



Manual

Temperature Probes

Models 6507E and 6535A



Revision History

File name / Revision	Date	Authors & Change Details	Checked/ Approved
Previous version BX	2004	RS/JH	MS
Unidata Manual 6507 6535 - Temperature probes Issue 2.0	2007	AB/CB/JH/MS/KC	MS
Unidata Manual - 6507 6535 Temperature probes Issue 3.0	11 09 13	MP	
Unidata Manual - 6507A 6507D and 6535A Temperature Probes Issue 4.0.docx	03 06 14	IM/CB Update	MS
Unidata Manual - 6507E and 6535A Temperature Probes Issue 4.1.docx	12 10 17	IM Product number update	DM
Unidata Manual - 6507E and 6535A Temperature Probes 15 01 2019.docx	15 01 19	IM Page 7 Update	PD

Copyright © Unidata Pty Ltd 2000-2013. All rights reserved. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any spoken or computer language, in any form or by any means. Electronic, mechanical, magnetic, optical, chemical, manual or otherwise, without prior written permission of Unidata Pty Ltd 40 Ladner St, O'Connor Western Australia 6163.



TABLE OF CONTENTS

1.0	Introduction	1
1.1	Thermistor Probes	1
1.2	Linear Temperature Probe	1
2.0	Using A Probe In A Starlog Scheme	2
2.1	Adding an Instrument using V4 software	2
3.0	Installation and connections.....	7
3.1	Thermistor Probes	7
4.0	Calibration	8
4.1	Thermistor Correction Formula	8
5.0	Instrument Testing.....	9
6.0	Specifications.....	9
6.1	Model 6507E Thermistor Probes.....	9
6.2	Model 6535A Linear Temperature Probe	9
7.0	Appendix A - Thermistor Range Tables.....	10
7.1	Thermistor Range Table.....	10
7.2	Thermistor Resolution Tables for Starlogger	10

1.0 INTRODUCTION

This supplement provides information about temperature probes, in particular, the probes listed below. Some of the following information relates to any type of thermistor probe allowing a wide range of thermistors to be used with the Starlog Data Logger.

This supplement includes descriptions and operating instructions for:

- Model 6507E Thermistor Temperature Probe
- Model 6535A Linear Temperature Probe (LM34)

1.1 Thermistor Probes

These Negative Temperature Coefficient (NTC) thermistors are high quality, precision curve matched elements, available for a wide range of temperatures. Used in conjunction with thermistor reference resistors, these probes are interchangeable and retain factory calibration for two years or more.

1.2 Linear Temperature Probe

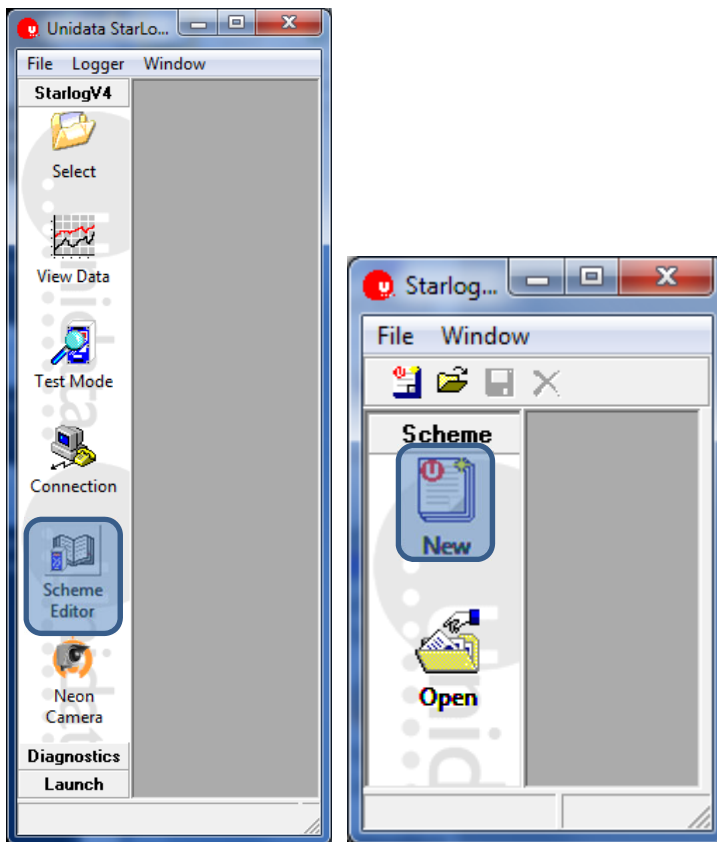
The linear temperature probe is used for measuring temperatures between -17.8°C and 100°C . The output signal is a DC voltage which is directly proportional to the temperature. This is especially useful for use with the Model 6004-2 Starlogger which can only display linear formulae on its LCD.

