




# FOIL STRAIN GAUGES

## series F

Operating temperature range  
 -196°C  +150°C

Temperature compensation range  
 +10°C  +100°C

Suffix code for temperature compensation materials  
 -11: Mild steel  -17: Stainless steel  -23: Aluminium 

Applicable adhesives

CN	-196 ~ +120°C
P-2	-30 ~ +150°C
EB-2	-60 ~ +150°C

For ordering, the above suffix code should be added to the basic gauge type.

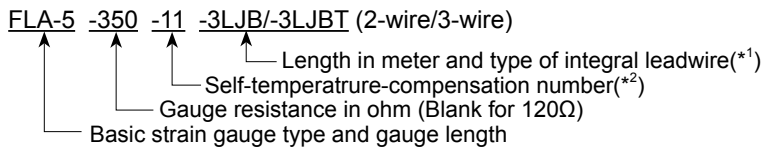
### GENERAL USE

Gauge pattern	Basic type	Gauge size		Backing		Resistance Ω
		L	W	L	W	

These gauges employ Cu-Ni alloy foils for the grid and special plastics for the backing. The plastics backing exhibits excellent electrical insulation performance, and is color-coded to identify the objective material for self-temperature-compensation. Various types of strain gauges such as "for residual stress measurement" are available in addition to general use gauges.



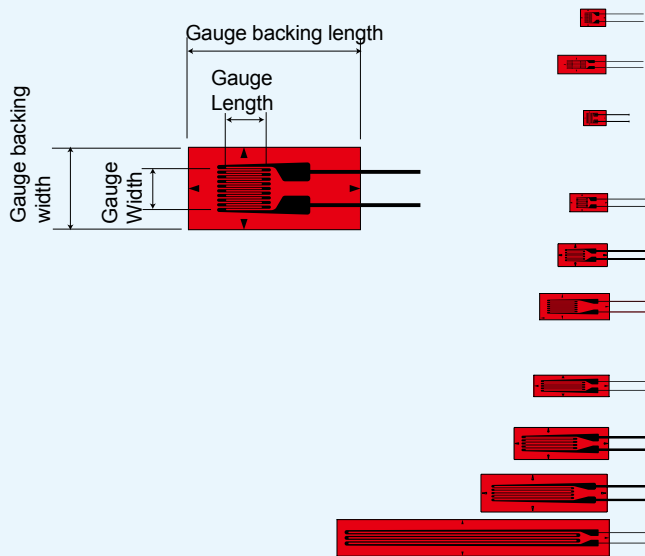
Example of type number designation



<sup>\*1</sup>: Not mentioned for gauges without leadwire  
<sup>\*2</sup>: The following numbers are available for F series gauges  
 -11: Mild steel (11ppm/°C)  
 -17: Stainless steel, Copper alloy (17ppm/°C)  
 -23: Aluminium (23ppm/°C)










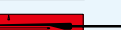

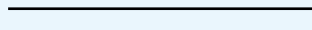









### Single element : FLG/FLA/FLK

Each package contains 10 gauges.



FLK type with narrow gauge width

High gauge resistance 350Ω and 1000Ω

	FLG-02	0.2	1.4	3.5	2.5	120
	FLG-1	1	1.1	6.5	2.5	120
	FLA-03	0.3	1.4	3	2	120
	FLA-05	0.5	1.2	5	2.2	120
	FLA-1	1	1.3	5	2.5	120
	FLA-2	2	1.5	6.5	3	120
	FLA-3	3	1.7	8.8	3.5	120
	FLA-3-60	3	1.2	8	3	60
	FLA-5	5	1.5	10	3	120
	FLA-6	6	2.2	12.5	4.3	120
	FLA-10	10	2.5	16.7	5	120
	FLA-30	30	2	36.1	5.1	120
	FLK-1	1	0.7	4.5	1.4	120
	FLK-2	2	0.9	5.5	1.5	120
	FLK-6	6	1.0	11.2	2.2	120
	FLK-10	10	1.6	16.2	3.8	120
	FLA-1-350	1	1.6	4.5	3	350
	FLA-2-350	2	1.9	6.1	3.5	350
	FLA-3-350	3	1.6	7.2	3	350
	FLA-5-350	5	1.8	9.4	3.8	350
	FLA-6-1000	6	4.6	13.5	7	1000

-196°C Operating temperature range +150°C

Temperature compensation range  
+10°C +100°C

Suffix code for temperature compensation materials  
-11: Mild steel ■ -17: Stainless steel ■ -23: Aluminium ■

For ordering, the above suffix code should be added to the basic gauge type.


