



STRAIN GAUGE SELECTION

Strain Gauge Characteristics

Strain gauge series (usage)	Shape	Objective material for measurement	Applicable coefficient of linear thermal expansion (×10 ⁻⁶ /°C)	Operating temperature range (°C)	Temperature compensation range (°C)	Main applicable adhesive	Material		RoHS2 Directive compliance		
							Backing	Grid			
Strain gauge for general use											
F GOBIET	Single/Multi-axis	Metal Glass Ceramic	8,11,17,23	-196~+150°C	+10~+100°C	CN,P-2 EB-2	Special plastics	Cu-Ni	CE marked		
F	Stress concentration Shearing/Torque	Metal Glass Ceramic	8,11,17,23	-196~+150°C	+10~+100°C	CN,P-2 EB-2	Special plastics	Cu-Ni	Partly compliant with Option -F (except general strain gauges)		
Strain gauge with waterproof construction											
WF	Single/Multi-axis	Metal Glass Ceramic	11,17,23	0~+80°C	+10~+80°C	CN,P-2	Epoxy	Cu-Ni	CE marked		
Strain gauge for high temperature use											
QF GOBIET	Single/Multi-axis	Metal Ceramic	11,17,23,28	-30~+200°C	+10~+100°C	CN,C-1 NP-50B	Polyimide	Cu-Ni	CE marked		
QF	Stress concentration Shearing/Torque	Metal Ceramic	11,17,23,28	-20~+200°C	+10~+100°C	CN,C-1 NP-50B	Polyimide	Cu-Ni	Partly compliant with Option -F (except general strain gauges)		
ZF	Single/Multi-axis	Metal Ceramic	11,17,23	-20~+300°C	+10~+100°C	CN,C-1 NP-50B	Polyimide	Ni-Cr	Not applicable (high melting point solder) CE marked		
EF	Single	Metal	11	-196~+300°C	+10~+150°C	CN,C-1 EB-2 NP-50B	Polyimide	Ni-Cr	Not applicable (high melting point solder) CE marked		
	Multi-axis			-196~+200°C	0~+150°C				Not compliant		
Strain gauge for high and low temperature use											
CEF	Single	Metal Ceramic	11,17,23	-269~+200°C	-196~+80°C *1	CN,C-1 EA-2A	Polyimide	Special alloy	Not applicable (high melting point solder) CE marked		
Strain gauge for cryogenic temperature use											
CF	Single/Multi-axis	Metal Ceramic	11,17,23	-269~+80°C	-196~+80°C *1	CN,C-1 EA-2A	Special plastics	Special alloy	Not applicable (high melting point solder) CE marked		
Weldable strain gauge											
AWM	Single	Metal	11,17	-196~+300°C	RT~+300°C	Spot welding	SUS304 Inconel 600	Special alloy	CE marked		
AWMD	Single	Metal	12	-196~+800°C	****	Spot welding	Inconel 600	Special alloy	CE marked		
AWH	Single	Metal	11,17	-196~+650°C *2	RT~+600°C	Spot welding	SUS304 Inconel 600	Special alloy	CE marked		
AWHU	Single	Metal	11	-196~+800°C	RT~+800°C	Spot welding	Inconel 600	Special alloy	CE marked		
AW-6	Single	Metal	11	-196~+300°C	+10~+100°C	Spot welding	SUS304	Special alloy	CE marked		
AWC-8B	Single	Metal	11	-20~+100°C	+10~+100°C	Spot welding	SUS304	Special alloy	Not compliant		
Strain gauge for concrete and mortar											
P	Single/Multi-axis	Concrete Mortar	11	-20~+80°C	+10~+80°C	CN-E RP-2,PS	Polyester	Cu-Ni wire	CE marked		
PF	Single/Multi-axis	Metal Mortar	11	-20~+80°C	+10~+80°C	CN-E RP-2,PS	Polyester	Cu-Ni	CE marked		
FLM/WFLM	Single	Concrete Mortar	11	-20~+80°C	+10~+80°C	PS	SUS304	Ni-Cr	Not compliant		
Mold strain gauge											
PMF	Single	Concrete Mortar	****	-20~+60°C	****	Embedment	Special plastics	Cu-Ni	Compliant with Option -F		
