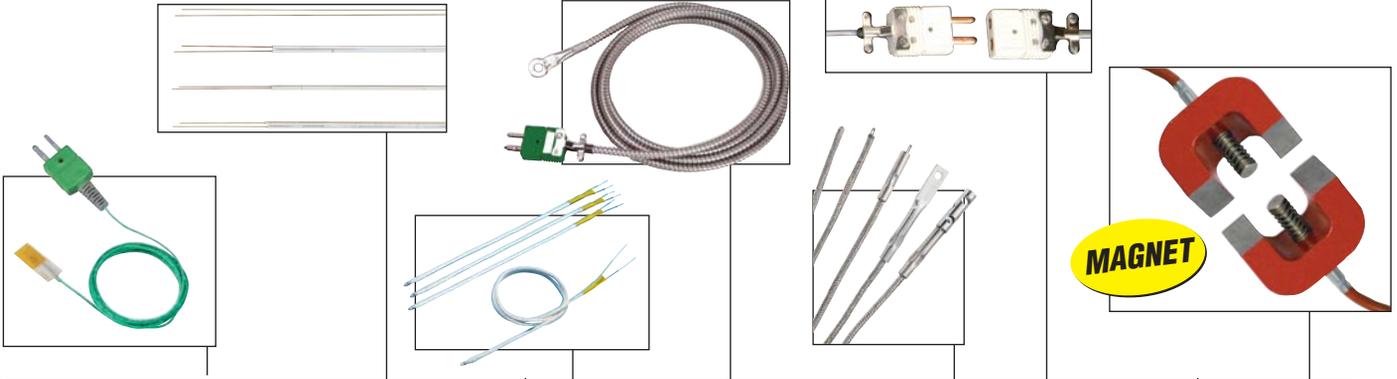


# Thermocouple



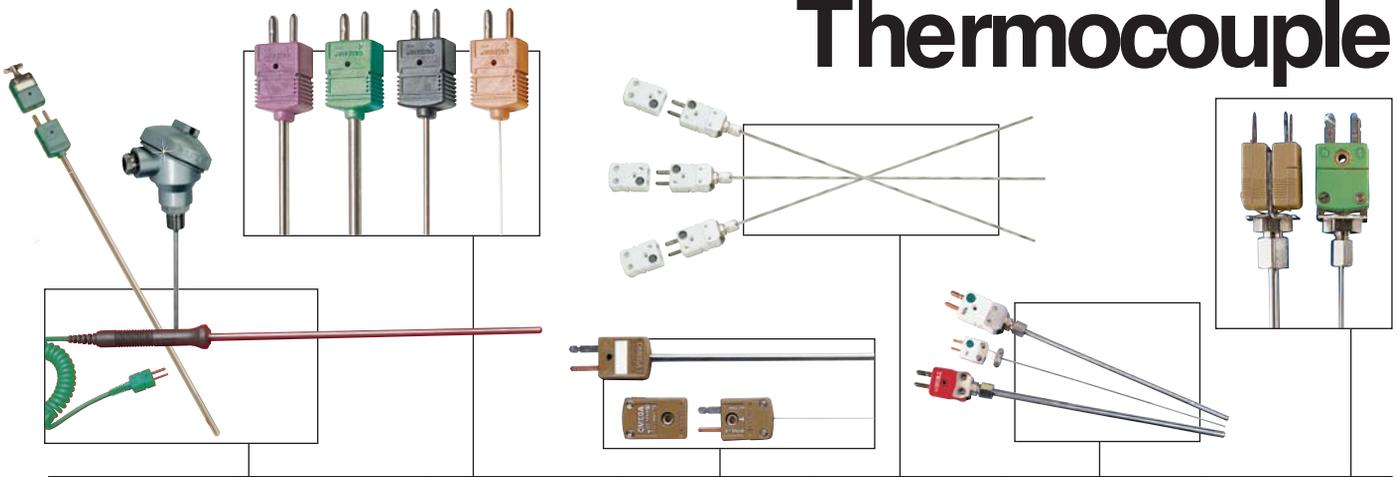
Series No.	Unsheathed TC	5TC/5SRTC	5SC / 5LSC	HSTC	SA2	SA1 / SA1-SC
Price	£11.50 pkg of 5	£22 pkg of 5	£39 pkg of 5	£16.75	£20	£40 pkg of 5
Page No.	14	16	18	19	20	21
Configuration	Fine gauge bare wire uninsulated exposed junction	Insulated exposed junction	Insulated exposed junction with wire caddy mini connector	Hermetically sealed tip	Self-adhesive silicone patch	Insulated with self-adhesive pad
Available Calibration	J, K, T, E, R, S, B, G, C, D, N	J, K, T, E	J, K, T, E	J, K, T, E	J, K, T, E	J, K, T, E
Temperature Range (Configuration and application dependent)	To 2315°C	To 480°C	To 480°C connector to 220°C	To 250°C	To 200°C	-60 to 175°C
Insulation/Sheathing	None	PFA or glass braid KAPTON®	PFA or glass braid KAPTON®	PFA	Sensor patch: silicone. Leadwire: PFA	PFA
Size (Non-standard lengths readily available)	0.0127 to 0.813 mm dia 150 or 300 mm lengths standard	0.0127 to 0.813 mm dia 1 or 2 m lengths standard	0.0127 to 0.813 mm dia 1 or 2 m lengths standard	7/0.2 mm stranded, 1 or 2 m lengths standard	Flat, 15 x 50 mm or 35 x 12 mm. 7/0.2 mm stranded thermocouple wire. 1 and 2 m lengths Custom lengths available	Flat, 25 x 19 mm 1 m length Custom lengths available
Features	Fast response. Very small diameters. Pin-point measurements. Low heat transfer.	Moulded subminiature connector with integral strain relief (5SRTC only). class 1 wire. Fast response.	Moulded subminiature connector with integral strain relief. class 1 wire. Fast response.	Hermetically sealed thermocouple junction. Flexible, small and fast response.	Self adhesive silicone patch	Self-adhesive backing. Fast response. Low thermal inertia.
Applications	Biophysics, scientific instruments, cryogenics, gas chromatography, quickly changing temperatures. Unprotected, not suitable for liquid immersion and applications requiring protected probes.	Gas and surface measurements, applications requiring exposed thermocouple bead. PFA insulation resists chemical attack, glass insulation rated for high temperatures.	Gas and surface measurements, applications requiring exposed thermocouple and strain relief connector attachments. PFA insulation resists chemical attack, glass insulation rated for high temperatures.	Cleanrooms, laboratories, food services, chemical and petroleum. PFA insulation resists chemical attack.	Surface temperature. Flat or curved metal, glass, plastic or other smooth surface	Surface temperature measurement easily removed
Sold As	J, K, T, E, N sold in packs of 5. R, S, B, G, C, D calibrations sold individually. Contact Sales for special sizes and assemblies.	Packs of 5. Contact Sales for special sizes and assemblies.	Packs of 5. Contact Sales for special sizes and assemblies.	Individually.	Individually.	Packs of 5. Other lengths available.

