



**Measurement
Solutions LLC**

TEMPERATURE MEASUREMENT & CONTROL



SERVICES

- Sensor design and manufacturing
- Contract manufacturing
- N.I.S.T. calibration and repair
- Control systems design
- Consulting, validation and installation
- Gas combustion



LARGE INVENTORY

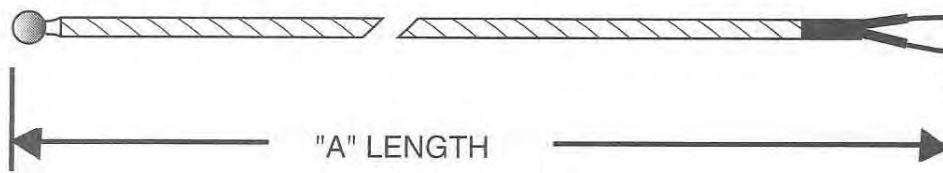
- Thermocouple, RTD and Thermistor Probes
- Wire, Connectors, Heads, Blocks, Panel Jacks
- Controllers, Indicators and Panel Meters
- Electric Heating Elements
- SCR and SSR



Measurement Solutions
480-897-0300
info@measol.com
www.MEASOL.com

Wire and Tube Thermocouples

Beaded Wire Thermocouple



TC- - - - X - -

Insulation*

Glass (900°F) **GG**
 PFA Teflon (500°F) **TT**
 High Temp Glass (1300°F) **HH**
 Kapton (600°F) **KK**
 Glass w/SS Braid (900°F) **SB**

*For insulation descriptions and special insulations, see page 3

Calibration*

Iron Constantan **J**
 Chromel Alumel **K**
 Chromel Constantan **E**
 Copper Constantan **T**

*For additional calibrations call sales

Termination*

MCL Mini Male (400F) \$5.50
MCH Mini Hi-Temp Male (800F) \$7.00
MFL Mini Female (400F) \$5.50
MFH Mini Hi-Temp Female (800F) \$7.00
SCL Standard Male (400F) \$5.50
SCH Stand. Hi-Temp Male (800F) \$7.00
SFL Standard Female (400F) \$6.00
SFH Stand. Fem Hi-Temp (800F) \$10.00
SPL Spade Lugs \$3.50
STR 3/4" Stripped leads N/C

*Special connectors available. Call sales

"A" Length

Specify in inches

Wire Gage

20 30 20S *
 24 36 24S *

*Stranded Wire available in 20 awg **TT** or **GG** insulation only.

Exposed junction thermocouples fill your need for low cost sensors. Fast, accurate & affordable, they are made with "Special Limits" wire. Consult sales for NIST traceability.

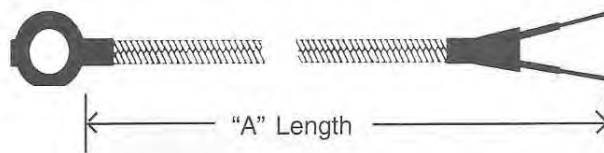
Insulation	Prices
Glass GG	6.00 + .50 / Foot + termination
PFA Teflon TT	6.00 + .75 / Foot + termination
High Temp Glass HH	6.00 + .75 / Foot + termination
Kapton KK	7.00 + .95 / Foot + termination
Glass w/SS Braid SB	7.00 + .95 / Foot + termination
No additional charge for stranded wire	

Discount Schedule	
1 - 24 units	Net
25 - 49 units	10%
50 - 99 units	20%
100 and up	25%

Example: TC-GG-K-24 X 24-STR = \$6.50

Wire and Tube Thermocouples

Washer Thermocouple



WT- - - X -

Calibration*

Iron Constantan **J**
 Chromel Alumel **K**
 Chromel Constantan **E**
 Copper Constantan **T**

*For additional calibrations call sales

Screw Size

No. 8 (4mm) **8**
 No. 10 (4mm) **10**
 1/4" (6mm) **14**

Insulation*

Glass (900°F) **GG**
 PFA Teflon (500°F) **TT**
 High Temp Glass (1300°F) **HH**
 Kapton (600°F) **KK**
 Glass w/SS Braid **SB**

*For insulation descriptions and special insulations, see page 3.

Termination*

MCL Mini Male (400F) \$5.50
MCH Mini Hi-Temp Male (800F) \$7.00
MFL Mini Female (400F) \$5.50
MFH Mini Hi-Temp Female (800F) \$7.00
SCL Standard Male (400F) \$5.50
SCH Stand. Hi-Temp Male (800F) \$7.00
SFL Standard Female (400F) \$6.00
SFH Stand. Hi-Temp Female (800F) \$10
SPL Spade Lugs \$3.50
STR 3/4" Stripped leads N/C

"A" Length

Specify in inches

Washer Dimensions

Size	I.D.	O.D.	Lgth.
No. 8	11/64"	5/16"	9/16
No. 10	3/16"	3/8"	11/16"
1/4"	17/64"	9/16"	15/16"

Washer Thermocouples are made with "Special Limits" wire.
 No. 8 has 24 gauge wire, No. 10 & 1/4" have 20 gauge wire.

Example: WT-K-8-TT X 24-MCL = \$13.25

Discount Schedule

1 - 24 units	Net
25 - 49 units	10%
50 - 99 units	15%
100 and up	20%

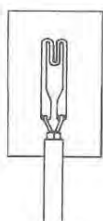
Insulation

Prices (Includes first foot)

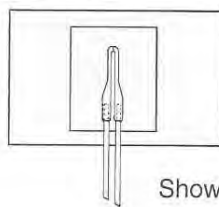
Glass	GG	7.00 + .50 / Foot	+ termination
PFA Teflon	TT	7.00 + .75 / Foot	+ termination
High Temp Glass	HH	7.00 + .75 / Foot	+ termination
Kapton	KK	8.00 + .95 / Foot	+ termination
Glass w/SS Braid	SB	8.00 + .95 / Foot	+ termination

Wire and Tube Thermocouples

Cement On Thermocouple



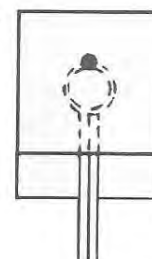
Model 1



Model 2



Model 3



Model 4

Shown actual size

These versatile, low cost thermocouples can be used for a wide variety of surface temperature measurements including environmental testing, temperature surveys of electrical components, oven wall temperatures, etc.