PMFLS	Single	Asphalt	****	-20~+60°C	****	Embedment	Special plastics	Cu-Ni	Compliant with Option -F		

*1: Approximately temperature compensated range

*2: Up to +600 $^{\circ}\text{C}$ for static measurement, Up to +650 $^{\circ}\text{C}$ for dynamic measurement

		Strain limit in room temperature ($\mu\epsilon$)	Fatigue life Strain level Number of cycles	Description	See page
	F	5% (50,000)	$\pm 1,500\mu\epsilon$ 1×10^6	These are CE marked strain gauges (compliant to RoHS2 Directive) for general use having a new series name "GOBLET". They have joined to our well proven F-series general-use strain gauges. CE marked leadwires are also available in combination with the strain gauges.	42
	F	5% (50,000)	$\pm 1,500\mu\epsilon$ 1×10^6	These are foil strain gauges for general use having expanded operating temperature range of -196 to +150°C by the employment of special plastics backings. The backing is color coded to identify the objective material for self temperature compensation. Strain gauges using lead-free solder are available with option code -F. Various leadwires are also available for this series to meet diverse measurement conditions.	45
	WF	3% (30,000)	$\pm 1,500\mu\epsilon$ 3×10^4	These are F-series strain gauges with integral vinyl leadwires. Whole area of the strain gauge and the leadwire junction are coated with epoxy resin for water proofing. The coating is transparent and flexible, so the positioning and bonding works are very easy. By merely bonding the gauge with an adhesive, outdoor or underwater measurement for a short-term becomes possible.	47
	QF	3% (30,000)	$\pm 1,500\mu\epsilon$ 1×10^6	These are CE marked strain gauges (compliant to RoHS2 Directive) with backings made of polyimide resin. They are suited to strain measurement in high temperature up to 200°C. They are also used for strain gauge type transducers such as load cells.	48
	QF	3% (30,000)	$\pm 1,500\mu\epsilon$ 1×10^6	These are strain gauges utilizing polyimide resin as the backing material. They are suited to strain measurement in high temperature up to 200°C. They are also used as the strain sensing element in strain gauge type transducers such as load cells.	49
	ZF	1% (10,000)	$\pm 1,500\mu\epsilon$ 1×10^6	These strain gauges utilize specially designed Ni-Cr alloy foil for the grid and polyimide resin for the gauge backing. Owing to the construction, these strain gauges are successfully used for measurement in high temperature up to 300°C.	50
	EF	1% (10,000)	$\pm 1,500\mu\epsilon$ 1×10^6	These are extremely small strain gauges enabling strain measurement in narrow space. Single element gauge is applicable to measurement in high temperature up to 300°C. Two or three element gauge is applicable to measurement up to 200°C. In cryogenic temperature range, all gauges are applicable down to -196°C.	51
	CEF	1% (10,000)	$\pm 1,500\mu\epsilon$ 1×10^6	These strain gauges feature a wide range of operating temperature from cryogenic temperature to +200°C. They utilize polyimide resin for the gauge backing. This series is available only in single axis configuration with gauge length of 1,3 and 6mm.	52