# Selection Guide



Series No.	SA1XL	Bare, SH, DH, FS	XS-20 - K	WT	XSIB	TRP	TCMAG
Price	£54 pkg of 5	£4	£10.75	£15.50	£18	£43.50	£40.50
Page No.	22	<a href="http://omega.co.uk">omega.co.uk</a>	<a href="http://omega.co.uk">omega.co.uk</a>	25	<a href="http://omega.co.uk">omega.co.uk</a>	<a href="http://omega.co.uk">omega.co.uk</a>	52
Configuration	Insulated with self adhesive pad. Can also be used as a "Cement-On" Pad	Bare wire TC with ceramic bead insulation	Silica insulated exposed junction	Insulated with washer termination armoured cable option	Silica fibre insulated, Inconel overbraid	Temperature reference probe	Magnetic mount
Available Calibration	J, K, T, E	J, K, T, E, N	J, K, E, N	J, K, T, E	J, K, E, N	J, K, T, E, R, S, B, G, C, D	J, K, T, E
Temperature Range (Configuration and application dependent)	To 315°C	Various; depends on diameter of thermocouple	Insulation to 1038°F Thermocouple to rated limits	To 480°C	To 1038°C depending on alloys	Probe to 980°C	To 370°C
Insulation/ Sheathing	<b>Sensor tip:</b> Kapton®, fibre glass <b>Leadwire:</b> fibreglass (also available with SS overbraid)	Ceramic bead insulators	High temperature silica ceramic	Glass braid and PFA	High temperature silica fibre with Inconel 600 overbraid	304 Stainless steel sheath material	PVC, PFA, silicon or fibreglass
Size (Non-standard lengths readily available)	Flat, 9.5 x 25.4 mm 1 or 2 m lengths Custom lengths available.	0.5 to 3.25 mm dia 300 mm lengths with 75 mm leads standard	0.5, 0.8, 1.6 mm dia 300 mm lengths with 150 mm incremental add'l lengths	600 mm to 2 m lengths. 3.7 to 6.6 mm washer hole dia for M3.5, M4, M4.5, M6 screws	4.5 to 8 mm dia 1 to 3 m lengths	3.2 mm dia 150 mm probe 300 mm standard lead length	25 H x 40 W x 25 mm D
Features	"All-in-One" surface TC. Self adhesive or "Cement-On". Fast response. Low thermal inertia.	Choice of various ceramic insulators available with most sizes. Fast response.	Insulation rated to 1200°C continuous, 1425°C short term.	Washer termination attaches to surfaces with various size screws. Armoured cable option.	5 styles available: flexible, abrasion-resistant, high-temperature rating.	Made with Class 1 wire. Comes with mating connectors.	Magnetic, spring-mounted TC. Single or dual 9 kg pull magnet. Connector and cable clamp options
Applications	Flat or curved metal, glass, plastic or other smooth surfaces.	Inside thermowells. Some models for high temperatures. glued to surface.	High temperature. Can be used as the element in a head and well assembly.	Surface temperature measurement. Bolts to surface.	Ovens, furnaces profiling machinery.	Calibration accessory. Thermocouple to copper transition at probe tip typically used in ice point chamber	Surface temperatures of magnetic material
Sold As	Packs of 5 Other lengths available.	Individually. Contact Sales for special sizes.	Individually.	Individually. Stripped leads or OSTW type standard size connector. Custom lead lengths available.	Custom lengths.	Individually	Individually. Single or dual magnet probe. Custom lead lengths available.