Model 1 Foil Thermocouples

Designed for easy installation with conventional thermal or chemical adhesives such as phenolic, epoxies, acrylics and pressure sensitive adhesives. They feature rugged fiberglass insulated lead wires. Select adhesive to suit maximum expected operation temperature. Solvent release adhesives are not recommended. Epoxy adhesives, especially those suited for use at 500°F, are generally most satisfactory. Color coded insulated leads are supplied. 36" leads are standard.

Model 2 Foil Thermocouples

Intended primarily for application with ceramic cements. The thin foil thermocouple can be easily brushed into a thin layer of cement, following application and drying of a thin insulating layer, to produce an ungrounded junction. Care must be taken in the choice of cement to avoid incompatible materials. For instance, cements containing phosphoric acid are not recommended for use with thermocouples having copper. Installation can be made directly to non-conductive materials with any variety of cements. Grounded junctions may be made on conductive materials if desired. 6" leads are standard.

Model 3 Stikon Thermocouples

Ready to directly cement in place. They are embedded in a paper thin laminate for surface applications by adhesive bonding. Low thermal inertia results in fast response for an ungrounded thermocouple. Good for temperatures from -320°F up to 700°F. These may be clamped or taped in place as well as cemented. Color coded leads are supplied. 36" fiberglass leads are standard.

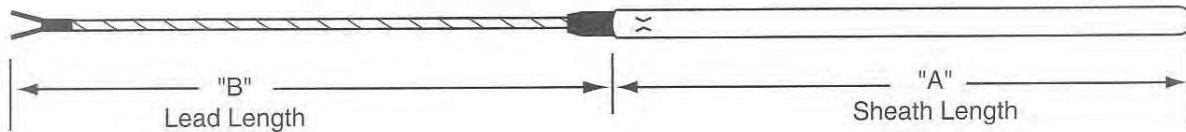
Model 4 Self-Adhesive Stikon Thermocouples

Same characteristics as Model 3 except with pressure sensitive adhesive. 36" teflon leads are standard.

Part No.	Calibration	Foil (Wire) Thickness	Lead Length	Price
1CO-CA	Chromel-Alumel (K)	0.0005"	36"	\$30.00
1CO-CX	Chromel-Constantan (E)	0.0005"	36"	\$30.00
1CO-CP	Copper-Constantan (T)	0.0005"	36"	\$30.00
2CO-CA	Chromel-Alumel (K)	0.0005"	6"	\$22.00
2CO-CX	Chromel-Constantan (E)	0.0005"	6"	\$22.00
2CO-CP	Copper-Constantan (T)	0.0005"	6"	\$22.00
3CO-IC	Iron-Constantan (J)	0.010"	36"	\$17.00
3CO-CA	Chromel-Alumel (K)	0.010"	36"	\$17.00
3CO-CX	Chromel-Constantan (E)	0.010"	36"	\$17.00
3CO-CP	Copper-Constantan (T)	0.010"	36"	\$17.00
4CO-IC	Iron-Constantan (J)	0.010"	36"	\$12.00
4CO-CA	Chromel-Alumel (K)	0.010"	36"	\$12.00
4CO-CX	Chromel-Constantan (E)	0.010"	36"	\$12.00
4CO-CP	Copper-Constantan (T)	0.010"	36"	\$12.00

Wire and Tube Thermocouples

Low Temp Thermocouple



LT- - - - - - -

"B" Lead Length

Specify in inches

Insulation*

Glass **GG**
 PFA Teflon **TT**
 Kapton **KK**
 Glass w/SS Braid **SB**

*For insulation descriptions and special insulations see pg. 2.

Sheath O.D. (in)*

.125" **18**
 .188" **316**
 .250" **14**

*Consult sales for other diameters

Calibration*

Iron Constantan **J**
 Chromel Alumel **K**
 Chromel Constantan **E**
 Copper Constantan **T**

*For additional calibrations call sales

Termination*

MCL ... Mini Male \$5.50
MFL ... Mini Female \$5.50
SCL ... Standard Male \$5.50
SFL ... Standard Female \$6.00
SPL ... Spade Lugs \$3.50
STR ... 3/4" Stripped leads N/C

*Special connectors available.
 Call sales.

"A" Sheath Length

Specify in inches

Junction

G Grounded
U Ungrounded
H Dual Grounded
W Dual Ungrounded

- 24 Gauge solid wire is standard. Stranded wire, overbraids and other wire gauges available.
- Sheath is 300 series stainless steel.
- Maximum temperature is 500°F. For higher temperatures use MI style T/C.

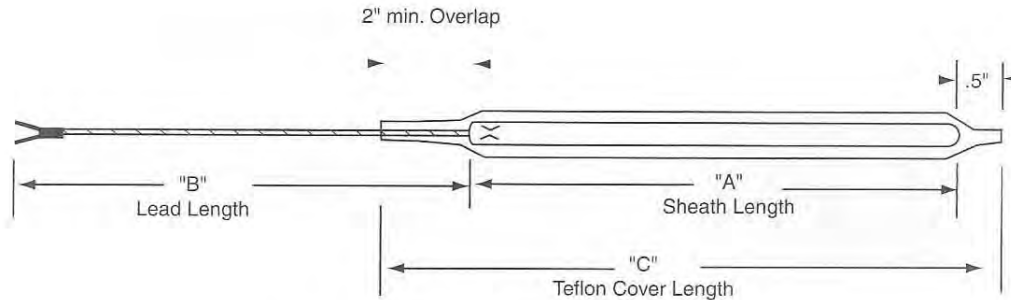
Discount Schedule

1 - 9 units	Net
10 - 24 units	10%
25 and up	15%

Base Price (Includes up to 12" sheath) For dual element add \$10		Sheath Diameter		
		.125	.188	.250
Junction Adder	G,H	N/C	N/C	N/C
	U	\$2.00	\$2.00	\$2.00
	W	\$6.00	\$4.00	\$4.00
Add'l Sheath Adder (per inch)		.40	.50	.50
Lead Adder per foot (x2 for dual)		GG	TT	KK,SB
		.50	.75	.95
Termination (x2 for dual)		Add from table above		

Wire and Tube Thermocouples

Teflon Covered Thermocouple



TP - - - - - -

"B" Lead Length

Specify in inches

Calibration*

J Iron Constantan
 K Chromel Alumel
 T Copper Constantan
 *For additional calibrations call sales

Sheath O.D. (in)

18125 (.155" finished O.D.)
 316188 (.240" finished O.D.)

