STRAIN GAGES

Strain Gages	
Strain Gayes	

Outline

Lead-wire cable

General

Waterproof

Concrete

Composite material PCB Plastics

Ultra-small strain High temp. Low temp.

High elongation

Nonmagnetoresistive

Hydrogen gas Bending

With protector Embedded

Crack

Adhesive Coating agent

Customdesigned Waterproof Strain Gages (KFWB)

KOHSresin. T under insulat under resin isWhen ordering, suffix the lead-wire cable code (see table at the right) to the model number with a space in between.Image: Color Eg.E.g. KFWB-5-120-C1-11 with a vinyl-coated flat 2-wire cable 2 m long \rightarrow KFWB-5-120-C1-11 L2M2R KFWB-5-120-D17-11 with a vinyl-coated flat 3-wire cable 5 m long \rightarrow KFWB-5-120-D17-11 L5M3SImage: Color Motes on Sind Sind These gages are also available with 3500These gages are also available with 3500 resistance.Notes on Sitand stripe The let KFWUniaxial Resistance: 120 Ω Gage factor: Approx. 2.1The fol KFW	rface o The wa water ion res an unc flexibl icable C-33A C-36 P-340 es, leng other le type m m temp. rks n pre-at ard colo green, green, ard 3-wis s to be c case of reen stris s for 0°,	of the KFWB ser terproof structur measurement sistance shows derwater pressu- le enough to er Adhesives Adhesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chestives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives	Ges ies foil st ure enab merely b virtually ure of app able eas erating T <u>uring the</u> -10 to 8 -10 to 8 -10 to 8 -10 to 8 of lead-w engths, c lat 2-wire Dif L11 L31 L5 for ≥ 6 m cables ole pre-attra ble to be p hed to uni yellow str d triaxia	rain gac les thes by beinc no dete proxima y bondi "emp. Adhesi" 0°C 0°C 0°C 0°C 0°C 0°C cable 5, D17 5C2S 0C2S M2S M2S M2S M2S M2S M2S M2S M2S M2S	Width ge is cove gages g bonde erioratii tely 10 ng to co ve les pre-a us. D to 80°C uniaxial g	attached Vinyl-coat L15C3R L30C3R L1M3R L5M3R	Width n a specifor out asuring fter 10 addition faces. to KFW ed flat 3 -10 for	cial waterpro door or g objects. (Th)0 hours of u n, the coverir /B series gag B-wire cable D16, D17 L15C35 L30C35 L1M35 L3M35 L5M35 ≥ 6 m
 ♦KFWB Series Waterproof F RoHS When ordering, suffix the lead-wire cable code (see table at the right) to the model number with a space in between. E.g. KFWB-5-120-C1-11 with a vinyl-coated flat 2-wire cable 2 m long → KFWB-5-120-C1-11 L2M2R KFWB-5-120-D17-11 with a vinyl-coated flat 3-wire cable 5 m long → KFWB-5-120-D17-11 L5M3S These gages are also available with 350Ω resistance. Notes o Stand stripe In the and g stripe The following for the foll	rface o The wa water ion res an unc flexibl icable C-33A C-36 P-340 es, leng other le type m m temp. rks n pre-at ard colo green, green, ard 3-wis s to be c case of reen stris s for 0°,	of the KFWB ser terproof structur measurement sistance shows derwater pressu- le enough to er Adhesives Adhesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chestives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives	ges ies foil st ure enab merely b virtually ure of app able eas erating T <u>uring the</u> -10 to 8 -10 to 8 -10 to 8 -10 to 8 of lead-w engths, c lat 2-wire D16 L11 L31 L31 L5 for ≥ 6 m cables ole pre-attra ble to be p hed to uni yellow str d triaxia	rain gac les thes by beinc no dete proxima y bondi cemp. Adhesir 0°C 0°C 0°C 0°C 0°C 0°C 0°C 0°C 0°C 0°C	Width ge is cove gages g bonde erioratii tely 10 ng to co ve les pre-a us. D to 80°C uniaxial g	Length vered with s to serve ed to mea on even a MPa.) In a urved surf attached Vinyl-coat C1 L15C3R L3OC3R L1M3R L5M3R L5M3R	Width n a specifor out asuring fter 10 addition faces. to KFW ed flat 3 -10 for	cial waterpro door or g objects. (Th)0 hours of u n, the coverir /B series gag B-wire cable D16, D17 L15C35 L30C35 L1M35 L3M35 L5M35 ≥ 6 m