	CF	1% (10,000)	$\pm 1,500\mu\epsilon$ 1×10^6	These are strain gauges designed for measurement in cryogenic temperature. They are available in single element, 2-element and 3-element configurations with 350Ω resistance. The thermal output is stable even under cryogenic conditions.	53
	AWM	1% (10,000)	$\pm 1,000\mu\epsilon$ 1×10^6	This strain gauge has a strain sensing element fully encapsulated in a metal tube. The connection method is quarter bridge 3-wire. It is suited to measurement in high temperature up to 300°C and/or in harsh environment. This strain gauge is installed using our spot welder W-50RC.	55
	AWMD	1% (10,000)	$\pm 1,000\mu\epsilon$ 1×10^6	This strain gauge has a sensing element of quarter bridge 3-wire connection which is fully encapsulated in a metal tube. It is measured in full bridge method using the attached high pass filter. It is suited to measurement in high temperature up to 800°C and/or in harsh environment. This strain gauge is applicable only for dynamic strain measurement using DC exciting dynamic strain meter. It is installed using our spot welder W-50RC.	55
	AWH	0.6% (6,000)	$\pm 1,000\mu\epsilon$ 1×10^6	The sensing element is made of special alloy and is fully encapsulated in a corrosion-resistant metal tube such as Inconel 600. The sensing part has half bridge configuration with active element and dummy element, and it is measured in full bridge method using the attached temperature compensation circuit board. This gauge is suited to static measurement in high temperature up to 600°C (650°C for dynamic measurement). It is applicable to use in various environment including gas or liquid. Installation is made using our spot welder W-50RC.	56
	AWHU	1% (10,000)	$\pm 1,000\mu\epsilon$ 1×10^6	The sensing element is made of special alloy and is fully encapsulated in a corrosion-resistant metal tube such as Inconel 600. The sensing part has half bridge configuration with active element and dummy element, and it is measured in full bridge method using the attached temperature compensation circuit board. This gauge is available for use in high temperature up to 800°C for both of static and dynamic measurement. It is applicable to use in various environment including gas or liquid. Installation is made using our spot welder W-50RC.	56
	AW-6	0.5% (5,000)	$\pm 1,000\mu\epsilon$ 1×10^6	The construction of this strain gauge is that a high temperature strain gauge is bonded on a thin stainless steel sheet (0.08mm thick) with heat-curing adhesive. Strain measurement in temperature up to 300°C is possible by this strain gauge. It is suited to measurement of a specimen on which strain gauge bonding is not possible, and/or to a long term measurement. Installation is made using our spot welder W-50RC.	57
	AWC	0.5% (5,000)	$\pm 1,000\mu\epsilon$ 1×10^6	The sensing element of this strain gauge is encapsulated in a stainless steel tube with adhesive. Owing to the sealed construction, this strain gauge is suited to measurement under water and/or for a long term. It is installed by spot welding the stainless steel backing using our spot welder W-50RC.	57