Termination*

MCL ... Mini Male \$5.50
 MFL ... Mini Female \$5.50
 SCL ... Standard Male \$5.50
 SFL ... Standard Female \$6.00
 SPL ... Spade Lugs \$3.50
 STR ... 3/4" Stripped leads N/C

*Special connectors available.
 Call sales.

"C" Teflon Cover Length

Specify in inches

"A" Sheath Length

Specify in inches

- Max. operating temp. 200°C / 392°F
- 24 gauge Teflon wrap and fused leads standard
- Heavy wall teflon cover ensures liquid and vapor tight for a wide variety of immersion applications
- Minimum overlap from sheath onto lead is 2"

Discount Schedule

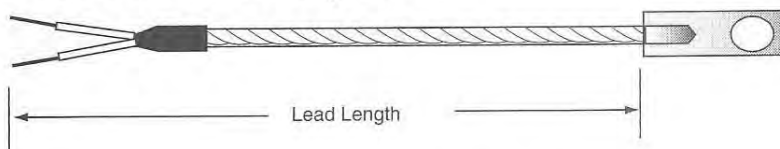
1 - 9 units	Net
10 - 24 units	10%
25 and up	20%

*Base Price	Sheath Diameter	
	.125	.188
Up to 12" sheath	\$23.50	\$25.50
Up to 24" sheath	\$33.50	\$35.50
Up to 36" sheath	\$43.50	\$45.50
Add'l Sheath (per inch)	.40	.50
Lead Adder (per foot)	.75	.75
Teflon Adder (per inch)	.60	.85
Termination	Add from table above	
*Base price does not include teflon cover or leads.		

Wire and Tube Thermocouples

Bolt-On Thermocouple

- Rugged design easily mounts on a variety of surfaces
- Made from 20 AWG fiberglass rated to 900°F or teflon wire rated to 500°F
- For #6, #8, #10 and 1/4" screw sizes



BT - - - - -

Calibration

Iron Constantan **J**
 Chromel Alumel **K**
 Copper Constantan **T**

Screw Size

#6 Screw **6**
 #8 Screw **8**
 #10 Screw **10**
 1/4" Screw **14**

Lead Insulation

Glass **GG**
 PFA Teflon **TT**

Termination

MCL .. Mini Male \$5.50
MFL ... Mini Female \$5.50
SCL ... Standard Male \$5.50
SFL ... Standard Female \$6.00
SPL ... Spade Lugs \$3.50
STR ... Stripped Leads N/C

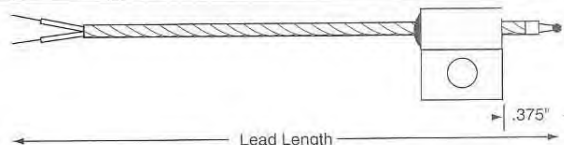
Lead Length

specify in inches
 (standard lengths are 12",
 24", 36" and 60")

Price is \$8.00 basic + .50/ft for additional leads. Add in for termination from table above.

Bolt-On Air Probe

- Made from 24 AWG fiberglass rated to 900°F or teflon wire rated to 500°F
- Aluminum flange ideal for air measurement



AP - - - - -

Calibration

Iron Constantan **J**
 Chromel Alumel **K**
 Copper Constantan **T**

Screw Size

#6 Screw **6**
 #8 Screw **8**
 #10 Screw **10**
 1/4" Screw **14**

Lead Insulation

Glass **GG**
 PFA Teflon **TT**
 SS Braid **SB**

Termination

MCL .. Mini Male \$5.50
MFL ... Mini Female \$5.50
SCL ... Standard Male \$5.50
SFL ... Standard Female \$6.00
SPL ... Spade Lugs \$3.50
STR ... Stripped Leads N/C

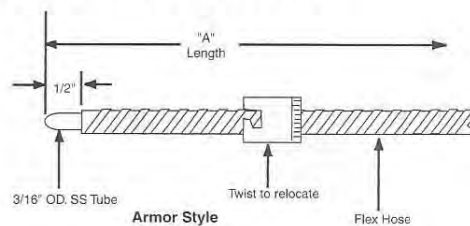
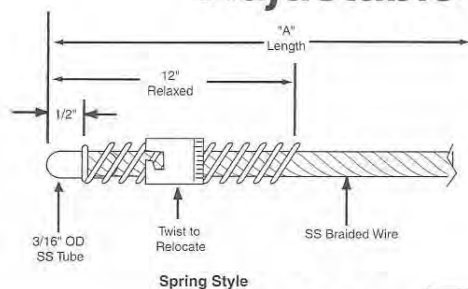
Lead Length

specify in inches
 (standard lengths are 12",
 24", 36" and 60")

Price is \$18.00 basic + .50/ft for fiberglass leads, .75/ft. for teflon leads or .95/ft. for SS braided leads. Add termination from table above.

