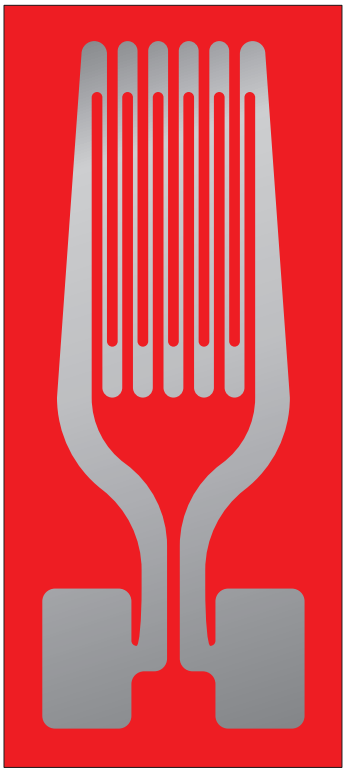
TML FOIL STRAIN GAUGES F series

CE

GOBLET Gauges Of Brilliant Lifespan and Environmentally Thoughtful



A strain gauge is constructed so that the gauge leads to conduct electrical signal are connected by soldering to the metal foil which is called gauge element. The solder is an alloy composed of lead and tin. Since lead is not only harmful to human bodies but may cause adverse effects on the natural environment, we have developed a strain gauge using lead-free solder. It is known that the use of lead-free solder may result in a shorter fatigue life of the strain gauge compared to a strain gauge using conventional solder including lead. To overcome the problem, we have developed a strain gauge having a unique gauge pattern and special plastics backing. With the use of lead-free solder for the connection of gauge leads, the strain gauge of this configuration shows a fatigue life equivalent to that of conventional strain gauges. Most of general purpose strain gauges in our strain gauge series F are available in this configuration, and they are supplied as RoHS compliant products with CE marking.

We have given a name GOBLET especially for the strain gauges, as the pattern looks like a goblet. GOBLET is also an abbreviation of “Gauges Of Brilliant Lifespan and Environmentally Thoughtful”, which represents the excellent fatigue life and small environmental effect of the strain gauges and expresses the concept of development of the strain gauges.

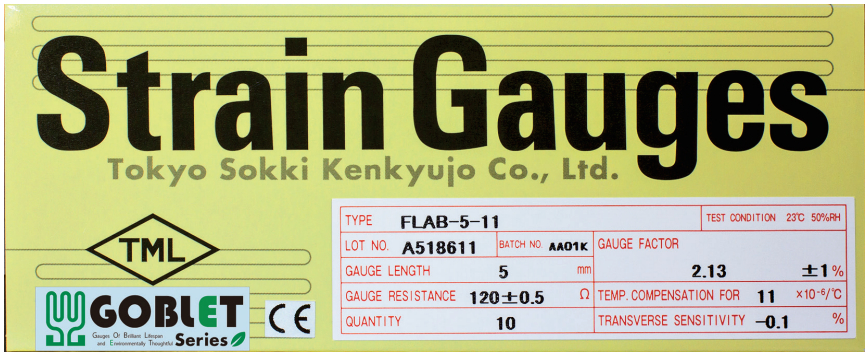
Owing to the use of special plastics for the backing, operating temperature range of the gauges has been improved to -196 to +150°C. Integral leadwires for instrumentation are available using lead-free solder and in various types to meet usage conditions.

We will keep extending the GOBLET to other series of our strain gauges, not only to satisfy the needs for strain gauges but to meet environmental requirements including effective use of natural resources.

Trademark application pending in Japan

GOBLET Gauges Of Brilliant Lifespan and Environmentally Thoughtful Series

Package of GOBLET strain gauges (example)



The GOBLET strain gauges bear the logo and the CE mark on their package.