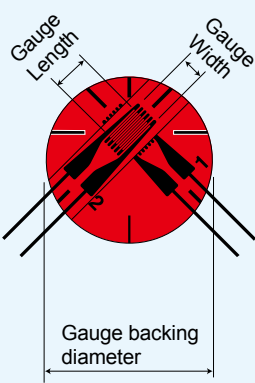
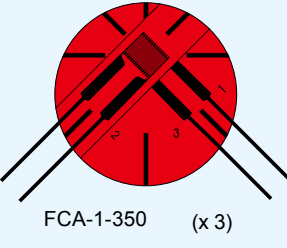
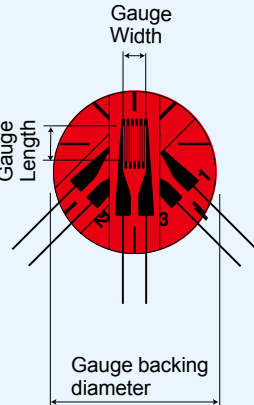
**FOIL STRAIN GAUGES**

**series F**

Applicable adhesives

CN	-196 ~ +120°C
P-2	-30 ~ +150°C
EB-2	-60 ~ +150°C

**GENERAL USE**

Gauge pattern	Basic type	Gauge size L W	Backing L W	Resistance $\Omega$
				
Each package contains 10 gauges.				
<p><b>0°/90° 2-element Rosette Stacked: FCA</b></p> 	FCA-1	1 0.7	$\phi$ 4.5	120
	FCA-2	2 0.9	$\phi$ 7	120
	FCA-3	3 1.7	$\phi$ 11	120
	FCA-5	5 1.9	$\phi$ 12	120
	FCA-6	6 2.4	$\phi$ 14	120
	FCA-10	10 2.5	$\phi$ 17	120
	Each package contains 10 gauges.			
<p><b>350<math>\Omega</math> 0°/90° 2-element Rosette Stacked: FCA</b></p> 	FCA-1-350	1 1.6	$\phi$ 8	350
	FCA-2-350	2 1.9	$\phi$ 9.5	350
	FCA-3-350	3 2	$\phi$ 10	350
	FCA-5-350	5 1.8	$\phi$ 10	350
Each package contains 10 gauges.				
<p><b>0°/45°/90° 3-element Rosette Stacked: FRA</b></p> 	FRA-1	1 0.7	$\phi$ 4.5	120
	FRA-2	2 0.9	$\phi$ 7	120
	FRA-3	3 1.7	$\phi$ 11	120
	FRA-5	5 1.9	$\phi$ 12	120
	FRA-6	6 2.4	$\phi$ 14	120
	FRA-10	10 2.5	$\phi$ 17	120

# FOIL STRAIN GAUGES



## series F

-196°C Operating temperature range  
 +150°C  
 Temperature compensation range  
 +10°C ~ +100°C

Suffix code for temperature compensation materials  
 -11: Mild steel ■ -17: Stainless steel ■ -23: Aluminium ■  
 For ordering, the above suffix code should be added to the basic gauge type.

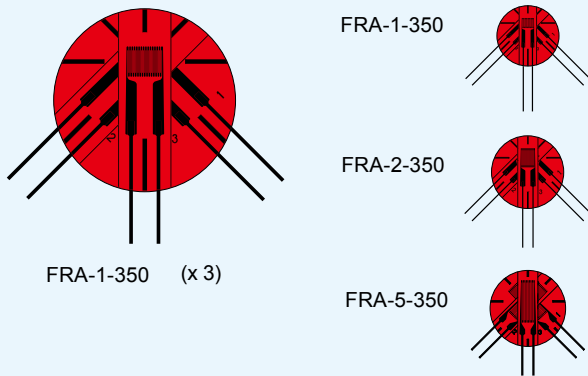
Applicable adhesives	CN	-196 ~ +120°C
	P-2	-30 ~ +150°C
	EB-2	-60 ~ +150°C

