Projekt Elektronik
MESS - UND REGELUNGSTECHNIK GMBH
AM BORSIGTURM 54
13507 BERLIN
TEL. 030 / 43 03 22 40
FAX 030 / 43 03 22 43

Addendum to Operating Manual

AS-active-probe

AS-U3D GEO-X x+y+z syn-out

Made in Germany

1. Description

1.1 General Description of Operation

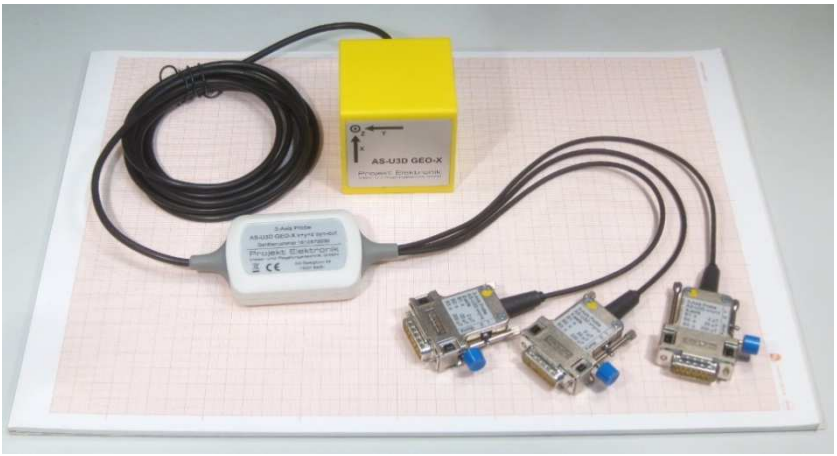


Abb. 1 Overall view AS-U3D GEO-X x+y+z syn-out

The AS-U3D GEO-X x+y+z syn-out probe is a measuring system with three sensors arranged at right angles. The signals from these three sensors are output in parallel. This allows the three axes of the magnetic field to be measured simultaneously and independently of each other. The probes have a separate 15-pin SubD connector for each of the three single-axis signals.

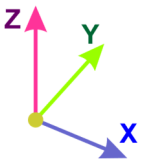


Abb. 2 the three axes

With its maximum measuring range of ±200 µT, it is particularly suitable for measuring very small magnetic fields such as the earth's magnetic field. The probe housing is very compact at 66 mm x 66 mm x 66 mm and is therefore also suitable for measurements in confined spaces.

1. Description

The probe housing has a threaded insert with the usual thread for photo tripods (1/4 20 UNC). This means that the probe can be mounted on almost any tripod if required. It is also possible to mount one of the commercially available handles on the probe. The tripod or the handle should be made of non-magnetic material. A mini tripod is already included in the scope of delivery.

Abb. 3 mini tripod with thread

A small housing is integrated into the probe cable just before the probe plug, in which the probe cable is divided between the connections of the three individual axes. As with the single-axis probes, the active electronics of the probes are contained in the 15-pin SubD connector.

The AS-U3D GEO-X x+y+z syn-out probe is compatible with the other probes in our AS active probe range. This means that it can also be used with all devices that are intended for the connection of an AS active probe.

Since the AS-U3D GEO-X x+y+z syn-out probes each have three probe plugs, three FM 302 Teslameters or three AS-probe adapters are required for use. Alternatively, an AS Adapter 3 can also be used, as it has three probe connections.

1. Description

The AS-active-probes are active measuring probes for measuring magnetic induction. Our AS-probes have active electronics so that a calibrated analog signal is available at the connector. These are high-quality transducers for measuring DC and AC fields.

1.2 Measurement Direction and Polarity

The three axes of the AS-U3D GEO-X x+y+z syn-out each behave like a normal single-axis probe. This means that they can only detect fields parallel to their respective measuring direction. If the axis is positioned at an angle to the field, the displayed value is lower than the actual field. The display value results from the following formula:

$$B_{display} = B_{real} \cdot \cos \alpha$$

From the measurement of all three axes (X, Y, Z) the actual total field can be reconstructed.

The direction of the field is also indicated by the sign of the measured value. The direction for a positive reading is indicated by the axis arrows on the sonde body.

1.3 Calculation of the Total Field

The probes just deliver the single axis signals. A generation of the total signal is not performed. If needed, the calculation has to be done in further external processing according to the following formula.

$$B = \sqrt{{B_x}^2 + {B_y}^2 + {B_z}^2}$$

2. Technical Advice

2.1 General Notices

Constant field and alternating field may not overload the sensors. This would result in distort measurement results.

The axis of the compensation potentiometer should not be subjected to any bending stress in order not to damage the axis or the potentiometer itself.

2.2 Ground Connection / Earthing

The ground connections of the three probe connectors are connected with each other.