Leadwire type	Code to order	Core/ Dimensions	Cross section (mm^2)	Combination temperature for use with GOBLET strain gauge
0.08mm^2 paralleled vinyl leadwire	LJB-F	7/0.12	0.08	-20~ +80°C
0.08mm^2 3-wire paralleled vinyl leadwire	LJBT-F	7/0.12	0.08	-20~ +80°C
0.11mm^2 paralleled vinyl leadwire	LJC-F	10/0.12	0.11	-20~ +80°C
0.11mm^2 3-wire paralleled vinyl leadwire	LJCT-F	10/0.12	0.11	-20~ +80°C
0.08mm^2 polyporopyrene 4-wire paralleled leadwire with modular plug	LQM-F	7/0.12	0.08	-20~+100°C
0.08mm^2 vinyl 4-wire paralleled leadwire with modular plug	LBQM-F	7/0.12	0.08	-20~ +80°C
3-wire paralleled special vinyl leadwire	LXT-F	7/0.12	0.08	-20~+150°C
Temperature-integrated 3-wire paralleled vinyl leadwire	TLJBT-F	7/0.12	0.08	-20~ +80°C
0.14mm^2 polyurethane leadwire 0.18mm^2 polyurethane leadwire	LP-F	1/0.14 1/0.18	-	-20~+120°C
0.14mm^2 polyester leadwire 0.18mm^2 polyester leadwire	LU-F	1/0.14 1/0.18	-	-196~+150°C
0.14mm^2 polyimide leadwire 0.18mm^2 polyimide leadwire	LE-F	1/0.14 1/0.18	-	-196~+150°C

STRAIN GAUGE CODING SYSTEM GOBLET

FLAB - 3 T - 350 - 11 - 3 LJB-F

Pattern configuration

FLAB FLKB FLGB	Single element
FCAB	0°/90° 2-element rosette
FRAB	0°/45°/90° 3-element rosette

Gauge length

Unit	mm

Gauge resistance

Blank	120Ω
350	350Ω
1000	1000Ω

Length of leadwire pre-attached

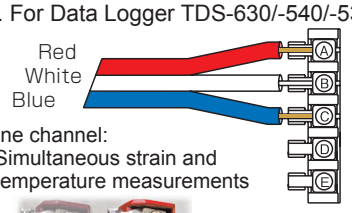
2-wire system 1, 3, or 5 meter long
3-wire system 3 or 5 meter long

Temperature integration

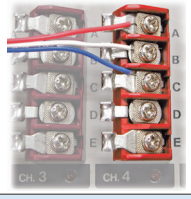
Simultaneous measurement of strain and temperature
With temperature-integral leadwire TLJBT-F for **GOBLET**, such measurement comes true. (Our instrument Data Logger is required.)

Wire connection methods

1. For Data Logger TDS-630/-540/-530



One channel:
Simultaneous strain and temperature measurements



Temperature compensation ×10⁻⁶/°C

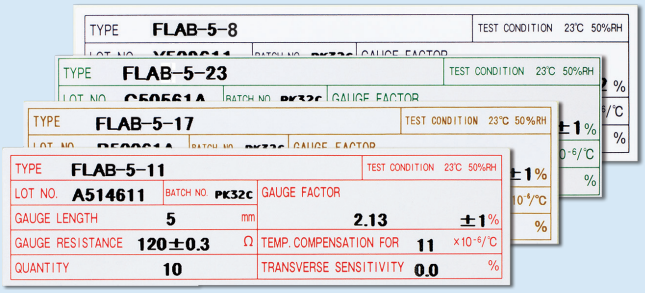
8	Composite material, Glass	
	Glass	7.9
	Titanium	8.9
	Titanium alloy (Ti-6Al-4V)	8.8
11	Mild steel	
	Mild steel (0.1~0.2C)	11.8
	Hard steel (0.4~0.5C)	11.2
17	Stainless steel	
	SUS 304	16.2
	SUS 310	15.8
	SUS 316	16.0
	SUS 321	16.7
23	Aluminium	
	Aluminium	23.4
	Aluminium 2024-T4	23.0