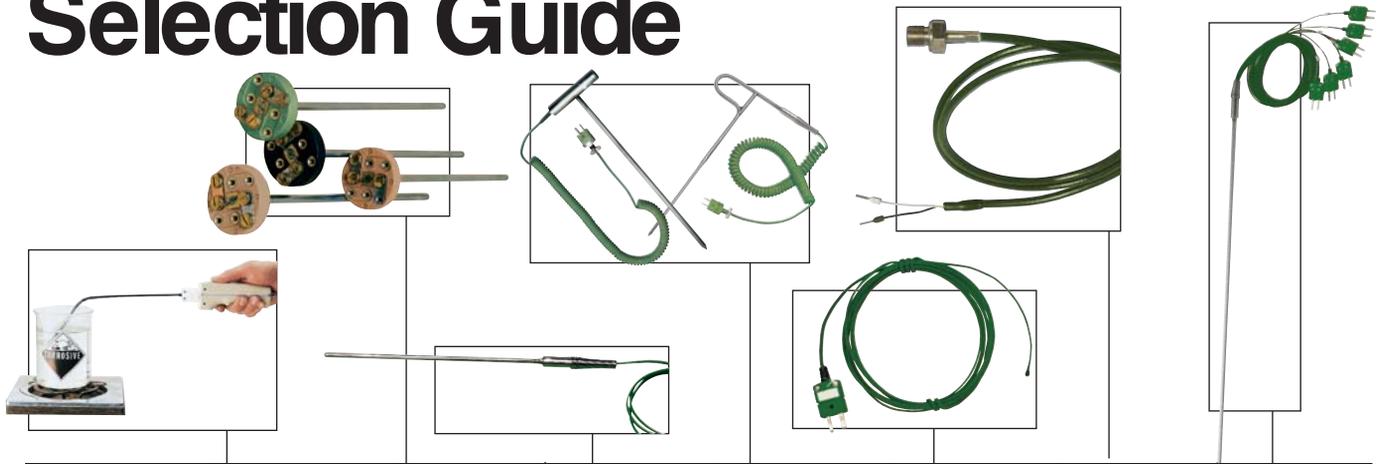
# Thermocouple



Series No.	Super OMEGA CLAD™ XL	STD Connector Probes	Mini Conn Probes	(Probe) -NHX, -SHX	Extreme, High-Temp	(Probe) Dual
Price	£17.50	£18	£16	£24.50	£83	£37.50
Page No.	26	31	30	34	32	<a href="http://omega.co.uk">omega.co.uk</a>
Configuration	Super OMEGA CLAD™ XL transition joint, quick connect and handle styles	Metal sheathed, quick disconnect probes with standard size connectors	Metal sheathed, quick disconnect probes with miniature sized connectors	Metal sheathed, quick disconnect, high temperature probes	Metal sheathed exotic high-temperature probes	Dual element with miniature or standard size connector
Available Calibration	K, N	J, K, T, E, N	J, K, T, E, N	J, K, T, E, N	R, S, B, G, C, D	J, K, T, E, N
Temperature Range (Configuration and application dependent)	To 1335°C	To 980°C	To 980°C	Depending on thermocouple type and diameter	To 2300°C in vacuum. To 2200°C in inert/reducing atmosphere. To 1540°C in oxidising atmosphere.	To 980°C
Insulation/Sheathing	MgO insulation with Nickel-chrome based Super OMEGA CLAD™ XL Sheathing	MgO insulation with 304 or 321 SS or Inconel™ 600 sheathing 310SS/316SS	MgO insulation with 304 or 321 SS or Inconel 600 sheathing 310SS/316SS	MgO insulation with 304 or 321 SS or Inconel 600 sheathing	Hafnia, magnesia or alumina insulation with tantalum, molybdenum, Pt rhodium alloy or Inconel 600 sheathing	MgO insulation with 304 or Inconel sheathing 310SS/316SS
Size (Non-standard lengths readily available)	0.25 to 9.5 mm dia 300 mm standard length or 150 mm	0.25 to 9.5 mm dia 50, 300, 450 and 600 mm lengths. Other lengths on request.	0.25 to 9.5 mm dia 50, 300, 450 and 600 mm lengths. Other lengths on request.	0.25 to 6.0 mm dia 150, 300, 450 and 600 mm lengths standard	1.5 to 6.0 mm dia. Various lengths	1.5 to 6.0 mm dia
Features	High temperature, low thermal drift, very stable.	Standard male connectors (mating females included)  Bendable sheaths/many optional features eg. grounded, ungrounded, exposed tip, SS or Inconel sheath, moulded or non-moulded and connectors, weld pads, PFA coating, low noise designs, high temperature, EMI suppression, low-cadmium environmentally friendly polymer	Mini male connectors (mating females included)	Includes SHX or NHX ceramic male connectors rated to 650°C. Mating female connector included. Standard and miniature sizes.	Very high temperature ratings. Choice of quick disconnect, transition junction, high temperature connector or stripped lead termination.	Standard and subminiature connectors.
Applications	Excellent oxidation, carburisation and chlorination resistance.	Immersion in liquid, gas or air, custom tips for soft solid penetration, fast response, surface and air measurement.		High temperature requiring quick connection and disconnection of probe, and where sheath and connectors may be subjected to high temperatures.	High temperature measurements in inert, oxidising, or reducing atmospheres.	Permits 2 temp signals from 1 point. General purpose and immersion. Probes bend to radius of no less than 3x sheath diameter.
Sold As	Individually. Custom lengths available   See page 26 to 29.	<b>Page Model Feature</b> Mini Plug, page 30 Standard Plug, page 31 Ceramic Plug, page 34		Individually. Custom lengths available. Supplied with mating female connector and cable clamp. Contact Sales for special requirements.	Individual probes. Lead wire, standard or mini connectors, heavy-duty or ceramic. Contact Sales for special requirements.	Individually

All Probe Pages Displaying the XL Logo are available in Super OMEGA CLAD™ XL Material

