



G & M B was formed in 1967, manufacturing and supplying a small number of re-sale outlets with a wide range of temperature measuring devices. This the Company has continued to do successfully, increasing the range of products and the number of outlets.

In 1975, Fitmec, a separate Limited Company was formed, with the intention of finding an end-user market for our products. It was at this time that we began the manufacture of wire and cable for our own use. In April, 1988, it was found to be a natural progression to merge the two Companies to form G & M B Fitmec Limited.

We supply an extensive range of sensors, from the smallest possible Thermocouple and Resistance Thermometer to the largest multi-point assembly. These we can manufacture to the customers requirements or they can be individually designed. Technical drawings may also be submitted for our consideration and quotation.

**G & MB FITMEC LIMITED**

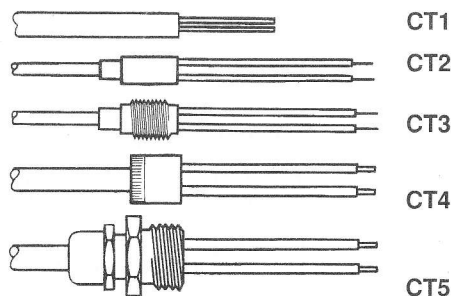
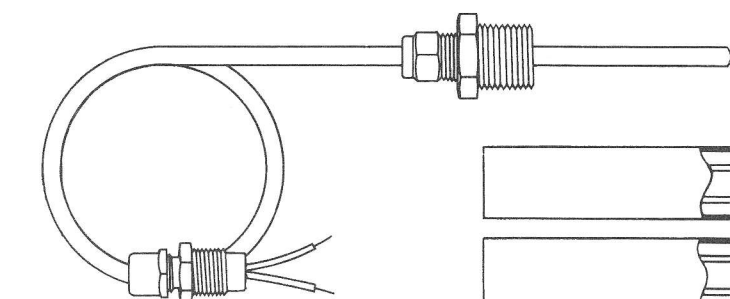
COWLING STREET,  
OLDHAM OL8 1UY

**TEL: 061 620 0410**  
**061 620 3888**

**FAX: 061 627 0507**

**TELEX: 635091 ALBION G**

## MINERAL INSULATED THERMOCOUPLES



### CONSTRUCTION

The mineral insulated thermocouple consists of a seamless metal sheath containing the thermocouple conductors embedded in highly compacted magnesium oxide powder. The assembly is hermetically sealed giving the conductors full protection from the operating environment.

### ADVANTAGES

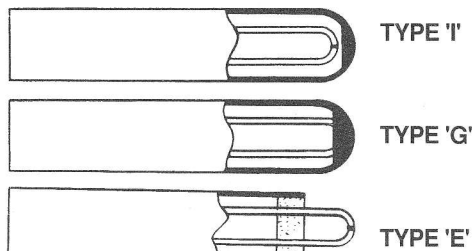
**Stability** Because of the complete protection afforded to the conductors, the output characteristics remain stable throughout the life of the thermocouple.

**Toughness** The insulation is not impaired by bending, twisting or flattening and this greatly facilitates the correct positioning of the tip under awkward conditions. Also, being so robust, a much smaller diameter may be selected as compared with a conventional thermocouple.

### STOCK DIAMETERS AVAILABLE (mm)

Simplex 1.0 1.5 3.0 4.5 & 6mm  
Duplex 3 & 6mm

Calibrations, sheath materials, diameters, terminations and mountings other than those specified in this data sheet can be supplied to special order. Please ask for a quotation.



## TYPES OF JUNCTION

**TYPE 'I' INSULATED.** Hot junction insulated from sheath. Gives floating output with insulation resistance in excess of 100 Megohms.

**TYPE 'G' GROUNDED.** Hot junction welded to sheath tip giving earthed output and faster response to temperature changes.

**TYPE 'E' EXPOSED.** Fastest response mainly for the measurement of air temperature in ducts and continuous ovens. Restricted to a maximum operating temperature of 300 °C.