Leadwire type

LJB-F	0.08mm² parallel vinyl leadwire
LJBT-F	0.08mm² 3-wire parallel leadwire
LJC-F	0.11mm² paralleled vinyl leadwire
LJCT-F	0.11mm² 3-wire paralleled vinyl leadwire
LQM-F	0.08mm² polypropylene 4-wire paralleled leadwire with modular plug
LBQM-F	0.08mm² vinyl 4-wire paralleled lead wire with modular plug
LXT-F	3-wire parallel special vinyl leadwire
LP-F	0.14mm²/0.18mm² polyurethane lead wire
LU-F	0.14mm²/0.18mm² polyester leadwire
LE-F	0.14mm²/0.18mm² polyimide leadwire
TLJBT-F	Temperature-integrated 3-wire paralleled vinyl leadwire

■COLOR CODING FOR TEST SPECIMEN

Colors of package label differ depending on the test specimen material for temperature compensation.



Colors of GOBLET backing differ depending on the test specimen material for temperature compensation.

Measurement object	Linear thermal expansion coefficient	Backing coloring	Name exampled
Mild steel	**11×10⁻⁶/°C**	**Red**	FLAB-3-11
Stainless steel	**17×10⁻⁶/°C**	**Brown**	FLAB-3-17
Aluminium	**23×10⁻⁶/°C**	**Green**	FLAB-3-23
Glass/Ceramics	**8×10⁻⁶/°C**	**Yellow**	FLAB-2-8

GENERAL USE F Series

GOBLET

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.

Operating temperature range
–196°C +150°C

Temperature compensation range
+10°C +100°C

Applicable adhesives

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

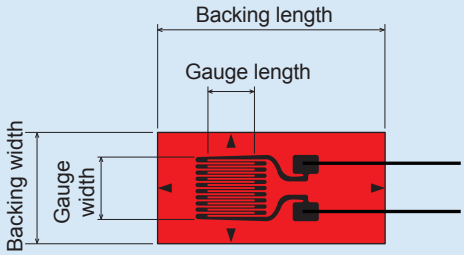
Strain gauges compliant to RoHS2 Directive 2011/65/EU are added to the lineup in F series. They are supplied with CE marking as standard specification. Our logo GOBLET, which is an abbreviation of "Gauges Of Brilliant Lifespan and Environmental Thoughtful", is marked on the package of these gauges.

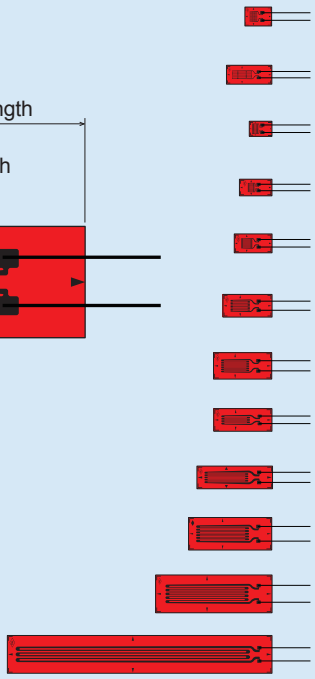
CE

Example of type number designation
FLAB -5 -350 -11 -3LJB-F
- CE compliant leadwire
- Self-temperature-compensation number
- Gauge resistance (blank for 120Ω)
- Gauge length
- Basic gauge type

GAUGE PATTERN

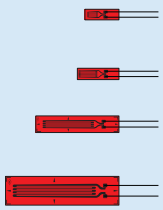
Single element





Basic type	Gauge size Length	Gauge size Width	Backing Length	Backing Width	Resistance in Ω
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

