



Foil Strain Gauges F series (GOBLET)



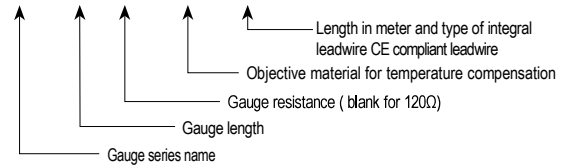
Strain gauges compliant to RoHS2 Directive 2011/65/EU are added to the lineup in F series. They are supplied with CE marking as standard specification. Our logo GOBLET, which is an abbreviation of "Gauges Of Brilliant Lifespan and Environmental Thoughtful", is marked on the package of these gauges.



Operating temperature range	Applicable adhesives
-196~+150℃	CN -196~+120℃
Temperature compensation range	P-2 -30~+150℃
+10~+100℃	EB-2 -60~+150℃

Please specify the type number as shown in the example below.

FLAB -5 (-350) -11 -3LJC-F



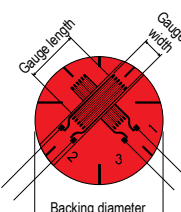
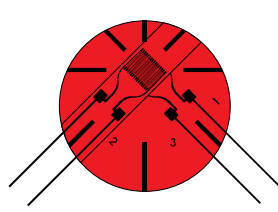
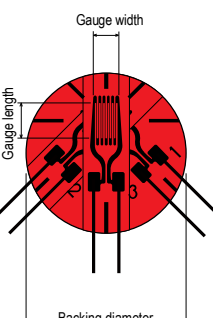
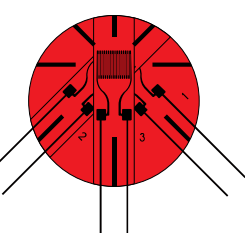
Objective material for temperature compensation
(coefficient of linear thermal expansion $\times 10^{-6}/^{\circ}\text{C}$)
.11: Mild steel .17: Stainless steel .23: Aluminium

Gauge pattern		Type	Gauge size(mm) Length Width		Backing size(mm) Length Width		Resistance Ω
●Single axis 							
General use		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
Gauge resistance 350 Ω		FLAB-1-350	1	1.6	4.5	3	350
		FLAB-1W-350	1	2	4.7	3.6	350
		FLAB-2-350	2	1.9	6	3.5	350
		FLAB-3-350	3	1.6	7.2	3	350
		FLAB-3W-350	3	3.2	8.5	5	350
		FLAB-5-350	5	1.8	9.4	3.8	350
Gauge resistance 1000 Ω		FLAB-6-1000	6	4.6	11	7	1000

Minimum order quantity is 10 strain gauges.



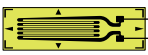
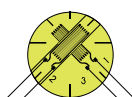
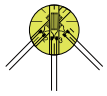
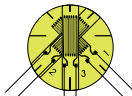
F series (GOBLET)

Gauge pattern	Type	Gauge size(mm)		Backing size(mm)		Resistance Ω
		Length	Width	Length	Width	
●0°/90° 2-axis Stacked type						
	FCAB-1	1	0.7	$\phi 4.5$		120
	FCAB-2	2	0.9	$\phi 7$		120
	FCAB-3	3	1.7	$\phi 11$		120
	FCAB-5	5	1.9	$\phi 12$		120
	FCAB-6	6	2.4	$\phi 14$		120
	FCAB-10	10	2.5	$\phi 17$		120
●350Ω 0°/90° 2-axis Stacked type						
	FCAB-1-350	1	1.6	$\phi 8$		350
	FCAB-2-350	2	1.9	$\phi 9.5$		350
	FCAB-3-350	3	2	$\phi 10$		350
	FCAB-5-350	5	1.8	$\phi 10$		350
●0°/45°/90° 3-axis Stacked type						
	FRAB-1	1	0.7	$\phi 4.5$		120
	FRAB-2	2	0.9	$\phi 7$		120
	FRAB-3	3	1.7	$\phi 11$		120
	FRAB-5	5	1.9	$\phi 12$		120
	FRAB-6	6	2.4	$\phi 14$		120
	FRAB-10	10	2.5	$\phi 17$		120
●350Ω 0°/45°/90° 3-axis Stacked type						
	FRAB-1-350	1	1.6	$\phi 8$		350
	FRAB-2-350	2	1.9	$\phi 9.5$		350
	FRAB-3-350	3	2	$\phi 10$		350
	FRAB-5-350	5	1.8	$\phi 10$		350

Minimum order quantity is 10 strain gauges.