## CONDUCTORS

<b>E</b> Nickel Chromium/Constantan	870 °C
<b>J</b> Iron/Constantan	800 °C
<b>K</b> Nickel Chromium/Nickel Aluminium	1100 °C
<b>T</b> Copper/Constantan	400 °C
<b>N</b> Nickel-Chromium-Silicon / Nickel-Silicon-Magnesium	1100 °C

## MOUNTINGS

**MS1** 1/8" B.S.P. taper stainless steel compression fitting (1.5 3.0 and 6.0mm).

**MB1** 1/8" B.S.P. taper brass compression fitting (3.0 and 6.0mm).

**MB2** 1/2" B.S.P. taper brass compression fitting for use with 6.0mm sheaths.

**MS2** 1/2" B.S.P. taper stainless steel compression fitting for use with 6mm dia sheath.

## LENGTH

The thermocouple length is measured from the tip to the nearest point on the cold end terminal.

## HOW TO ORDER - (PLEASE SPECIFY)

**K-** Calibration  
**240-** Length in mm  
**S1-** Sheath Material  
**3.0-** Sheath Diameter  
**I-** Type of Hot Junction  
**CT4** Cold End Terminal  
**MB1** Mounting (if none, omit)  
i.e., K / 240 / S1 / 3.0 / I / CT4 / MB1

## COLD END OPTIONS

**TYPE CT1** Bare conductors 25mm long. End sealed with Epoxy Resin; Maximum temperature 105 °C.

**TYPE CT2** Plain crimp-on pot seal with P.T.F.E. sleeved tails 50mm long. Epoxy potted; maximum temperature 105 °C.

**TYPE CT3** Crimp-on seal as above but with ISO 8mm x 1mm thread. Lock nuts are available and should be ordered separately.

**TYPE CT4** Screw on pot seal, plastic compound potted with glass fibre end cap and 50mm P.T.F.E. sleeved tails; maximum temperature 135 °C. (Not suitable for 1.5mm dia. sheath.)

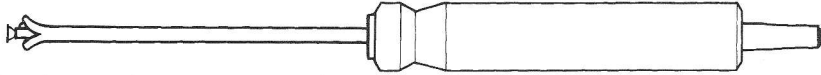
**TYPE CT5** Brass or stainless steel gland, epoxy potted with 50mm P.T.F.E. sleeved tails; maximum temperature 105 °C.

A variety of threads are available to suit customer's terminating head. 16mm ISO metric is standard.

## SHEATH MATERIALS

Code	Composition	Properties	Maximum
<b>S1</b>	18/8/1 stainless steel AISI 321	Good general corrosion resistance. High ductility	870 °C
<b>S2</b>	25/20 stainless steel AISI 310	Oxidation resistant. Suitable for sulphur bearing atmospheres.	1100 °C
<b>NC</b>	76/16/7 Nickel Chromium (INCONEL 600)* *Trade name.	Excellent oxidation resistance. Unsuitable for sulphur bearing atmospheres above 550 °C.	1100 °C

## HAND HELD THERMOCOUPLE PROBES



**H1** For surface temperature measurement. The spring loaded copper sensing disc and tripod tip ensure correct alignment. Available without tripod for restricted access.

**H1-B** For heavy duty surface temperature measurement. Uses a spring loaded copper sensing disc.

**H1-C** For fast response surface temperature measurement. Uses a coiled element as sensor to improve accuracy.

**H3** A right angled version of type H1 for easy access to awkward areas.

**H3-B** Heavy duty version of H3. Uses a spring loaded copper sensing disc.

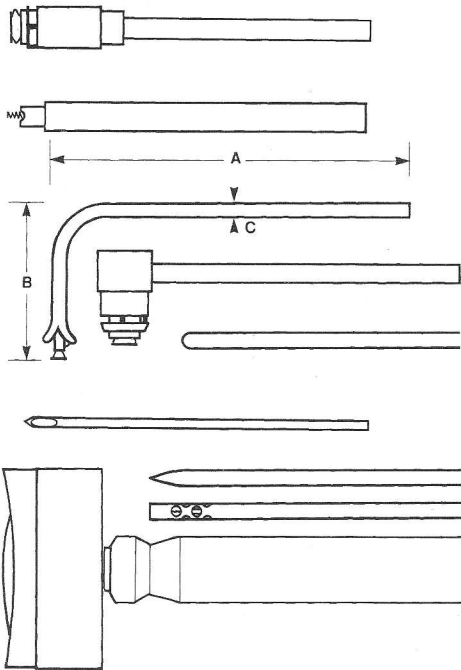
**H4** General purpose mineral insulated immersion probe for use in air, gas and liquid. Available in a variety of sheaths and diameters.

