SKH 2053

4-20mA RH / TEMPERATURE PROBE

Skye Instruments Ltd
21 Ddole Enterprise Park
Llandrindod Wells
Powys
LD1 6DF
UK

Tel: +44 (0) 1597 824811
Fax: +44 (0) 1597 824812
Email: skyemail@skyeinstruments.com
Web: www.skyeinstruments.com

CONTENTS

SKH 2053 RELATIVE HUMIDITY & TEMPERATURE PROBE

This unit has the same specifications as for other members of the SKH 2000 series, except that it has a current instead of coltage output.

It has a 4 core cable with an uncommitted screen, which, if desired, may be connected to either core, a system earth, or left unconnected.

Colours are as follows:-

Red	-	Positive supply
Green	-	Negative return for humidity
Yellow	-	Negative return for temperature
Grey	-	Screen
Blue	-	Not used

The supply voltage is 12-36 volts and the current, dependent on humidity, is between 4 and 20mA.

On the temperature return, 20mA corresponds to 70ºC and 4mA to -20ºC, with linear scale in between.

On the humidity return 4mA corresponds to 0%RH and 20mA to 100%, with linear scale between. As with other systems, when there is water present on the sensor, indicated humidity may exceed 100% or 20mA until the sensor dries out.

The limit of 36 volts must not be exceeded and incorrect operation will result below 12volts. The unit is reverse protected.

The humidity sensor will not be harmed by breathable concentrators of contaminants or pollutants and in the open air, life of the capacitative sensor should be in excess of 2-3 years.

The unit may be used with the gauze screen in place for protection against dirt and dust etc., or alternatively, for fastest response but only in clean indoor environments, the end cap may be unplugged and the gauze screen removed by sliding it off.

MEASURING HUMIDITY

The sensitive elements employed in the SKH 2000 and 2050 series probes measure relative humidity by calculating (electronically), by means of oscillators, etc. the capacitance of a metal plate capacitor with a permeable top plate and dielectric. The top plate is “cracked chromium”, being a very thin evaporated layer that has been stretched and crackedf (see illustration). The dielectric absorbs water vapour according to the Relative Humidity of its environment. The cracks have a small width, 100nm or less, thus liquid phase water penetration is prevented.

Thus, as the Relative Humidity around the sensor changes, the electronics converts the capacitance change of the sensor into a linear voltage. This is scaled to Relative Humidity 4-20mA equivalent to 0-100% RH.

Response speed of the sensor is high, responding to 90% of a 50% RH step change in less than 2 seconds, though rarely in use will such suddent changes be encountered. It should, however, be bourne in mind that the process of diffusion of water molecules in the dielectric, does take a finite time, and when used in colsed vessels (e.g. the probe is used to equilibriate with grain etc. in a conical flask) with unstirred air, then approx 20 mins should be allowed before the final readings are taken. This time will be reduced where only a small changes of %RH (%) and conversely greater times with large changes (50%) of RH must be allowed.

Where the probe is used in free air or can be moved or waved about to promote air flow past the sensor, it will equilibriate in a matter of seconds, depending on the step change of hjmidity it has been subjected to.

Where the probe is used inside a closed vessel, e.g. sealed in the neck of a flask, then the contents of the vessel must be maintained at a constant and known temperature, since for many materials, temperature will affect the equilibrium Relative Humidity.

When the probe is used in conditions of saturation or above 97%RH, then condensation may readily occur on the sensor (although it can occur under other conditions) giving rise to parallel capacitance and resistive errors at the sensor and consequently readings will not have the normal 2% accuracy. Above 98%RH the instrument may have 4% error, and if condensation occurs, which is hard to avoid at the level of humidity, erroneous readings will result. Condensation such as this, will not harm the sensor or affect its long term calibration, but a period of settling at lower humidities will be required to dry the sensor. Similarly, if the probe is suddenly taken from a cold area to a warm room or breathed on, condensation may form, as it also will when exposed closely to hot moist air. Time will be needed for the sensors temperature to equilibriate. However, when this has occurred, the final temperature will not affect readings.

The probe may be mounted at any angle, but the location should be considered. If exposed directly to the sun, then both RH and temperature readings will not those of the bulk surrounding air. This can be avoided by the use of a screen (SKRS080 or Stevenson pattern). Such a sensor will also protect the sensors from rain and “fallout” of dirt from the air.

SENSOR RECALIBRATION

All probes and meters may be recalibrated by returning them to the factory for a nominal charge.

Periodic checks amy be made by the user, employing simple apparatus. A kit, SKH 1093, is available with complete instructions.