RoHS The surresin. Tunder insulatunder resin is When ordering, suffix the lead-wire cable code (see table at the right) to the model number with a space in between. ■ E.g. KFWB-5-120-C1-11 with a vinyl-coated flat 2-wire cable 2 m long ■ → KFWB-5-120-C1-11 with a vinyl-coated flat 3-wire cable 5 m long ● → KFWB-5-120-C1-11 L2M2R Notes o KFWB-5-120-D17-11 with a vinyl-coated flat 3-wire cable 5 m long ● → KFWB-5-120-D17-11 L5M3S Notes o These gages are also available with 350Ω resistance. ● Stand stripe Uniaxial The fol Resistance: 120 Ω The fol Gage factor: Approx. 2.1 KFW	rface o The wa water ion res an unc flexibl icable C-33A C-36 P-340 es, leng other le type m m temp. rks n pre-at ard colo green, green, ard 3-wis s to be c case of reen stris s for 0°,	of the KFWB ser terproof structur measurement sistance shows derwater pressu- le enough to er Adhesives Adhesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chestives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives Chesives	ges ies foil st ure enab merely b virtually ure of app able eas erating T <u>uring the</u> -10 to 8 -10 to 8 -10 to 8 -10 to 8 of lead-w engths, c lat 2-wire D16 L11 L31 L31 L5 for ≥ 6 m cables ole pre-attra ble to be p hed to uni yellow str d triaxia	rain gac les thes by beinc no dete proxima y bondi "emp. Adhesi 0°C 0°C 0°C 0°C 0°C 0°C cable 5, D17 5C2S 0C2S M2S M2S M2S M2S M2S M2S M2S M2S M2S	ge is cover gages g bonde erioratii tely 10 ng to co ve les pre-aus.	vered with to serve ed to mea on even a MPa.) In a urved suri attached Vinyl-coat C1 L15C3R L30C3R L1M3R L3M3R L5M3R	to KFW	cial waterpro door or g objects. (Th)0 hours of u n, the coverir /B series gag B-wire cable D16, D17 L15C35 L30C35 L1M35 L3M35 L5M35 ≥ 6 m
When ordering, suffix the lead-wire cable code (see table at the right) to the model number with a space in between. E.g. KFWB-5-120-C1-11 with a vinyl-coated flat 2-wire cable 2 m long \rightarrow KFWB-5-120-C1-11 L2M2R KFWB-5-120-D17-11 with a vinyl-coated flat 3-wire cable 5 m long \rightarrow KFWB-5-120-D17-11 L5M3S These gages are also available with 350Ω resistance. Notes o stand stripe The le Uniaxial Resistance: 120 Ω Gage factor: Approx. 2.1 Comparison Comparis	P-340 es, leng other le Type m m m n n temp. rks n pre-ata ard colo , green, y ard 3-wis s to be c c case of reen stris s for 0°,	C1 L15C2R L30C2R L1M2R L3M2R L5M2R L-6, L-9 L-6, L-9 L-7 L-7 L-7 L-7 L-7 L-7 L-7 L-7	-10 to 8 of lead-w engths, c lat 2-wire D10 L11 L31 L31 L51 for \geq 6 m cables ble to be p hed to unin yellow str d triaxia	0°C vire cable contact of cable 5, D17 5C2S 0C2S M2S M2S M2S -10 eched to fre-attach	US.	Vinyl-coat 	ed flat 3	B-wire cable D16, D17 L15C3S L30C3S L1M3S L3M3S L5M3S ≥ 6 m
