JDG3-3　　　3 Axis 3g Sensor

Designed specifically for the Australian motor racing industry, this sensor is a ruggedised and affordable alternative for measuring the g-forces experienced in competitive performance applications. The sensor is a 3-axis sensor (X, Y and Z) with each axis being perpendicular to the other two axes, and will measure both positive and negative g's in each of the 3 axes.

Installation – Mechanical

Two options are possible:
1. Rigid Mounting (using M4 countersunk bolts) for when a more direct coupling is required. Excessive vibration may swamp the g-force measurements.
2. Flexible Mounting (using double sided tape or velcro) for when an amount of shock "filtering" is required.

Installation – Electrical

The sensor requires a supply voltage of 6 to 12 Volts, which must be from a protected source. DO NOT connect the sensor directly to the vehicle battery. The g-force outputs from the sensor are analog voltage levels in the range 0 to 3.3 Volts, and may be fed directly into the 5 Volt analog input of a data acquisition system. If excessive electrical noise is present, then a shielded loom may be required. Sensor wiring is as per the following table:

Wire Colour	Function
Red	Supply Voltage +6 Volts to +12 Volts
Black	Ground / Chassis Connection
White	X – Axis Output
Yellow or White	Y – Axis Output
Purple	Z – Axis Output

Calibration

Each sensor needs to be calibrated to its data acquisition system. The sensor is calibrated by placing the sensor on a flat surface on each of its six faces (ignoring the angled faces). Doing so will result in a force of 1g being applied in turn to each axis in each direction. The X-axis and Y-axis should each be set to read +1g and -1g. The Z-axis (vertical) is a special case and may be calibrated as either an absolute or a relative g-force reading:

- Absolute – Calibrate the sensor to read 1g when placed flat and -1g when placed upside down. In this calibration the vehicle will have a g-force reading of 1g straight down while the vehicle is stationary.
- Relative – Calibrate the sensor to read 0g when placed flat and -2g when placed upside down. In this calibration the vehicle will have a g-force reading of 0g on all axes while stationary.
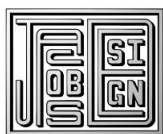
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Sensor Part Number

The sensor part number consists of 3 parts separated by the "–" symbol:

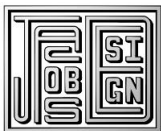|	
JDG3-3-50	This part is a 3-Axis g-force sensor
JDG3-**3**-50	The sensor will measure at least 3g's of positive and negative g force on each axis.
JDG3-3-**50**	The data is filtered to 50Hz with a first order filter. The analog channel should be set to sample at 100Hz or more to avoid loss of data. Filter range available is 1Hz, 2Hz, 5Hz, 10Hz, 20Hz, 50Hz, 100Hz, 200Hz and 500Hz.

Specifications

Parameter	Min	Typical	Max	Units
Measurement Range	3	3.6	-	g
Zero g Voltage	1.3	1.65	2	V
Sensitivity	290	330	370	mV/g
Stability	-	±0.015	-	%/°C
Operational Temperature Range	-20	-	75	°C
Non-linearity	-	±0.3	-	%
Inter-axis Alignment Errors	-	±0.1	-	°
Package Alignment Errors	-	±2	-	°
Cross Axis Sensitivity	-	±1	-	%
Supply Voltage	6	-	12	V
Supply Current	-	1	-	mA

The sensor is either 52mm x 32mm x 12.5mm with a weight of 45grams (old spec), or 52mm x 13mm x 15mm with a weight of 55grams (new spec).

Company Information

Jacobs Design (Aust) Pty Ltd incorporated in July 2000. Since then the company has been involved in the development of custom hardware and software solutions. The company has also supplied a data analysis support service to the V8 Supercars since its inception.