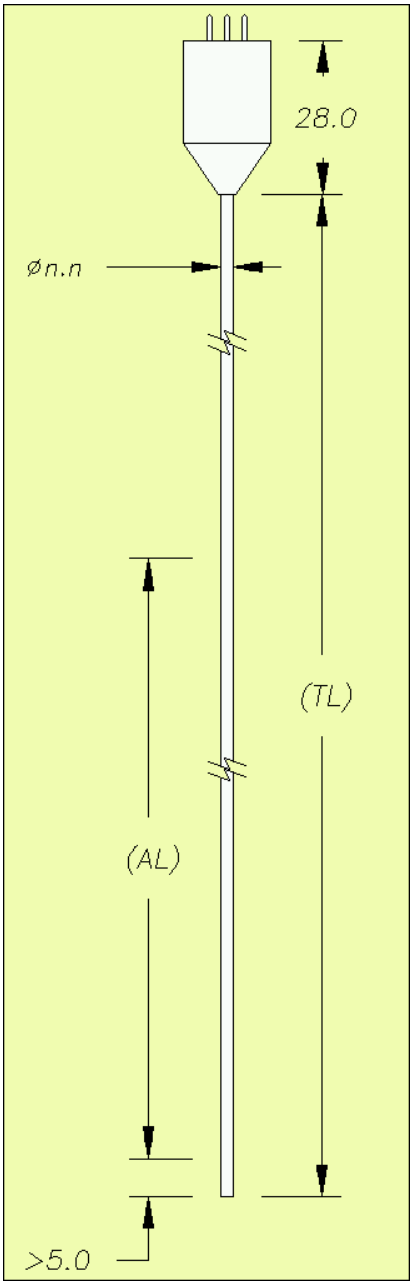
Twickenham
Scientific Instruments

Helium Probes



An Sx- series Helium probe.

Helium level gauge probes to operate with the HDI range of level gauges are available in a number of series. All probes are made using a linear (Niobium Titanium) superconducting wire from one of two ranges as the sensing element, and this is enclosed in a perforated protective tube to allow liquid helium to circulate around the element. The outer tubes are available in a choice of materials and diameters.

The standard series of probes suit most applications, but Twickenham also specialises in custom made probes with unusual materials or parameters. There are two base range materials that are used, Stainless Steel and pultruded Glass fibre. Probes can be made in either of these materials to almost any length required. Other tube materials, such as PTFE (Teflon) and PEEK are also available or in development.

Most probes are single element units, but Twickenham also offers dual element versions with effective active lengths of up to 4000 mm. Such a probe, when coupled to an HDI, can be arranged to add the readings from both elements and display the total.

With ever expanding demands and availability of materials, we are able to consider new geometries, sizes and constructional techniques in order to provide a suitable probe for the requirement.

All probes fitted with the 7M 7 pin termination can be plugged directly into the HDI via the probe cable. The probe's calibration (its active length) is simply entered into the HDI, and the system is then ready to make measurements.

Other terminations for probes include wire - of various materials and insulations, or other special or alternative connectors to suit the requirements of installation.

Probe Series

Stainless Steel (Sx-) series.

Diameter: 2.1 mm; 2.4, 2.7 mm available on request or for special requirements, but that may increase delivery times.

Length: Up to 2000 mm in 2.1 mm diameter.

Note: For the 7M termination, the connector and housing add an extra 28 mm to the overall length.

Glass Fibre (Gx-) series.

Diameter: 6.3 mm (1/4"); 5.5 mm available on request or for special requirements.

Length: Up to 4000 mm.

Notes: This is pultruded glass fibre tubing. For the 7M termination, the connector and housing add an extra 23 mm to the overall length.

Teflon (PTFE) (Px-) series.

Diameter: 2.8 mm.

Length: Up to 2000 mm.

Note: Normally wire terminated.

PEEK (Kx-) series.

Diameter: 3.1 mm (1/8").

Length: Up to 1000 mm.

Note: Wire termination versions will be radiation hard.

Radiation hard (Rx-) series.

Diameter: 2.9 mm.

Length: Up to 2000 mm.

Note: A variant of the Sx- series, in development, but with prototype units in use.

Probe Ranges

In order to ensure continuing supply, additional ranges of helium probes have, and will be introduced. The difference is with the normal state resistivity of the superconducting element. Probes using the original superconducting element are designated as the S range. Probes with the second range of superconducting elements now introduced are designated as the G range.

A Glass fibre series probe, with the original superconducting element has the initial two-letter code **GS**†. A Stainless steel series probe with the second range of superconducting element has the initial two-letter code **SG**.

To display the correct readings with these G range probes, the HDI unit requires a change in calibration; those that have this calibration changed at the factory are given the G calibration, but this can be done on existing units already installed in systems. Probes from this range are regularly supplied to original equipment manufacturers (OEMs).

†. This particular combination of series and range was formerly described as GF, and is the only change to probe descriptions.

Probe Terminations - connectors

Three types of connectors are usually offered as terminations.

7 pin Male (7M) termination.

The usual termination for any probe that runs out to room temperature. This is a glass-to-metal sealed connector, which itself is sealed into the connector housing at the top of the probe. It is shown in the drawing on the first page.

7 pin Fischer (7F) termination.

An alternative termination to the 7M, this uses a hermetically sealed Fischer connector (part number DBEE102Z056), which has an O ring seal to the connector housing.