### GENERAL USE

Gauge pattern	Basic type	Gauge size		Backing		Resistance Ω
		L	W	L	W	
 						
<p>Example of type number designation</p> <p><u>FLA-5</u> <u>-350</u> <u>-11</u> <u>-3LJB/-3LJBT</u> (2-wire/3-wire)</p> <p>↑ Length in meter and type of integral leadwire(*1)                  ↑ Self-temperature-compensation number(*2)                  ↑ Gauge resistance in ohm (Blank for 120Ω)                  ↑ Basic strain gauge type and gauge length</p> <p>*1 : Not mentioned for gauges without leadwire                  *2 : The following numbers are available for F series gauges                  -11: Mild steel (11ppm/°C)                  -17: Stainless steel, Copper alloy (17ppm/°C)                  -23: Aluminium (23ppm/°C)</p>						



#### 350Ω 0°/45°/90° 3-element Rosette Stacked: FRA

Each package contains 10 gauges.



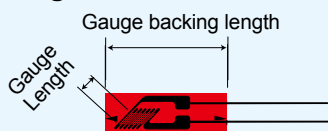
FRA-1-350	1	1.6	φ 8	350
FRA-2-350	2	1.9	φ 9.5	350
FRA-3-350	3	2	φ 10	350
FRA-5-350	5	1.8	φ 10	350

### SPECIAL USE

Gauge pattern	Basic type	Gauge size		Backing		Resistance Ω
		L	W	L	W	
 						
<p>Option F                  This code is appended to the basic type for strain gauges with lead-free solder in place of leaded solder. Fatigue life of the strain gauge may become shorter by the lead-free solder.</p> <p>Example of type number designation</p> <p><u>FLT-05A</u> <u>-11</u> <u>-350</u> <u>-F</u> <u>-3LJC</u> <u>-F</u></p> <p>↑ Option F : LEAD-free soldering of leadwire                  ↑ Length in meter and type of integration leadwire                  ↑ Option F: LEAD-free soldering of strain gauge                  ↑ Gauge resistance (Blank for 120Ω)                  ↑ Self-temperature-compensation number                  ↑ Basic strain gauge type</p>						

#### Shearing strain measurement : FLT

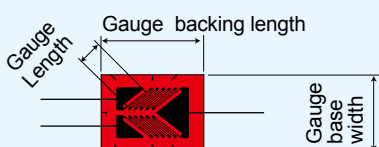
Each package contains 10 gauges.



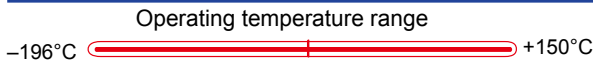
Left 45°	FLT-05A	0.5	0.66	4	1.3	120
Right 45°	FLT-05B	0.5	0.66	4	1.3	120

#### Torque measurement : FCT

Each package contains 10 gauges.



	FCT-2	2	1.5	8.7	6.5	120
	FCT-2-350	2	1.5	7.6	5.3	350



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# series F

Suffix code for temperature compensation materials  
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 For ordering, the above suffix code should be added to the basic gauge type.

Applicable adhesives

CN	-196 ~ +120°C
P-2	-30 ~ +150°C
EB-2	-60 ~ +150°C

## SPECIAL USE

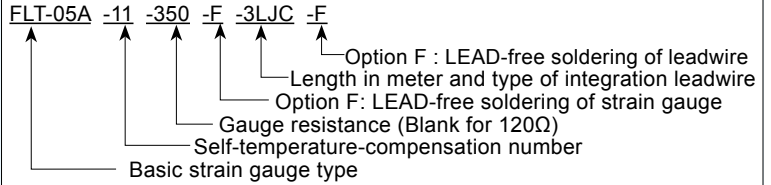
### Gauge pattern

#### Option F

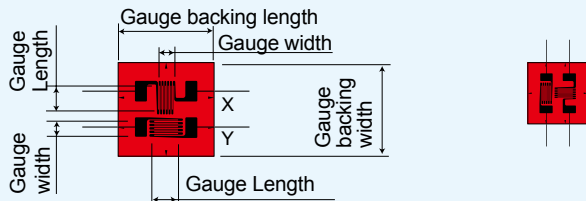
This code is appended to the basic type for strain gauges with lead-free solder in place of leaded solder. Fatigue life of the strain gauge may become shorter by the lead-free solder.



