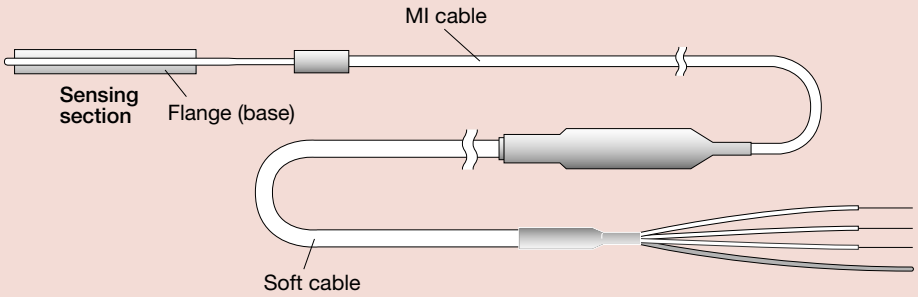
Encapsulated Strain Gages

Encapsulated strain gages are 2-element, temperature compensation gages applicable at high temperatures. The capsule has active and dummy gages embedded in a metal tube filled with insulation (MgO). The leadwire cable is composed of an MI cable and a soft cable, 3 conductors each, for easy handling. Except for the KHCD gage, measurement is performed in conjunction with the dedicated HDB adapter to form a strain-gage bridge. Also available is a bridge adapter which is connected directly to the terminal of the soft cable in place of the HDB.



●Extension of MI Cable/Soft Cable

Extension of MI Cable

The MI cable can be extended to 0.5, 1, 1.5, 2m and thereafter by every 1m step to 30m. Since the MI cable resistance of the KHCD gage is as high as approximately 40Ω/1m reciprocated, its extension considerably reduces the gage factor. Thus, it is recommended to extend the soft cable.

Extension of Soft Cable

The soft cable can be extended up to 30m by every 1m step.

●MI Cables

Gage	Cable Extension Unit
KHCS	0.5m, 1m, 1.5m, 2m and thereafter by every 1m step to 30m
KHCM	
KHC G8	
KHC G9	
KHCX	2m to 30m by every 1m step

● Soft Cables

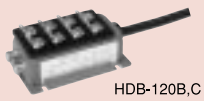
Gage	Cable Extension Unit
KHCX, KHCD, KHCS, KHCM, KHC	Up to 30m by every 1m step

Options

■Dedicated Adapters HDB-B/C

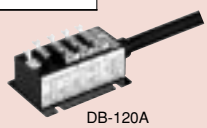
The dedicated adapter enables the user to easily configure a strain-gage bridge by soldering the temperature compensation resistor (accessory to encapsulated gage) to the terminal of the adapter (excluding the KHCD gage).

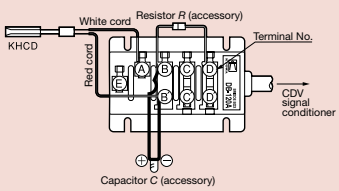
Applicable Gage Resistance	Model	Cable Length	Dimensions & Mass
120Ω	HDB-120B HDB-120C	1m long; terminated with arrow-shaped chip 1m long; terminated with NDIS connector plug	86 x 54 x 33 mm, approx. 200g
60Ω	HDB-60B HDB-60C	1m long; terminated with arrow-shaped chip 1m long; terminated with NDIS connector plug	

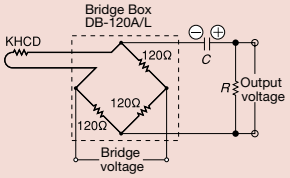

HDB-120B,C

■Bridge Boxes DB-120A/L

The bridge box enables the user to easily configure a measuring circuit by soldering the resistor and capacitor (accessories to KHCD gages) to the terminal of the box.

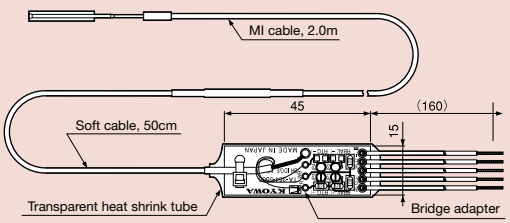

DB-120A





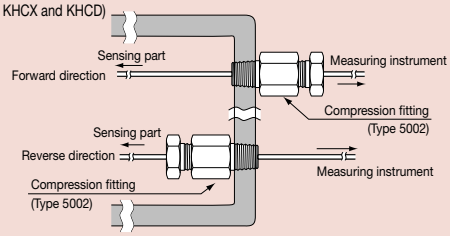
■Bridge Adapter

The bridge adapter has the most suitable temperature compensation resistor for the operating temperature range mounted to the board. It is connected to the soft cable when delivered. It makes the dedicated HDB adapter unnecessary, while eliminating any possible erroneous wiring and ensuring labor-saving. (excluding the KHCD gage).



