M3
	2 polyester-coated copper wires	-196 to 150°C	30cm	KFRP-5-120-D22-1 N30C2	
			50cm	KFRP-5-120-D22-1 N50C2	
			50cm·1m	1m	KFRP-5-120-D22-1 N1M2
	Silver-clad copper wires	-196 to 200°C	25mm	KFRP-5-120-D22-1	
 <p>KFRP-2-120-D22-1</p> <p>3 6 9</p> <p>Triaxial, 0°/90°/45°</p> <ul style="list-style-type: none"> ● Base Size 15 x 15 mm ● Gage Length 2 mm ● Gage Resistance 120Ω ● Pieces per Pack 10 	Vinyl-coated flat 3-wire cable L-7 (L-10 for 6m or longer)	-10 to 80°C	1m	KFRP-2-120-D22-1 L1M3S	
				3m	KFRP-2-120-D22-1 L3M3S
				5m	KFRP-2-120-D22-1 L5M3S
		Vinyl-coated flat 2-wire cable L-6 (L-9 for 6m or longer)	-10 to 80°C	1m	KFRP-2-120-D22-1 L1M2S
				3m	KFRP-2-120-D22-1 L3M2S
				5m	KFRP-2-120-D22-1 L5M2S
		Middle-temperature 3-wire cable L-12	-100 to 150°C	1m	KFRP-2-120-D22-1 R1M3
				3m	KFRP-2-120-D22-1 R3M3
				5m	KFRP-2-120-D22-1 R5M3
		Middle-temperature 2-wire cable L-11	-100 to 150°C	1m	KFRP-2-120-D22-1 R1M2
				3m	KFRP-2-120-D22-1 R3M2
				5m	KFRP-2-120-D22-1 R5M2
		Fluoroplastic-coated high/low-temp. 3-wire cable L-3	-196 to 200°C	1m	KFRP-2-120-D22-1 F1M3
				3m	KFRP-2-120-D22-1 F3M3
				5m	KFRP-2-120-D22-1 F5M3
	3 polyester-coated copper wires	-196 to 150°C	30cm	KFRP-2-120-D22-1 N30C3	
			50cm	KFRP-2-120-D22-1 N50C3	
			50cm·1m	1m	KFRP-2-120-D22-1 N1M3
	2 polyester-coated copper wires	-196 to 150°C	30cm	KFRP-2-120-D22-1 N30C2	
			50cm	KFRP-2-120-D22-1 N50C2	
			50cm·1m	1m	KFRP-2-120-D22-1 N1M2
	Silver-clad copper wires	-196 to 200°C	25mm	KFRP-2-120-D22-1	

KFRP Gages ● Uniaxial 350Ω

Pattern	Leadwire Cable – Type and Shape	Operating Temp. Range	Leadwire Length	Model	
 <p>KFRP-5-350-C1-1 3 6 9</p> <p>Uniaxial</p> <ul style="list-style-type: none"> ● Base Size 15 x 5 mm ● Gage Length 5 mm ● Gage Resistance 350Ω ● Pieces per Pack 10 	Vinyl-coated flat 3-wire cable L-7 (L-10 for 6m or longer)	-10 to 80°C	1m	KFRP-5-350-C1-1 L1M3R	
				3m	KFRP-5-350-C1-1 L3M3R
				5m	KFRP-5-350-C1-1 L5M3R
		Vinyl-coated flat 2-wire cable L-6 (L-9 for 6m or longer)	-10 to 80°C	1m	KFRP-5-350-C1-1 L1M2R
				3m	KFRP-5-350-C1-1 L3M2R
				5m	KFRP-5-350-C1-1 L5M2R
		Middle-temperature 3-wire cable L-12	-100 to 150°C	1m	KFRP-5-350-C1-1 R1M3
				3m	KFRP-5-350-C1-1 R3M3
				5m	KFRP-5-350-C1-1 R5M3