# Selection Guide



Series No.	(Probe) -PFA	TB-(* )	Transition Joint	TJFT72	TC-PVC-(* )	(* )-G1/4	PP3-36-(* )
Price	£31.50	£18	£18.75	£21.50	£10.75	£26.50	£190
Page No.	35	<a href="http://omega.co.uk">omega.co.uk</a>	36 to 43	<a href="http://omega.co.uk">omega.co.uk</a>	<a href="http://omega.co.uk">omega.co.uk</a>	48	44
Configuration	Metal sheathed PFA coated probes (probes can be ordered bent)	Metal sheathed probes with colour coded terminal block	Metal sheathed, metal transition junction probes	Special probe transition junction probes	Insulated, soft vinyl	Pipe plug probe	Profile probes
Available Calibration	Various	J, K, T, E, N	J, K, T, E, N	J, K, T, E	J, K, T, E	J, K, T	J, K, T, E
Temperature Range (Configuration and application dependent)	To 200°C	Probe to 980°C block to 220°C	To 980°C	Probe to 980°C	-10 to 80°C	To 480°C	Probe to 650°C
Insulation/ Sheathing	Magnesium oxide insulation with SS or Inconel™ 600 sheathing and PFA coating	Magnesium oxide insulation with SS or Inconel 600 sheathing 310SS/316SS	MgO insulation with 304 or 321 SS or Inconel 600 sheathing 310SS/316SS	MgO insulation with 304 or 321 SS or Inconel 600 sheathing 310SS/316SS	PVC with epoxy-coated tip	Mixed	MgO insulation with 316SS sheathing
Size (Non-standard lengths readily available)	As small as 1 mm OD 1.2 m max length	1.5 to 6.0 mm dia 300, 600, 900 mm lengths standard	0.25 to 9.5 mm dia 50, 300, 450 and 600 mm lengths. Other lengths on request	1.5 and 6.0 mm dia 150, 300, 450 and 600 mm lengths standard	3.2 mm tip dia. 3 m length	M8 x 1 M10 x 1 G1/8 G1/4 G1/2	3, 4.5 or 6 mm dia length 900 mm leads; custom sizes available
Features	Chemically inert. Electrically insulated. Abrasion resistant.	Integral terminal block provides quick wiring.	Flexible stripped wire or optional terminals (See STD and Mini connector probes). USB output (page 37)	Ungrounded, grounded or exposed junction.	Sealed junction tip, includes male write-on connector	SS fitting 2 m lead standard	3, 6, 10 sensing points on one probe custom number available
Applications	Battery electrolyte, plating baths, anodising baths, severe environments, caustic or corrosive chemical solutions.	Inside thermowells and/or quick hook-ups for direct immersion compression fitting mounting	Immersion in liquid, gas or air, custom tips for soft solid penetration, fast response, surface and air measurement.	General purpose and immersion. radius of no less than 3x the diameter of the sheath.	Submersion, soil, Probes bend to wet or moist environments.	Easy pipe or tank installation	Furnaces, reactors, heat exchanges, air ducts.
Sold As	Individual metal sheathed probes. PFA coating also available on thermowells. Contact Sales for special requirements.	Individually. Contact Sales for special requirements.	TJ1 Standard, page 36 Metal Braided Lead, page 40 Armoured Lead, page 37 High Temperature, page 37 USB output, page 41	Individually. Contact Sales for special sizes	Individually or in packs of 5.	Individually.	Individually. Custom sizes available.

# Thermocouple



Series No.	HYP	88000	SP-RL	KHSS-IM60G-RSC	HPS-CASS	SP-HF-K
Price	£33.50	£74	£49	£22	£24.75	£143
Page No.	46	50	<a href="http://omega.co.uk">omega.co.uk</a>	54	<a href="http://omega.co.uk">omega.co.uk</a>	<a href="http://omega.co.uk">omega.co.uk</a>
Configuration	Metal sheathed hypodermic probes	Special purpose surface probes	Various heavy-duty surface probes	Metal sheathed probes with easy-grip moulded handle and coiled cable	Metal sheathed probes with integral handle	Metal sheathed high temperature foundry probes with integral handle
Available Calibration	J, K, T, E, RTD	K, E	K, E, J	J, K, T, E, N	J, K, T, E, N	J, K
Temperature Range (Configuration and application dependent)	To 200°C	Various-depends on model 200°C To 815°C	Various-depends on model	Probe to 525°C Handle to 115°C	To 980°C	To 1260°C
Insulation/ Sheathing	Stainless steel needle	Various, including exposed TC element and SS sheaths	Various, including exposed TC element and SS sheaths	Magnesium oxide insulation with SS or Inconel™ 600 sheathing	Magnesium oxide insulation with SS or Inconel 600 sheathing	Glass braid insulation with stainless steel sheathing
Size (Non-standard lengths readily available)	0.203 to 1.83 mm dia 13 to 38 mm lengths	Various-depends on model number	Various-depends on model number	1.5 to 9.5 mm dia 300, 450 or 600 mm lengths standard	1.5 mm dia 300 mm probe length standard	12.7 mm dia 25 mm dia tip 762 mm probe length standard
Features	Small, needle-type probes in various diameters and lengths.	Variety of sensing heads for hundreds of applications. Models with swivel head design and replaceable elements	Six rugged probe styles, PFA coated lead wire, black and anodised aluminium handle with handle probes	Integral moulded handle retractable cable. General purpose probe tip standard; air and penetration tips available. Includes submin. male connector.	Integral pistol-grip handle Retractable cable. Heavy-duty.	Extra heavy-duty design with rugged. aluminium handle. 1.8 m SS overbraided lead wires.
Applications	Industrial, laboratory, manufacturing and chemical research. Various size needle probes suit temperature measurements in plants, liquids, semi-solids, food processing and natural sciences. surfaces, and more. Model HYP-1 is autoclavable. Not suitable for human implantation.	General purpose, straight and right angle surfaces, rotating surfaces, insertion, small electronic part	General purpose, roller surface, needle tip, flexible tip and overbraided models.	General purpose, penetration and air probe tips available	General purpose immersion, custom tips available for penetration, fast response surface and air temperature measurements.	Heavy-duty tips penetrate surface measure casting surface temperature.
Sold As	Individually in 5 styles Comes with or without connectors.	Individually with SMP miniature male connector, one-foot retractable cable.	Individually with 1.8 m PFA coated lead wire, SMP subminiature connector.	Probe, handle, cable and connector set. Contact Sales for special requirements.	Probe and handle set. Contact Sales for special requirements	Probe and handle set. Contact Sales for special requirements

