

and steady temperatures—generally 200, 400 and 600°C. The bath temperature is controlled electrically and is determined by reference to a standard platinum resistance thermometer used in conjunction with an a.c. double bridge having inductively-coupled ratio arms. As a secondary standard instrument the resistance thermometer is itself calibrated by the N.P.L. Measurement Group in terms of IPTS-68 and is capable of measuring temperature to an accuracy of a few millidegrees Celsius.

Throughout the tests the e.m.f. measurements are effected by means of a precision vernier potentiometer or by a digital voltmeter of comparable discrimination and as a normal precaution against the effects of stray thermal e.m.f.s a reversing switch is included in the measuring system.

The calibration is concluded with the compilation of a table recording the e.m.f. output of the thermocouple quoted to the nearest microvolt for a series of nominal temperatures covering the range. Provided that the per-

formance of the thermocouple has been satisfactory the calibration is given an accuracy of $\pm 0.3^\circ\text{C}$.

Sensitive devices like these thermocouples call for special care in manufacture, in carriage and in use. Johnson Matthey Metals have recently introduced a foam-lined case, shown in Fig. 1, in which each thermocouple is sent to the National Physical Laboratory for calibration. On return from N.P.L. each thermocouple is despatched in its case, together with its N.P.L. calibration report, from Johnson Matthey direct to the customer, thereby ensuring that its accuracy is not impaired in transit by cold work induced by handling during transfer from one case to another. Thereafter the life of the calibration is finite, of course, and the rate of change from calibration will depend upon the frequency and conditions of use.

Reference

1 T. J. Quinn and T. R. D. Chandler, *Platinum Metals Rev.*, 1972, 16, (1), 2-9

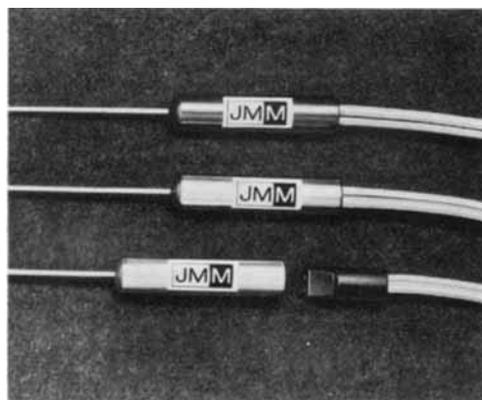
Connectors for Metal Clad Thermocouples

PLUG-IN END CAPS FOR COMPENSATING LEADS

A new type of end connector recently developed by Johnson Matthey Metals Limited enables the compensating lead to be disconnected from the thermocouple, so making thermocouple replacement simpler. The new unit makes it possible to connect one lead in turn to any number of thermocouples, thus saving on the number of leads and temperature recording instruments.

Housed within the anodised aluminium case are gold plated pins and sockets, to which are soldered the thermocouple wires and the compensating cable respectively. The assembly is then encapsulated in nylon to form a two-piece connector, each half bearing corresponding flats to ensure correct polarity with every connection.

These end connectors satisfactorily withstand operating temperatures of up to 100°C, the normal working temperature of the compensating lead. At this temperature stray e.m.f.s at the pin and socket junctions are negligible and do not affect output of the thermocouple.



Colour coding of the aluminium cases easily identifies thermocouples; red denotes platinum: 13 per cent rhodium-platinum, gold denotes platinum: 10 per cent rhodium-platinum, and silver or neutral colour other combinations (5 per cent Rh-Pt: 20 per cent Rh-Pt, 6 per cent Rh-Pt: 30 per cent Rh-Pt, Pallador).