

Twickenham

Application note on the use of Twickenham Scientific Instruments nitrogen level probes.

This note is intended for users of the nitrogen probe, either as a stand alone unit or as a probe attached to the Helium Depth Indicator (HDI).

Part number scheme

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

where:

NC is the two letter code describing the series of probe;

- TL is the total length of the tube in mm. This does not include the connector and housing at the top;
- AL is the active length of the probe in mm;
- P designates the wiring pinout type: A or B, for operation on the corresponding channel of the HDI, V for the 0 10 V or I for the 4 20 mA output options;
- nn gives the diameter of the feeder tube in tenths of mm (1/10 mm);
- rr gives the diameter of the tube at the seal point in tenths of mm (1/10 mm);

(WL) gives the length of the (larger) seal point tube section in mm.

The sections of the part number in slanted text are only necessary when the larger collar option is required and are otherwise omitted.

Mechanical construction

The thin wall stainless steel tube that is used to construct the main part of the probe is strong enough for normal use; it will permanently deform if abused, causing failure of the probe. It is NOT recommended that the connecting lead is connected to the probe before it is inserted into a dewar, but that it is connected after the probe is fully inserted.

Should the locking ring which keeps hold of the top assembly become loose, it should only be tightened to finger tight; excessive force could damage the nitrogen probe, and this is not covered by warranty.

Wiring of the probe

There are four possible wirings for the probe, and this is indicated in the probe's part number. The options 'A' and 'B' are for operation of the probe on those channels of the HDI.

For operation in the stand alone modes, the probe should be wired up according to the pin assignment as shown in the following table N1.

Calibration of the probe to the controller

For successful operation with the HDI, it is necessary to configure the controller for the nitrogen probe to operate on the required channel; refer to section 5 of the HDI manual for complete instructions for this. Note that the HDI requires configuration, as the default state is for helium probes. It is not advisable to connect the nitrogen probe to the HDI without the configuration having first been done.

Connector pin	V option function	I option function
А		$4 - 20 \mathrm{mA}$ +ve output
В		$4 - 20 \mathrm{mA}$ –ve output
С	0 V	
D	0 - $10 V$ +ve output	0 - 10 V +ve output
Ε	0 - $10 \mathrm{V}$ –ve output	0 - $10 \mathrm{V}$ –ve output
F	18 - 24 V supply	

Table N.1. The wiring of the nitrogen probe with the 'V' and 'I' options.

Simple trouble shooting and diagnostics

A nearly zero reading

If the probe has just been inserted, it will take a few moments for the element to come into thermal equilibrium with the liquid nitrogen, and during that time, the reading will be seen to be rising steadily.

If the reading remains zero, or is rising very slowly, it is possible that there is a plug of solid material, such as water ice at the bottom of the probe, or some of the sediment which appears at the bottom of some types of dewar. Thermal cycling (and gentle warming) to remove the solid (and physical removal of any debris) will normally restore the probe to good working order.

Apparently under reading and/or the level being 'stuck' at a value

Again it is possible that a plug of solid material, such as water ice has blocked one of the internal venting holes, preventing the liquid getting into all of the active length. As above, thermal cycling (and gentle warming) to remove the solid will normally restore the probe to good working order.

The reading of the HDI is always at the maximum value

Switch off the HDI immediately. For nitrogen probes used with a (configured) HDI, the reading should be zero when it is at room temperature. Ensure that the HDI has been configured for the nitrogen probe to operate on the correct channel (which is stated in the probe part number). An incorrect configuration of the HDI often causes the reading to be always maximum.

Similarly, for the stand alone units, at room temperature the unit should give 0 V or 4 mA for the V and I options respectively. These probes are set to give maximum output when the active length is fully covered with nitrogen.

If problems persist, please contact the staff at Twickenham Scientific Instruments on +44 (0) 20 8892 7400.