**H5** Rigid hypodermic probe for use in semi solids ie. rubber, plastics, foods etc. Available in a variety of diameters.

**H6** Swaged tip probe suitable for food.

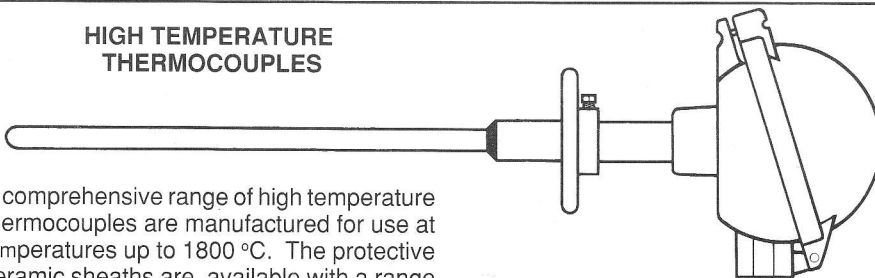
**H7** Fast response gas temperature probe with ventilated stainless steel sheath.

**H8** For surface temperature measurement of static or slowly rotating rollers. Uses a lightly sprung stainless steel sensing strip and has PTFE cheek plates.



TEMPERATURE RATINGS				DIMENSIONS		
	K	J	T	A	B	C
H1	850°C	800°C	400°C	80mm	-	4.7mm
H1-B	850°C	800°C	400°C	150mm	-	6mm(TIP 12.5mm)
H1-C	850°C	N/A	N/A	100mm	-	8mm
H3	850°C	800°C	400°C	200mm	45mm	4.7mm
H3-B	850°C	800°C	400°C	145mm	25mm	6mm(TIP 13.4mm)
H4(1)	1100°C	800°C	400°C	100mm	-	1.5mm
H4(2)	1100°C	800°C	400°C	200mm	-	3mm
H4(3)	1100°C	800°C	400°C	300mm	-	6mm
H5(1)	350°C	350°C	350°C	75mm	-	1.6mm
H5(2)	350°C	350°C	350°C	100mm	-	3.2mm
H6(1)	350°C	350°C	350°C	100mm	-	3.2mm
H6(2)	350°C	350°C	350°C	150mm	-	4.7mm
H6(3)	350°C	350°C	350°C	250mm	-	6mm
H7	700°C	700°C	400°C	100mm	-	4.7mm
H8	250°C	250°C	250°C	35mm	35mm	60mm

## HIGH TEMPERATURE THERMOCOUPLES



A comprehensive range of high temperature thermocouples are manufactured for use at temperatures up to 1800 °C. The protective ceramic sheaths are available with a range of diameters from 8mm to 25mm and length to suit customer requirements.

Options include primary and optional secondary sheaths and a choice of materials dependant upon temperature range and environmental requirements ie., Impervious aluminous porcelain, impervious recrystallised alumina. Assemblies in all the common thermocouple combinations are available in both simplex, duplex and triplex forms. A range of flanges and bushes both fixed and adjustable are available to suit the application.

## SELECTION GUIDE

TC CODE	CONDUCTORS	OPERATION TEMPERATURE	
		CONTINUOUS	SHORT TERM
K	Nickel Chromium vs Nickel Aluminium	0 - +1100	-180 - +1350
N	Nickel-Chromium- Silicon vs Nickel-Silicon-Magnesium	0 - +1100	0 - +1300
R	Platinum-13% Rhodium vs Platinum	0 - +1600	-50 - +1700
S	Platinum-10% Rhodium vs Platinum	0 - +1550	-50 - +1700
B	Platinum-30% 6% Rhodium vs Platinum	+100 - +1600	+50 - +1800

## FAST RESPONSE THERMOCOUPLE

**TYPE SRP** Fast Response, Self Adhesive Silicone Rubber, Patch Thermocouple.

The robust waterproof construction includes aluminium foil backing and is resistant to oils and chemicals. 35mm x 13mm x 2m thick complete with 1m PTFE twin twisted leads. Remains flexible over the temperature range - 60 °C to +250 °C.