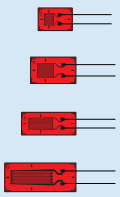
FLK pattern with narrow gauge width



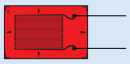
Basic type	Gauge size Length	Gauge size Width	Backing Length	Backing Width	Resistance in Ω
FLKB-1	1	0.7	4.5	1.4	120
FLKB-2	2	0.9	5.5	1.5	120
FLKB-6	6	1	11	2.2	120
FLKB-10	10	1.6	15	3.8	120

350Ω Single element

Gauge resistance 350Ω



Basic type	Gauge size Length	Gauge size Width	Backing Length	Backing Width	Resistance in Ω
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



Basic type	Gauge size Length	Gauge size Width	Backing Length	Backing Width	Resistance in Ω
FLAB-6-1000	6	4.6	11	7	1000

GENERAL USE F Series

GOBLET

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.

Operating temperature range
–196°C +150°C

Temperature compensation range
+10°C +100°C

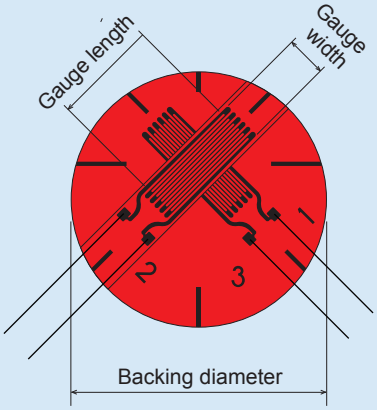
Applicable adhesives

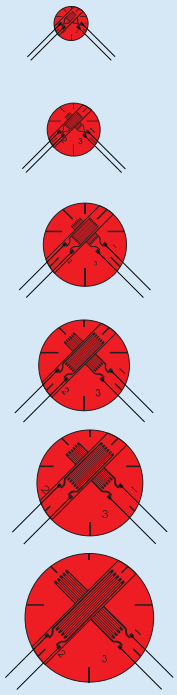
CN	–196 ~ +120ºC
P-2	– 30 ~ +150ºC
EB-2	– 60 ~ +150ºC

CE

Example of type nubmer designation
FCAB -5 -350 -11 -3LJB-F
- FCAB: Basic gauge type
- -5: Gauge length
- -350: Gauge resistance (blank for 120Ω)
- -11: Self-temperature-compensation number
- -3LJB-F: CE compliant leadwire

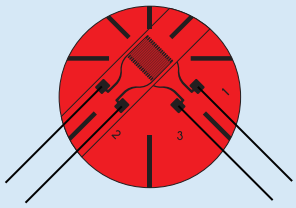
0°/90° 2-element rosette stacked





GAUGE PATTERN	Basic type	Gauge size Length	Gauge size Width	Backing Diameter in mm	Resist-ance in Ω
	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)

FCAB-1-350

FCAB-2-350

FCAB-5-350

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

GENERAL USE F Series

GOBLET

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.

Operating temperature range
–196°C +150°C

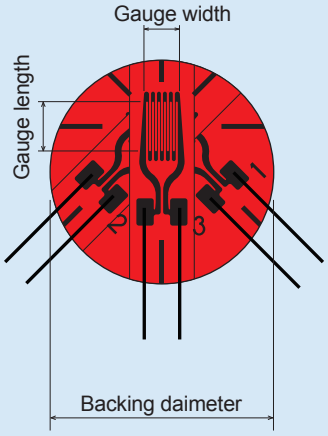
Temperature compensation range
+10°C +100°C