#### Example of type number designation



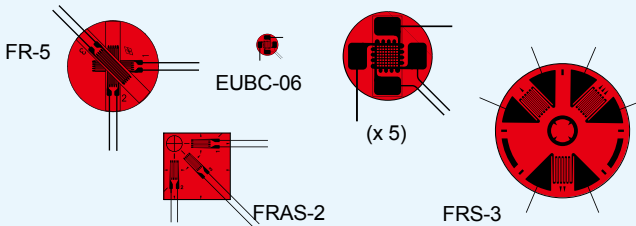
### 0°/90° 2-element Rosette Plane : FCB



Each package contains 10 gauges.

FCB-2	X and Y axes 2 1.5	8.2 8	120
FCB-6-350	X and Y axes 6 2.0	10 13	350

### Residual stress measurement : FR/EUBC/FRS



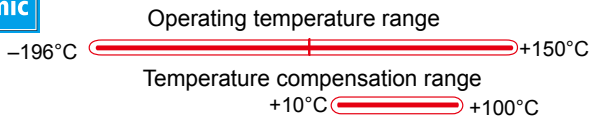
Each package contains 10 gauges.

FR-5	5 1.5	φ 12	120
EUBC-06	0.6 0.7	φ 2.4	120
FRAS-2	2 1.1	9 9	120
FRS-2	1.5 1.3	φ 9.5	120
FRS-3	3 2.6	φ 17.5	120

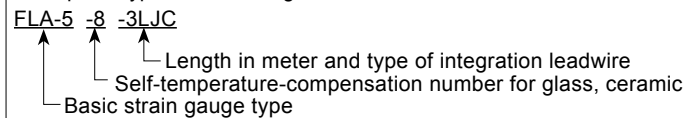
## GLASS, CERAMIC

### Gauge pattern

Suffix code for temperature compensation materials  
 -8: Glass, Ceramic ■  
 For ordering, the above suffix code should be added to the basic gauge type.



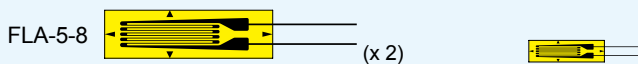
#### Example of type number designation



Applicable adhesives

CN	-196 ~ +120°C
P-2	-30 ~ +150°C
EB-2	-60 ~ +150°C

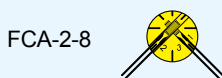
### Single element : FLA



Each package contains 10 gauges.

FLA-2	2 1.5	6.5 3	120
FLA-5	5 1.5	10.0 3	120

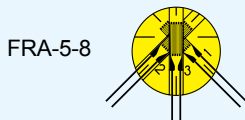
### 0°/90° 2-element stacked Rosette FCA



Each package contains 10 gauges.

FCA-2	2 0.9	φ 7	120
FCA-5	5 1.9	φ 12	120

### 0°/45°/90° 3-element stacked Rosette FRA

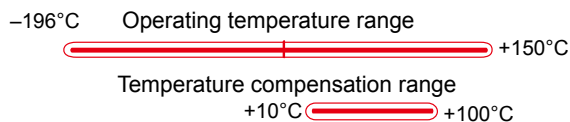


Each package contains 10 gauges.

FRA-2	2 0.9	φ 7	120
FRA-5	5 1.9	φ 12	120

# FOIL STRAIN GAUGES

## series F



Suffix code for temperature compensation materials  
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Applicable adhesives

CN	-196 ~ +120°C
P-2	-30 ~ +150°C
EB-2	-60 ~ +150°C

For ordering, the above suffix code should be added to the basic gauge type.

### STRESS CONCENTRATION MEASUREMENT

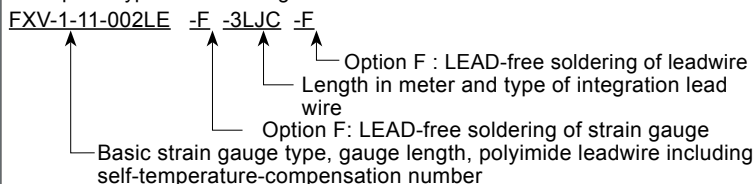
Gauge pattern	Basic type	Gauge size		Backing		Resistance Ω
		L	W	L	W	

#### Option F

This code is appended to the basic type for strain gauges with lead-free solder in place of leaded solder. Fatigue life of the strain gauge may become shorter by the lead-free solder.

