

Inclination and Declination Instrument U8495258

Instruction Sheet

10/10 ELWE/ALF



- 1 Base-plate
- 2 Pillar
- 3 Hand-wheel
- 4 Scale ring
- 5 Magnet needle
- 6 Cradle
- 7 Connecting sockets

1. Description

The inclination and declination instrument is used to measure the inclination and declination of the earth's magnetic field, and to demonstrate the magnetic field produced by a current-carrying conductor.

The instrument consists of a base-plate with a pillar which supports an axially rotatable cradle carrying a magnetic needle and a scale ring. The scale ring is divided into four quadrants ($4 \times 90^\circ$). The cradle can be rotated by a hand-wheel, which also has a separate quadrant scale. The magnet needle is mounted on a bearing consisting of sharp agate tips,

and is free to rotate in either a horizontal or a vertical plane according to the direction of its axis. The sockets on the cradle can be used to pass a current of up to 10 A through it.

2. Technical data

Length of magnet needle:	100 mm
Overall dimensions:	200x140x200mm ³ approx.
Weight:	620 g approx.

3. Operation

When the polarity is reversed, the direction of the deflection changes.

3.1 General precautions

- Protect the instrument from moisture, dust and mechanical shocks.
- Avoid touching the magnet needle.

The geometry of the earth's magnetic field lines can be greatly altered by static magnetic fields, steel frames of laboratory benches and equipment, and steel supports in the floor, ceiling and walls of buildings. For this reason the measured angles may sometimes differ widely from the expected values.

3.2 Inclination

The magnet needle aligns itself along the direction of the earth's magnetic field.

- With the scale ring in the horizontal plane, turn the instrument so that the blue end of the magnet needle is at 0° (the blue end of the needle is its north-seeking pole).
- Next use the hand-wheel to turn the cradle through 90° (the plane of the scale ring is then vertical). The blue end of the magnet needle is inclined downwards.

The angle between the magnet needle and the horizontal plane is called the inclination. It differs from place to place. At a latitude of about 50° north (Europe) the inclination is 63° to 68° .

3.3 Declination

The horizontal deviation of the magnet needle from the direction of the geographical north pole is called the declination.

- With the scale ring in the horizontal plane, turn the instrument so that the blue end of the magnet needle points to the angle on the scale ring corresponding to the angle of declination for the place where you are.

The 0° axis of the scale ring is then lying along the geographical north-south axis.

3.4 Magnetic effect of an electric current

In order to carry out the experiment, a variable DC current source is also needed, such as:

DC power supply 0-20 V, 0-5 A U33020-230

or

DC power supply 0-20 V, 0-5 A U33020-115.

- With the scale ring in the horizontal plane, turn the instrument so that the blue end of the magnet needle (its north-seeking pole) is at 0° .
- Connect the sockets on the instrument to a variable DC current source.

As the current is increased, the needle is deflected increasingly from its original direction.