		Middle-temperature 2-wire cable L-11	-100 to 150°C	1m	KFRP-5-350-C1-1 R1M2
				3m	KFRP-5-350-C1-1 R3M2
				5m	KFRP-5-350-C1-1 R5M2
		Fluoroplastic-coated high/low-temp. 3-wire cable L-3	-196 to 200°C	1m	KFRP-5-350-C1-1 F1M3
				3m	KFRP-5-350-C1-1 F3M3
				5m	KFRP-5-350-C1-1 F5M3
	3 polyester-coated copper wires	-196 to 150°C	30cm	KFRP-5-350-C1-1 N30C3	
			50cm	KFRP-5-350-C1-1 N50C3	
			1m	KFRP-5-350-C1-1 N1M3	
	2 polyester-coated copper wires	-196 to 150°C	30cm	KFRP-5-350-C1-1 N30C2	
			50cm	KFRP-5-350-C1-1 N50C2	
			1m	KFRP-5-350-C1-1 N1M2	
	Silver-clad copper wires	-196 to 200°C	25mm	KFRP-5-350-C1-1	
 <p>KFRP-2-350-C1-1 3 6 9</p> <p>Uniaxial</p> <ul style="list-style-type: none"> ● Base Size 10 x 5 mm ● Gage Length 2 mm ● Gage Resistance 350Ω ● Pieces per Pack 10 	Vinyl-coated flat 3-wire cable L-7 (L-10 for 6m or longer)	-10 to 80°C	1m	KFRP-2-350-C1-1 L1M3R	
				3m	KFRP-2-350-C1-1 L3M3R
				5m	KFRP-2-350-C1-1 L5M3R
		Vinyl-coated flat 2-wire cable L-6 (L-9 for 6m or longer)	-10 to 80°C	1m	KFRP-2-350-C1-1 L1M2R
				3m	KFRP-2-350-C1-1 L3M2R
				5m	KFRP-2-350-C1-1 L5M2R
		Middle-temperature 3-wire cable L-12	-100 to 150°C	1m	KFRP-2-350-C1-1 R1M3
				3m	KFRP-2-350-C1-1 R3M3
				5m	KFRP-2-350-C1-1 R5M3
		Middle-temperature 2-wire cable L-11	-100 to 150°C	1m	KFRP-2-350-C1-1 R1M2
				3m	KFRP-2-350-C1-1 R3M2
				5m	KFRP-2-350-C1-1 R5M2
		Fluoroplastic-coated high/low-temp. 3-wire cable L-3	-196 to 200°C	1m	KFRP-2-350-C1-1 F1M3
				3m	KFRP-2-350-C1-1 F3M3
				5m	KFRP-2-350-C1-1 F5M3
	3 polyester-coated copper wires	-196 to 150°C	30cm	KFRP-2-350-C1-1 N30C3	
			50cm	KFRP-2-350-C1-1 N50C3	
			1m	KFRP-2-350-C1-1 N1M3	
	2 polyester-coated copper wires	-196 to 150°C	30cm	KFRP-2-350-C1-1 N30C2	
			50cm	KFRP-2-350-C1-1 N50C2	
			1m	KFRP-2-350-C1-1 N1M2	
	Silver-clad copper wires	-196 to 200°C	25mm	KFRP-2-350-C1-1	

KFRP Gages ● Triaxial 350Ω

Pattern	Leadwire Cable – Type and Shape	Operating Temp. Range	Leadwire Length	Model	
 <p>KFRP-5-350-D22-1</p> <p>3 6 9</p> <p>Triaxial, 0°/90°/45°</p> <ul style="list-style-type: none"> ● Base Size 19 x 19 mm ● Gage Length 5 mm ● Gage Resistance 350Ω ● Pieces per Pack 10 	Vinyl-coated flat 3-wire cable L-7 (L-10 for 6m or longer)	-10 to 80°C	1m	KFRP-5-350-D22-1 L1M3S	
				3m	KFRP-5-350-D22-1 L3M3S