2.0 USING A PROBE IN A STARLOG SCHEME

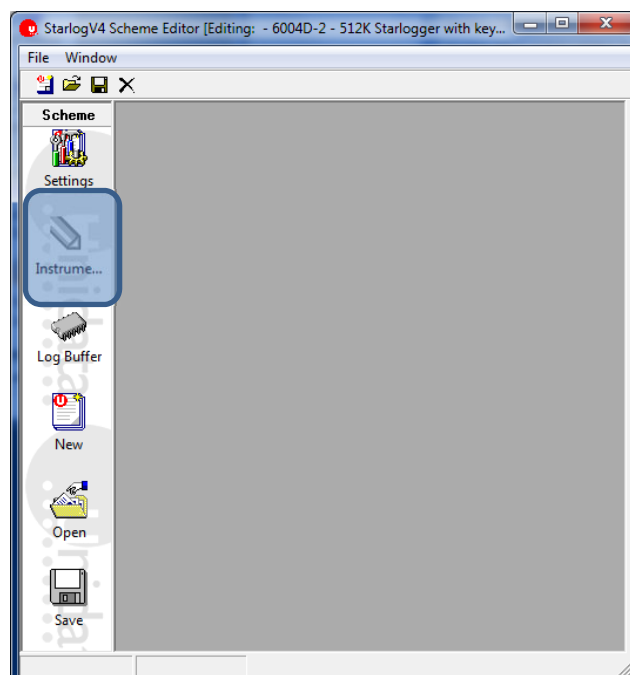
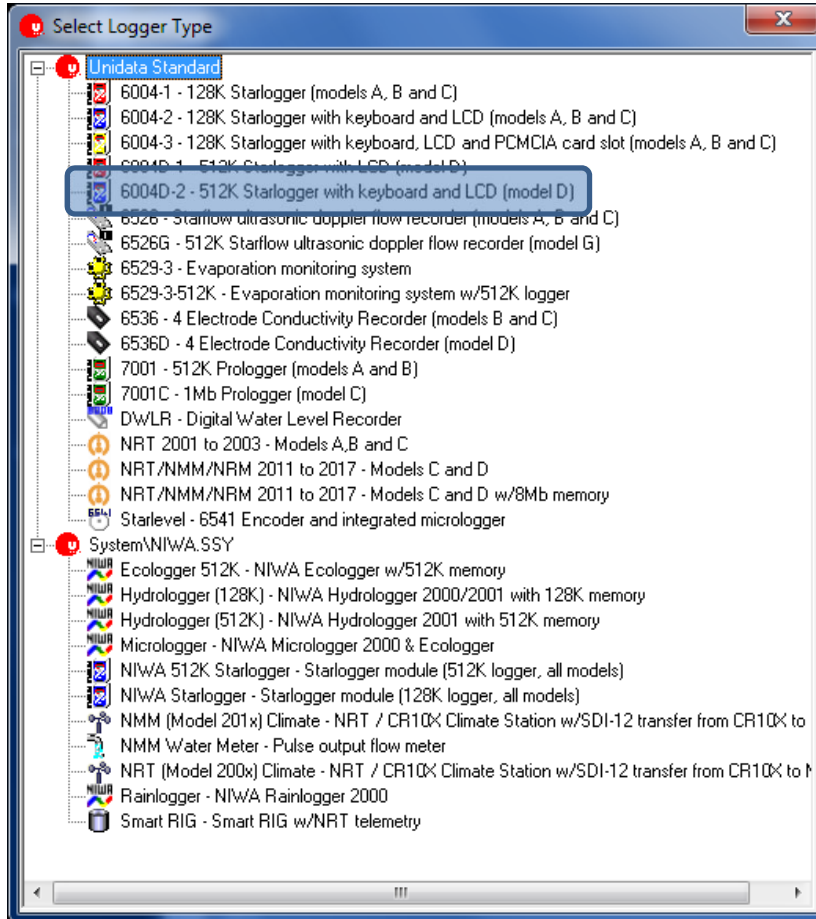
Unidata’s temperature probes are designed for automatic monitoring and collection of temperature data in a Starlog Data Logging System. When the probes are connected to a data logger, data sensed by the probes is logged and stored according to a program you define using the Starlog V4 software.