■Compression Fitting (Cable Extractor)

(Except for KHCX and KHCD)



Encapsulated Strain Gages

KHCX

- Gage Factor: Approx. 1.5 (950°C)
- Applicable Linear Expansion Coefficients: 11, 13

Mounting Method and Operating Temperature Range

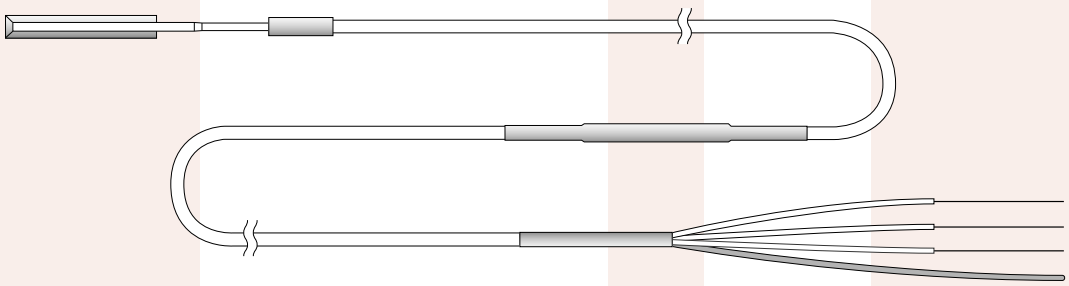
Spot welding: –196 to 950°C

■Encapsulated Gages for Static/Dynamic Strain Measurement at 950°C

The KHCX gages are uniaxial 2-element temperature compensation Capsule Gages. The maximum operating temperature is 950°C, the highest level in the world.

KHCX Gages ●Uniaxial 120Ω

Pattern	Leadwire Cable – Type and Shape	Operating Temp. Range	Leadwire Length	Model
KHCX-10-120-G13-11 13	3-conductor shielded cable	–196 to 950°C	MI cable, 2m Soft cable, 50cm	KHCX-10-120-G13-11 C2M
	3-conductor shielded cable with bridge adapter	–196 to 950°C	MI cable, 2m Soft cable, 50cm	KHCX-10-120-G13-11 C2MV



Uniaxial 2-element, temperature compensation

- Base Size: 20 x 3 mm
- Gage Length: 10 mm
- Gage Resistance: 120Ω
- Pieces per Pack: 1

Encapsulated Strain Gages

KHCD

● Gage Factor Approx. 0.8 (800°C)

Mounting Method and Operating Temperature Range

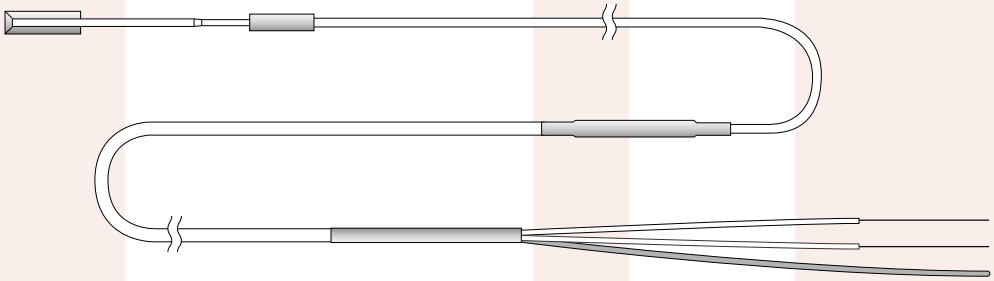
Spot welding: Normal temp. to 800°C

■Encapsulated Gages for Dynamic Strain Measurement at 800°C

The KHCD gages are uniaxial 1-element active Capsule Gages. Conductors of the MI cable are made of high-temperature thermocouple compensation copper wires and enable temperature monitoring. Applicable measuring instruments are the DB-120A/L bridge box and the CDV signal conditioner.