**TYPE PSA** Fast Response, Self Adhesive Patch Thermocouple.

24mm x 10mm patch complete with 1m PTFE twin twisted leads as standard. For use on surfaces up to 250 °C.

**TYPE P.1.** Araldite Base Patch Thermocouple  
11mm x 8mm patch complete with 1m PTFE twisted leads as standard. For use on surfaces up to 250 °C.



**TYPE FMS** Fast Response, Surface thermocouple.

Insulated hot junction on surface of a strip of flexible magnetic rubber 50mm x 25mm x 1mm thick. Supplied with 1 metre PTFE insulated 1/0.2mm (twisted pair) lead. For use on ferrous metals up to 120 °C.

**TYPE EJ-P** Exposed Junction.

PTFE Insulated, Twin Twisted, 1m long as standard. Maximum temperature 250 °C.



**TYPE EJ-F** Exposed Junction.

Glass Fibre Insulated, Flat Pair 1m long as standard. Maximum temperature 350 °C - 400 °C.

**TYPE EJ-B** Exposed Junction, Bare Wire Thermocouple.

1m long as standard. Maximum temperature depends upon thermocouple calibration and wire diameter.



All EJ thermocouple types available in a wide range of wire diameters and thermocouple calibrations.

**NOTE** All the above thermocouples are available with alternative lead lengths, and thermocouple calibrations.

## HEADS

**'P' TYPE** A die-cast angled terminal head with a dustproof hinged lid. Process Entry 16mm ISO, Cable Entry 16mm ISO.

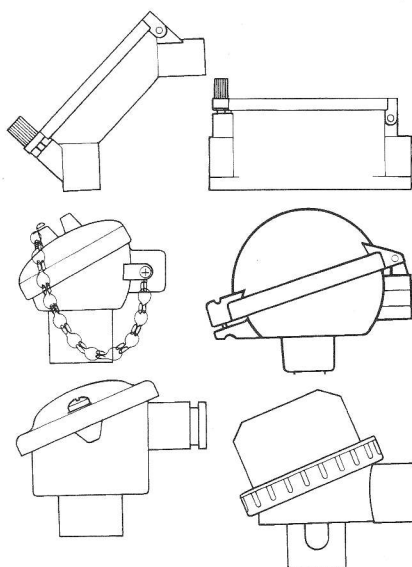
**'PS' TYPE** A die-cast straight through terminal head with dustproof hinged lid. Process Entry 16mm ISO, Cable Entry 16mm ISO.

**CT11 HEAD** A die-cast aluminium head with screw on lid. Process Entry 16mm ISO, Cable Entry 16mm ISO.

**'BUZ' TYPE** A light metal alloy head with hinged lid. To IP54. Process Entry 1/2" BSP, Cable Entry 20mm ISO.

**'B' TYPE** A DIN type die-cast aluminium head with a dustproof lid retained by two screws. Process Entry 1/2" BSP, Cable Entry 20mm ISO.

**'N' TYPE** A DIN type polymer head with screw on lid. Process Entry 1/2" BSP, Cable Entry 20mm ISO.



## THERMOCOUPLE CONNECTORS & ACCESSORIES

TYPE	CODE	COLOUR
Chromel * - Alumel *	K	Yellow
Copper - Constantan	T	Blue
Iron - Constantan	J	Black
Platinum - Rhodium	R/S	Green
Chromel * - Constantan	E	Violet
Copper - Copper	Cu	White

\* Trade Name

### PREFIX ORDERING CODES

#### STANDARD CONNECTORS

PLUG SP- SOCKET SS-

#### MINIATURE CONNECTORS

PLUG MP- SOCKET MS-

#### PANEL MOUNTING SOCKETS

STANDARD FSS- MINIATURE FMS-

i.e. FSS-R/S

#### PANELS FOR CONNECTORS

From 1 to 12 ways in a single row.  
16 to 24 ways in two rows.

**NOTE :ORDERING CODE (FSP- or FMP-)**

For **STANDARD CONNECTORS** please use the Prefix **FSP**. i.e. FSP1 Way

For **MINIATURE CONNECTORS** please use the Prefix **FMP**. i.e. FMP24 Way

#### BARRIER TERMINAL STRIP



Contacts thermocouple alloy or compensating materials (Types R & S).