Attention should be paid that in the probe there is a connection between GND, probe head, connector shield, connector housing and cable. Possibly an isolated installation of the probe and/or the probe connector is necessary to prevent an unintended connection between measuring GND and protective earth.

2.3 Minimum Operation Conditions (EMC)

The presence of strong HF fields can result in distorted measurement results. A field strength of 3 V/m should not be exceeded.

3. Items Supplied

- AS-active-probe AS-U3D GEO-X x+y+z syn-out
- Mini tripod
- operating Manual
- factory calibration certificate with traceability to national standards (PTB)

4. Operation

4.1 General

Every single axis of the probe behaves like a normal single axis probe. The full bandwidth of the probe is available.

4.2 Compensation of the earth's magnetic field

Since the earth's magnetic field is around 50 µT everywhere, it is possible to set this basic value to zero using a compensation potentiometer, and thus to measure changes in the basic value in the x10 or x100 sensitive range. This compensation can be switched off so that you can switch back to absolute value measurement (without compensation) at any time.

☞ **In order to be able to use the best possible stability in the 2 µT range, the probe should be switched on for at least 30 minutes.**

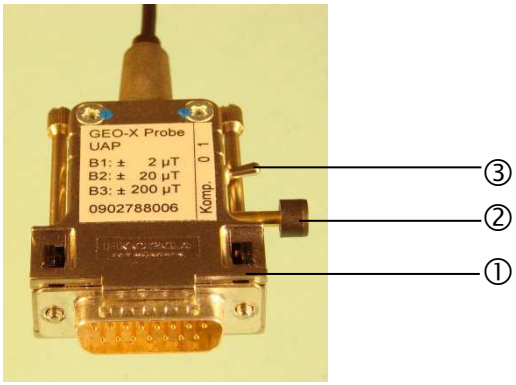


Abb. 4 Controls plug AS-U3D GEO-X x+y+z syn-out

① Connector housing
② Compensation potentiometer
③ Compensation switch

The shaft of the compensation potentiometer should not be exposed to any bending stress in order not to damage the shaft and the potentiometer itself.

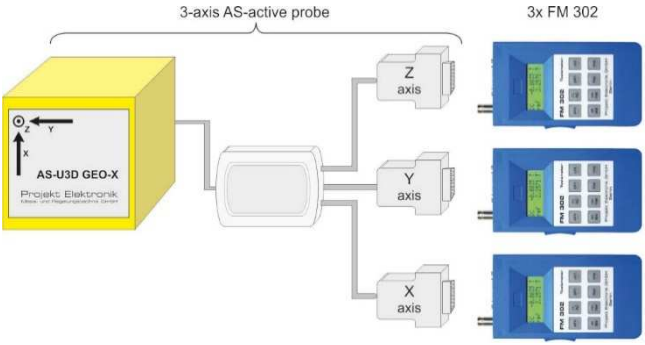
4.3 Use of the AS-active-probes with Teslameter FM 302

A separate Teslameter FM 302 is required for each of the three individual axes. Normally, the plug of the probe electronics is simply plugged into the teslameter. You can start measuring immediately.

All functions of the Teslameter FM 302 can be used for the measurement. With the Teslameter FM 302, both the direct component of the field (FM 302 - measurement type DC) and the effective value of the alternating component (FM 302 - measurement type AC) can be determined.

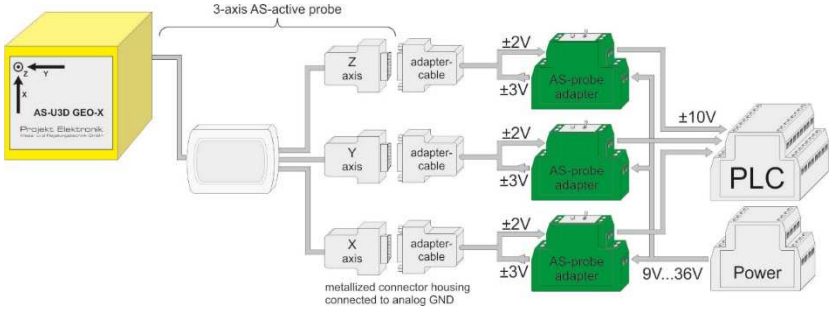
All other options of the FM 302 Teslameter can also be used, such as the calibrated analogue output, control via USB or the power supply unit.

A USB cable is then required for each of the three Teslameter FM 302 to connect to the computer. These are included in the scope of delivery of the Teslameter FM 302. A separate virtual serial interface appears on the computer for each of the devices.