KHCD Gages ●Uniaxial 200Ω

Pattern	Leadwire Cable – Type and Shape	Operating Temp. Range	Leadwire Length	Model
KHCD-5-200-G11	2-conductor shielded cable	–196 to 800°C	MI cable, 2m Soft cable, 50cm	KHCD-5-200-G11 C2M



Uniaxial 1-element active type

- ●Base Size 10 x 3 mm
- ●Gage Length 5 mm
- ●Gage Resistance 200Ω
- ●Pieces per Pack 1

Encapsulated Strain Gages

KHCS

- Gage Factor: Approx. 1.98 (750°C)
- Applicable Linear Expansion Coefficients: 11, 13, 16

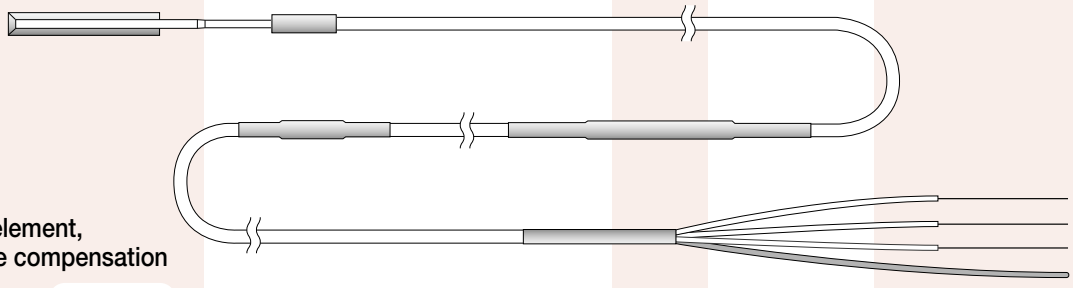
Mounting Method and Operating Temperature Range
Spot welding: –196 to 750°C

■Encapsulated Gages for Static/Dynamic Strain Measurement at 750°C

The KHCS gages are uniaxial 2-element temperature compensation Capsule Gages. While they are equipped with a built-in temperature compensation element, use of a proper compensation resistor for the measuring object enables further reduction of thermally-induced apparent strain.

KHCS Gages ●Uniaxial 120Ω

Pattern	Leadwire Cable – Type and Shape	Operating Temp. Range	Leadwire Length	Model
KHCS-10-120-G12-11 13 16	3-conductor shielded cable	–196 to 750°C	MI cable, 2m Soft cable, 50cm	KHCS-10-120-G12-11 C2M
	3-conductor shielded cable with bridge adapter	–196 to 750°C	MI cable, 2m Soft cable, 50cm	KHCS-10-120-G12-11 C2MV
	3-conductor shielded cable with compression fitting	–196 to 750°C	MI cable, 2m Soft cable, 50cm	KHCS-10-120-G12-11 C2MF
	3-conductor shielded cable with compression fitting & bridge adapter	–196 to 750°C	MI cable, 2m Soft cable, 50cm	KHCS-10-120-G12-11 C2MFV



Uniaxial 2-element, temperature compensation

- Base Size: 20 x 3 mm
- Gage Length: 10 mm
- Gage Resistance: 120Ω
- Pieces per Pack: 1

Encapsulated Strain Gages

KHCM

- Gage Factor: Approx. 1.8 (650°C)
- Applicable Linear Expansion Coefficients: 11, 13, 16

Mounting Method and Operating Temperature Range

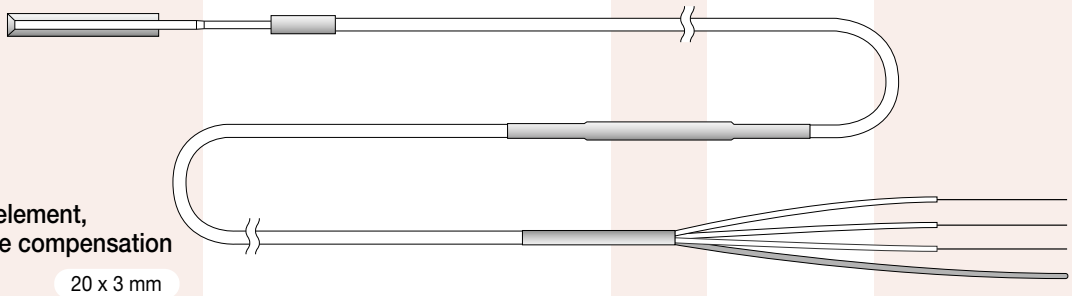
Spot welding: –196 to 650°C

■Encapsulated Gages for Static/Dynamic Strain Measurement at 650°C

The KHCM gages are uniaxial 2-element temperature compensation Capsule Gages. Equipped with a built-in temperature compensation element, these gages can measure both static strain and dynamic strain at a maximum operating temperature of 650°C.