2.1 Adding an Instrument using V4 software

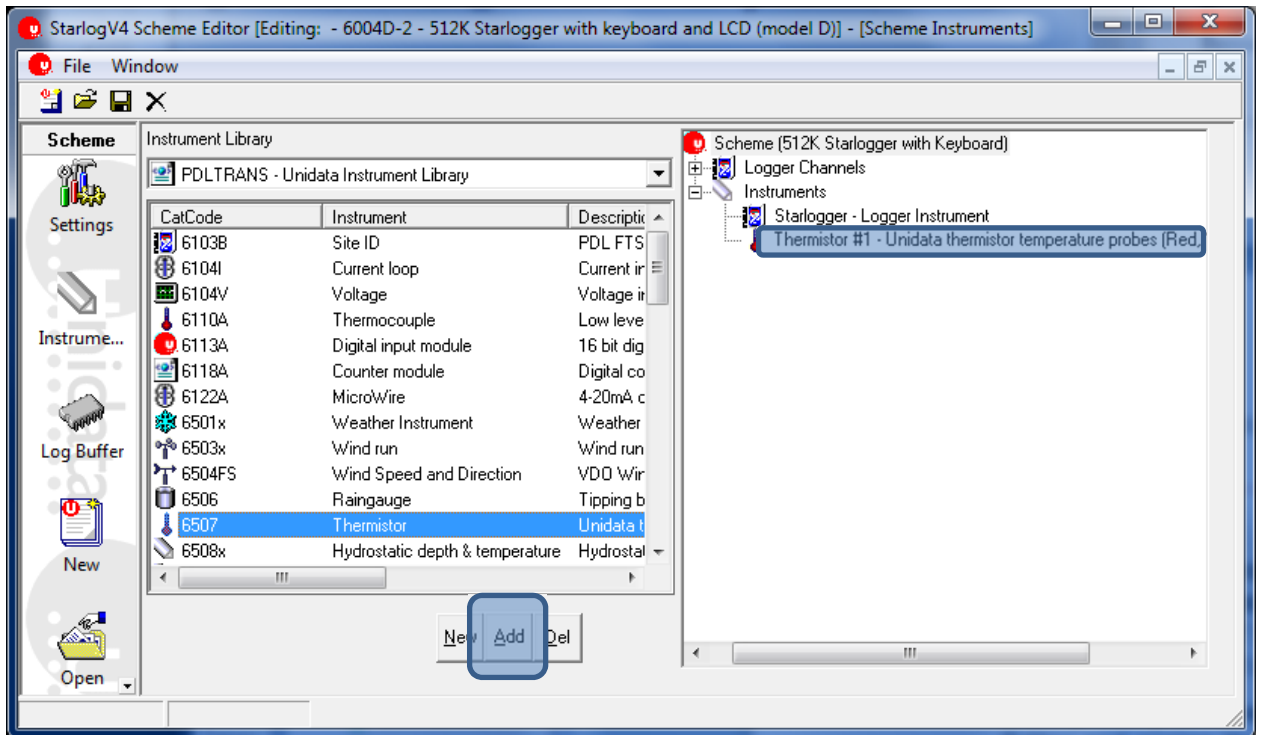
To create a temperature monitoring scheme, select a Scheme Editor, New