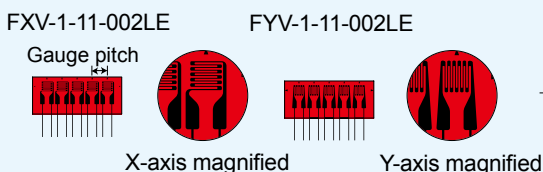


Example of type number designation



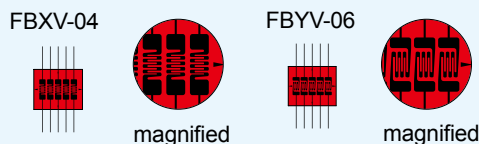
#### 5-element Single-axis : FXV/FYV/FBXV/FBYV

Each package contains 10 gauges.



Gauge pitch 2mm	FXV-1-002LE	1	1.3	5	12	120
	FYV-1-002LE	1	1.4	5	12	120

-002LE: Polyimide insulated gauge lead of 2-cm pre-attached



Gauge pitch 1mm	FBXV-04-005LE	0.4	1.3	5.4	7.4	120
	FBYV-06-005LE	0.6	0.8	5.3	7	120

-005LE: Polyimide insulated gauge lead of 5-cm pre-attached

#### 10-element 2 axes : FCV

Each package contains 10 gauges.



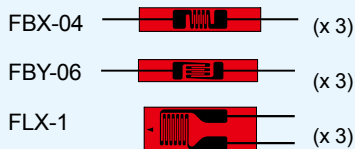
Gauge pitch 2mm	FCV-1-005LE	1	1.4	7.5	12	120
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-005LE: Polyimide insulated gauge lead of 5-cm pre-attached

#### Single element : FBX/FBY/FLX

Each package contains 10 gauges.

Single element cut away from the above Stress Concentration gauge.

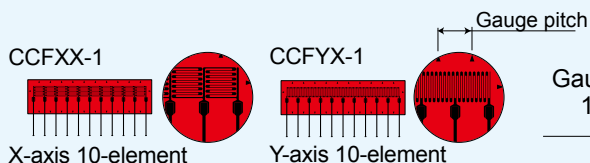


FBX-04-005LE	0.4	1.3	5.4	1	120
FBY-06-005LE	0.6	0.8	5.3	1	120
FLX-1-002LE	1	1.3	5	2	120

-005LE: Polyimide insulated gauge lead of 5-cm pre-attached  
 -002LE: Polyimide insulated gauge lead of 2-cm pre-attached

#### Chain Strain Gauges CCFXX, CCFYX

Each package contains 10 gauges.

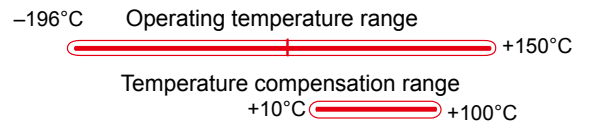





Gauge pitch 1.5mm	CCFXX-1-002LE	1	1.5	16.4	4.5	120
	CCFYX-1-002LE	1	1.5	16.4	4.5	120

-002LE: Polyimide insulated gauge lead of 2-cm pre-attached

These gauges are specially designed to use Complete correction method for strain and need our Data Logger TDS-540 for the measurement. For details, contact TML.

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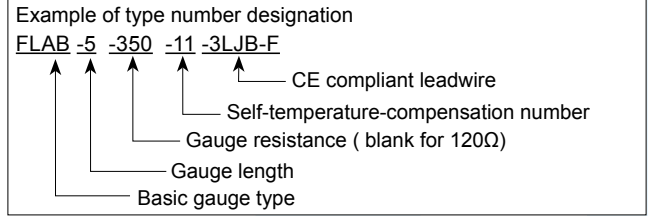
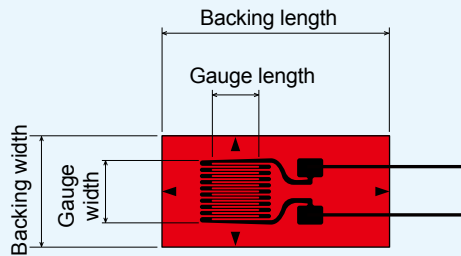
Applicable adhesives	Temperature compensation range
CN	-196 ~ +120°C
P-2	-30 ~ +150°C
EB-2	-60 ~ +150°C
























## GENERAL USE

Strain gauges compliant to RoHS2 Directive 2011/65/EU are added to the lineup in F series. They are supplied with CE marking as standard specification. Our logo GOBLET, which is an abbreviation of "Gauges Of Brilliant Lifespan and Environmental Thoughtful", is marked on the package of these gauges.



