

Description, application and handling of the Residual Field Indicator (Art. No. 3821.002)

Application: With the aid of the Residual Field Indicator 3821.002 the residual magnetism in a workpiece can be checked e.g. after magnetic particle crack detection. As well the position and polarity of magnetic poles can be identified. Residual Field Indicators are very sensitive against small changes of a magnetic field. Therefore, they are best suited for comparative measurements, e.g. in order to distinguish between sufficiently and insufficiently demagnetized parts.

Description: A small magnet, to which an external magnetic field exerts a torque, is mounted onto the revolving axis of the instrument's pointer. Another magnet inside the housing keeps the pointer in zero position as long as no external magnetic field is present. The magnetic field intensity is measured at the movement staff location, i.e. on the axis where the revolving magnet is mounted: 16 mm apart from front and rear side of the housing. The axis of the pointer is 16 mm apart from the bottom side of the housing, where the "TEST" mark indicates the edge which should be in contact with a workpiece when using the Residual Field Indicator. One end of the pointer axis is visible through the glass.

The Residual Field Indicator is equipped with two scales. The upper black scale reads directly in gauss of a uniform magnetic field oriented parallel with the centerline of the instrument scale and the "TEST" arrow. The lower red scale is used in determining the *magnitude and direction* of an unknown magnetic field by merely orienting the instrument for maximum reading. At such a maximum reading the direction of the field is parallel with the instrument pointer and the magnitude can be read in gauss on the red scale.

A (+) deflection of the pointer indicates the TEST edge of the Residual Field Indicator has been presented to a magnetic North pole, a (-) deflection, that is has been presented to a magnetic South pole. (Hint for the earth magnetic field: The geographical North pole is from the magnetic point of view a South pole.)

Application: To check for residual magnetism place the Residual Field Indicator with its TEST edge (s. illustration) onto the workpiece. Find magnetic poles and residual magnetism by moving the instrument slowly over the surface and observing the deflection of the pointer.

Care should be given to that the pointer is always moving within the range of the scale. If - with strong residual magnetism - the pointer is going to be off scale withdraw the instrument from the surface until the pointer reads within the scale again.

When a position of strong residual magnetism is found on the workpiece, it is recommended to tilt and turn the instrument in order to get maximum readings.

Influence of the shape of a workpiece: Point-like or line-shaped magnetic sources – e.g. the ends, edges or grooves of a workpiece – cause non-uniform magnetic fields whose magnitudes decrease rapidly with distance. The Residual Field Indicator 3821.002 measures the mag-

netic field inside its housing at a distance of 16 mm from the "TEST" edge. Therefore, the field shown by the pointer will always be smaller than the actual field close to the surface of the workpiece. If accurate measurements close to the surface of the workpiece are necessary, we recommend our electronic Field Strength Meter (type **DEUTROMETER 3872**) with appropriate small sized probes for point-like measurements. Although put into the same magnetic field, Residual Field Indicators of different manufacturers are likely to show different indications – except for the case of a completely uniform magnetic field. This is due to different mechanical and geometrical setups of different models. Therefore, Residual Field Indicators are only suited for comparing purposes, especially for finding out different degrees of demagnetization with geometrically identical workpieces.

Accuracy, Temperature Range: The accuracy in a uniform magnetic field is given as $\pm 10\%$ of full scale. The allowed temperature range is: $20\text{ }^{\circ}\text{C} \pm 10\text{ }^{\circ}\text{C}$. All Residual Field Indicators come with an individual quality certificate. In-house measurements which are carried out to check the instruments prior to shipment are traceable to national or international standards.

Handling, cleaning and care: Prior to use, you should check the instrument for smooth moving of the pointer by slightly shaking it. Correct zero position of the pointer should be checked by rotating the instrument in horizontal position slowly by 360° : The maximum deflections (+) and (-) should be equal. The order of the earth magnetic field is ± 1 gauss. The pointer should show zero, if the "TEST" edge resp. arrow is aimed to west or east, since the instrument is less sensitive to magnetic field parallel to the pointer.

Do not expose the Residual Field Indicator to strong magnetic field in excess of 400 gauss and do not drop the instrument. Whenever the instrument pointer fails to properly return to center zero, it is indication that it has been exposed to high magnetic field or strong mechanical impact or vibration. This can crack the pivot jewels, creating unwanted friction and sluggish action.

Clean the housing with a soft cloth. Avoid seeping of dust or liquid into the housing of the Residual Field Indicator.

Hints for the control of this test equipment: Recommended interval for regular checks: 1 year.