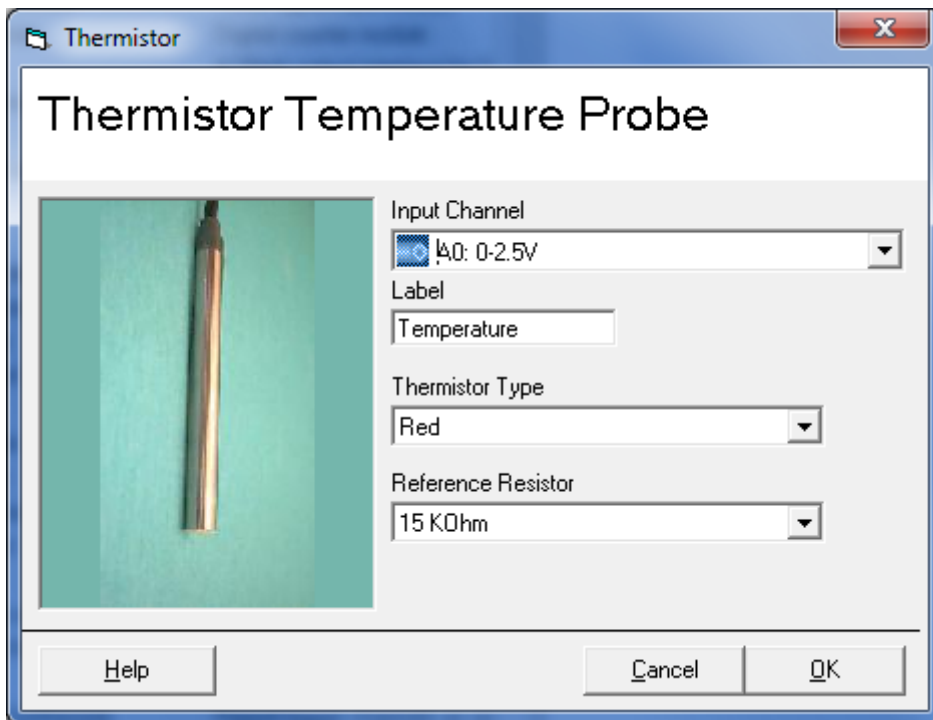
Select logger that you intend to use (e.g.6004-2 512K Starlogger), select Instruments



