http://www.wuntronic.com
e-mail: WUNTRONIC@wuntronic.de

WUNTRONIC
Mess-, Steuer- und Regelgeräte GmbH

Model WFG-120
3 AXIS MINIATURE FLUXGATE MAGNETOMETER SYSTEM

Users Manual and Technical Reference

January 2008

Heppstrasse 30 D - 80995 München Phone +49 89 / 313 30 07 Fax +49 89 / 314 67 06

MODEL WFG-120 3 AXIS MINIATURE FLUXGATE MAGNETOMETER SYSTEM

Table of Contents

Figure

I. INTRODUCTION

The WFG-120 System is a precision 3 axis fluxgate magnetometer packaged in an aluminum package of dimensions 0.75" x 0.75" x 2.75". The system operates from input voltages of ±7 to ±12 VDC. As an option, the system can be configured to operate from ±5 VDC.

The system provides 3 analog output voltages proportional to the magnetic field in three orthogonal directions. Full-scale output is ±4.0 volts; this voltage represents a magnetic field of ±1.00 G. Linearity is 0.1% of full scale.

The detailed system specifications of the WFG-120 System are given in section II. Mechanical and electrical performance data is discussed in sections III. and IV. System calibration data is discussed in section V.

II. SYSTEM SPECIFICATIONS

Noise Level ..... $<1x10^{-6}$ G RMS/vHz

Frequency Response ..... DC to 400 Hz (-3 db)

Linearity ..... ±0.1% of Full Scale

Initial Offset ..... <±0.002 V

Drift in zero with temperature ..... $<2x10^{-5}$ G/°C

Drift in scale factor with temperature ..... <0.02% Full Scale/°C

Sensitivity ..... 4.00 V/G

Orthogonality between axis ..... ±0.2°

Alignment of sensor package with sensor reference surfaces ..... ±0.2°

Size (cylindrical) ..... Rectangular parallelpiped with rounded corners. 0.75" x 0.75" x 2.75" (will fit inside 1" I.D. tube)

Weight ..... 30 gms

Power input ..... +7 to +12 VDC at 20 ma
-7 to -12 VDC at -20 ma
or
+5VDC at 20ma
-5 VDC at –20ma

Input connections ..... six #26 gauge insulated wires 4" long

III. MECHANICAL FEATURES OF THE SYSTEM

An outline drawing of the WFG-120 System is shown in Fig. 1. To provide ruggedness and environmental sealing and to maintain the sensor alignment, the system is plotted with epoxy.

The sensor alignment with respect to the system package is shown in Fig. 1. The X axis is aligned parallel to the package long dimension. The Z axis is aligned so that it projects through the center of a 0.067" hole in the bottom of the system. The system Y axis is orthogonal to the X and Z directions. The system coordinate system is right handed.

The output polarity sense of the axes is such that a field increase in the direction of the arrows shown in Fig. 1 produces an increase in the voltage output for that axis.

In general, the magnetic axis of the WFG-120 systems will be orthogonal and aligned within ±0.2° of the right-handed coordinate system specified by the outer package alignment surface and alignment holes.