Checks are made using a saturated solution of Sodium Chloride and alumino silicate granules. To obtain accuracy, care must be taken to use clean glassware and a constant temperature waterbath.

250ml glass conical flasks are used, one containing about 50mls of saturated Sodium Chloride, the other about 30-40grammes of alumino silicate granules. They should be immersed in a constant temperature bath and allowed to equilibriate for several hours, the top of each flask being completely sealed, when not used with the sensor.

The Sodium Chloride will be a 75.4% * reference, the alumino silicate 1.0% (after 24hrs).

Using a suitable seal (obtainable from Skye Instruments) the sensor can be sealed into the neck of the zero reference flask. After approximately 2 hours the reading should be 1.2 to 1.4%. Some agitation of the granules will speed the equilibrium. Overnight equilibriation should give 0.9 – 1.1%. Slight adjustment of the zero potentiometer (see diagram) may be required.

The 75.4% Reference may then be used, again allowing several hours preferably overnight for equilibriation. Slight adjustment of the full scale potentiometer amy be required.

The location of each potentiometer is shown on the diagrams of the probe type supplied. Procedure for calibrating each probe is as previously described.

If it is not possible or practical to dismount the probe then a single point trim may be performed. This is acceptable since the zero drift is very small, and the slope or gain (full scale) is usually all that required adjustment. A calibrated “Assman” hygrometer should be used adjacent to the probe under test, and the full scale control adjusted until the probe and the Assman agree. If an Assman is not available, then a less ideal check can be made with a whirling hygrometer. Great care must then be taken to check the individual thermometer errors, and ensure that the instrument is “whirled” for an adequate period. In both cases, the wicks must be clean and correctly wetted with pure distilled water.

ACCESSORIES

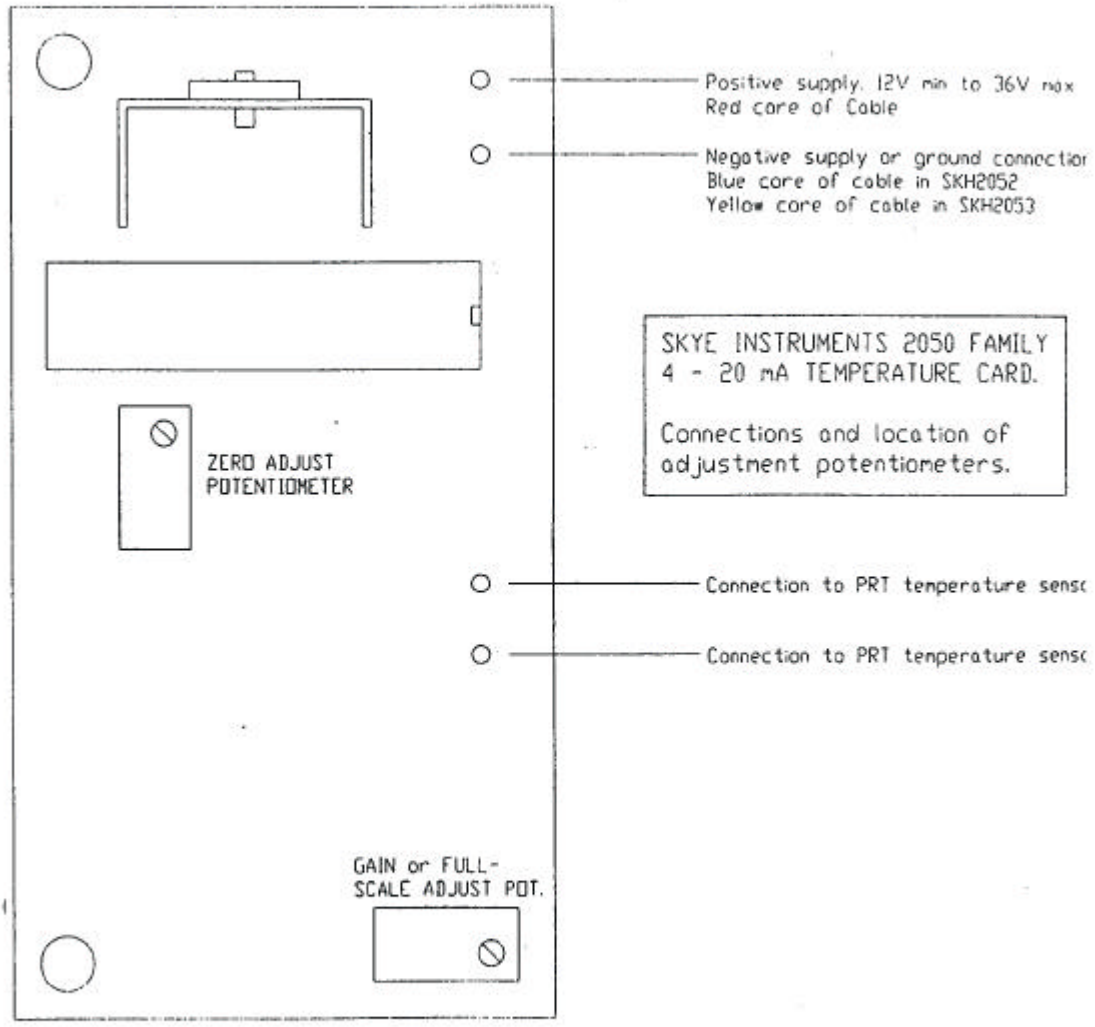
SKHA	Sodium Chloride
SKHA	Alumino Silicate
SKHA	Sealing ring for probes in 250 / 500ml flasks
SKHA	250ml flask