Wire and Tube Thermocouples

Adjustable Bayonet Thermocouple



AB - - -

Style

12" Spring Style **S**
Flex Armor Style **A**

"A" Length
Specify in inches

Termination

Stripped Leads **STR**
Spade Lugs **SPL**
Spade Lugs with BX Connector **BXC**
Std. Male Connector **SCL**

PRICING

(Includes up to 48" of "A" length)

Spring Style Base Price		\$17.30	
Armor Style Base Price		\$20.50	
Add'l "A" Length	Spring Style	\$.16/inch	
	Armor Style	\$.20/inch	
STR	SPL	BXC	SCL
N/C	\$3.50	\$4.80	\$4.00

Both fixed and adjustable styles are:

- Type J Thermocouple
- Grounded Junction
- 3/16" dia. Stainless Steel Sheath
- Maximum Oper. Temp. 650°F

Fixed Bayonet Thermocouple

FB - - - -

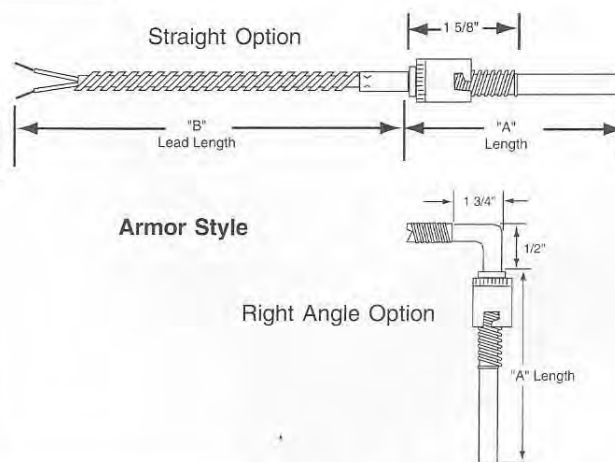
A Straight
B 90° Bend

"A" Dimension
specify in inches

Termination

SCL Std. Male (400F)
SFL Std. Female (400F)
SPL Spade Lugs
STR 3/4" Stripped Leads

"B" Lead Length
specify in inches

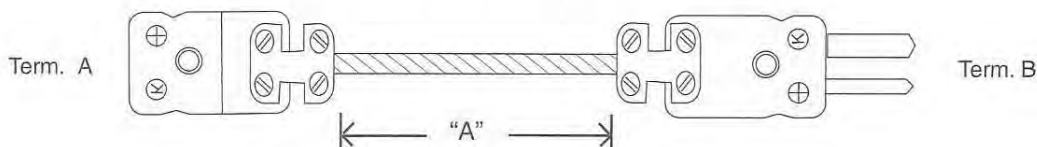


PRICING

Base Price		Straight	\$23.20
Includes up to 12" A length and 48" lead length		Right Angle	\$25.20
Add'l Lead (per inch)		.20	
STR stripped leads	SCL std. male conn.	SFL std. female conn.	SPL spade lugs
N/C	\$4.00	\$4.50	\$3.50

Wire and Tube Thermocouples

Extension Cables



EX- **-** **-**

Insulation*

Glass	GG
PFA Teflon	TT
PVC	PP
High Temp Glass	HH
Kapton	KK
PVC Spring Cord	RS
Glass w/Stainless Braid	SB
Glass w/SS Hose	AR

*For insulation descriptions and special insulations, see pg 2.

Calibration*

Iron Constantan	J
Chromel Alumel	K
Chromel Constantan	E
Copper Constantan	T
Uncompensated	U

*For additional calibrations call sales

Termination A

MCL Mini Male (400F)	\$5.50
MCH Mini Hi-Temp Male (800F)	\$7.00
MFL Mini Female (400F)	\$5.50
MFH Mini Hi-Temp Female (800F)	\$7.00
SCL Standard Male (400F)	\$5.50
SCH Stand. Hi-temp Male (800F)	\$7.00
SFL Standard Female (400F)	\$6.00
SFH Stand. Fem Hi-Temp (800F)	\$10
SPL Spade Lugs	\$3.50
STR 3/4" Stripped Leads	N/C

Wire Gage

20	30	20S *
24	36	24S *

*Stranded Wire uses **TT** , **GG** or **PP** insulation only.

Termination B

MCL Mini Male (400F)	\$5.50
MCH Mini Hi-Temp Male (800F)	\$7.00
MFL Mini Female (400F)	\$5.50
MFH Mini Hi-Temp Female (800F)	\$7.00
SCL Standard Male (400F)	\$5.50
SCH Stand. Hi-Temp Male (800F)	\$7.00
SFL Standard Female (400F)	\$6.00
SFH Stand. Fem Hi-Temp (800F)	\$10
SPL Spade Lugs	\$3.50
STR 3/4" Stripped Leads	N/C

Length "A"*

Specify in inches

*RS Cords avail. in 12" (5 ft. expanded), 24" (10 ft. expanded) and 36" (15 ft. expanded) lengths.

Example: EX-GG-J-MCL-48-MFL-24 = \$21.50

Discount Schedule

1 - 9 units	Net
10 - 24 units	10%
25 and up	20%

Insulation

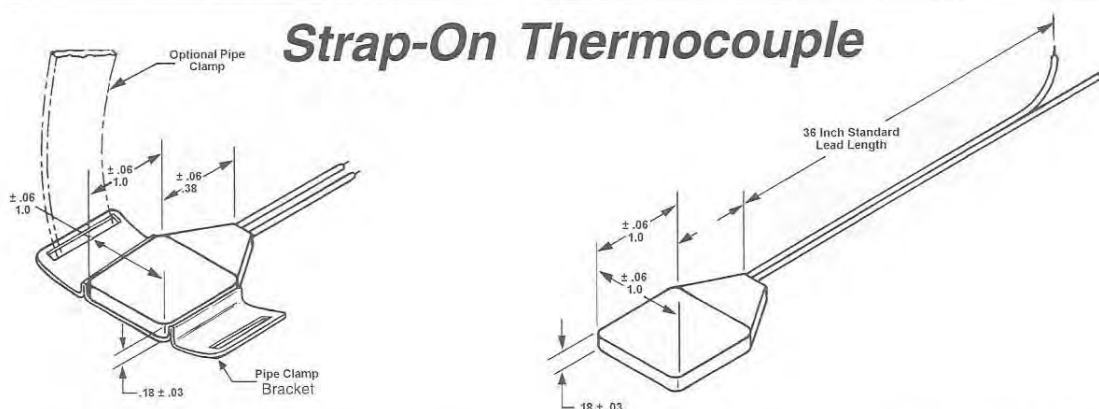
Prices (Includes first foot)