4 pin cryogenic (4S) termination.

For helium probes that do not run out to room temperature, but need to be dismantled from the system regularly, we offer a 4 pin cryogenic termination. The length of the connector housing (30 mm long, 8 mm diameter) is *included* in the total length of these probes. Allow at least 20 mm to manoeuver the supplied mating half.

Probe Terminations - wire ended

Twickenham currently offers five types of wire termination to match various requirements for permanantly installed probes. When a wire termination is required, a number (the length of the wire in mm) is put in the termination part of the probe part number. The optional types of wiring offered are then designated by the option letter placed after the diameter in the probe part number.

Wires are identified by the colour of the insulation (copper wires, and T option); insulation colour and short teflon sleeves (E option); or by short colour coded teflon sleeves (M and F options).

Enamelled copper wires (usual wiring).

Diameter: 0.2 mm for current, 0.1 mm for voltage.

Enamelled constantan (CuNi) wires (E option).

Diameter: 0.2 mm

Teflon (PTFE) insulated constantan wires (T option).

Diameter: 0.25 mm, 0.4 mm with insulation.

Note: This option has a small collar, 18 mm long and 5 mm diameter at the top of the probe. Its length is *included* in the total length.

Polyimide insulated copper wires (M option).

Diameter: 0.2 mm.

Polyimide insulated Phosphor-Bronze wires (F option).

Diameter: 0.2 mm.

Terminations - general points

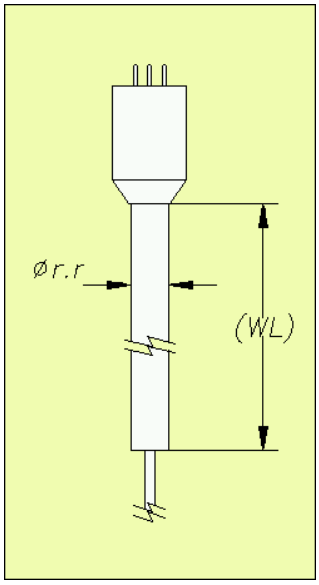
When fitted, the top 7 pin 7M or 7F connectors are wired in one of two standard ways, designated types A and B, corresponding to those channels on the HDI. Probes with an active length < 555 mm are *usually* wired as type A, others as type B, but this can be altered as necessary.

The E, M and F options described in the wire termination section may also be used for helium probes with a connector termination for special applications.

Other types of electrical connectors can be fitted as demanded by the system, for example for potential high pressure operation.

Collar option

A large number of systems require helium probes of small thermal mass, but have an access port which will not seal to Twickenham's standard 2.1 mm diameter range. Probes can be specified with a top section made from a larger diameter tube, to suit the access port of the system. Top section tube diameters, specified as *rr*, are available from 3.2 to 12.7 mm. The length of this top section, specified as *WL*, is typically 60 mm.



Collar option details

Still Well options

Twickenham strongly recommend the Still Well option for any helium probe that is to be installed in a liquefier system when no other still well provision is provided. This still well still gives an outside diameter of the whole assembly as small as 4.0 mm, other sizes are available. There are two versions, SW and PW, with the PW being most suitable for probes which also require a larger diameter collar as well.

How to Order

The part number of the probe identifies all its principle parameters. The generalised part number is

MR-TL-AL-CN-nn [Option(s)]

where:

MR is the general probe descriptor two-letter code. The first letter of this code describes the series (tubing material) and the second the range (superconducting element) of probe;

TL is the total length of the tube in mm. Note that the external probe connector cap is extra to this, and for 2.1 mm diameter probes is an extra 28 mm. For probes with the 4S connector or the T option, the total length includes the top section termination housing;

AL is the active length of the probe in mm;

CN describes the termination. 7M indicates the standard 7 pin male connector, 7F the alternative Fischer male connector, 4S the cryogenic 4 pin connector, and other types and styles of connector are specified and used for particular applications, whereas a number indicates the length of the terminating wires in mm;

nn gives the diameter of the tube in tenths of mm (1/10 mm)

The options are specified by their codes after the probe tube diameter. The currently available options are:

E for wire ended probes with enamelled constantan wire;

T for wire ended probes with PTFE (Teflon) insulated constantan wire;

M for wire ended probes with polyimide insulated copper wire;

F for wire ended probes with polyimide insulated phosphor bronze wire;

D where the probe tube has holes every 25 mm instead of the standard 50 mm;

/rr(WL) for a collar option, with a diameter of r.r mm, and length of WL mm.

When a still well is required, the nn of the probe part number is replaced by the outside diameter of the still well, rr, in the following manner:

rrSW(CL) for the SW Still Well option, with outside diameter r.r mm; this is usually 4.0 mm. CL is the length of the top collar (part of the main probe) of the same diameter;

rrPW for the PW Still well option, with outside diameter r.r mm; this is usually 4.0 mm;

If other options are required with the still well, they are then specified after the chosen still well option code.

Because of the enormous range of possible probes that are available, we will be please to quote to your individual requirements.

Registered office: 61d St Margaret's Road, Twickenham, Middlesex, TW1 2LL, UK.
Telephone +44 20 8892 7400 *Fax* +44 20 8892 7436 *email* sales@twicksci.co.uk
www.twicksci.co.uk

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