# Selection Guide



Series No.	SPHT	RAT/SAT/BAT	NB3, 5, 12	(Probe) -PD	ADR	TERP / SERP	CF, BT
Price	£30	£89	£28	£27	£18	£30	£17.50
Page No.	53	<a href="http://omega.co.uk">omega.co.uk</a>	56	<a href="http://omega.co.uk">omega.co.uk</a>	<a href="http://omega.co.uk">omega.co.uk</a>	<a href="http://omega.co.uk">omega.co.uk</a>	59
Configuration	Metal sheathed high-temperature surface probe with integral handle	Ceramic tube assemblies	Metal sheathed probes with industrial protection head and integral terminal block or transmitter	Metal sheathed probes with weld pad	Metal sheathed adjustable depth probes	PFA and plastic extruder probes	Metal sheathed bayonet and compression fitting probes
Available Calibration	J, K, E	R, S, B	J, K, T, E, N	J, K, T, E	J, K, T, E	J, K, T, E	J, K, T, E
Temperature Range (Configuration and application dependent)	To 650°C	To 1650°C	To 1335°C max 610°C for PFS heads, 290°C for plastic heads	To 1150°C	To 480°C	To 900°C	To 480°C
Insulation/Sheathing	Magnesium oxide insulation with SS sheathing	Ceramic protection tube	Magnesium oxide insulation with SS or Inconel™ 600 sheathing	Magnesium oxide insulation with SS or Inconel 600 sheathing	Glass braid on wire inside SS tip	Braided glass wire with SS housing. Hastelloy™ tip on PFA models	Glass braid on wire inside stainless steel probe
Size (Non-standard lengths readily available)	9.5 mm dia tip 150 or 300 mm probe lengths standard	6 or 9.5 mm 300 mm probe standard length	1.5 to 6.0 mm dia probe. Various diameter wells. Various lengths.	1.5 to 6.0 mm dia 25.4 x 19 x 3.2 mm pad 300 mm lengths standard	4.7 mm dia tip up to 75 mm tip length 1500 mm cable length standard	3.2 mm dia tip; 75 or 150 mm barrel lengths; flush, 6, 13, 19 or 25 mm tip lengths	<b>Bayonet models:</b> 4.7 mm dia 57 and 89 mm L probe. <b>Compression fitting:</b> 50 and 100 mm L probe. Straight or 90° bend probes.
Features	Spring-loaded sensing element. Ceramic tip. Retractable cable with mini plug.	Includes NB1-2 head	Choice of industrial heads with integral terminal blocks. Fixed/spring loaded. Choice of thermowell size and material. Head can house a transmitter.	Parallel, 90° or curved weld pad at tip of probe. Variety of terminations.	Flexible armoured cable with sliding lock fitting. Spring action catch holds probe firmly in place. Grounded or ungrounded junction.	Rigid or flexible connection. Various tip and barrel lengths. Single or dual elements.	Variety of probe lengths. 6.4 mm flexible stainless steel cable 304 or 321 SS construction.
Applications	High-temperature surface measurements, stationary surfaces.	High-temperature oxidising or reducing atmospheres.	Heavy-duty, industrial environments. Sheathed or non-sheathed thermocouple elements fit into thermowell if necessary.	Permanent installations, probe welds to surface.	Immersion, adjusts to any depth. Spring loaded tip presses against the bottom of a well for rapid heat transfer.	PFA or plastic extruders.	Immersion, bored samples, surfaces.
Sold As	Individually. Contact Sales for special requirements. 90° Bend Version Available.	Individually.	Individually with threaded fitting and head. Variety of thermowell sizes, designs and materials. Contact Sales for special requirements.	Individually. Flat or curved pads available. Contact Sales for special requirements.	Individually with permanently attached or removable lock fittings. Spade lugs or quick disconnect termination.	Individually with OSTW standard size male connector. Contact Sales for special requirements.	Individual spring-loaded bayonet or compression fitting styles. Contact Sales for special requirements.

# Introduction to Thermocouples and Thermocouple Assemblies

## What is a thermocouple?

A thermocouple is a sensor for measuring temperature. It consists of 2 dissimilar metals, joined together at one end, which produce a small unique voltage at a given temperature. This voltage is measured and interpreted by a thermocouple thermometer.

## What are the different thermocouple types?

Thermocouples are available in different combinations of metals or “calibrations.” The 3 most common calibrations are J, K and T. There are high-temperature calibrations, R, S, B, and G, C, D. Each calibration has a different temperature range and environment, although the maximum temperature varies with the diameter of the wire used in the thermocouple.

## How do I choose a thermocouple type?

Because thermocouples measure in wide temperature ranges and can be relatively rugged, they are often used in

industry. The following criteria are used in selecting a thermocouple:

- Temperature range
- Chemical resistance of the thermocouple or sheath material
- Abrasion and vibration resistance
- Installation requirements (may need to be compatible with existing equipment; existing holes may determine probe diameter).

## How do I know which junction type to choose? (also see diagrams)

Sheathed thermocouple probes are available with 1 of 3 junction types: grounded, ungrounded, or exposed. At the tip of a grounded junction probe, the thermocouple wires are physically attached to the inside of the probe wall. This results in good heat transfer from the outside, through the probe wall to the thermocouple junction. In an ungrounded probe, the thermocouple junction is detached from the probe wall. Response time is slower than the grounded

style, but the ungrounded offers electrical isolation. See table below.

Room Temperature Insulation Resistance		
Nominal Sheath mm	Applied DC Voltage Min	Insulation Resistance Min
<0.80	50V	100 M-
0.80 to 1.5	50V	500 M-
>1.5	500V	1000 M-

The thermocouple in the exposed-junction style protrudes out of the tip of the sheath and is exposed to the surrounding environment. This type offers the best response time, but is limited to dry, non-corrosive, and non-pressurised applications.

## What is response time?

A time constant has been defined as “the time required by a sensor to reach 63.2% of a step change in temperature under a specified set of conditions. Five time constants are required for the sensor to approach 100% of the step change value.” Exposed junction thermocouples are the fastest responding. Also, the smaller the probe sheath diameter, the faster the response, but the maximum temperature may be lower. Be aware that sometimes the probe sheath cannot withstand the full temperature range of the thermocouple type.