E.g. KFWB-5-120-C1-11 with a vinyl-coated flat 2-wire cable 2 m long \rightarrow KFWB-5-120-C1-11 L2M2R KFWB-5-120-D17-11 with a vinyl-coated flat 3-wire cable 5 m long \rightarrow KFWB-5-120-D17-11 L5M3S These gages are also available with 350Ω resistance. Notes o •Stand stripe •In the and g stripe The le	m m m m m m m m m m m m m m m m m m m	L15C2R L30C2R L1M2R L3M2R L5M2R L-6, L-9 ttached lead-wire or of the 2-wire cab yellow or black cal ire cable pre-attac hanged to blue or a biaxial gage an ipes for 0°, 90° an 90° and 45°, resp	L1 L3 L1 L3 L5 for ≥ 6 m cables ble pre-atta ble to be p hed to uni 'yellow str d triaxial c	5C2S 0C2S M2S M2S M2S -1(ached to re-attach	uniaxial g	L15C3R L30C3R L1M3R L3M3R L5M3R C L-7, L		L15C3S L30C3S L1M3S L3M3S L5M3S ≥ 6 m
L.g. Image: constraint of the second stripe KFWB-5-120-C1-11 with a vinyl-coated flat 2-wire cable 2 m long Image: constraint of the second stripe → KFWB-5-120-D17-11 with a vinyl-coated flat 3-wire cable 5 m long Image: constraint of the second stripe → KFWB-5-120-D17-11 L5M3S Notes o These gages are also available with 350Ω resistance. Notes o Uniaxial The fol Resistance: 120 Ω The fol Gage factor: Approx. 2.1 KFN KFN KFN	m m m m m m m m m m m m m m m m m m m	L15C2R L30C2R L1M2R L3M2R L5M2R L-6, L-9 ttached lead-wire or of the 2-wire cab yellow or black cal ire cable pre-attac hanged to blue or a biaxial gage an ipes for 0°, 90° an 90° and 45°, resp	L1 L3 L1 L3 L5 for ≥ 6 m cables ble pre-atta ble to be p hed to uni 'yellow str d triaxial c	5C2S 0C2S M2S M2S M2S -1(ached to re-attach	uniaxial g	L15C3R L30C3R L1M3R L3M3R L5M3R C L-7, L		L15C3S L30C3S L1M3S L3M3S L5M3S ≥ 6 m
L-g. KFWB-5-120-C1-11 with a vinyl-coated flat 2-wire cable 2 m long → KFWB-5-120-C1-11 L2M2R KFWB-5-120-D17-11 with a vinyl-coated flat 3-wire cable 5 m long → KFWB-5-120-D17-11 L5M3S These gages are also available with 350Ω resistance. Uniaxial Resistance: 120 Ω Gage factor: Approx. 2.1 KF W	m m m m m m m m m m m m m m m m m m m	L30C2R L1M2R L3M2R L5M2R L-6, L-9 ttached lead-wire or of the 2-wire cab yellow or black cal ire cable pre-attac thanged to blue or a biaxial gage an ipes for 0°, 90° an 90° and 45°, resp.	L_3 L_1 L_3 L_5 for $\ge 6 \text{ m}$ cables ble pre-atta ble to be p hed to uni 'yellow str d triaxial c	0C2S M2S M2S M2S –1(ached to re-attach	uniaxial g	L30C3R L1M3R L3M3R L5M3R C L-7, L		L30C3S L1M3S L3M3S L5M3S ≥ 6 m
flat 2-wire cable 2 m long \rightarrow KFWB-5-120-C1-11 L2M2R KFWB-5-120-D17-11 with a vinyl-coated flat 3-wire cable 5 m long \rightarrow KFWB-5-120-D17-11 L5M3S These gages are also available with 3500 resistance. Notes o • Stand stripe The let Uniaxial Resistance: 120 Ω Gage factor: Approx. 2.1 KFW	n temp. rks n pre-at ard colo , green, y ard 3-wi s to be c case of reen stri s for 0°,	L1M2R L3M2R L5M2R L-6, L-9 ttached lead-wire of the 2-wire cab yellow or black cal ire cable pre-attac changed to blue or a biaxial gage an ipes for 0°, 90° an 90° and 45°, resp	L1 L3 for ≥ 6 m cables ble pre-atta ble to be p hed to uni yellow str d triaxial c	M2S M2S M2S –10 ached to re-attach	uniaxial g	L1M3R L3M3R L5M3R C L-7, L		L1M3S L3M3S L5M3S ≥ 6 m
$ \rightarrow \text{KFWB-5-120-C1-11 L2M2R} $ $ \text{KFWB-5-120-D17-11 with a vinyl-coated} $ $ \text{flat 3-wire cable 5 m long} $ $ \rightarrow \text{KFWB-5-120-D17-11 L5M3S} $ $ \text{These gages are also available with 350\Omega} $ $ \text{resistance.} $ $ \text{Notes o} $ $ \text{Stand} $ $ \text{stripe} $ $ \text{el in the and g stripe} $ $ \text{The fol} $ $ \text{Gage factor: Approx. 2.1} $ $ \text{KFW} $	n pre-at ard colo , green, y ard 3-wi s to be c case of reen stri s for 0°,	L3M2R L5M2R L-6, L-9 ttached lead-wire or of the 2-wire cab yellow or black cal ire cable pre-attac changed to blue or a biaxial gage an ipes for 0°, 90° an 90° and 45°, resp.	L3 L5 for ≥ 6 m cables ble pre-atta ble to be p hed to uni yellow str d triaxial of	M2S M2S –1(ached to re-attach	uniaxial g	L3M3R L5M3R C L-7, L		L3M3S L5M3S ≥ 6 m