KHCM Gages ●Uniaxial 120Ω

Pattern	Leadwire Cable – Type and Shape	Operating Temp. Range	Leadwire Length	Model
KHCM-10-120-G15-11 13 16	3-conductor shielded cable	–196 to 750°C	MI cable, 2m Soft cable, 50cm	KHCM-10-120-G15-11 C2M
	3-conductor shielded cable with bridge adapter	–196 to 750°C	MI cable, 2m Soft cable, 50cm	KHCM-10-120-G15-11 C2MV
	3-conductor shielded cable with compression fitting	–196 to 750°C	MI cable, 2m Soft cable, 50cm	KHCM-10-120-G15-11 C2MF
	3-conductor shielded cable with compression fitting & bridge adapter	–196 to 750°C	MI cable, 2m Soft cable, 50cm	KHCM-10-120-G15-11 C2MFV



Uniaxial 2-element, temperature compensation

- Base Size: 20 x 3 mm
- Gage Length: 10 mm
- Gage Resistance: 120Ω
- Pieces per Pack: 1

Encapsulated Strain Gages

KHC

● Applicable Linear Expansion Coefficients: 11, 16

Mounting Method and Operating Temperature Range

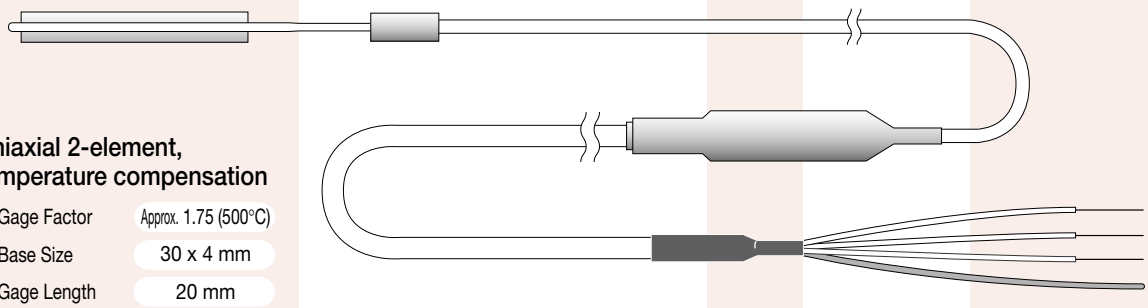
Spot welding: –196 to 550°C

■Encapsulated Gages for Measurement of Dynamic Strain at 550°C and Static Strain at 500°C

The KHC gages are uniaxial temperature compensation Capsule Gages with 2 elements, active and dummy, forming a half bridge. The sensing part and MI cable are made of Inconel 600 with the G8 type and of stainless steel with the G9 type. Thus, an optimum model for the operating environment can be selected.

KHC Gages ●Uniaxial 120Ω

Pattern	Leadwire Cable – Type and Shape	Operating Temp. Range	Leadwire Length	Model
KHC-20-120-G8-11 16	3-conductor shielded cable	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-20-120-G8-11 C2M
	3-conductor shielded cable with bridge adapter	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-20-120-G8-11 C2MV
	3-conductor shielded cable with compression fitting	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-20-120-G8-11 C2MF
	3-conductor shielded cable with compression fitting & bridge adapter	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-20-120-G8-11 C2MFV

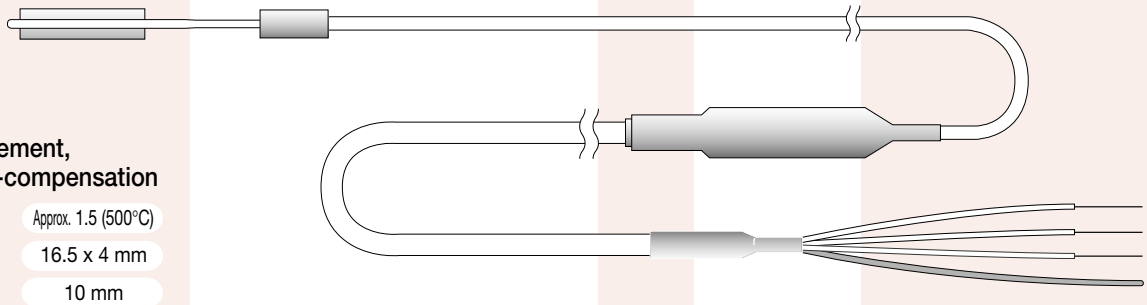


Uniaxial 2-element, temperature compensation

- ● Gage Factor: Approx. 1.75 (500°C)
- ● Base Size: 30 x 4 mm
- ● Gage Length: 20 mm
- ● Gage Resistance: 120Ω
- ● Pieces per Pack: 1