GLASS, CERAMIC USE (CE)

Please specify the type number as shown in the example below.
-8: Glass, Ceramic

Gauge pattern	Type	Gauge size(mm)		Backing size(mm)		Resistance Ω
		Length	Width	Length	Width	
●Single axis						
 (x 2)	FLAB-2-8	2	1.5	6.5	3	120
	FLAB-5-8	5	1.5	10	3	120
●0° /90° 2-axis Stacked type						
	FCAB-2-8	2	0.9	φ 7		120
	FCAB-5-8	5	1.9	φ 12		120
●0° /45° /90° 3-axis Stacked type						
	FRAB-2-8	2	0.9	φ 7		120
	FRAB-5-8	5	1.9	φ 12		120

Minimum order quantity is 10 strain gauges.

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Dedicated leadwires recommendable for F series strain gauge(GOBLET)

We supply various leadwires dedicated to strain gauges so as to meet our customers' requirements. Please refer to page 30 to 38 for the details of combination of a strain gauge and a leadwire. For CE marked GOBLET series strain gauges, only the leadwires using lead-free solder are available.

Type and designation of leadwires (GOBLET)

Usage	Leadwire name	Operating temperature range of leadwire (°C)	Type number example
General purpose (without temperature change)	Paralleled vinyl LJB-F Paralleled vinyl LJC-F	-20 ~ +80	FLAB-5-11-3 LJB-F FLAB-5-11-3 LJC-F
General use	3-wire paralleled vinyl LJB-T-F 3-wire paralleled vinyl LJCT-F	-20 ~ +80	FLAB-5-11-3 LJB-T-F FLAB-5-11-3 LJCT-F
Mid-high temperature	3-wire paralleled vinyl LXT-F	-20 ~ +150	FLAB-5-11-3 LXT-F
1-Gauge 4-Wire measurement	Polypropylene 4-wire paralleled LQM-F	-20 ~ +100	FLAB-5-11-3 LQM-F (modular plug attached)

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

Dedicated leadwires recommendable for F series strain gauge

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Type and designation of leadwires

Usage	Leadwire name	Operating temperature range of leadwire (°C)	Type number example
General purpose (without temperature change)	Paralleled vinyl LJB/LJB-F Paralleled vinyl LJC/LJC-F	-20 ~ +80	FLA-5-11-3 LJB FLA-5-11-3 LJC
General use	3-wire paralleled vinyl LJB-T/LJB-T-F 3-wire paralleled vinyl LJCT/LJCT-F	-20 ~ +80	FLA-5-11-3 LJB-T FLA-5-11-3 LJCT
Mid-high temperature	3-wire paralleled vinyl LXT/LXT-F	-20 ~ +150	FLA-5-11-3 LXT
Temperature integration	3-wire paralleled vinyl TLJB-T/TLJB-T-F	-20 ~ +80	FLA-5-11-3 TLJB-T
1-Gauge 4-Wire measurement	Polypropylene 4-wire paralleled LQM/LQM-F	-20 ~ +100	FLA-5-11-3 LQM (modular plug attached)



F series

In the F series, strain gauges dedicated to a special usage (shearing strain measurement, torque measurement, residual stress measurement or stress concentration measurement) and 2-axis plane type strain gauges are compliant to RoHS Directive when they are supplied with Option-F.



Operating temperature range

-196~+150°C

Temperature compensation range

+10~+100°C

Applicable adhesives

CN -196~+120°C

P-2 -30~+150°C

EB-2 -60~+150°C

Please specify the type number as shown in the example below.

FLT-05A (-350) -11 (-F) -3LJC (-F)

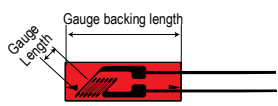
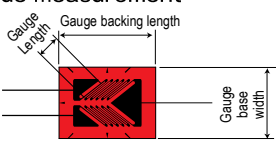
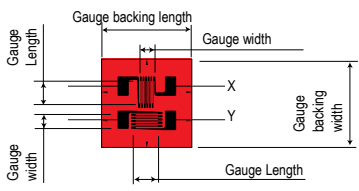
Option F : LEAD-free soldering of leadwire
Length in meter and type of integral leadwire
Option F : LEAD-free soldering of strain gauge
Objective material for temperature compensation
Gauge resistance (blank for 120Ω)
Gauge series name

Objective material for temperature compensation

(coefficient of linear thermal expansion $\times 10^{-6}/^{\circ}\text{C}$)