Select 6507 Thermistor instrument and Add



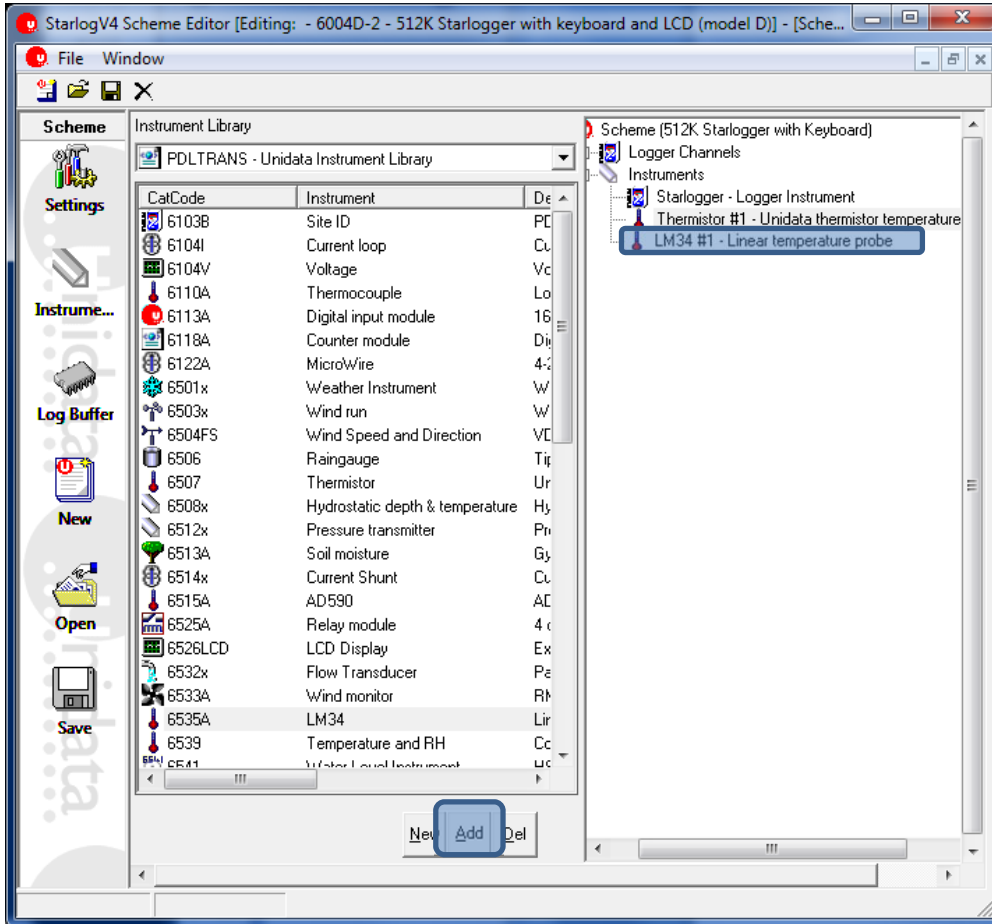
Double click on selected scheme



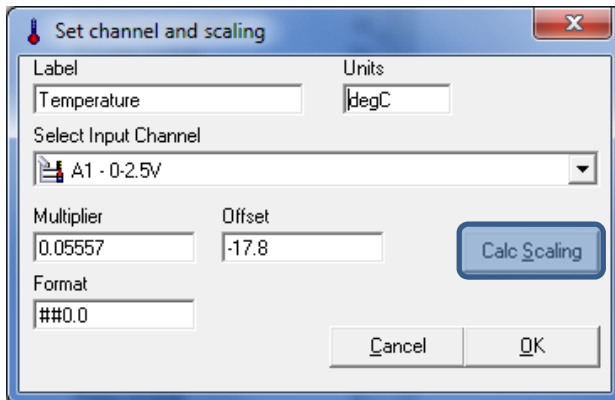
Select input channel, thermistor type (Red) and reference resistor (15KΩ)
OK