KHC Gages ●Uniaxial 120Ω/60Ω

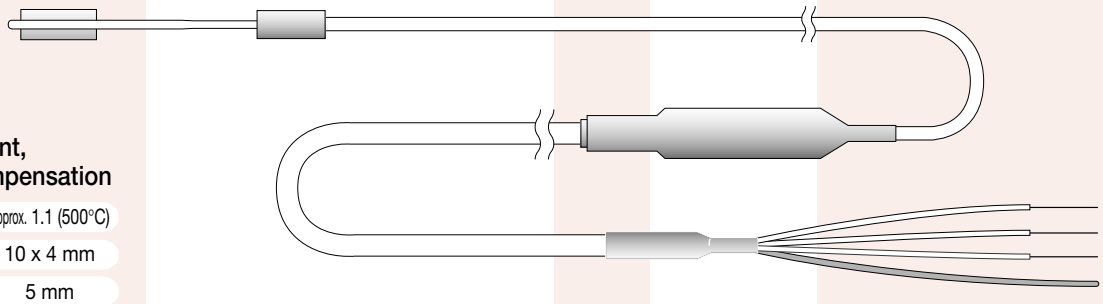
Pattern	Leadwire Cable – Type and Shape	Operating Temp. Range	Leadwire Length	Model
KHC-10-120-G8-11 16	3-conductor shielded cable	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-10-120-G8-11 C2M
	3-conductor shielded cable with bridge adapter	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-10-120-G8-11 C2MV
	3-conductor shielded cable with compression fitting	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-10-120-G8-11 C2MF
	3-conductor shielded cable with compression fitting & bridge adapter	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-10-120-G8-11 C2MFV



Uniaxial 2-element, temperature-compensation

- ● Gage Factor: Approx. 1.5 (500°C)
- ● Base Size: 16.5 x 4 mm
- ● Gage Length: 10 mm
- ● Gage Resistance: 120Ω
- ● Pieces per Pack: 1

Pattern	Leadwire Cable – Type and Shape	Operating Temp. Range	Leadwire Length	Model
KHC-5-60-G8-11 16	3-conductor shielded cable	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-5-60-G8-11 C2M
	3-conductor shielded cable with bridge adapter	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-5-60-G8-11 C2MV
	3-conductor shielded cable with compression fitting	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-5-60-G8-11 C2MF
	3-conductor shielded cable with compression fitting & bridge adapter	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-5-60-G8-11 C2MFV

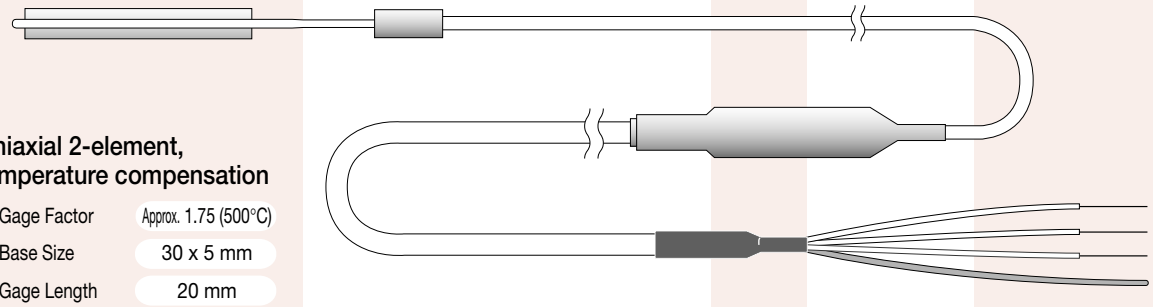


Uniaxial 2-element, temperature compensation

- ● Gage Factor: Approx. 1.1 (500°C)
- ● Base Size: 10 x 4 mm
- ● Gage Length: 5 mm
- ● Gage Resistance: 60Ω
- ● Pieces per Pack: 1