## Operating Atmosphere—Typical Sheath Materials

Material	Maximum Temperature	Application Atmosphere			
		Oxidising	Hydrogen	Vacuum	Inert
304, 310, 316, and 321 SS	900°C	Very Good	Good	Very Good	Very Good
Inconel® 600	1150°C	Very Good	Good	Very Good	Very Good
Super OMEGA CLAD™ XL	1335°C	Excellent	Good	Very Good	Very Good
Platinum-Rhodium Alloy	1650°C	Very Good	Poor	Poor	Poor
Molybdenum	2200°C	Not Rec.	Fair	Good	Fair
Tantalum	2300°C	Not Rec.	Not Rec.	Good	Not Rec.

## OMEGA CLAD™

### Specifications

**Diameters:** Standard diameters: 0.25 mm, 0.5 mm, 0.75 mm, 1 mm, 1.5 mm, 3 mm, 4.5 mm, and 6 mm, 8 mm and 9.5 mm.

**Length:** Standard OMEGA™ thermocouples have 300 mm immersion lengths.

Other lengths are available.

**Sheaths:** 304 SS and Inconel® are standard. Other sheath materials are available; call for price and availability.

**Insulation:** High-purity magnesium oxide is standard. Minimum insulation resistance wire to wire or wire to sheath is 1 G- at 500 Vdc in diameters above 1.5 mm

**Calibration:** Iron-constantan (J), CHROME GA™-ALOMEGA™ (K), copper-constantan (T), and CHROME GA™-constantan (E) are standard calibrations.

**Bending:** Easily bent and formed. Bend radius should be not less than twice the diameter of the sheath.

**Delivery:** Off-the-shelf. Other sheaths are available; call for price and delivery.

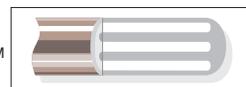
**Dual Elements:** Thermocouples with a sheath diameter of 1 mm through 6 mm are available in dual element.

**Accuracy:** The wires used in OMEGA™ thermocouples are selected and matched to meet IEC Class 1 Limits of Error. Thermocouples can be made from 0.25 mm OD to 9.5 mm OMEGA CLAD™ thermocouple wire.

**Polarity:** In the thermocouple industry, standard practice is to colour code insulated wires. Other standards that OMEGA™ uses are: the negative lead of bare wire thermocouple is approximately 6 mm shorter than the positive lead, and the large pin on a thermocouple connector is always the negative conductor.

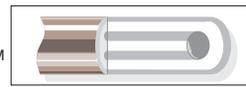
**Extension Wire:** Thermocouple alloy wire must always be used to connect a thermocouple sensor to the instrumentation to ensure accurate measurements.

Grounded Junction, OMEGA CLAD™ Probes



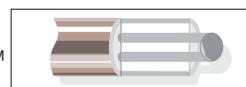
A **grounded junction** is recommended for the measurement of static or flowing corrosive gas and liquid temperatures and for high-pressure applications. The junction of a grounded thermocouple is welded to the protective sheath, giving faster response than the ungrounded junction type.

Ungrounded Junction, OMEGA CLAD™ Probes



An **ungrounded junction** is recommended for measurements in corrosive environments where it is desirable to have the thermocouple electronically isolated from and shielded by the sheath. The welded wire thermocouple is physically insulated from the thermocouple sheath by MgO powder (soft).

Exposed Junction, OMEGA CLAD™ Probes



An **exposed junction** is recommended for the measurement of static or flowing non-corrosive gas temperatures where fast response time is required. The junction extends beyond the protective metallic sheath to give accurate, fast response. The sheath insulation is sealed where the junction extends to prevent penetration of moisture or gas, which could cause errors.

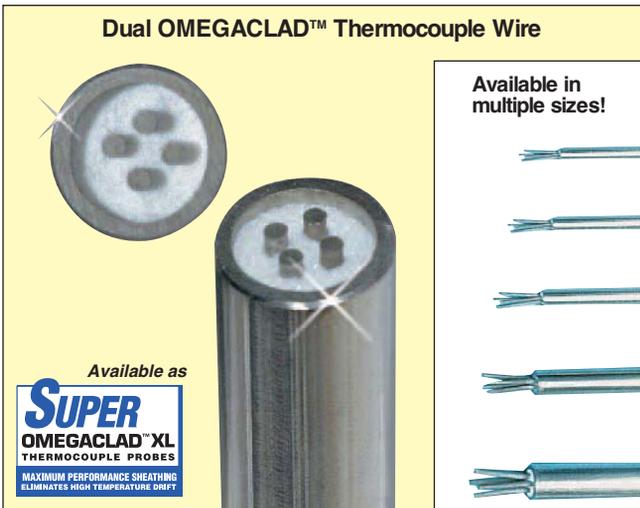
From the tip of the sensor to the thermocouple connector and the instrumentation that reads the signal, OMEGA takes ownership of the quality of our products and manufactures not only the finished thermocouple assembly but the individual components as well.



### Insulated Thermocouple Wire

Bare thermocouple wire can be insulated with a variety of materials to accommodate different applications, whether it's temperature, chemical resistance, abrasion resistance, or any number of other requirements. OMEGA's wire insulating and manufacturing capabilities include:

- Braiding
- Thread Serving
- Tape Wrapping
- Cabling
- Stranding
- Plastic Extrusion



### Mineral-Insulated, Metal-Sheathed Cable

OMEGA has dedicated an entire building to the sole purpose of manufacturing mineral-insulated, metal-sheathed cable. This cable manufacturing line incorporates thermocouple wire, a metal sheath, and mineral oxide (MgO) insulation to produce the OMEGA CLAD™ used in our thermocouple probe products.