Single element






Gauge pattern	Basic type	Gauge size		Backing		Resistance $\Omega$	
		L	W	L	W		
	FLGB-02	0.2	1.4	3.5	2.5	120	
	FLGB-1	1	1.1	6	2.5	120	
	FLAB-03	0.3	1.4	3	2	120	
	FLAB-05	0.5	1.2	4.3	2.2	120	
	FLAB-1	1	1.3	5	2.5	120	
	FLAB-2	2	1.5	6.5	3	120	
	FLAB-3	3	1.7	7.7	3.5	120	
	FLAB-3-60	3	1.2	7.7	3	60	
	FLAB-5	5	1.5	10	3	120	
	FLAB-6	6	2.2	11	4.3	120	
	FLAB-10	10	2.5	15.4	5	120	
	FLAB-30	30	2	35	5	120	
FLK pattern with narrow gauge width		FLKB-1	1	0.7	4.5	1.4	120
		FLKB-2	2	0.9	5.5	1.5	120
		FLKB-6	6	1	11	2.2	120
		FLKB-10	10	1.6	15	3.8	120
350 $\Omega$ Single element		FLAB-1-350	1	1.6	4.5	3	350
		FLAB-2-350	2	1.9	6	3.5	350
		FLAB-3-350	3	1.6	7.2	3	350
		FLAB-5-350	5	1.8	9.4	3.8	350
		FLAB-6-350	6	2.6	10.8	4.5	350
		FLAB-10-350	10	3	16	5	350
		FLAB-6-1000	6	4.6	11	7	1000

Each package contains 10 gauges.

# FOIL STRAIN GAUGES series F

-196°C Operating temperature range +150°C

Temperature compensation range  
+10°C +100°C

Suffix code for temperature compensation materials  
-11: Mild steel  -17: Stainless steel  -23: Aluminium 

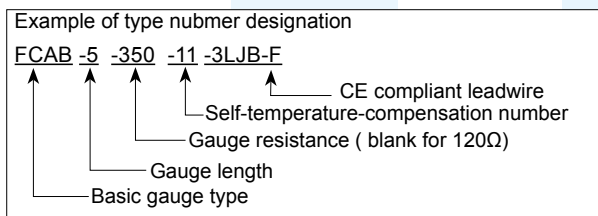
Applicable adhesives

CN	-196 ~ +120°C
P-2	-30 ~ +150°C
EB-2	-60 ~ +150°C

For ordering, the above suffix code should be added to the basic gauge type.

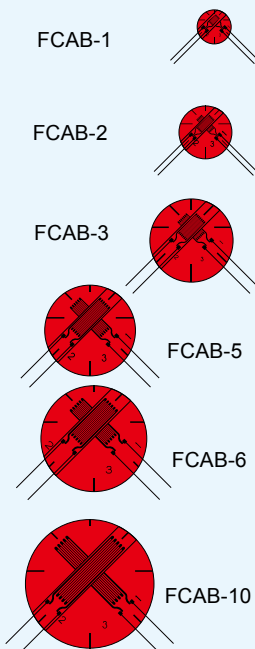
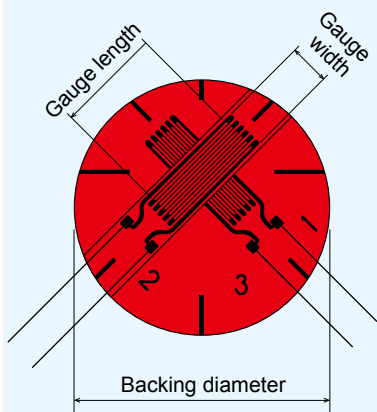
## GENERAL USE

Gauge pattern	Basic type	Gauge size L W	Backing L W	Resistance Ω
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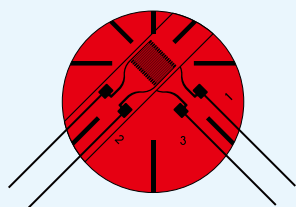
Each package contains 10 gauges.