Glass	GG	\$9.00 + .50/ft. + terminations
PFA Teflon	TT	\$9.00 + .75/ft. + terminations
PVC	PP	\$9.00 + .50/ft. + terminations
High Temp Glass	HH	\$9.00 + .75/ft. + terminations
Kapton	KK	\$10.00 + .95/ft. + terminations
PVC spring cord	RS	\$12.00 + 1.00/ft + terminations
Stainless Braid	SB	\$10.00 + .95/ft. + terminations
*SS Hose	AR	\$10.00 + 1.50/ft. + terminations

*SS hose only available with standard size connectors

Wire and Tube Thermocouples

Strap-On Thermocouple



These sensors are designed for very easy installation. They have a useful temperature range between -73°C to +260°C (-100°F to +500°F) continuous and -157°C to +316°C (-250°F to +600°F) for short periods. Good for temporary or permanent measurements of fluid lines for energy management systems, process plants and refineries, or utilities applications. Mount them by cementing or taping them to the surface, or order with pipe clamp bracket to facilitate installation with built-in stop to prevent overtightening.

ST - - - - -

Mounting Options

00 None
CL Clamp Bracket

Calibration

J Iron/Constantan
K Chromel/Alumel
T Copper/Constantan

Junction

G Grounded
U Ungrounded

"B" Lead Length
specify in inches

Lead Style

GG Glass
TT Teflon
TTSB Teflon w/SS braid

Assemblies are rated to 500°F (260°C) max. temperature. It is recommended to use SS braid for better strain relief on applications where leads are subject to stress or movement.

Discount Schedule

1 - 9 units	Net
10 - 24 units	10%
25 and up	20%

PRICING

(Includes 36" leads)

Without Clamp Bracket		\$33.00
With Clamp Bracket		\$48.40
Additional Leads (per ft.)	GG	.50
	TT	.75
	TTSB	.95
Junction	Grounded	N/C
	Ungrounded	\$4.00
24 gauge leads are standard		

Wire and Tube Thermocouples

Monitored Wafer

MW- - - X -

Circuits

1 point	1
2 point	2
3 point	3
4 point	4
5 point	5

Calibration

Iron Constantan	J
Chromel Alumel	K

Wafer Diameter

4" wafer	4
5" wafer	5
6" wafer	6
8" wafer	8

Termination*

MCL	Mini Male (400F)	\$5.50
MCH	Mini Hi-Temp Male (800F)	\$7.00
MFL	Mini Female (400F)	\$5.50
MFH	Mini Hi-Temp Female (800F)	\$7.00
SPL	Spade Lugs	\$3.50
STR	3/4" Stripped leads	N/C

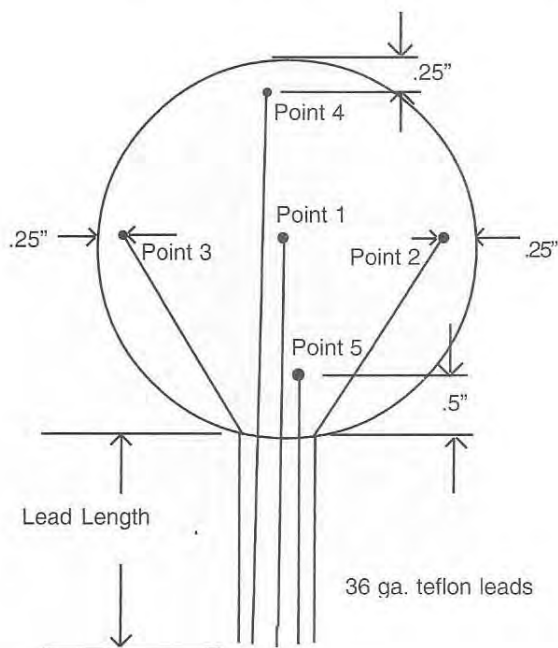
*Special connectors available. Call sales

Leadwire Length

Specify in inches
01 to 99 inches

- Continuous operating temperature 260°C
- Short term exposure 285°C
- Low mass, fast response thermocouple
- Special locations on request
- 36 gauge teflon leads are standard
- Customer supplied wafers can also be used (Consult sales for price)

Wafer Size	Base Price (includes 1st point)	Per Point	Leads per foot x # pts.
4"	\$65.00	\$15.00	.90
5"	\$75.00	\$15.00	.90
6"	\$90.00	\$15.00	.90
8"	\$140.00	\$15.00	.90
Termination: Add from table above x no. of points			



Standard Layout

Junctions are aligned vertically and horizontally from one another. Drawing shows points 1, 4 & 5 offset for illustration purposes only.

Wire and Tube Thermocouples

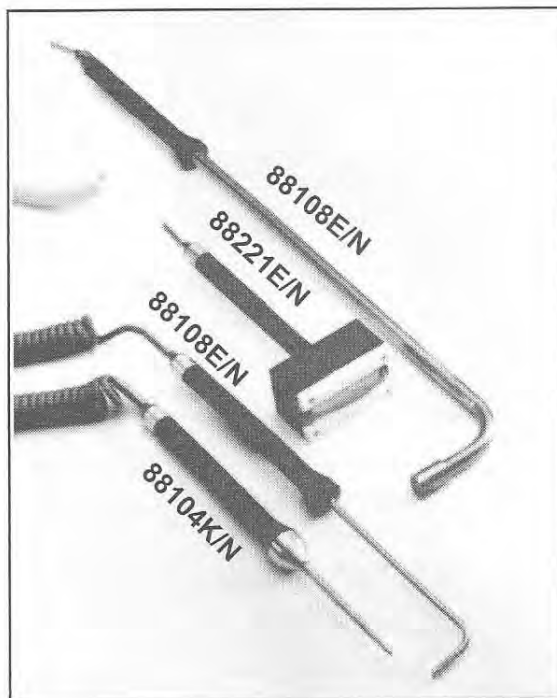
Handheld Temperature Probes

- Over 50 Styles to Choose From
- Available in K & E Calibrations
- For Temperatures to 1400°F/760°C
- Use On Stationary, Moving or Rotating Surfaces
- Replaceable Element Design in many Probes