KHC Gages ●Uniaxial 120Ω

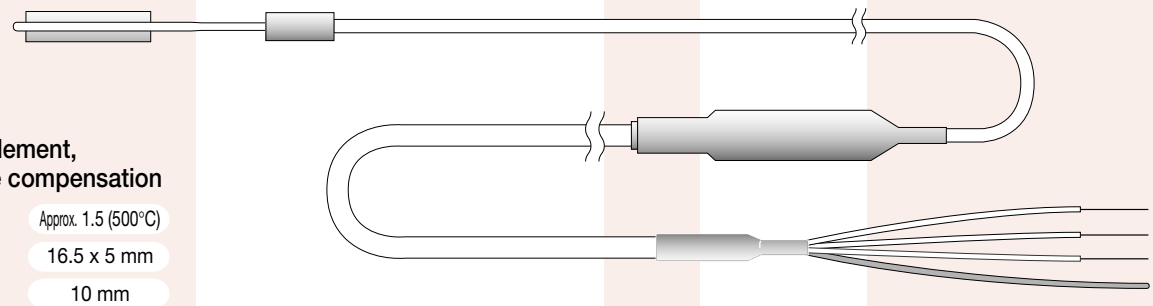
Pattern	Leadwire Cable – Type and Shape	Operating Temp. Range	Leadwire Length	Model
KHC-20-120-G9-11 16	3-conductor shielded cable	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-20-120-G9-11 C2M
	3-conductor shielded cable with bridge adapter	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-20-120-G9-11 C2MV
	3-conductor shielded cable with compression fitting	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-20-120-G9-11 C2MF
	3-conductor shielded cable with compression fitting & bridge adapter	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-20-120-G9-11 C2MFV



Uniaxial 2-element, temperature compensation

- ●Gage Factor: Approx. 1.75 (500°C)
- ●Base Size: 30 x 5 mm
- ●Gage Length: 20 mm
- ●Gage Resistance: 120Ω
- ●Pieces per Pack: 1

Pattern	Leadwire Cable – Type and Shape	Operating Temp. Range	Leadwire Length	Model
KHC-10-120-G9-11 16	3-conductor shielded cable	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-10-120-G9-11 C2M
	3-conductor shielded cable with bridge adapter	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-10-120-G9-11 C2MV
	3-conductor shielded cable with compression fitting	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-10-120-G9-11 C2MF
	3-conductor shielded cable with compression fitting & bridge adapter	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-10-120-G9-11 C2MFV

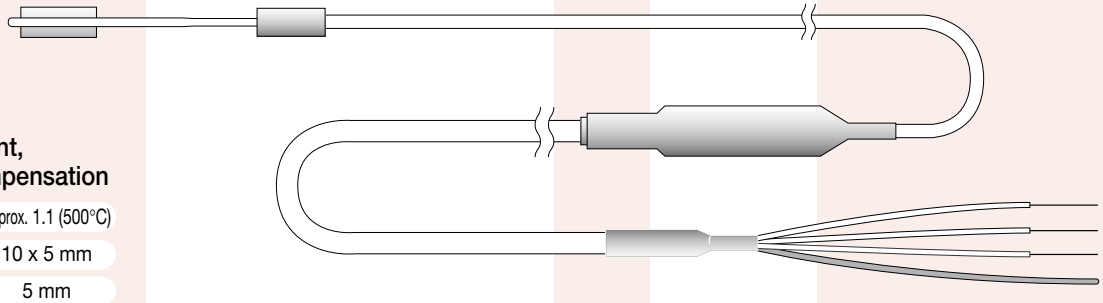


Uniaxial 2-element, temperature compensation

- ●Gage Factor: Approx. 1.5 (500°C)
- ●Base Size: 16.5 x 5 mm
- ●Gage Length: 10 mm
- ●Gage Resistance: 120Ω
- ●Pieces per Pack: 1

KHC Gages ●Uniaxial 60Ω

Pattern	Leadwire Cable – Type and Shape	Operating Temp. Range	Leadwire Length	Model
KHC-5-60-G9-11 16	3-conductor shielded cable	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-5-60-G9-11 C2M
	3-conductor shielded cable with bridge adapter	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-5-60-G9-11 C2MV
	3-conductor shielded cable with compression fitting	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-5-60-G9-11 C2MF
	3-conductor shielded cable with compression fitting & bridge adapter	–196 to 550°C	MI cable, 2m Soft cable, 50cm	KHC-5-60-G9-11 C2MFV



Uniaxial 2-element, temperature compensation

- Gage Factor: Approx. 1.1 (500°C)
- Base Size: 10 x 5 mm
- Gage Length: 5 mm
- Gage Resistance: 60Ω
- Pieces per Pack: 1