0°/90° 2-element rosette stacked

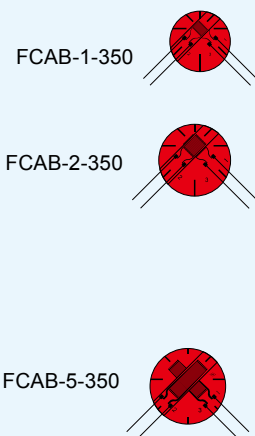


FCAB-1	1	0.7	φ 4.5	120
FCAB-2	2	0.9	φ 7	120
FCAB-3	3	1.7	φ 11	120
FCAB-5	5	1.9	φ 12	120
FCAB-6	6	2.4	φ 14	120
FCAB-10	10	2.5	φ 17	120

350Ω 0°/90° 2-element rosette stacked

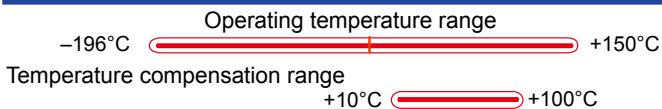


FCAB-1-350 (x 3)



Each package contains 10 gauges.

FCAB-1-350	1	1.6	φ 8	350
FCAB-2-350	2	1.9	φ 9.5	350
FCAB-3-350	3	2	φ 10	350
FCAB-5-350	5	1.8	φ 10	350



# FOIL STRAIN GAUGES

## F Series



Suffix code for temperature compensation materials  
 -11: Mild steel ■ -17: Stainless steel ■ -23: Aluminium ■

For ordering, the above suffix code should be added to the basic gauge type.

Applicable adhesives

CN	-196 ~ +120°C
P-2	-30 ~ +150°C
EB-2	-60 ~ +150°C

### GENERAL USE

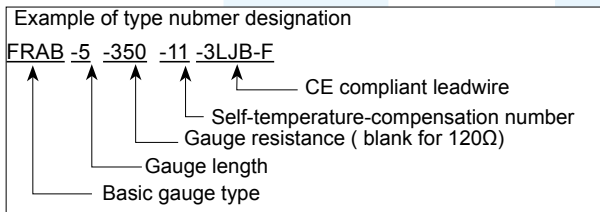
Gauge pattern

Basic type

Gauge size  
L W

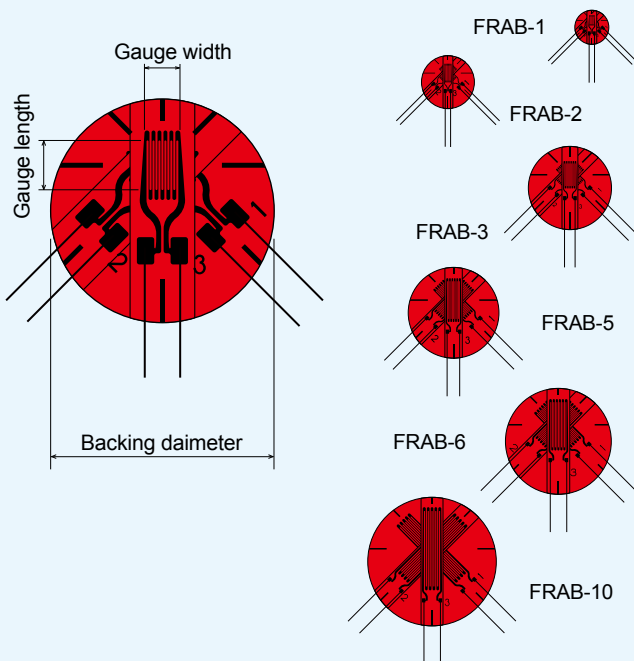
Backing  
L W

Resist-  
ance Ω



0°/45°/90° 3-element rosette stacked

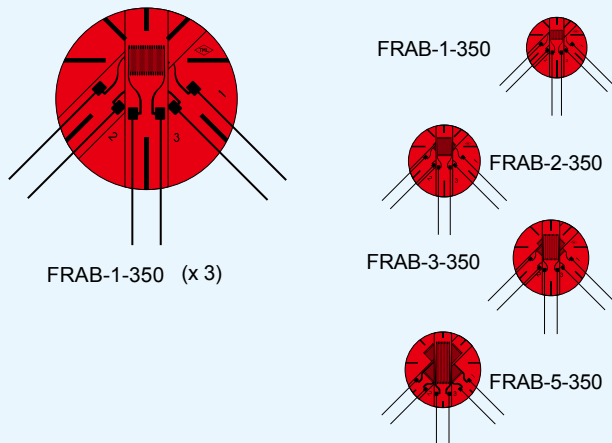
Each package contains 10 gauges.