The 88000 Series are fast, highly accurate surface/insertion temperature measurement probes with specialized features to fit any application possible. Available in K (Chromel-Alumel) and E (Chromel-Constantan) calibrations and capable of withstanding surface temperatures up to 1400°F/760°C (handle temperature should not exceed 325°F/162°C). All 88000 probes come with retractable sensor cable (which expands to 5 ft. and is rated to 220°F/104°C), an SMP subminiature male connector, and a TAS-3 mini-to-standard transition adapter.

Many models of the 88000 Series are available with unique heads to accommodate various applications. Swivel head probes (designated with the 98000 Series part number, for easy ordering) allow for 180° rotation, and are used where different head orientations and alignments are necessary.

Many 88000 surface/insertion probes feature a unique replaceable element design, with one additional element supplied free at the time of purchase.

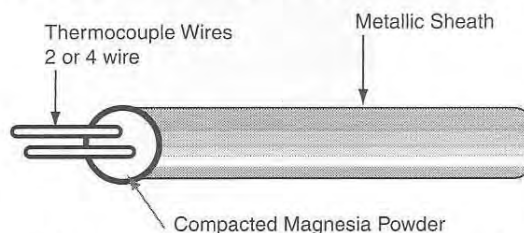


Model No.	Price	Description	Max. Surface Temp.
88001(*)/N	\$110	Standard probe for measuring stationary surface (molds, plates, walls, glassware)	900°F/482°C
88003(*)/N	\$120	For measurement of surfaces such as stone, iron and steel	900°F/482°C
88006(*)/N	\$115	Miniature, fast response surface measurement probe ideal for small electronics	900°F/482°C
88007(*)/N	\$110	Miniature, fast response surface measurement probe ideal for small electronics	480°F/249°C
88010(*)/N	\$175	12" version of 88006	1400°F/760°C
88101(*)/N	\$115	Stationary surface probe with right angle head for hard to reach surfaces	900°F/482°C
88104(*)/N	\$115	Micro-sensor probe with right angle and lateral spring; ideal for contact surface	750°F/399°C
88108(*)/N	\$205	Right-angle, long, 12" reach with fast response design	1400°F/760°C
88221(*)/N	\$120	Probe for measuring moving or stationary flat surfaces (i.e. metal and plastic)	480°F/249°C
98221(*)/N	\$140	Swivel head version of 88221	480°F/249°C
88301(*)/N	\$80	Tapered, SS sheath suitable for measuring internal temperatures of semi-solid & liquid substances	900°F/482°C

*Specify thermocouple type K or E

Mineral Insulated Thermocouples

About Mineral Insulated Thermocouples



Mineral Insulated (MI) thermocouples consist of matched thermocouple wires surrounded by insulating material (typically magnesia oxide) compacted by drawing or swaging the sheath. The result is a rugged and reliable construction suitable for a wide variety of applications including furnaces, food and beverage, heat treating, medical, nuclear reactors, refineries and oil processing, vacuum furnaces, laboratory and research, etc. Advantages of mineral insulated thermocouples are:

- Useable under severe conditions
- Withstands temperatures up to metal melting point
- Withstands corrosive conditions limited only by the choice of sheath material
- Can be formed to a minimum radius of twice the sheath diameter without loss of integrity
- Can be welded, brazed or soldered to other metals when proper techniques are used
- Available in a wide variety of diameters from .010" to .500"
- Available in standard and special limits of error
- Can withstand external pressures up to 50,000 psi
- Dual element cable is available

Therm-X Standard Sheath Materials

Sheath Material**	Therm-X Code	Max. Temp. In Air	Melting Point
304SS	A	1650°F (900°C)	2550°F (1400°C)
310SS	D	2000°F (1090°C)	2550°F (1400°C)
316SS	F	1650°F (900°C)	2500°F (1370°C)
Inconel® 600*	Q	2000°F (1090°C)	2470°F (1350°C)

*Not recommended for use in sulfur atmospheres.
 **Other sheath materials are available. Consult sales.

**Calibration	Symbol
Chromel®-Alumel®	K
Iron-Constantan	J
Copper-Constantan	T
Chromel-Constantan	E

**Other calibrations available. Consult sales.

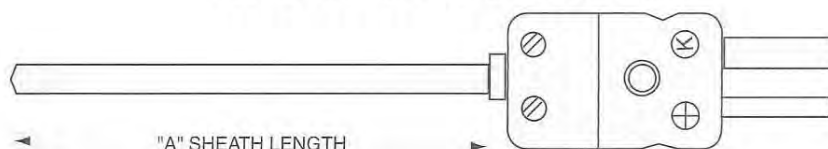
M.I. Cable Specifications

Sheath Diameter:	± .002" or ± 1% of nominal diameter, whichever is greater.
Wall Thickness:	± .0015" or ± 15% of nominal wall thickness, whichever is greater, 10% of diameter as a minimum.
Insulation Material:	98% (min.) MGO Magnesium Oxide
Insulation Temp.:	Insulation is useable over a temperature range of -450°F to 3000°F without change of phase or chemical reaction with adjacent metals. Melting temperature of insulation is 4800°F. Limiting temperature is associated with sheath material used.

Chromel® and Alumel® are registered trademarks of Hoskins Manufacturing Company.
 Inconel® is a registered trademark of the Inco family of companies.