				5m	KFRP-5-350-D22-1 L5M3S
		Vinyl-coated flat 2-wire cable L-6 (L-9 for 6m or longer)	-10 to 80°C	1m	KFRP-5-350-D22-1 L1M2S
				3m	KFRP-5-350-D22-1 L3M2S
				5m	KFRP-5-350-D22-1 L5M2S
		Middle-temperature 3-wire cable L-12	-100 to 150°C	1m	KFRP-5-350-D22-1 R1M3
				3m	KFRP-5-350-D22-1 R3M3
				5m	KFRP-5-350-D22-1 R5M3
		Middle-temperature 2-wire cable L-11	-100 to 150°C	1m	KFRP-5-350-D22-1 R1M2
				3m	KFRP-5-350-D22-1 R3M2
				5m	KFRP-5-350-D22-1 R5M2
		Fluoroplastic-coated high/low-temp. 3-wire cable L-3	-196 to 200°C	1m	KFRP-5-350-D22-1 F1M3
				3m	KFRP-5-350-D22-1 F3M3
				5m	KFRP-5-350-D22-1 F5M3
		3 polyester-coated copper wires	-196 to 150°C	30cm	KFRP-5-350-D22-1 N30C3
				50cm	KFRP-5-350-D22-1 N50C3
				50cm·1m	KFRP-5-350-D22-1 N1M3
	2 polyester-coated copper wires	-196 to 150°C	30cm	KFRP-5-350-D22-1 N30C2	
			50cm	KFRP-5-350-D22-1 N50C2	
			50cm·1m	KFRP-5-350-D22-1 N1M2	
	Silver-clad copper wires	-196 to 200°C	25mm	KFRP-5-120-D22-1	
 <p>KFRP-2-350-D22-1</p> <p>3 6 9</p> <p>Triaxial, 0°/90°/45°</p> <ul style="list-style-type: none"> ● Base Size 15 x 15 mm ● Gage Length 2 mm ● Gage Resistance 350Ω ● Pieces per Pack 10 	Vinyl-coated flat 3-wire cable L-7 (L-10 for 6m or longer)	-10 to 80°C	1m	KFRP-2-350-D22-1 L1M3S	
				3m	KFRP-2-350-D22-1 L3M3S
				5m	KFRP-2-350-D22-1 L5M3S
		Vinyl-coated flat 2-wire cable L-6 (L-9 for 6m or longer)	-10 to 80°C	1m	KFRP-2-350-D22-1 L1M2S
				3m	KFRP-2-350-D22-1 L3M2S
				5m	KFRP-2-350-D22-1 L5M2S
		Middle-temperature 3-wire cable L-12	-100 to 150°C	1m	KFRP-2-350-D22-1 R1M3
				3m	KFRP-2-350-D22-1 R3M3
				5m	KFRP-2-350-D22-1 R5M3
		Middle-temperature 2-wire cable L-11	-100 to 150°C	1m	KFRP-2-350-D22-1 R1M2
				3m	KFRP-2-350-D22-1 R3M2
				5m	KFRP-2-350-D22-1 R5M2
		Fluoroplastic-coated high/low-temp. 3-wire cable L-3	-196 to 200°C	1m	KFRP-2-350-D22-1 F1M3
				3m	KFRP-2-350-D22-1 F3M3
				5m	KFRP-2-350-D22-1 F5M3
		3 polyester-coated copper wires	-196 to 150°C	30cm	KFRP-2-350-D22-1 N30C3
				50cm	KFRP-2-350-D22-1 N50C3
				50cm·1m	KFRP-2-350-D22-1 N1M3
	2 polyester-coated copper wires	-196 to 150°C	30cm	KFRP-2-350-D22-1 N30C2	
			50cm	KFRP-2-350-D22-1 N50C2	
			50cm·1m	KFRP-2-350-D22-1 N1M2	
	Silver-clad copper wires	-196 to 200°C	25mm	KFRP-2-350-D22-1	