	P	2% (20,000)	$\pm 1,000\mu\epsilon$ 1×10^5	These strain gauges utilize a thin wire as the sensing element and have comparatively long gauge lengths. They are mainly used for measurement on concrete. Since the backing is transparent, the bonding position can easily be checked in the installation works. Strain gauges with integral leadwires are available with CE marking.	59
	PF	2% (20,000)	$\pm 1,500\mu\epsilon$ 1×10^6	These strain gauges have polyester resin backings which are the same as P series, while they have sensing elements made of foil. They can be handled as easily as P series gauges. They are applicable to various materials including concrete, mortar and metals. Strain gauges with integral leadwires are available with CE marking.	60
	FLM/WFLM	0.5% (5,000)	$\pm 1,000\mu\epsilon$ 1×10^5	These strain gauges have resin backings lined with metal foil for the purpose of preventing the penetration of moisture from the reverse side. They are exclusively used for the measurement of strain on concrete surface. The WFLM gauges have moisture proofing over-coating and integral leadwire in addition to the metal backing. It is suited to long term measurement or measurement on underwater-curing concrete.	61
	PMF	****	****	These gauges are designed for measurement of internal strain of concrete or mortar. They are embedded into the measurement position when the concrete or mortar is placed. These gauges are exclusively used for short term measurement such as a loading test. For long term measurement, the use of strain transducer [KM] is recommended. (see page 63-64)	62
	PMF-LS	****	****	This strain gauge utilizes super engineering plastics for the backing material, which exhibit excellent water and heat resistance. It withstands the high temperature of 200°C when the asphalt is placed. This strain gauge is manufactured using lead-free solder with option code -F.	62



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							Backing	Grid			
Strain gauge for composite material											
UBF	Single	Composite material	****	Static -30~+120°C	****	CN,EB-2 NP-50B	Polyimide amide	Cu-Ni	CE marked		
				D y n a m i c -30~+150°C							
BF GOBIET	Single/Multi-axis	Composite material	3, 5, 8	-30~+200°C	+10~+80°C	CN,EB-2 NP-50B	Polyimide	Cu-Ni	CE marked		
Strain gauge for low elastic modulus material											
GF GOBIET	Single/Multi-axis	Plastics	50, 70	-30~+80°C	+10~+80°C	CN	Special plastics	Cu-Ni	CE marked		
LF GOBIET	Single	Wood Gypsum	11	-30~+80°C	+10~+80°C	CN-E	Special plastics	Cu-Ni	CE marked		
Strain gauge for long-term measurement on wood											
PFLW	Single	Wood	11	-20~+80°C	+10~+80°C	PS	Polyester	Cu-Ni foil	CE marked		
PLW								Cu-Ni wire			
Strain gauge for magnetic field use											
MF	Single	Concrete	****	-20~+80°C	****	CN,CN-E RP-2	Special plastics	Ni-Cr	Not compliant		
MF	Multi-axis	Metal	11, 17, 23	-20~+200°C	****	CN NP-50B	Polyimide	Ni-Cr	Not compliant		
QMF	Single	Metal	11, 17, 23	-30~+200°C	0~+150°C	CN NP-50B	Polyimide	Ni-Cr	CE marked		
