

D/I theodolite with cableless FLUXSET[®] magnetometer

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Most widely used D/I flux theodolites for absolute observations have two separate units connected with cable. This solution is inconvenient because the instrument can be affected by external electromagnetic disturbances. This problem can be avoided if the magnetometer electronics is placed together or close to the sensor and the magnetometer is connected to the display unit via radio link. The final goal of our project is to develop a semi-automatic instrument and procedure to carry out absolute observations.

Simple construction and low power consumption of FLUXSET[®] magnetometers allow for putting them into a small box together with a battery. This box is mounted on the telescope of the theodolite. This way it moves together with the sensor during the whole measurement procedure. Any possible small magnetic moment will be cancelled by this method.

Display unit and magnetometer are connected by a radio link and the display can be placed to a large distance in order to avoid measurement disturbances. Measured data are transmitted to the display unit by a radio transmitter.



Figure 1: D/I theodolite with FLUXSET.

The display unit has a LED bar display in addition to large scale numbers. It indicates the operation of the radio connection and the output signal level including a sign when we are outside the measurement range. In order to decrease the power consumption the display has automatic luminosity control. Battery power is well enough for a whole day's operation.

To increase measurement accuracy the display unit is equipped with a GPS, which gives a precise time stamp to the data. They are stored in a memory by remote command. At the end of the measurement process the memory content can be uploaded to a processing computer via USB connection.



Figure 2: Magnetometer display.

Angle readings have to be entered manually to the computer but a digital encoder and radio transmission of angle data is under development.

Instrument charging needs 10 to 18 V DC or 100 to 240 V AC for convenient observatory and field use.

Technical specifications:

Theodolite Zeiss THEO 010/020

Magnetometer

operating range: $\pm 6 \mu\text{T}$
measuring range: $\pm 200 \text{ nT}$
resolution: 0.1 nT
offset error: $\pm 1 \text{ nT}$, adjustable

Display unit

characters: 54 mm (3½ digit+sign)
radio link: 2,4 GHz
working range: > 15 m
operating time: > 12 hr
charging time: ~ 8 hr

References:

Vértesy G., Gasparics A., Szöllősy J. (2000) High sensitivity field sensor. Sensors and Actuators, 85, 202-208.

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