6535A Linear Temperature Probe

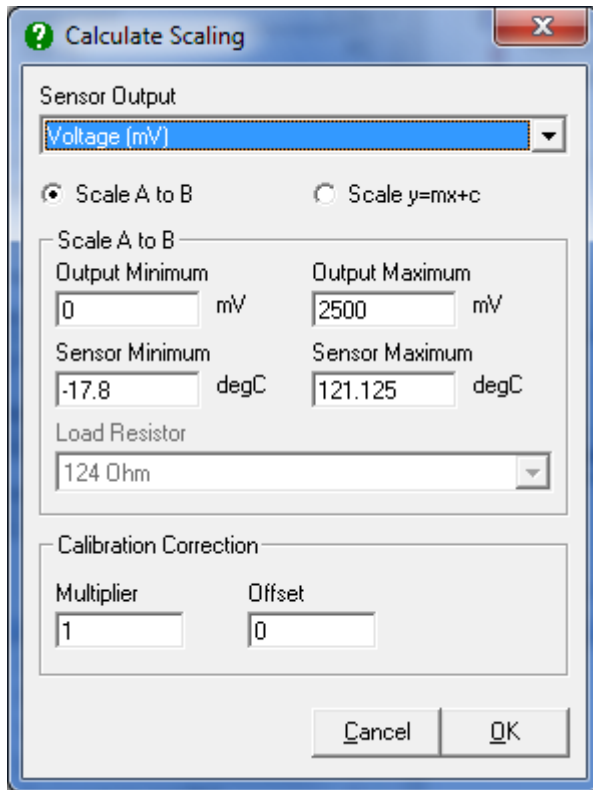
Select 6535A linear temperature probe instrument and Add



Double click on selected scheme



Select sensor output (mV), output min and max, temperature range min and max, OK



Calculate Scaling

Sensor Output
Voltage (mV)

Scale A to B Scale $y=mx+c$

Scale A to B

Output Minimum	0	mV	Output Maximum	2500	mV
Sensor Minimum	-17.8	degC	Sensor Maximum	121.125	degC

Load Resistor
124 Ohm

Calibration Correction

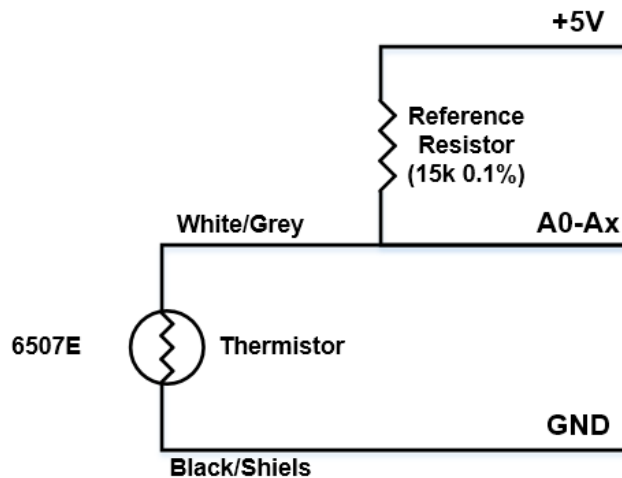
Multiplier	1	Offset	0
------------	---	--------	---

Cancel OK

3.0 INSTALLATION AND CONNECTIONS

3.1 Thermistor Probes

The thermistor probe connects to a data logger through corresponding FTS. The connection is not polarised so either thermistor lead can be connected to the signal input. The thermistor acts as a passive voltage divider (potentiometer) and therefore must be referenced to the logger power via a precision reference resistor (usually 15kΩ). This reference is connected from the Analog +ve input to the logger power (+5V).



Probe	Colour	Function	Starlogger 6103E FTS Terminal	Prologger 7100E FTS Terminal	Micrologger Terminal	NRT 2103F-S5 FTS Terminal	2013F NRT
6507E	White/Grey	Analog +ve	18	18	ANL 0	A0	N/A
	Black/Shield	Ground	20	19	AGND	AGND	N/A
	Ref Resistor	Side 1	18	18	ANL 0	A0	N/A
	Ref Resistor	Side 2	17	14	UPS	UPS	N/A
6535A	Red	+5V DC	15	14	UPS	UPS	UPS
	Yellow	Analog +ve	18	18	ANL 0	A0	A0
	Green	Ground	20	19	AGND	AGND	AGND

4.0 CALIBRATION

4.1 Thermistor Correction Formula

The measurement made by the Data Logger is an inverse logarithmic function of the temperature being recorded. To interpret the actual measured temperature (in °C), apply the following correction formula:

$$T(^{\circ}\text{C}) = \frac{B}{\ln\left(\frac{R}{(500/V - 1)}\right) - A} - (C + 273.15)$$

