

AN004 - Application Note
Interpretation of Analog Channel Values

Issue 1.1 JJM 25/04/2006

The reading values returned by an SHM Logger (UL8, UL24, RL32) for Analog or Temperature channels are in the form of 16-bit signed integers.

Signed integers are in the 2's Complement format, as used by all modern computers. Thus a 16-bit signed integer can represent an integer in the range -32768 to +32767. If you are unfamiliar with computer integer arithmetic, many explanations of 2's Complement arithmetic and signed/unsigned integers are available on the Internet, for example at <http://www.rwc.uc.edu/koehler/comath/13.html> .

Analog Voltage Channels

The value of the input voltage (0 to +10 Volts) is represented as a signed integer in the range 0 to +32767

Input Voltage	Logger (Decimal)	Logger (Hex)
< 0	0	0000
0	0	0000
+5	16383	3FFF
+10	32767	7FFF
> +10	32767	7FFF

Formula :- $V = (N \times 10) / 32767$ Where **N** is the raw logger reading

Analog Current Channels

The value of the input current (0 to +20 milliamps) is represented as a signed integer in the range 0 to +32767

Input Current	Logger (Decimal)	Logger (Hex)
< 0	0	0000
0	0	0000
+4	6553	1999
+10	16383	3FFF
+20	32767	7FFF
> +20	32767	7FFF

Formula :- $I = (N \times 20) / 32767$ Where **N** is the raw logger reading

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Temperature Channels

The value of the temperature is represented as an integer in the range -800 to +1500, in units of 0.1 degree Celsius.

Temperature	Logger (Decimal)	Logger (Hex)
< -80 °C	-800	FCE0
-80.0 °C	-800	FCE0
-10.0 °C	-100	FF9C
0.0 °C	0	0000
+20.0 °C	200	00C8
+100.0 °C	1000	03E8
+ 150.0 °C	1500	05DC
> + 150.0 °C	1500	05DC

Formula :- $T = N / 10$

Where **N** is the raw logger reading

NB. Since the thermistor temperature sensors used with SHM loggers have a negative temperature coefficient, an open-circuit sensor will produce a logger reading of -800 (-80 °C), and a short-circuit sensor will produce a logger reading of +1500 (+150 °C).