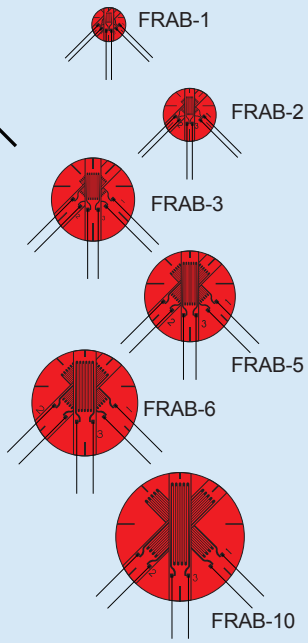
Applicable adhesives

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

CE

0°/45°/90° 3-element rosette stacked

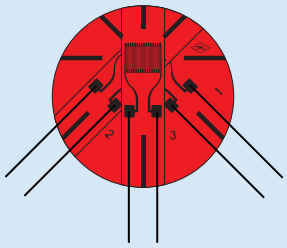




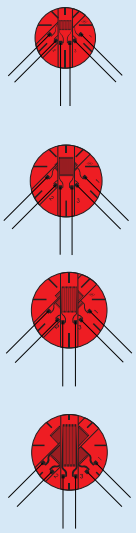
Example of type nubmer designation
FRAB -5 -350 -11 -3LJB-F
- FRAB: Basic gauge type
- -5: Gauge length
- -350: Gauge resistance (blank for 120Ω)
- -11: Self-temperature-compensation number
- -3LJB-F: CE compliant leadwire

GAUGE PATTERN	Basic type	Gauge size Length in mm	Gauge size Width in mm	Backing Diameter in mm	Resist-ance in Ω
	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



FRAB-1-350 (x 3)



Basic type	Gauge size Length in mm	Gauge size Width in mm	Backing Diameter in mm	Resist-ance in Ω
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

Each package contains 10 gauges.

GLASS, CERAMICS USE F Series

GOBLET

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

Operating temperature range
–196°C ——— +150°C

Temperature compensation range
+10°C ——— +100°C

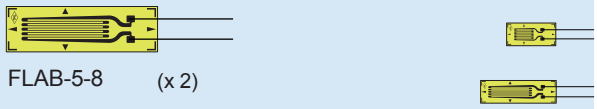
Applicable adhesives

CN	–196 ~ +120ºC
P-2	– 30 ~ +150ºC
EB-2	– 60 ~ +150ºC

CE

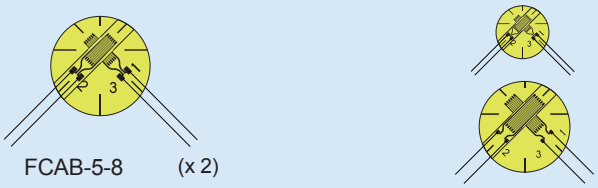
Example of type nubmer designation
FRAB -5 -8 -3LJB-F
- FRAB: Basic gauge type
- -5: Gauge length
- -8: Self-temperature-compensation number
- -3LJB-F: CE compliant leadwire

Single element



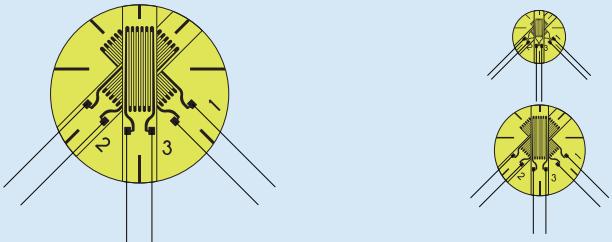
FLAB-5-8 (x 2)

0°/90° 2-element rosette stacked



FCAB-5-8 (x 2)

0°/45°/90° 3-element rosette stacked



FRAB-5-8 (x 2)

Each package contains 10 gauges.

Basic type	Gauge size Length	Gauge size Width	Backing Length	Backing Width	Resistance in Ω
FLAB-2-8	2	1.5	6.5	3	120
FLAB-5-8	5	1.5	10	3	120
FCAB-2-8	2	0.9	φ 7		120
FCAB-5-8	5	1.9	φ 12		120
FRAB-2-8	2	0.9	φ 7		120
FRAB-5-8	5	1.9	φ 12		120

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Approval Certificate **ISO9001**
Design and manufacture of strain gauges, strain measuring equipment and transducers

Contents of this pamphlet are subject to change without prior notice. Contents of this pamphlet are of April 2017.

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