Temperature range of -100° to +220°C.

Available for Types K,J,T,E,R/S & Cu/Cu.

Mounting screw M 2.5 cheese head.

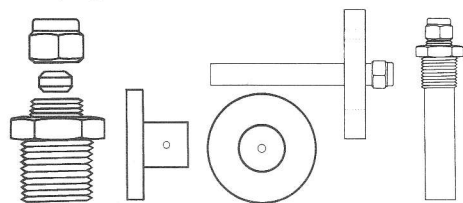
Spade terminations from the thermocouple material to suit terminal block to order.

## COMPRESSION GLANDS

Available in both brass and stainless steel in a variety of threads to suit a wide range of sheath diameters.

## FLANGES

Available in both brass and stainless steel suitable for use with sheaths of 1/8" to 3/8" diameters. The flange comes complete with clamping screw.



## FABRICATED POCKETS AND SOLID DRILLED THERMOWELLS

All our thermowells are machined from solid bar stock and are produced on special purpose high accuracy machines. This ensures perfect concentricity of the bore and maintains a consistent wall thickness over the full length of the thermowell.

For less demanding applications fabricated pockets can be supplied. Materials are selected to suit each individual application and are of the highest quality. Special wear or corrosion resistant coatings can be applied ie: PTFE, Tungsten Carbide, Tantalum etc. Testing includes full dimensional check, ultrasonic pressure tests and material certificates. Welding procedures and qualifications are also available.

## MINERAL INSULATED AND STANDARD RESISTANCE THERMOMETER ASSEMBLIES

### WIRING CONNECTIONS

2, 3 or 4 wire systems are available according to the requirements of the associated measuring equipment.

### ACCURACY

The probe is normally supplied to BS 1904: 1984: Grade B. Higher accuracy detectors are available on request.

### TERMINATION

A wide range of heads and extension leads are available (see heads above) leads include PVC (80°C) silicone rubber (200°C) PTFE (250°C) and fibre glass (400°C).

### OPTIONS

Duplex versions ie. 2 x 2 wire or 2 x 3 wire can be supplied and detectors with a variety of resistance values are also available.

### MOUNTINGS

A selection of stainless steel welded or adjustable fittings are available.

## STANDARD ASSEMBLIES

These high quality Resistance Thermometers are designed for industrial applications and are available in a number of configurations.

Each assembly consists of a closed end protective sheath in stainless steel. The sheath houses a wire wound Resistance Thermometer Detector mounted at the tip and constructed to give excellent thermal response.

### SHEATH DIAMETERS

The most commonly used sheath diameters are 3mm, 4mm, 5mm, and 6mm, although larger diameters can be specified. For fast response a reduced tip is available.

### SHEATH LENGTH

The length of sheath should be specified, allowing at least twice the detector length (usually 25mm) to allow for stem conduction errors. Sheaths up to 2M long are available.

### TEMPERATURE RANGE

Unless otherwise specified the assembly will be supplied with a working temperature of 250°C.

## MINERAL INSULATED ASSEMBLIES

These high accuracy assemblies are ideal for use in hazardous conditions of high vibration, high pressure / vacuum and have a wide temperature range of -100°C to +500°C.

Each assembly consists of a welded closed end length of 316 stainless steel sheathed mineral insulated cable with a wire wound resistance thermometer detector mounted at the tip. This type of assembly offers fast response high insulation resistance and the ability of the sheath to withstand being bent, twisted and flattened. (However it must be kept straight for at least 50mm from the sensing tip).

### SHEATH DIAMETERS

These assemblies are available in both 3mm and 6mm diameters.