Strain gauge for post-yield (large strain) measurement											
YEF	Single/Multi-axis	Metal	****	-30~+80°C	****	CN CN-Y	Special plastics	Cu-Ni	CE marked		
YF	Single	Metal	****	-20~+80°C	****	CN CN-Y	Special plastics	Cu-Ni	CE marked		
YHF	Single	Metal	****	-30~+80°C	****	CN CN-Y	Special plastics	Special alloy	CE marked		
High endurance strain gauge											
DSF	Single	Metal C o m p o s i t e material	****	-60~+200°C	****	CN,EB-2 C-1	Polyimide	Special alloy	Not compliant		
One-side strain gauges											
DD	Single axis (2-element)	Metal	****	-10~+70°C	****	CN P-2	Acrylic	Cu-Ni	Compliant with Option -F		
Crack detection gauges											
FAC	****	Metal Concrete	****	-30~+80°C	****	CN RP-2	Special plastics	Cu-Ni	CE marked		
Stress gauges											
SF	****	Metal	11, 17, 23	-20~+200°C	+10~+100°C	CN,NP-50B C-1	Polyimide	Cu-Ni	CE marked		
Temperature gauge											
TF	Single	General materials	****	-20~+200°C	****	CN,NP-50B C-1	Polyimide	Ni	CE marked		
Bolt strain gauges											
BTM	Single	Bolt M10 or larger	****	-10~+80°C	****	A-2	Special plastics	Cu-Ni	Not applicable (high melting point solder) CE marked		
BTMC	Single	Bolt	****	-10~+80°C	****	CN	Special plastics	Cu-Ni	Not applicable (high melting point solder) CE marked		
Frictional strain gauges											
CBF	Single/Multi-axis Torque	Metal Steel	11	0~+60°C	0~+60°C	Not required	Special resin	Cu-Ni	Partly compliant		

		Strain limit in room temperature ($\mu\epsilon$)	Fatigue life Strain level Number of cycles	Description	See page
	UBF	3% (30,000)	$\pm 1,500\mu\epsilon$ 1×10^6	These are strain gauges developed for measurement on composite materials. Owing to the development of gauge backing with better compliance, the number of repetition in thermal cycling test and the creep characteristics have been significantly improved compared to conventional strain gauges.	65
	BF	3% (30,000)	$\pm 1,500\mu\epsilon$ 1×10^6	These are strain gauges designed for measurement on composite materials. They have a specially designed grid pattern to reduce the stiffening effect to the measurement object.	66
	GF	3% (30,000)	$\pm 1,500\mu\epsilon$ 1×10^6	These strain gauges are suited to the measurement on materials such as plastics, which have low elastic modulus compared to metal. The specially designed grid reduces the stiffening effect of strain gauge to the specimen material, and also reduces the effect of Joule heat in the strain gauge.	67
	LF	3% (30,000)	$\pm 1,500\mu\epsilon$ 1×10^6	This strain gauge is designed for measurement on materials having low elastic modulus such as wood or gypsum. Its specially designed grid reduces the stiffening effect of the strain gauge to the specimen material.	68
	PFLW	2% (20,000)	$\pm 1,000\mu\epsilon$ 1×10^5	These are polyester strain gauges whose backings lined with metal foil. The metal foil prevents the penetration of moisture to the strain gauge and makes it suited to the use for long term measurement.	69