One of OMEGA's automated connector manufacturing lines

### Thermocouple Connectors

We strive to make our products the best value for our customers and nowhere is this better illustrated than in our thermocouple connector lines. With features like a removable write-on window, spring-loaded contact washers, and internal wire divider, our connectors make assembly and use easy. To ensure quality and reliability, we've automated our connector manufacturing and perform over 20 quality checks during the process.



### Thermocouple Probes

OMEGA insulates the wire, manufactures the mineral-insulated cable, and assembles the connectors. We use these components to manufacture our finished thermocouple probes on our automated manufacturing line. At every opportunity, OMEGA invests in the latest technologies to bring innovative features and services to our customers. This commitment to manufacturing ensures that a quality product, fabricated start to finish by us, is on the shelf ready for delivery to our customers.



### Our People

OMEGA's people are at the core of our manufacturing process. Everyone at OMEGA takes pride in the products they manufacture and provide to our customers. They understand the need for quality and performance, and above all else, they value serving the customer.

## Thermocouple Assemblies

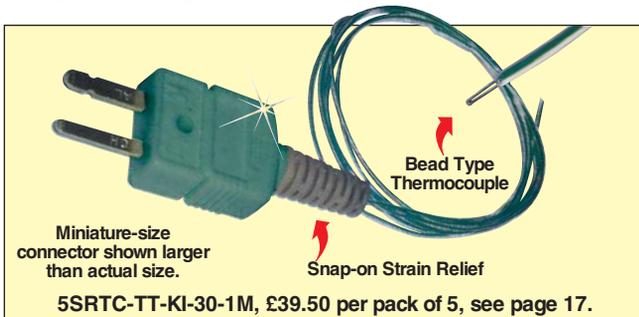
For every temperature measurement application, there is a thermocouple or thermocouple assembly that is best suited to provide reliability, accuracy, and performance. Here, we will look at various thermocouple assemblies and their application.

- Bare Wire
- Insulated Wire
- Surface Mountable Insulated Wire
- Handheld Surface Probe
- Exotic/Precious Metals
- MIMS (Mineral-Insulated, Metal-Sheathed)
- Quick-Disconnect Style
- Transition Joint Style
- Handle Probe Style
- Industrial Head Style
- Innovations



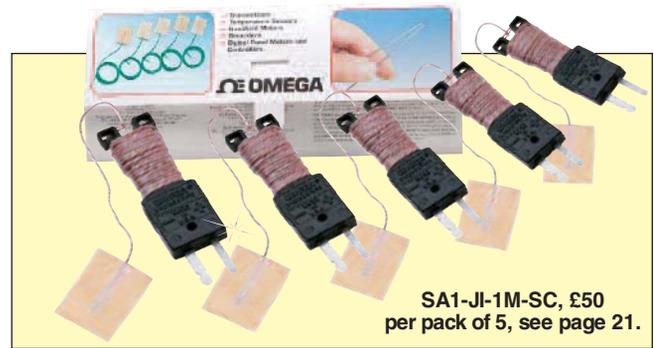
## Bare Wire Thermocouples

The bare wire thermocouple is the most basic assembly available. It is composed solely of the two thermocouple wires beaded to create the thermocouple circuit. OMEGA offers bare wire thermocouples with individual wire diameters as small as 0.0254 mm and as large as 3.25 mm. OMEGA stocks the base metal calibrations: J, K, T, E, and N, as well as precious metal calibrations: R, S, B, and C. OMEGA also offers a wide variety of insulating products such as ceramic insulators and braided fiberglass tubing for insulating of the bare wires.



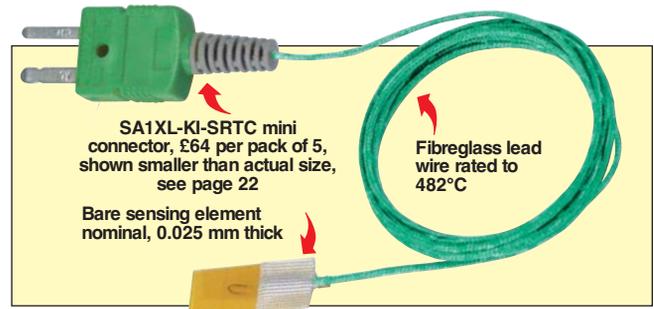
## Insulated Wire Thermocouples

OMEGA uses our in-house manufactured wire to produce our line of ready-made insulated thermocouples. These temperature sensors are stocked in a wide variety of terminations, insulating materials, and lengths. OMEGA offers the largest selection of off-the shelf insulated wire thermocouples on the market. Because we manufacture all the components, custom lengths and configurations are easily produced and quickly shipped.



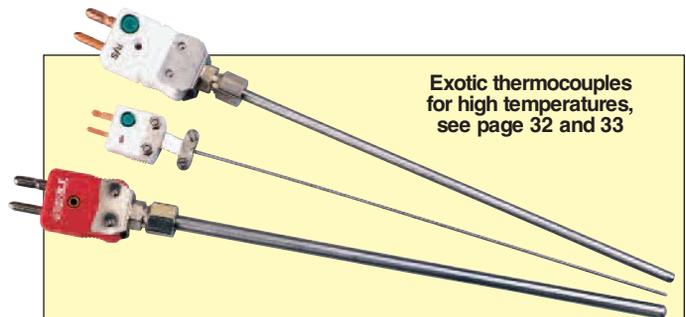
## Surface-Mountable, Insulated Wire Thermocouples

For temporary or permanent attachment to almost any surface, OMEGA offers insulated wire thermocouples with an insulating patch or a mechanical washer covering the measuring junction. The patch can be mounted using a self-adhesive backing, or it can be cemented in place using one of our air set cements. The washer style surface mount can be bolted into place. Surface-mount wire thermocouples offer the benefit of extremely fast response times. The SA1XL pictured below combines all the features of a self-adhesive style thermocouple and a cement-on thermocouple with a response time faster than 0.15 seconds.