### SHEATH LENGTH

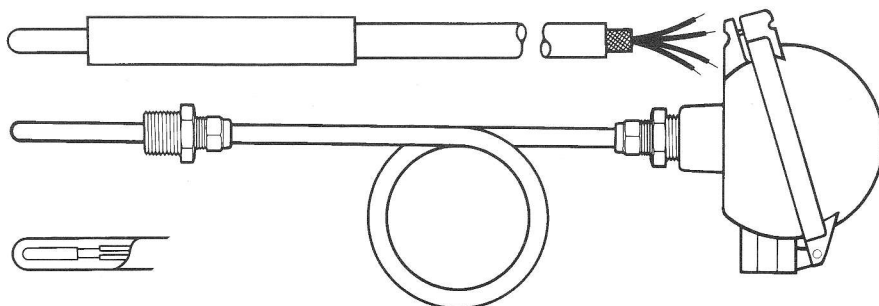
The 3mm diameter assemblies are available up to 150 metres long and the 6mm diameter up to 100 metres long.

### INNER LEADS

Unless otherwise specified these will be of nickel. (They can only be used in 3 or 4 wire systems and lead resistance has to be considered). Copper conductors are available on request but restrict the temperature range. (The Inner Leads and any extension lead resistance is additional to the sensing element resistance).

### TEMPERATURE RANGE

Unless otherwise specified the assembly will be supplied with a working temperature of -100°C to +500°C.





## EXTENSION AND COMPENSATING LEADS

FIG 1. TWIN TWISTED PAIR



FIG 2. FLAT PAIR



FIG 3. FLAT PAIR METAL SCREENED



FIG 4. TWIN TWISTED PAIR SHEATHED

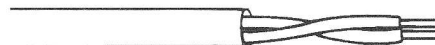
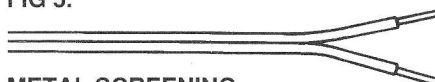


FIG 5.



### METAL SCREENING

This is done by overbraiding thermocouple extension / compensating leads with tinned copper, stainless steel or copper nickel wires.

### THERMOCOUPLE EMF VALUES AND TOLERANCE

The conductors are manufactured to comply with the relevant Parts of BS 4937 : 1973 and are within the tolerance limits laid down in BS 4937:1983 Part 20 Class 1 (PTFE) and Class 2 (GLASS FIBRE & PVC).

Other specifications and tolerances are available on request.

The information given in this leaflet is only to be used as a general guide to our manufacturing programme.

The user shall determine the suitability of the product for his own particular use.

## GLASS FIBRE INSULATED

1. Glass fibre insulated cores, silicone varnished, twin twisted pair. (Fig 1)
2. Double glass lapped cores, silicone varnished laid parallel and sheathed with an outer jacket of glass fibre, silicone varnished. (Fig 2)
3. High temperature glass fibre insulated cores, laid parallel and sheathed with an outer jacket of high temperature glass fibre (700 °C). (Fig 2)
4. Stainless steel or tinned copper braid applied to the finished cable to give protection in abrasive conditions. (Fig 3)

### STANDARD CONDUCTOR SIZES

Single strand conductors SWG36 to SWG19 (0.193mm to 1.02mm). Multi-strand conductors 7/0.2mm, 13/0.2mm, 24/0.2mm and 32/0.2mm (Other sizes available on request).

### STANDARD CONSTRUCTION:

Each conductor double glass lapped and varnished, laid side by side, overall glass braided and silicone varnished. Other variations of glass fibre insulation are possible for example lapped and braided conductors.

### TEMPERATURES UP TO 700 °C

For this temperature range the thermocouple wires are insulated with high temperature glass fibre. This type of insulation is produced only on request.

### TEMPERATURES UP TO 400 °C

The insulation for this range is based on glass fibre and modified silicone resin with a temperature rating of 300 °C to 400 °C depending on working conditions.

### DIAMETER SIZE

The overall dimensions of the thermocouple lead depend on the thickness of the insulation required.

## PTFE INSULATED

5. Extruded PTFE insulated cores, twin twisted together. (Fig 1). Available in 1 / 0.2, 1 / 0.3, 1 / 0.5 and 7 / 0.2mm.
6. Extruded PTFE insulated cores, laid parallel and sheathed with PTFE. (Fig 2). Available in 1 / 0.2, 1 / 0.5 and 7 / 0.2mm.
7. Extruded PTFE insulated cores, twisted together and sheathed with PTFE. (Fig 4). Available in 7/0.2mm.
8. Stainless steel or tinned copper braid applied to finished cable to give protection in abrasive conditions. (Fig 3). Available in 1 / 0.2, 1 / 0.5 and 7 / 0.2mm.

