

Voltage to Angle Conversion



OBJECTIVE

This document gives information on the voltage to angle conversion of the accelerometers. The document presents the equation for the conversion.

THE VOLTAGE TO AN ANGLE CONVERSION

The analogue output behaviour of the acceleration sensor is described in Picture 1. The arrow shows the positive acceleration direction. The output increases if there is acceleration to the direction of the arrow, or if the device is inclined as shown in Figure 1.

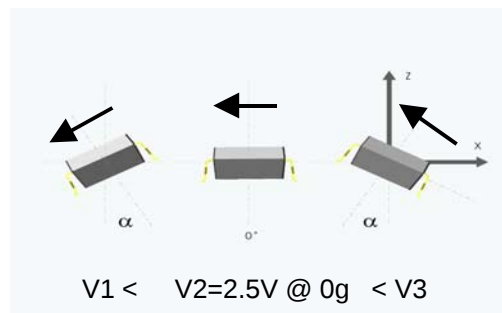


Figure 1. Behaviour of the analogue output

Analogue output can be transferred to angle using the following equation for conversion:

$$\alpha = \arcsin\left(\frac{V_{out} - Offset}{Sensitivity}\right),$$

where *Offset* is the output of the device at 0g position (nominal output is 2.5 V), and *Sensitivity* is the sensitivity of the device (for example, nominal sensitivity of SCA61T-FA1H1G is 2 V/g). To achieve the best accuracy, real values should be used instead of nominal values.

Examples of voltage to angle conversion values are calculated in the Table 1.



Table 1. Examples of analogue output to angle conversion

TRANSFER TABLE		Analog output [V]
Angle [°]	Acceleration [g]	
-90	-1.000	0.500
-80	-0.985	0.530
-70	-0.940	0.621
-60	-0.866	0.768
-50	-0.766	0.968
-40	-0.643	1.214
-30	-0.500	1.500
-20	-0.342	1.816
-10	-0.174	2.153
0	0.000	2.500
10	0.174	2.847
20	0.342	3.184
30	0.500	3.500
40	0.643	3.786
50	0.766	4.032
60	0.866	4.232
70	0.940	4.379
80	0.985	4.470
90	1.000	4.500

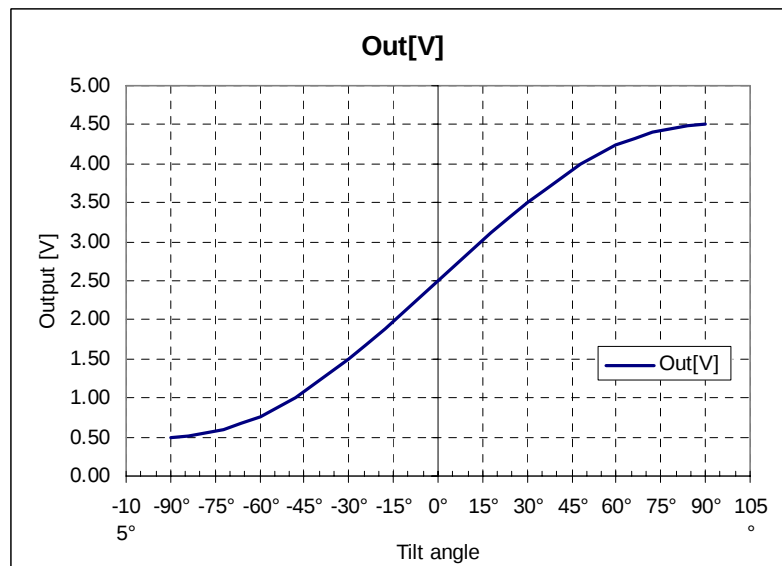


Figure 2. Voltage output compared to an inclination angle (2V/g sensitivity)

5 Sep 2005

VTI Technologies reserves all rights to modify this document without prior notice

VTI Technologies Oy
Myllynkivenkuja 6
P.O.Box 27
FIN-01621 Vantaa
Finland
Tel. +358 9 8791 81
Fax. +358 9 8791 8791
sales@vti.fi

VTI Technologies Oy
Frankfurt Branch
Rennbahnstr. 72-74
D-60528 Frankfurt am Main
Germany
Tel. +49 69 6786 880
Fax +49 69 6786 8829
sales.de@vti.fi

VTI Technologies, Inc.
One Park Lane Blvd.
Suite 804 - East Tower
Dearborn, MI 48126
USA
Tel. (313) 425 0850
Fax (313) 425 0860
sales@vtitechnologies.com

VTI
TECHNOLOGIES