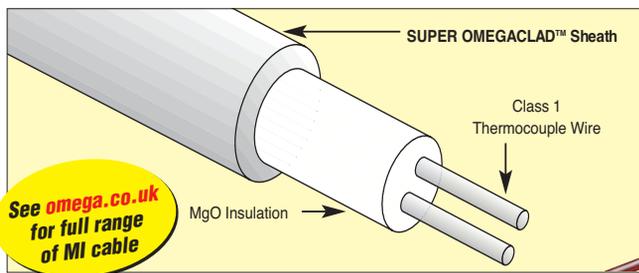
## Surface Probes

OMEGA's proprietary line of unique surface probes is offered in over 50 styles for stationary, rotating, and moving surfaces at temperatures up to 760°C. These probes can be manufactured with custom lead lengths and wire insulations, as well as a variety of handle materials. In addition, OMEGA uses a proprietary element design to ensure that our customers receive a robust and reliable sensor.



## Exotic Thermocouple Probes

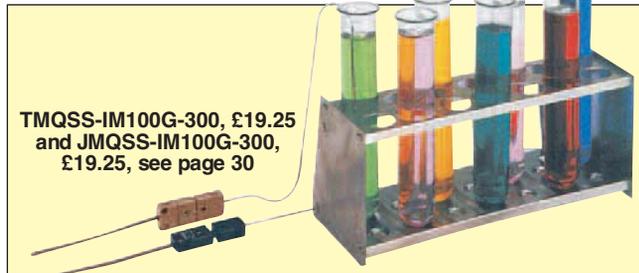
For applications that require temperature measurements above 1260°C, the calibrations R, S, B, and C, manufactured using various combinations of exotic/precious metals and insulating material, are employed. These exotic thermocouple probes are used at temperatures up to 2300°C. Ceramic sheaths are also available for use with these calibrations.



KHSS-IM60G-RSC-300,  
£25.50, see page 54

## MIMS (Mineral-Insulated, Metal-Sheathed) Thermocouples

Probably the most versatile and widely used temperature sensors are the mineral-insulated, metal-sheathed thermocouples. They are most commonly available in the base metal calibrations: J, K, T, E, and N. These probes are available with numerous sheath compositions, including 304 SS, 310 SS, 316 SS, 321 SS, Inconel 600, and Super OMEGACLAD™ XL. In addition, these probes are offered from stock with sheath diameters from as small as 0.25 mm to as large as 9.52 mm in both imperial and metric dimensions. Because OMEGA™ manufactures the MIMS cable, we are able to provide almost any diameter within this range.



TMQSS-IM100G-300, £19.25  
and JMQSS-IM100G-300,  
£19.25, see page 30

## Handle Probe Style

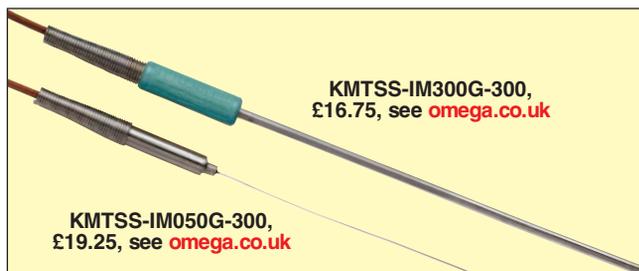
This probe style comes with a user-friendly handle, which is also the transition from the metal sheath to a lead wire. Handles can be moulded on or mechanically assembled. This type of probe is commonly used in conjunction with a handheld meter such as OMEGA's Supermeter. This allows the operator to perform spot checks on manufacturing lines, in metal refining, in food and beverage production, in HVAC, or in any number of applications. To assist in the applications, the sensor tips come in different styles, such as an "air-hood" that protects the sensing junction while allowing air flow or a reduced tip that allows the use of a heavy-gauge sheath material while reducing the sensing tip size for a faster response time. There are many styles available for various applications.



NB industrial head probes from £28, see page 56

## Quick-Disconnect Style

The quick-disconnect style probe combines a thermocouple connector with the MIMS probe. The design allows the probe to be quickly connected and/or disconnected from the measuring circuit. This style is available in various combinations of connectors and sheath materials.



KMTSS-IM300G-300,  
£16.75, see [omega.co.uk](http://omega.co.uk)

KMTSS-IM050G-300,  
£19.25, see [omega.co.uk](http://omega.co.uk)

## Transition Joint Style

The transition joint style probe incorporates the metal sheath probe with a built-in lead extension. OMEGA offers many variations for immediate delivery or can easily custom manufacture virtually any combination of sheath material, calibration, lead insulation, and cold-end termination to fit your application.

## Industrial Head Style

The industrial head style metal-sheathed thermocouple is commonly used in liquid or gas flow operations such as petroleum refineries, wastewater treatment, and natural gas production. The probe features a metal-sheathed thermocouple with a welded or brazed threaded fitting, which is attached to a plastic or metal head. The head contains a terminal block and a wire exit port for connection to the temperature monitoring system. The probe is "screwed" in the process, placing the sensor tip into the media flow while maintaining a closed system.

## Innovations

Our manufacturing capabilities give us the unique ability to develop and bring to market innovative products to meet or exceed the demands of our customers. Products like:

- Moulded Mini Connector with Integral Strain Relief (page 17)
- Reel Caddy for Beaded Wire Thermocouples (page 18)
- Hermetically Sealed Thermocouple Probes (page 19)
- SA1XL Surface-Mount Thermocouples (page 22)
- Super OMEGACLAD™ XL Thermocouple Probes (page 26)

The Super OMEGACLAD™ XL probe product line is the result of years of development and refinement by our technical staff and responds to the voice of our customers in product performance. It is designed for low drift, high temperature, long life, and increased performance in smaller diameter probes.

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