	MF	1% (10,000)	$\pm 1,500\mu\epsilon$ 1×10^6	These gauges are designed for strain measurement in magnetic field. The sensing element of the gauge is made of a material which exhibits low magnetoresistance effect. In addition, the sensing element is constructed to make the strain gauge less sensitive to the influence of electromagnetic induction.	70
	MF	1% (10,000)	$\pm 1,500\mu\epsilon$ 1×10^6	These are multi-axis strain gauges designed for strain measurement in magnetic field. They are applicable to the measurement in high temperature up to 200°C. The sensing element of the gauge is made of a material which exhibits low magnetoresistance effect. In addition, the sensing element is constructed to make the strain gauge less sensitive to the influence of electromagnetic induction.	70
	QMF	1% (10,000)	$\pm 1,500\mu\epsilon$ 1×10^5	These gauges are designed for strain measurement in magnetic field. They are applicable to the measurement in high temperature up to 200°C. The sensing element of the gauge is made of a material which exhibits low magnetoresistance effect. In addition, the sensing element is constructed to make the strain gauge less sensitive to the influence of electromagnetic induction.	71
	YEF	10~15% (100,000~150,000)	$\pm 1,500\mu\epsilon$ 5×10^5	These strain gauges are applicable to the measurement of large strain up to 10~15%. Also they withstand the repeated strain in elastic range (strain level of about $\pm 1500 \times 10^{-6}$) like ordinary strain gauges.	73
	YF	15~20% (150,000~200,000)	****	These strain gauges are applicable to the measurement of large strain up to 15~20%. They are not applicable to the measurement of repeated strain in elastic range as well as in large strain range.	74
	YHF	30~40% (300,000~400,000)	$\pm 1,500\mu\epsilon$ 2×10^4	These strain gauges are developed for the measurement of very large strain up to 30~40%. They are not applicable to the measurement of repeated strain in elastic range as well as in large strain range.	74
	DSF	1% (10,000)	$\pm 3,000\mu\epsilon$ 1×10^7	These strain gauges are developed for measurement in fatigue test. They satisfy the fatigue life over 10 million times at a strain level of $\pm 3000 \times 10^{-6}$ strain. It can save the labour and cost for replacing strain gauges during the fatigue test.	76
	DD	0.15% (1,500)	$\pm 1,000\mu\epsilon$ 1×10^5	These strain gauges are intended for measuring the bending and tensile strains separately by simply bonding the gauge on one side of a plate or beam. They are effectively used for the measurement of a box construction in structures such as bridges or pressure vessels, where the reverse side of the measurement object is not accessible for strain gauge installation. Strain gauges using lead-free solder are newly introduced with option code -F.	76
	FAC	****	****	These gauges are designed to measure the propagation speed of fatigue crack in a metal specimen. The gauge is bonded with an adhesive on the position where the crack is initiated or the crack initiation is expected. The gauge is used together with the crack gauge adapter CGA-120B for the measurement.	77