(Other sizes available on request)

### TEMPERATURES

The insulation on these cables has a usable temperature range of -75 °C to +250/300 °C depending on working conditions.

## PVC INSULATED

9. PVC insulated. (Fig 5) Available in 1 / 0.5 and 7 / 0.2mm.
10. PVC insulated twisted pair. (Fig 1) Available in 1 / 0.5 and 7 / 0.2mm.
11. PVC insulated cores, laid parallel and sheathed with overall jacket of PVC. (Fig 4) Available in 7 / 0.2, 13 / 0.2 and 23 / 0.2mm
12. Stainless steel or tinned copper braid applied to finished cable to give protection in abrasive conditions. (Fig 3). Available in 7 / 0.2, 13 / 0.2, and 23 / 0.2mm.

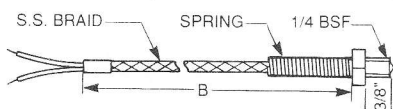
(Other sizes available on request).

### TEMPERATURES

The high temperature PVC insulation used on these cables has a usable temperature range of -10 °C to +105 °C.

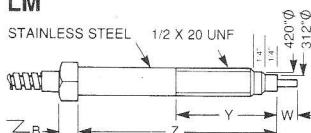
## THERMOCOUPLES FOR PLASTIC MACHINES

### NOZZLE THERMOCOUPLE TYPE LZ



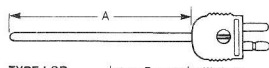
For use in tapped holes from 3 to 10mm deep

### MELT THERMOCOUPLE TYPE LM

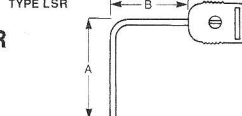


Dual element versions available - specify type LM2.

### PLUG AND JACK TYPES TYPE LP

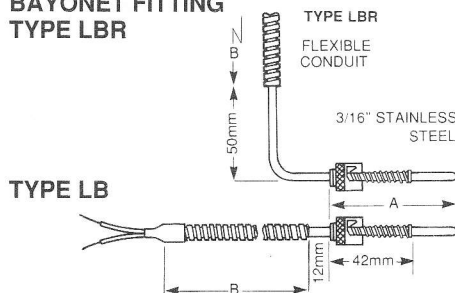


### TYPE LSR

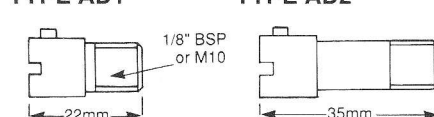


May be supplied with bayonet fitting (LPB or LSB) or compression fitting (LPC or LSC). Note that on bayonet fitting types, the 'A' dimension is measured from the tip to the rear of the bayonet cap.

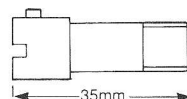
### BAYONET FITTING TYPE LBR



### BAYONET ADAPTORS TYPE AD1



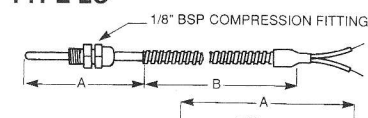
### TYPE AD2



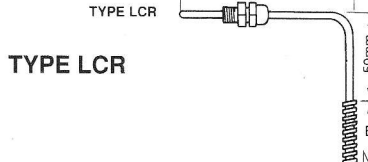
### SELECTING 'A' DIMENSION

Using adaptor AD1 - A = h + 25mm  
Using adaptor AD2 - A = h + 38mm  
where 'h' = hole depth prior to fitting adaptor

### COMPRESSION FITTING TYPE LC



### TYPE LCR



## HOW TO ORDER

Specify calibration and style (e.g. KLB, JLCR, etc.) and give appropriate lettered dimensions. Bayonet adaptors are not supplied with LB types and, if required, should be ordered separately.

For flexible lead types, standard dimensions are: 'A' = 100mm, 'B' = 1000mm.

Non-standard fittings and sheath diameters, also continental types, are available to special order.

**G & MB FITMEC**

**G & MB FITMEC LIMITED**

COWLING STREET,  
OLDHAM OL8 1UY

**TEL: 061 620 0410**  
**061 620 3888**

**FAX: 061 627 0507**

**TELEX: 635091 ALBION G**