Where

- T is the measured temperature in degrees celsius
- V is the value (0–255) recorded by the Data Logger
- R is the reference resistance in ohms
- A, B & C are constants for red probe:
A = -6.913, B = 5078, C = 42.24

Example 1 Red probes fitted with a 15k resistor

$$T(^{\circ}\text{C})(V) = \frac{5078}{\ln\left(\frac{15000}{(500/V - 1)}\right) - (-6.913)} - (42.24 + 273.15)$$

$$T(^{\circ}\text{C})(V) = \frac{5078}{\ln\left(\frac{15000}{(500/V - 1)}\right) + 6.913} - 315.39$$

- V=1 T=176.85°C
- V=80 T=26.09°C
- V=255 T=-8.91°C

5.0 INSTRUMENT TESTING

To test the Temperature Probe when connected to a Starlog Data Logger, you can connect the Logger to a computer running Starlog Software. The steps below explain how to use Scheme Test Mode.

1. Connect the Temperature Probe to the Data Logger
2. Connect the Logger to the Computer.
3. Using the Scheme Editor, create a Temperature Monitoring Scheme using the instrument you are about to test.
4. Program the Logger with this Scheme.
5. Select Scheme Test Mode to test the scheme you just generated.
6. The Test Window you see includes general information for a Scheme and the live temperature reading according to the scan rate selected.

6.0 SPECIFICATIONS

6.1 Model 6507E Thermistor Probes

PHYSICAL SPECIFICATIONS

Material: Stainless steel tube epoxy sealed

Size: Dia 6.40mm x 50mm long, different tube lengths available on request

Weight: 350 grams

ELECTRICAL SPECIFICATIONS

Temperature Range: -30°+100°C

Temperature Accuracy: ±0.1°C

Operating voltage: 5 VDC, from logger

Typical current consumption: 0.5mA at 5VDC

Outputs: 1 analog 0-2.55VDC

Cable: 10m or 20m 2 core cable shielded. Other cable length available on request

6.2 Model 6535A Linear Temperature Probe

PHYSICAL SPECIFICATIONS

Material: Stainless steel tube epoxy sealed

Size: Dia 8 mm x 100mm long, different tube lengths available on request

Weight: 350 grams

ELECTRICAL SPECIFICATIONS

Temperature Range: -17.8°+100°C

Temperature Accuracy: ±1.5°C

Operating voltage: 5 VDC, from logger

Typical current consumption: 150µA at 5VDC

Outputs: 1 analog 0-2120mVDC (18mV/°C)

Cable: 10m or 20m 4 core cable shielded. Other cable length available on request

7.0 APPENDIX A - THERMISTOR RANGE TABLES

7.1 Thermistor Range Table

The following tables show temperature ranges applicable if you are using the Model 6004 Starlogger Range in °C for 0.5° resolution (1° resolution)

Reference Resistor	Model 6507E
10kΩ	-1.2° to 45° (65°)
15kΩ	-8.9° to 35° (54°)
47kΩ	-28.7° to 10° (26°)

For example, using the table above, the 6507E probe, with a reference resistor of 15kΩ, has a range of -8.9° to 35°C at a resolution of 0.5°C and 35° to 54°C at a resolution of 1°C.

Temp	6507E Ohms
25°C	3,000Ω
60°C	746.4Ω

7.2 Thermistor Resolution Tables for Starlogger

Resolutions are twice that of the Data Logger. For instance, Red Thermistor with a 15k reference resistor connected to a Starlogger provides a resolution of: 0.302° at 60°C.

Temperature	HIRED10	HIRED15	HIRED47
80°C	0.215°	0.314°	0.955°
60°C	0.105°	0.151°	0.444°
25°C	0.031°	0.040°	0.099°
0°C	0.019°	0.020°	0.034°
-30°C	0.029°	0.023°	0.016°