Mineral Insulated Thermocouples

M.I. With Connector



C - - - - - -

Calibration*

Iron Constantan **J**
 Chromel Alumel **K**
 Chromel Constantan **E**
 Copper Constantan **T**

*For additional calibrations call sales

Sheath Materials

A 304SS **Q** ... Inconel 600
F 316SS **D** ... 310SS

See pg. 19 for sheath material descriptions

Sheath O.D. (in)

020020" **18**125"
040040" **316**188"
116062" **14**250"
516313"

Consult sales for other diameters

Connector

MCL Mini Male (400F) \$N/C
MCH Mini Hi-Temp Male (800F) \$7.00
MFL Mini Female (400F) \$N/C
MFH Mini Hi-Temp Female (800F) \$8.00
SCL Standard Male (400F) \$N/C
SCH Stand. Hi-Temp Male (800F) \$7.00
SFL Standard Female (400F) \$N/C
SFH Stand. Hi-Temp Female (800F) \$8.00
SCD Std. Dual Male (300F) \$22.00
MCD Mini Dual Male (400F) \$10.00

Standard connectors N/A on .020 sheath O.D.

Mini connectors N/A on .188 and larger sheath O.D.

Dual mini connector available on .062" and .125" dia. only.

"A" Sheath Length

Specify in inches

Junction

	Grounded	Ungrounded	Exposed
Single	G	U	E
Dual	H	W	D

Dual ungrounded & exposed junctions are isolated

P R I C I N G

Basic (includes 1st 12" of sheath) For dual element add \$15 to basic		.020	.040	.062	.125	.188	.250	.313
		\$40	\$32	\$26	\$26	\$27	\$30	\$38
Add'l Sheath (per inch) Single Element	304SS	.20	.15	.15	.15	.25	.45	.75
	Inc. 600	.20	.20	.20	.20	.40	.55	1.05
Add'l Sheath Dual Element	304SS	N/A	N/A	.20	.30	.40	.50	1.20
	Inc. 600	N/A	N/A	.25	.35	.60	.80	1.30
Junction Adder	G,E,H	N/C	N/C	N/C	N/C	N/C	N/C	N/C
	U	\$8	\$8	\$2	\$2	\$2	\$2	\$2
	W,D	N/A	N/A	\$10	\$6	\$4	\$4	\$4
Connector		Add from table above						

These durable thermocouples feature plug or jack termination and can be quickly connected or disconnected. The connectors are color coded per ANSI specification so calibration can be easily determined.

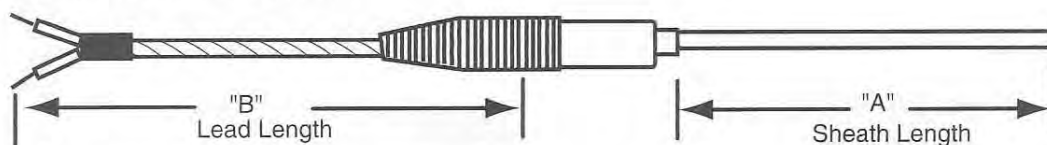
Discount Schedule

1 - 9 units	Net
10 - 24 units	10%
25 and up	20%

Mineral Insulated Thermocouples

Transition Style

Stripped leads termination shown



TR- [] - [] - [] - [] - [] - [] - []

"B" Lead Length

Specify in inches

Insulation*

Glass **GG**
 PFA Teflon **TT**
 High Temp Glass **HH**
 Kapton **KK**
 Glass w/SS Braid **SB**

*For insulation descriptions and special insulations, see pg. 2.

Calibration*

Iron Constantan **J**
 Chromel Alumel **K**
 Chromel Constantan **E**
 Copper Constantan **T**

*For additional calibrations call sales

Sheath O.D. (in)

020020" **18**125"
 040040" **316**188"
 116062" **14**250"
 516313"

Consult sales for other diameters

Sheath Materials*

A 304SS **Q** Inconel 600
F 316SS **D** 310SS

*For sheath material descriptions see pg. 21.

Termination*

MCL ... Mini Male (400F) \$4.00
MCH ... Mini Hi-Temp Male (800F) \$7.00
MFL ... Mini Female (400F) \$4.00
MFH ... Mini Hi-Temp Female (800F) \$8.00
SCL ... Standard Male (400F) \$4.00
SCH ... Stand. Hi-Temp Male (800F) \$7.00
SFL ... Standard Female (400F) \$4.50
SFH ... Stand. Fem Hi-Temp (800F) \$8.00
SPL ... Spade Lugs \$3.50
STR ... 3/4" Stripped Leads N/C

*Special connectors available. Call sales

"A" Sheath Length

Specify in inches

Junction*

	Grounded	Ungrounded	Exposed
Single	G	U	E
Dual	H	W	D

*Dual ungrounded & exposed junctions are isolated

P R I C I N G

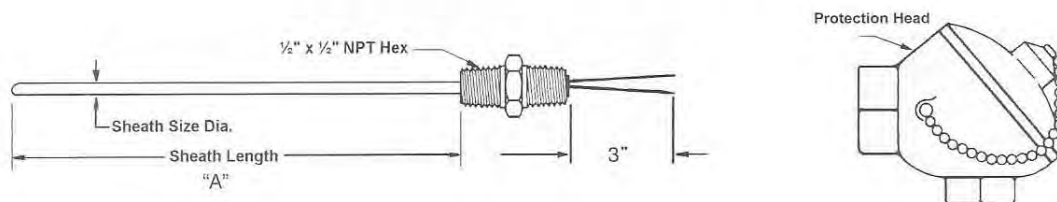
*Basic (includes 1st 12" of sheath & 36" GG or TT leads)		.020	.040	.062	.125	.188	.250	.313
		\$45	\$32	\$26	\$26	\$28	\$31	\$38
Add'l Sheath (per inch) Single Element	304SS	.20	.15	.15	.15	.25	.45	.75
	Inc. 600	.25	.20	.20	.20	.40	.55	1.05
Add'l Sheath Dual Element	304SS	N/A	N/A	.20	.30	.40	.50	1.20
	Inc. 600	N/A	N/A	.25	.35	.60	.80	1.30
Junction Adder	G,E,H	N/C	N/C	N/C	N/C	N/C	N/C	N/C
	U	\$8	\$8	\$2	\$2	\$2	\$2	\$2
	W,D	N/A	\$10	\$10	\$6	\$4	\$4	\$4
Additional Leads (per foot) x2 for dual				GG	TT	HH	SB	KK
				.50	.50	.75	.95	.95
Termination				Add from table above				