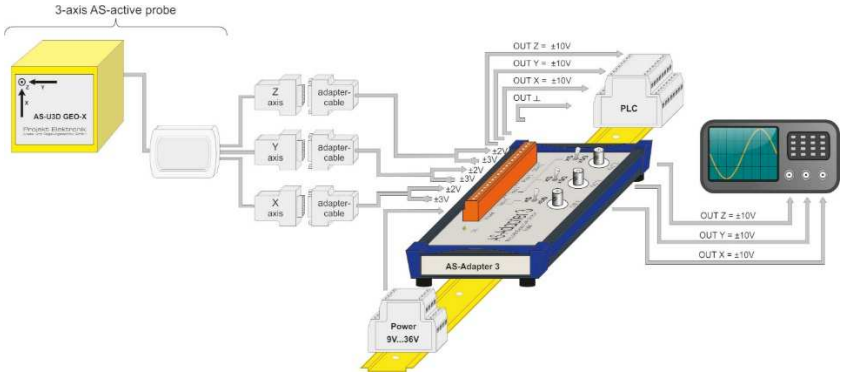
4.4 Use of the AS-active-probes with AS-probe adapter

A separate AS-probe adapter is required for each of the three individual axes. The plug of the probe electronics is connected to the AS-probe adapter. The adapter cable required for this is included in the scope of delivery of the AS-probe adapter.



4.5 Use of the AS-active-probes with AS-Adapter-3

The three 15-pin SubD connectors are connected to the appropriate adapter cable. The adapter cables required for this are included in the scope of delivery of the AS-Adapter 3.



4.6 Overload

The sensors used have a limited measuring range. Signals with more than ±200 µT lead to an overload of the individual sensors. The filters used are located after the sensors. Therefore, the entire field made up of alternating and constant fields must always be considered.

Constant field and superimposed alternating field must not overdrive the sensors. This would lead to deviating measured values.

Overloading does not damage the sensors. Only the hysteresis can lead to a shift in the offset of the individual axes, especially in the case of strong DC fields.

In case of doubt, e.g. with complex alternating fields, the signal should be checked with an oscilloscope at the analogue output of the Teslameter FM 302

5. Technische Daten

5.1 3-axis probe 200 µT (AS-U3D GEO-X x+y+z syn-out)

Abb. 5 3-axis Magnetic field probe AS-U3D GEO-X x+y+z syn-out for ±200 µT

measurable flux density	max. ±200 µT, bzw. 140 μT_{eff}
Transfer factor	
with FM 302	±2 V / 2 µT; ±2 V / 20 µT; ±2 V / 200 µT
with AS-Sonden Adapter	±10 V / 20 µT; ±10 V / 200 µT
with AS-Adapter 3	±10 V / 2 mT; ±10 V / 20 mT
Sensor volume	3 sensor‘s in 33 x 33 x 33 mm^3
Effective sensor area	Ø 6 mm x 25 mm pro axis
Perpendicularity of the sensors	±2°
Bandwidth (-3 dB)	DC – 500 Hz
Rise time (X, Y, Z)	<0,3 ms
Linearity error (X, Y, Z)	<0,8 % ±0,2 µT (bei 23 °C ±1 °C)
Temperature coefficient (X, Y, Z)	max. 0,1 %/K (10 °C bis 50 °C)
Zero drift (X, Y, Z)	max. 10 nT/K (DC)
Hysterese (X, Y, Z)	max. 0,1 % vom Messwert
Noise (X, Y, Z)	typ. 4,5 nT_{RMS} (10 Hz – 1 kHz)
	typ. 6 nT_{PP} (DC – 10 Hz, 50 s)
Probe head	66 mm x 66 mm x 66 mm without cable
Tripod thread	1/4-20 UNC (Photo tripod)
Length of cable	2,5 m

5. Technische Daten

Operation temperature	+5 °C bis +50 °C
Storage temperature	-10 °C bis +60 °C
Max. relative humidity	70 % bei +35 °C
Power	±3 V durch FM 302, AS-Sonden Adapter, AS-Adapter 3 or PLC
Connector	3x 15 pol. SubD
Output impedance	<1 Ω

Technical data are subject to change without prior notice!

6. EU Declaration of Conformity

EU Declaration of Conformity

Name of manufacturer	Projekt Elektronik Mess- und Regelungstechnik GmbH
Manufacturer's address	Am Borsigturm 54 D-13507 Berlin Deutschland Tel.: +49 (0)30 - 43 03 22 40 Fax.: +49 (0)30 - 43 03 22 43 http://www.projekt-elektronik.com Email: info@projekt-elektronik.com
declares that this product AS-active-probe	Serie F870
Short description	It is a 3-axis measuring system with which the three spatial axes of the magnetic field can be measured simultaneously.
under EMC guidelines,	2014 / 30 / EU
and RoHS directive	2011 / 65 / EU
complies with the following standards and/or standardizing documents	EN 61326 – 1:2013
Supplemental information	As to the restrictions regarding EN 61000-4-3 see also Minimum Operation Conditions (EMC) page5

Berlin, 19. December 2016

Dipl.-Ing. Hartmut Heinze
Managing Director / CE Coordinator