	SF	****	$\pm 1,500\mu\epsilon$ 1×10^6	These gauges are intended to measure the stress in an optional direction of the specimen in plane stress field. The gauge is sensitive not only in its axial direction but also in its transverse direction, and the sensitivity ratio of the transverse direction to the axial direction is equal to the Poisson's ratio of the specimen material. In addition, the gauge is not sensitive to the shearing strain. Therefore, the output of the gauge is proportional to the stress in the direction of the gauge axis.	77
	TF	****	****	These gauges are bonded on the specimen surface like ordinary strain gauges, and measure the surface temperature. By combining with the dedicated temperature gauge adapter (TGA-1A or TGA-1B), actual temperature can be measured easily using a strain meter. Gauges using lead-free solder are newly introduced with option code -F.	78
	BTM	****	****	These gauges are used for measurement of tensile strain of bolt. The gauge is simply inserted into a pre-drilled hole in the bolt shank together with A-2 bonding adhesive and cured. Installation service of bolt strain gauge from drilling till bonding and calibration service after the installation are also available.	79
	BTMC	****	****	These gauges are used for measurement of tensile strain of bolt. The BTMC gauges have a tube shape sensing element, and they are installed with fast-curing CN adhesive. The installation is easily made at room temperature.	80
	CBF	****	****	The frictional strain gauge measures strain using frictional force working on the contact surface between the strain gauge and the measurement object by pressing the gauge to the object with a constant force. It is utilized in the Strain Checker FGMH series which is mounted on a steel structure using magnet, and in the Torque Sensor System FGDH series and Axial Strain Transducer FGAH series which enable measurement of torque or axial force by merely being mounted on a drive shaft or tie rod.	83



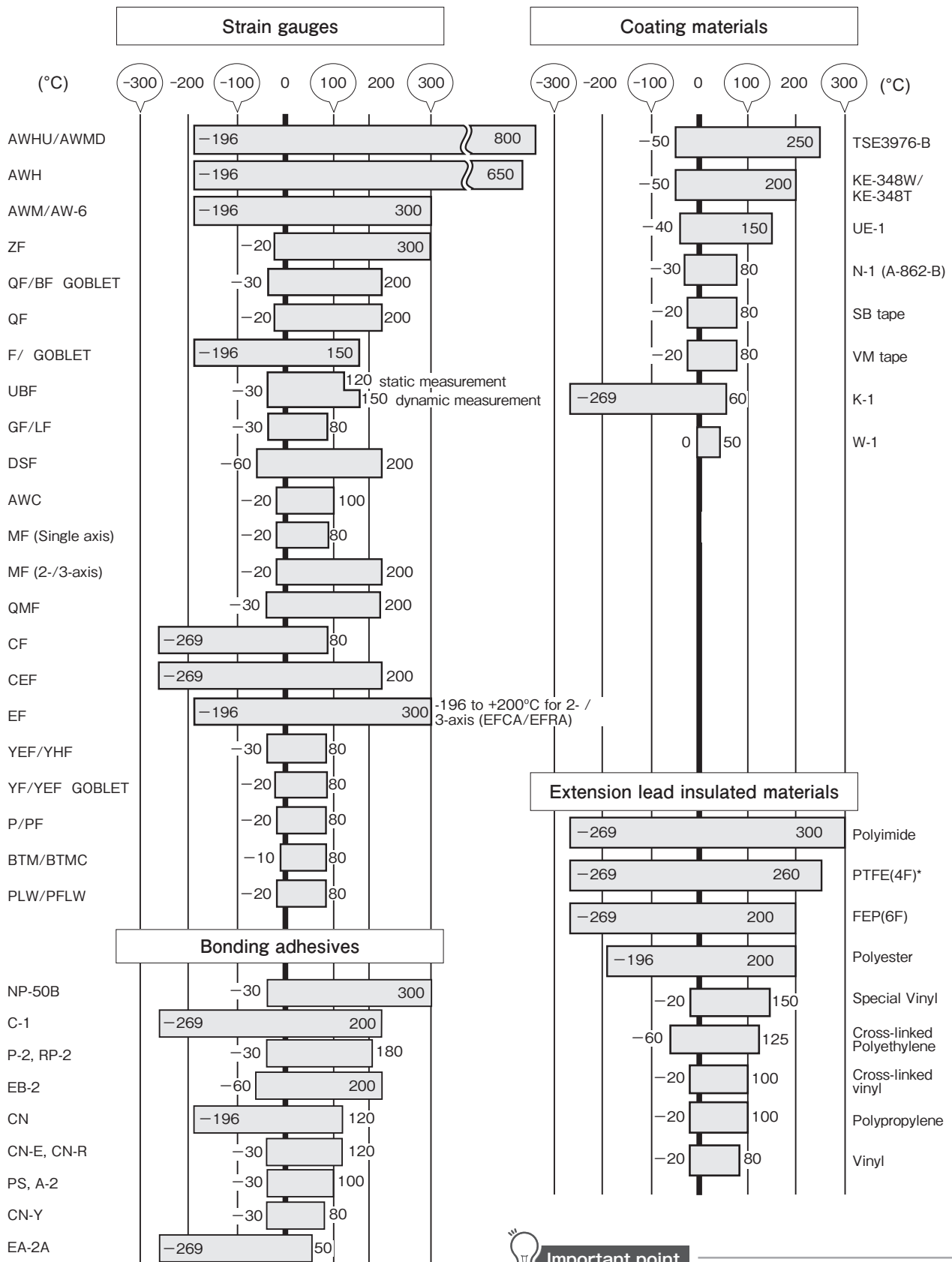
Measuring purpose

Gauge series selection chart

Material - Purpose		Gauges series & Operating temperature (° C)	Bonding adhesive	Coating materials	Lead wire insulator recommended
Metal					
General use	Mid-high temperature	<div><div>-196</div><div>/F/</div><div>GOBIET</div></div> +150	CN/P-2/EB-2	W-1/N-1/SB tape	Vinyl, FEP(6F)
		-20 <div>PF</div> +80	CN/P-2/EB-2	W-1/N-1/SB tape	Vinyl, Enamel
Underwater		0 <div>WF</div> +80	CN/P-2/EB-2	W-1/N-1/SB tape	-LDBB, -LDBTB
General use	High temperature	<div><div>-30</div><div>QF/</div><div>GOBIET</div></div> +200	CN/C-1/NP-50B	KE-348	FEP(6F), PTFE(4F)
	High temperature	-20 <div>ZF</div> +300	CN/C-1/NP-50B	TSE-3976-B	PTFE(4F)
	Miniature, High	<div><div>-196</div><div>/</div><div>EF(Single)</div></div> +300	CN/EB-2/C-1/NP-50B	KE-348/TSE-3976-B	FEP(6F), PTFE(4F)
	Miniature, High	<div><div>-196</div><div>/</div><div>EF(2-/3-axis)</div></div> +200			
	Wide range temp.	<div><div>-269</div><div>/</div><div>CEF</div></div> +200	EA-2A/CN/C-1	K-1	FEP(6F), PTFE(4F)
	Cryogenic temp.	<div><div>-269</div><div>/</div><div>CF</div></div> +80			