A recalibration kit, SKH 1093, is available giving all that is needed for recalibration, complete with detailed instructions.

76.0% at 10 degrees Celcius
75.4% at 20 degrees Celcius
75.0% at 25 degrees Celcius

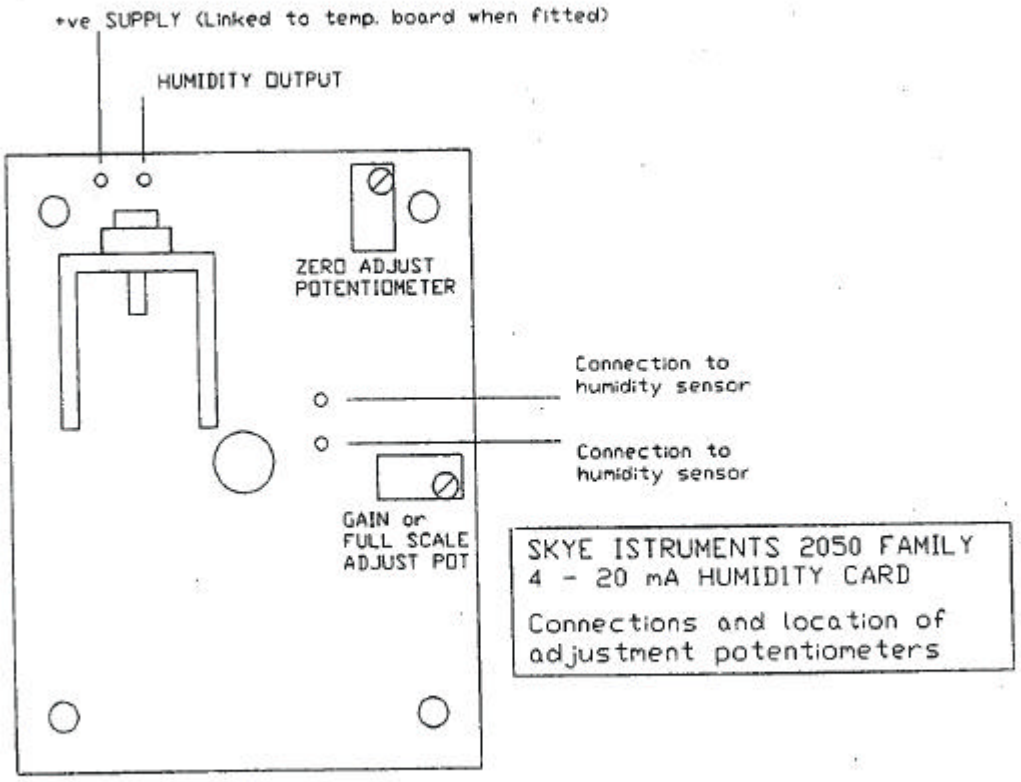
SKYE SKH 2050 SERIES 4-20mA TEMPERATURE CARD

Connections and location of adjustment potentiometers



SKYE SKH 2050 SERIES 4-20mA HUMIDITY CARD

Connections and location of adjustment potentiometers



INSTRUCTIONS FOR FITTING RADIATION SCREEN TO RH / TEMPERATURE PROBE

1. Remove base of probe
2. Unscrew the 4 stainless steel screws located in the 4 pillars of the screen
3. With the screen standing on its 4 dome nuts, locate the extension part of the probe in the central holes with housing resting on the 4 pillars.
4. The 4 stainless steel screws screw the box to the 4 pillars from the inside of the box. Holes in the box line up with these pillars.
5. Screw up firmly without overtightening
6. Replace the base of the probe.