FRAB-1	1	0.7	φ 4.5	120
FRAB-2	2	0.9	φ 7	120
FRAB-3	3	1.7	φ 11	120
FRAB-5	5	1.9	φ 12	120
FRAB-6	6	2.4	φ 14	120
FRAB-10	10	2.5	φ 17	120

350Ω 0°/45°/90° 3-element rosette stacked

Each package contains 10 gauges.



FRAB-1-350	1	1.6	φ 8	350
FRAB-2-350	2	1.9	φ 9.5	350
FRAB-3-350	3	2	φ 10	350
FRAB-5-350	5	1.8	φ 10	350



# FOIL STRAIN GAUGES series F



-196°C Operating temperature range +150°C

Temperature compensation range  
+10°C +100°C

Suffix code for temperature compensation materials  
-8: Glass, Ceramic



Applicable adhesives

CN	-196 ~ +120°C
P-2	-30 ~ +150°C
EB-2	-60 ~ +150°C

For ordering, the above suffix code should be added to the basic gauge type.

## GLASS, CERAMIC USE

Gauge pattern	Basic type	Gauge size		Backing		Resistance Ω
		L	W	L	W	
<p>Example of type number designation</p> <p><b>FRAB -5 -8 -3LJB-F</b></p> <p>↑ ↑ ↑ ↑</p> <p>Basic gauge type    Gauge length    Self-temperature-compensation number    CE compliant leadwire</p>						
Each package contains 10 gauges.						
Single element (x 2)	FLAB-2-8	2	1.5	6.5	3	120
	FLAB-5-8	5	1.5	10	3	120
Each package contains 10 gauges.						
0°/90° 2-element rosette stacked (x 2)	FCAB-2-8	2	0.9	φ 7		120
	FCAB-5-8	5	1.9	φ 12		120
Each package contains 10 gauges.						
0°/45°/90° 3-element rosette stacked (x 2)	FRAB-2-8	2	0.9	φ 7		120
	FRAB-5-8	5	1.9	φ 12		120

### Dedicated leadwires recommendable for strain gauge F series

Application	Leadwires	Operating temperature (°C)	Leadwire code exemplified
General use (temperature unchanged during measurement)	Paralleled vinyl LJB / LJB-F Paralleled vinyl LJC / LJC-F	-20 ~ +80	FLA-5-11-3LJB FLA-5-11-3LJC
General use	3-wire paralleled vinyl LJBT / LJBT-F 3-wire paralleled vinyl LJCT / LJCT-F	-20 ~ +80	FLA-5-11-3LJBT FLA-5-11-3LJCT
Mid-high temperature	3-wire paralleled vinyl LXT / LXT-F	-20 ~ +150	FLA-5-11-3LXT
Temperature integration	3-wire paralleled vinyl TLJBT / TLJBT-F	-20 ~ +80	FLA-5T-11-3TLJBT
1-Gauge 4-Wire measurement	Polypropyrene 4-wire paralleled LQM / LQM-F	-20 ~ +100	FLA-5-11-3LQM (modular plug attached)

### Recommendable for GOBLET strain gauges

Application	Leadwires	Operating temperature (°C)	Leadwire code exemplified
General use (temperature unchanged during measurement)	Paralleled vinyl LJB-F Paralleled vinyl LJC-F	-20 ~ +80	FLAB-5-11-3LJB-F FLAB-5-11-3LJC-F
General use	3-wire paralleled vinyl LJBT-F 3-wire paralleled vinyl LJCT-F	-20 ~ +80	FLAB-5-11-3LJBT-F FLAB-5-11-3LJCT-F
Mid-high temperature	3-wire paralleled vinyl LXT-F	-20 ~ +150	FLAB-5-11-3LXT-F
Temperature integration	3-wire paralleled vinyl TLJBT-F	-20 ~ +80	FLAB-5T-11-3TLJBT-F
1-Gauge 4-Wire measurement	Polypropyrene 4-wire paralleled LQM-F	-20 ~ +100	FLAB-5-11-3LQM -F (modular plug attached)

NB: For use with CE compliant GOBLET strain gauges, specify leadwire with option -F having lead-free solder on order.