Spot welding		<div><div><div><div>-196</div><div>/</div><div>AWM(Quarter with 3-wire)</div></div><div>+300</div></div><div><div><div>-196</div><div>/</div><div>AWMD(Full bridge)</div></div><div>for dynamic</div><div><div>+800</div></div></div><div><div><div>-196</div><div>/</div><div>AWH(Full bridge)</div></div><div>for static</div><div><div>+600</div></div></div><div>for dynamic</div><div><div>+650</div></div></div> <div><div><div>-196</div><div>/</div><div>AWHU(Full bridge)</div></div><div><div>+800</div></div></div> <div><div><div>-196</div><div>/</div><div>AW-6(Quarter with 3-wire)</div></div><div>+300</div></div> <div><div>-20</div><div>AWC</div><div>+100</div></div>	Spot welding (Welder W-50RC)	Consult TML	MI cable
Long-term		-20 <div>ZF</div> +300	C-1/NP-50B	W-1/SB tape	Vinyl/Cross-linked vinyl / PTFE(4F)
		<div><div>-196</div><div>/</div><div>AW-6(Quarter with 3-wire)</div></div> +300	Spot welding		
Stress concentration		<div><div>-196</div><div>/</div><div>F</div></div> +150	CN/P-2/EB-2	W-1/SB tape	Vinyl
		-20 <div>QF</div> +200	CN/C-1/NP-50B	KE-348	FEP(6F)
Residual stress		<div><div>-196</div><div>/</div><div>F</div></div> +150	CN	KE-348/N-1	Vinyl
Torque		<div><div>-196</div><div>/</div><div>F</div></div> +150	CN/P-2/EB-2	W-1/SB tape	Vinyl
		-20 <div>QF</div> +200	CN/C-1/NP-50B	KE-348	FEP(6F)
Shear strain		-20 <div>QF</div> +200	CN/C-1/NP-50B	KE-348	Vinyl, FEP(6F)
Bending/Tensile strain		-10 <div>DD</div> +70	CN/P-2	---	Vinyl
Bolt axial strain		-10 <div>BTM</div> +80	A-2	---	Vinyl
Large strain		-20 <div>YF</div> +80	CN/CN-Y	SB tape	Vinyl
		-30 <div>YEF/YHF</div> +80			
Metal or Concrete					
Magnetic field use		-20 <div>MF(Single)</div> +80	CN/CN-E/RP-2	W-1/SB tape	Twisted vinyl with shield
		-20 <div>MF(2-/3-axis)</div> +200	CN/NP-50B/EB-2/C-1	KE-348	Twisted FEP with shield
Concrete or Mortar					
Surface strain		-20 <div>P/PF</div> +80	CN-E/RP-2/PS	W-1/SB tape	Vinyl, Cross-linked polyethylene
		-20 <div></div> +80 FLM/WFLM	PS		
Internal strain		-20 <div></div> +60 PMF	Embedment	—	Cross-linked vinyl
Asphalt					
Internal strain		-20 <div></div> +60 PMFLS	Embedment	—	Chloroprene
Plastics					
General purpose		-30 <div>GF</div> +80 GOBIET	CN	W-1/N-1/SB tape	Vinyl
Composite					
General purpose		-30 <div>BF</div> GOBIET+200	CN/NP-50B/EB-2	W-1/SB tape	Vinyl, FEP(6F)
		<div><div>-30</div><div>UBF</div><div>for static +120</div><div>for dynamic +150</div></div>	CN/EB-2		
Fatigue test		-60 <div>DSF</div> +200	CN/C-1/EB-2	—	Vinyl, FEP(6F)
Printed circuit board					
General purpose		<div><div><div>-196</div><div>/</div><div>EF(Single)</div></div><div>+300</div></div> <div><div><div>-196</div><div>/</div><div>EF(2-/3-axis)</div></div><div>+200</div></div>	CN/NP-50B/EB-2	—	Vinyl, FEP(6F), PTFE(4F)
Wood long-term/Gypsum					
General purpose		-30 <div>LF</div> +80 GOBIET	CN-E	W-1/N-1/SB tape	Vinyl
		-20 <div></div> +80 PFLW/PLW	PS/CN-E		
General use					
Temperature		-20 <div>TF</div> +200	CN/C-1/NP-50B	W-1/SB tape	Vinyl, FEP(6F)



Operating temperature range



Important point

N.B.: PTFE(4F)
Short term use of 300°C available