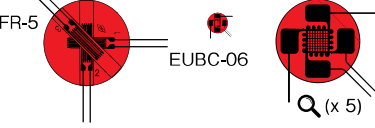
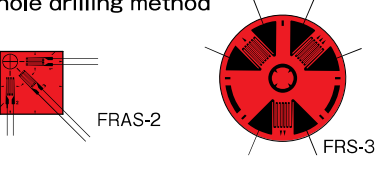
-11: Mild steel ■ -17: Stainless steel ■ -23: Aluminium ■

Shearing · Torque · Plane

Gauge pattern	Type	Gauge size(mm) Length Width		Backing size(mm) Length Width		Resistance Ω
●Shearing strain measurement 	FLT-05A	0.55	0.66	4	1.3	120
	FLT-05B	0.55	0.66	4	1.3	120
●Torque measurement 	FCT-2	2	1.5	8.7	6.5	120
	FCT-2-350	2	1.5	7.6	5.3	350
●0°/90° 2-axis Plane type 	FCB-2	2	1.5	X / Y axis 8.2 8		120
	FCB-6-350	6	2	X / Y axis 10 11.9		350

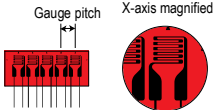
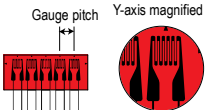
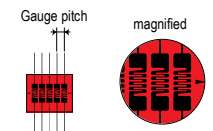
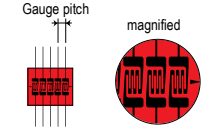
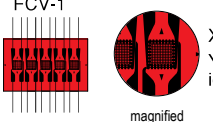
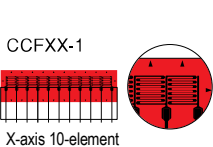
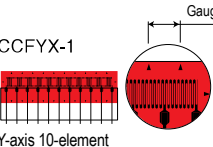
Minimum order quantity is 10 strain gauges.

Residual stress measurement

Gauge pattern	Type	Gauge size(mm) Length Width		Backing size(mm) Length Width		Resistance Ω
●Residual stress measurement 	FR-5	5	1.5	φ12		120
	EUBC-06	0.6	0.7	φ2.4		120
●Residual stress measurement using hole drilling method 	FRAS-2	2	1.1	9	9	120
	FRS-08	0.8	0.7	φ7		120
	FRS-2	1.5	1.3	φ9.5		120
	FRS-3	3	2.6	φ17.5		120

Minimum order quantity is 10 strain gauges.

Stress Concentration Measurement

Gauge pattern		Type	Gauge size(mm) Length Width		Backing size(mm) Length Width		Resistance Ω	
●5-element Single-axis								
FXV-1-11-002LE FYV-1-11-002LE								
		Gauge pitch 2mm	FXV-1-11-002LE	1	1.3	5	12	120
			FYV-1-11-002LE	1	1.4	5	12	120
-002LE: Polyimide insulated gauge lead of 2-cm pre-attached								
FBXV-04 FBYV-06								
		Gauge pitch 1mm	FBXV-04-11-005LE	0.4	1.3	5.4	7.4	120
			FBYV-06-11-005LE	0.6	0.8	5.3	7	120
-005LE: Polyimide insulated gauge lead of 5-cm pre-attached								
●10-element 2-axes								
FCV-1								
		Gauge pitch 2mm	FCV-1-11-005LE	1	1.4	7.5	12	120
-005LE: Polyimide insulated gauge lead of 5-cm pre-attached								
●Chain Strain Gauges								
CCFXX-1 CCFYX-1								
		Gauge pitch 1.5mm	CCFXX-1-11-002LE	1	1.5	4.5	16.4	120
			CCFYX-1-11-002LE	1	1.5	4.5	16.4	120
-002LE: Polyimide insulated gauge lead of 2-cm pre-attached								
These gauges are specially designed to use Complete Compensation Method of Strain and need our Data Logger TDS-540 for the measurement. For details, contact TML.								
●Single axis								
Single element cut away from the above Stress Concentration gauge								
FBX-04		Ω (x 3)						
FBY-06		Ω (x 3)						
FLX-1		Ω (x 3)						
-005LE: Polyimide insulated gauge lead of 5-cm pre-attached								
-002LE: Polyimide insulated gauge lead of 2-cm pre-attached								

Minimum order quantity is 10 strain gauges.

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Important point

Option F

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



Note

These gauges are specially designed to use Complete Compensation Method of Strain and need our Data Logger TDS-540 for the measurement. For details, contact TML.