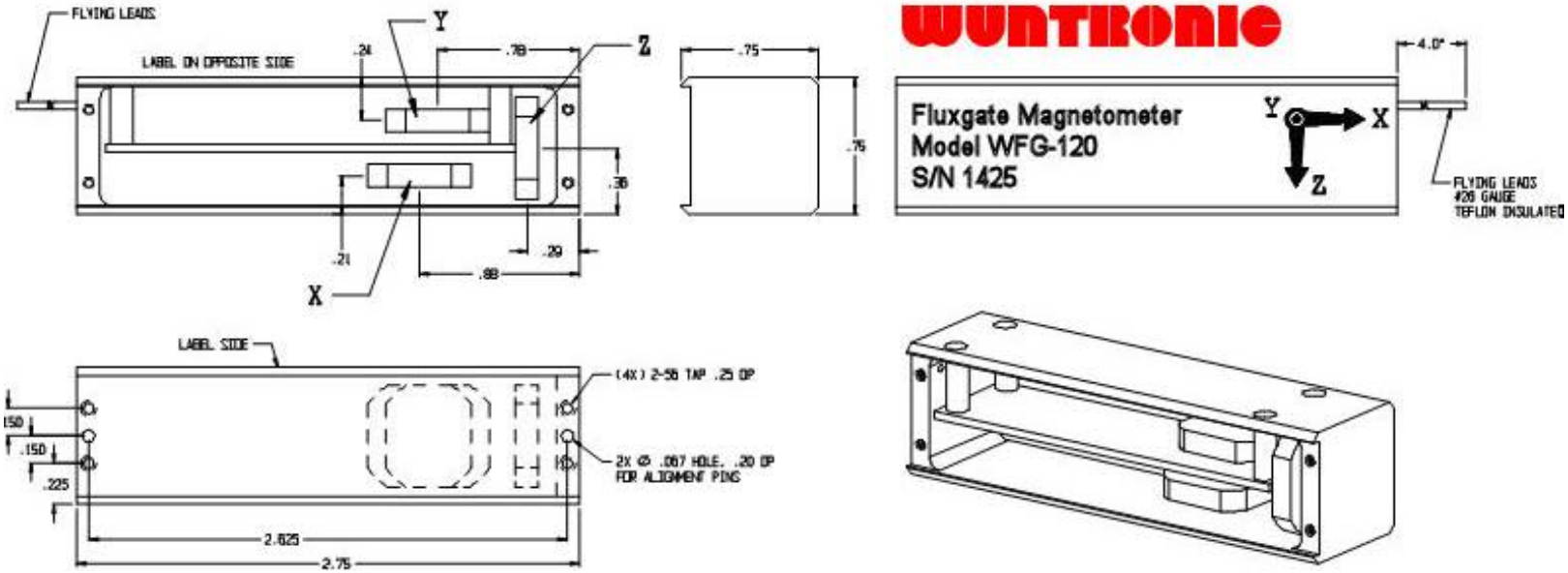
IV. ELECTRICAL FEATURES OF THE SYSTEM

The system can be powered by connection to the 7 flying leads connected to the system.

These wires have the following functions:

Wire Color	Function	Pin (test connector) Bendix PT02-12-10P (Male)
Red	+V in	H
Blue	-V in	K
White	OSC input	A
Yellow	Y output	D
Green	Z output	F
Orange	X output	E
Black	ground	G

The input for the oscillator is normally not used. This option is only used when an external 25 KHz TTL oscillator is supplied to the system.


FLYING LEADS
LABEL ON OPPOSITE SIDE
.24
Y
.78
Z
.75
.75
.36
.21
.29
.88
X
WUNTRONIC
Fluxgate Magnetometer
Model WFG-120
S/N 1425
Y
X
Z
4.0"
FLYING LEADS
#28 GAUGE
TEFLON INSULATED
LABEL SIDE
(4X) 2-56 TAP .25 DP
.150
.150
.225
2X Ø .067 HOLE, .20 DP
FOR ALIGNMENT PINS
2.625
2.75

V. CALIBRATION OF THE SYSTEM

Before shipment, we calibrate the WFG-120 System in our set of mu metal shields (to determine zero offset) and precision Helmholtz coils (to measure scale and axis alignment factors). The measured calibration data is supplied with each unit and enable external correction of these system parameters if desired.

The results of the calibration are summarized in a data sheet, which is shipped with each system. A sample data sheet is included in this manual. The calibration data enables the user to correct for axis misalignment, offset, and scale factor errors. In addition, (as an option) calibration of offset and scale factor variation can also be obtained over any temperature excursion in the -55 to +125°C range.

CALIBRATION DATA

Model #:

Serial #:

Date:

Temperature for Test: to °C
Base Temperature: °C

----------Definitions ----------

Vx = X Axis Sensor Voltage
Vy = Y Axis Sensor Voltage
Vz = Z Axis Sensor Voltage
DeltaT = The Sensor Temperature minus the Base Temperature

--------- Form of the Sensor Output Correction Equations --------

--------- Scale and Offset ---------

V1x = Vx * (CX1 + (CX2 * deltaT)) + CX3 + CX4 * deltaT
V1y = Vy * (CY1 + (CY2 * deltaT)) + CY3 + CY4 * deltaT
V1z = Vz * (CZ1 + (CZ2 * deltaT)) + CZ3 + CZ4 * deltaT

---- Alignment with respect to the Physical Coordinate System --------
V2x = (CX5 * V1x) + (CX6 * V1y) + (CX7 * V1z)
V2y = (CY5 * V1x) + (CY6 * V1y) + (CY7 * V1z)
V2z = (CZ5 * V1x) + (CZ6 * V1y) + (CZ7 * V1z)

---- Convert to Magnetic Field Values ----------
Hx = V2x * 0.25 Oe / Volt
Hy = V2x * 0.25 Oe / Volt
Hz = V2x * 0.25 Oe / Volt

------- Constants -------

CX1 =	CY1 =	CZ1 =
CX2 =	CY2 =	CZ2 =
CX3 =	CY3 =	CZ3 =
CX4 =	CY4 =	CZ4 =
CX5 =	CY5 =	CZ5 =
CX6 =	CY6 =	CZ6 =
CX7=	CY7 =	CZ7 =