$\begin{array}{c} KFWB-5-120-D17-11 \ with a \ vinyl-coated \\ flat 3-wire \ cable 5 \ m \ long \\ \rightarrow \ KFWB-5-120-D17-11 \ L5M35 \\ \hline \\ These \ gages \ are \ also \ available \ with \ 350\Omega \\ resistance. \\ \hline \\ \begin{array}{c} Notes \ o \\ \bullet \ Stand \\ stripe \\ \bullet \ In \ the \\ and \ gstripe \\ The \ le \\ \hline \\ \hline \\ \hline \\ \hline \\ \hline \\ \hline \\ \hline \\ \hline \\ \hline \hline \\ \hline \\ \hline \hline \\ \hline \\ \hline \\ \hline \hline \\ \hline \hline \\ \hline \\ \hline \hline \\ \hline \hline \\ \hline \hline \hline \\ \hline \hline \\ \hline \hline \\ \hline \hline \hline \hline \\ \hline \hline \hline \\ \hline \hline \\ \hline \hline \hline \\ \hline \hline \hline \hline \\ \hline \hline \hline \hline \\ \hline \\ \hline \hline$	n temp. rks n pre-at ard colo , green, y ard 3-wi s to be c case of reen stri s for 0°,	L5M2R L-6, L-9 ttached lead-wire or of the 2-wire cab yellow or black cal ire cable pre-attac hanged to blue or a biaxial gage an ipes for 0°, 90° an 90° and 45°, resp.	$for \ge 6 m$ cables ble pre-atta ble to be p hed to uni yellow str d triaxial c	M2S –1(ached to u	uniaxial g	L5M3R C L-7, L		L5M3S ≥6m
flat 3-wire cable 5 m long \rightarrow KFWB-5-120-D17-11 L5M3S These gages are also available with 350Ω resistance. These gages are also available with 350Ω resistance. Notes o • Stand tripe: • In the and g stripe: The le Comparison • Stand • Stand	temp. rks ard colo , green, y ard 3-wi s to be c case of reen stri s for 0°,	L-6, L-9 ttached lead-wire or of the 2-wire cab yellow or black cal ire cable pre-attac hanged to blue or a biaxial gage an ipes for 0°, 90° an 90° and 45°, resp.	$for \ge 6 m$ cables ble pre-atta ble to be p hed to unia yellow str id triaxial o	–1(ached to re-attach	uniaxial g	C L-7, L		≥6 m
 → KFWB-5-120-D17-11 L5M3S These gages are also available with 350Ω resistance. Notes o • Stand white • Stand stripe: In the and g stripe The le Uniaxial Resistance: 120 Ω Gage factor: Approx. 2.1 KFWB-5-120-D17-11 L5M3S	n pre-at ard colo , green, y ard 3-wi s to be c case of reen stri s for 0°,	ttached lead-wire or of the 2-wire cab yellow or black cal ire cable pre-attac hanged to blue or a biaxial gage an ipes for 0°, 90° an 90° and 45°, resp.	cables ble pre-atta ble to be p hed to uni yellow str id triaxial o	ached to i re-attach	uniaxial g	L-7, L		
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Resistance: 120 Ω Gage factor: Approx. 2.1		de is S in common.						
	WB-5-1 WB-5-1	models are delive 120-C1-11 L1N 120-C1-16 L1N 120-C1-23 L1N	/13R /13R	a vinyl-co 5	bated fla 1.4	t 3-wire ca 30	ble 1 m 12	long pre-attac
	WB-2- 1	120-C1-11 L1N 120-C1-16 L1N 120-C1-23 L1N	/13R	2	1.2	30	12	
KF	lowing <mark>VB-5-</mark> 1	models are delive 120-D16-11 L1	M3S	-				
	WB-5- 1	120-D16-16 L1 120-D16-23 L1 120-D16-11 L1	M3S	5	1.4	21	18	5 gages/ p
*The above picture is KFWB-5-120-D16-23 L1M3S.	WB-2-1 WB-2-1	120-D16-16 L1 120-D16-23 L1	M3S	2	1.2	21	18	5 gages/ p
	lowing <mark>VB-5-</mark> 1 <u>VB-5-</u> 1	models are delive 120-D17-11 L1 120-D17-16 L1	M3S M3S	a vinyl-cc	bated fla 1.4	t 3-wire ca 21	ble 1 m 18	long pre-attac 5 gages/ p
	WB-2- 1	120-D17-23 L1 120-D17-11 L1 120-D17-16 L1	M3S	2	1.2	21	18	5 gages/ p