Discount Schedule

1 - 9 units	Net
10 - 24 units	10%
25 and up	20%

Mineral Insulated Thermocouples

Industrial Process



IP- - - -

Calibration*

Iron Constantan **J**
 Chromel Alumel **K**
 Chromel Constantan **E**
 Copper Constantan **T**

*For additional calibrations call sales

Sheath Materials*

A 304SS **Q** .. Inconel 600
F 316SS **D** ... 310SS

*Consult sales for special sheath materials

Sheath O.D. (in)*

18125 **14**250
316188 **516**313

*Consult sales for other diameters

Junction*

	Grounded	Ungrounded	Exposed
Single	G	U	E
Dual	H	W	D

*Dual ungrounded & exposed junctions are isolated

Transmitter Option

Omit if none needed. See ordering information on next page.

Termination

ST Stripped Leads, 3" bare leads are standard. Specify lead length in inches and "GG" or "TT" after code for glass or teflon leads.

CA Cast Aluminum Head

CI Cast Iron Head

NY Nylon Head, Black

PW ... Polypropylene Head, White

EX Explosion Proof Head

See page 75 for head descriptions. Consult sales for additional options.

Fittings

See Table "B" on next page for ordering code. 1/2" x 1/2" NPT SS fitting (code "A") is standard.

Sheath Length "A"

Specify in inches

- Standard probe assemblies use 1/2"x1/2" NPT SS fitting brazed. Welded construction is available use fitting code "C".
- Spring loaded assembly is not sealed at process fitting.

See next page for pricing and discount schedule

Ordering example; **IP-KA-14U-12A-ST48GG** = Type "K" 304 stainless steel. 1/4" od, ungrounded junction. 12" A length with 1/2 x1/2" brazed fitting and 48" of fiberglass leads.

Mineral Insulated Thermocouples

Industrial Process (Cont'd)

Transmitter option; 1. I = Isolated or N = Non-isolated 2. & 3. **Temp. Range** (see table A below) 4. °C or °F

Example:

I	0	200	C
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 = Isolated 0-200 degrees C = 4-20mA

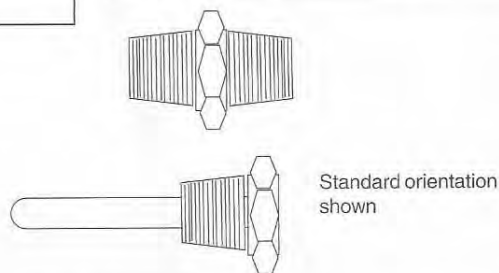
	Non-isolated	Isolated
T/C Input:	J, K, T, N	AE, B, E, J, K, N, R, S, T, U
Output:	4-20mA	4-20mA or 20-4mA
Ambient Temp.:	-40 to 185°F / -40 to 85°C	-40 to 185°F / -40 to 85°C
Power Supply:	6.5 to 32 VDC	6.5 to 36 VDC
Polarity Protection	Yes	Yes
Accuracy:	± 0.1% of span	± 0.1% of span
Calib. Accuracy:	± 0.1% of span	max. of 0.2°C or 0.1% of span
Long Term Stability	± 0.1% of span/year	± 0.1% of span/year
Connection:	up to 12 Awg. wire	up to 16 Awg. wire

Table A Standard Ranges		
J	K	T
0 - 200°C	0 - 250°C	-50 - 100°C
0 - 500°C	0 - 500°C	0 - 200°C
0 - 760°C	0 - 1000°C	0 - 400°C
0 - 350°F	0 - 500°F	-60 - 200°F
0 - 1000°F	0 - 1000°F	0 - 400°F
0 - 1400°F	0 - 2000°F	0 - 760°F

Consult factory for other ranges.

Table B FITTINGS			
Thread	Material	Sheath OD	Order Code
1/2"x1/2"	316SS	.125" to .313"	A
1/2"x1/2"	316SS	.125" to .250"	*B
1/2"x1/2"	316SS	.125" to .313"	**C
1/2" Single	316SS	.125" to .313"	D
1/4"x1/4"	316SS	.188" to .250"	E
1/4" Single	304SS	.062" to .250"	F
1/8" Single	304SS	.062" to .250"	G

* Spring Loaded Assembly
 ** 316SS welded fitting



Standard orientation for single threaded fittings is threads facing process. Add "X" after fitting order code for backwards fitting (threads facing lead end).

Industrial process thermocouples feature connection heads which provide superior dust and moisture protection. A variety of head styles are available depending upon your application. Optional head-mounted transmitters are also available.

Discount Schedule	
1 - 9 units	Net
10 - 24 units	10%
25 and up	20%

P R I C I N G						
*Basic (includes 1st 12" of sheath) *For dual element add \$15 to basic		.062	.125	.188	.250	.313
		N/A	\$26	\$28	\$31	\$38
Add'l Sheath per inch Single Element	304SS	N/A	.15	.25	.45	.75
	Inc. 600	N/A	.20	.40	.55	1.05
Add'l Sheath Dual Element	304SS	N/A	.30	.40	.50	1.20
	Inc. 600	N/A	.35	.60	.80	1.30
Junction Adder	G,E,H	N/A	N/C	N/C	N/C	N/C
	U	N/A	\$2	\$2	\$2	\$2
	W,D	N/A	\$6	\$4	\$4	\$4
Protection Head Adder		CA	CI	NY	PW	EX
		\$26	\$26	\$22	\$25	\$50
Fitting Adder		A	B	C,F,G	D	E
		N/C	\$10	\$5	\$4	\$9
Transmitter option add \$99 for non-isolated or \$189 for isolated.						