

# FG-4

## User manual V1.1

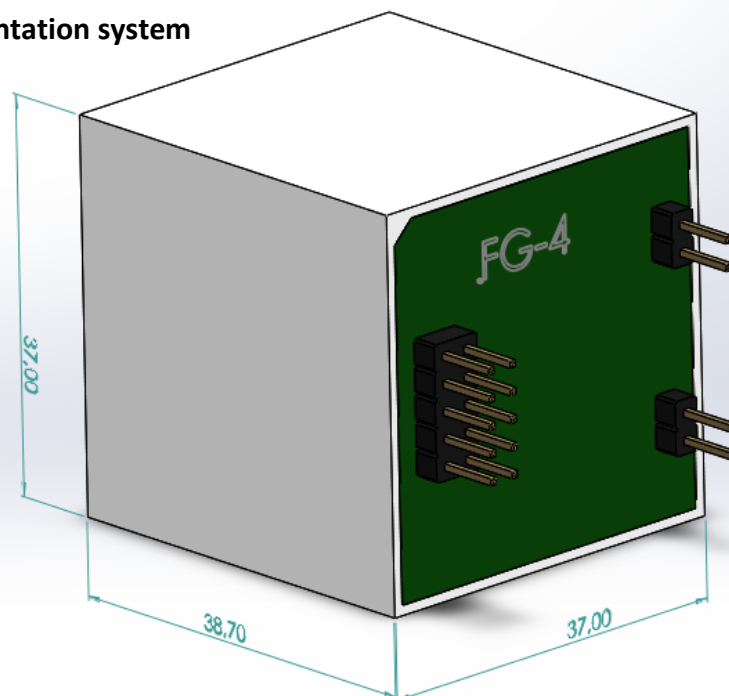
### 3.axial Flux-Gate Magnetic Field Sensor

#### FEATURES:

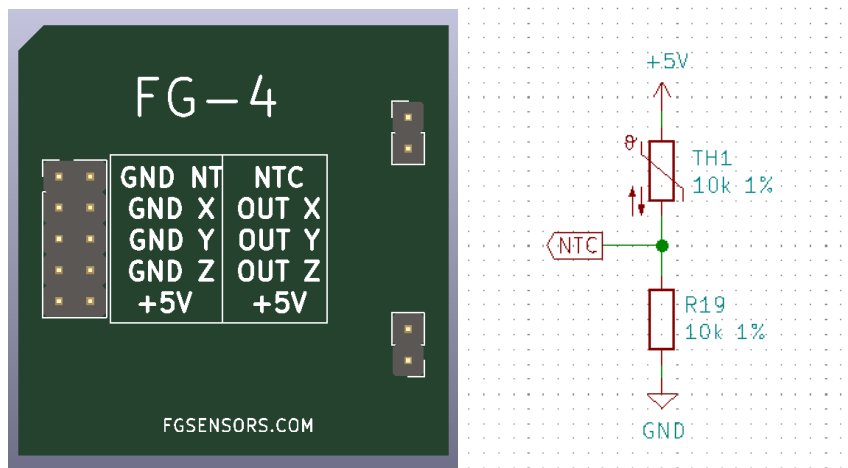
- Single supply
- Low Current
- Low temperature sensitivity
- Internal RC supply filter
- Digital output
- Small size and low weight
- Robust construction
- Waterproof

#### APPLICATIONS:

- Metal detector
- Weapon detector
- Gradiometer
- Vehicle and ship detector
- Aurora monitor
- 3-axis orientation system



PARAMETER	VALUE	UNIT
Recommended supply voltage	5	VDC
Typical Supply Current	3x 7.5	mA
Maximum supply Voltage	7	VDC
Output frequency (-70000 to +70000 nT)	50 - 120	kHz
Axes aligned	<1	Deg.
Temperature range	0 - 50	°C
Weight	70	g



## PIN FUNCTION

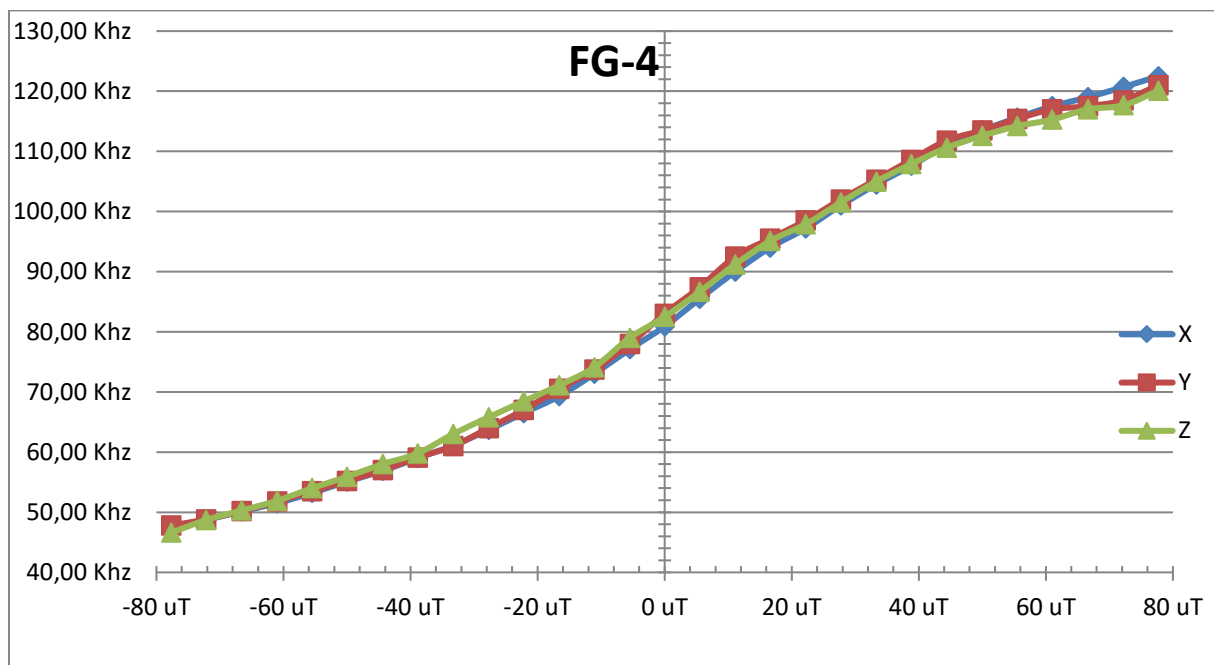
MNEMONIC	PIN	DISCRIPTION
GND NT	1	GND for internal NTC
NTC	2	Internal 10k NTC OUTPUT
GND X	3	GND for axes X
OUT X	4	OUTPUT for axes X
GND Y	5	GND for axes Y
OUT Y	6	OUTPUT for axes Y
GND Z	7	GND for axes Z
OUT Z	8	OUTPUT for axes Z
+5V	9,10	Power supply
NC	11,12,13,14	On right side. Not connected. User can use it for mounting

## GENERAL DESCRIPTION

The FG-4 devices contain 3. independent fluxgate sensors. FG-4 can operating in the  $\pm 70$  microtesla range (  $\pm 0.7$  oersted ) with also better linearity. The connections being common 5V and independent ground and output for each axes. The output is a robust 5 volt rectangular pulse whose period is directly proportional to the field strength, (giving a frequency which varies inversely with the field), making it very easy to interface to a computer or micro controller. The typical period swing for the full range of an FG-4 is from  $\sim 50$  KHz to  $\sim 120$ KHz, a clear indication of its high sensitivity.

Unlike Hall Effect field sensors, which are virtually unusable in this range because of their large temperature sensitivity, the FG-4 has a very low temperature coefficient

The chart below shows the typical response of the FG-4



This non-linearity varies somewhat between individual sensors, but may normally be expected to be in the region of 5%

## Supply Voltage Variation

The period (and frequency) of the FG-series of devices varies with supply voltage, having a coefficient of about 3.5% per volt at the nominal 5 volt supply level. For precise applications good supply regulation is required, but since the transducer's current (30mA) requirement is low, this is fairly easy to achieve using, for example, single regulation with devices from the LDO series.

## Use with Computers and Microcontrollers

The large pulse output gives considerable noise immunity permitting the use of transducers sited at long distances from the main system.

Interfacing is simple in that it requires only one bit of a digital input port per channel of measurement, the technique being to count input pulses for a fixed period to determine the frequency of the incoming signal, from which the field can be calculated.

Alternatively, where a faster response is required, the time between successive like edges permits the direct determination of period, from which again the field can be calculated. With microcontrollers this usually presents no problem, but with systems using many interrupts or extensive multi-tasking it may be necessary to buffer the input signals to deal with the high data rate. However this usually means no more than the addition of a single triple-counter I/O chip even for threedimensional orientation systems.