

**RESEARCH AND PRODUCTION ENTERPRISE “DIATECH”**  
**Pulse magnetic analyzer ИМА-4М (PMA-4М)**



**PURPOSE**

The ИМА-4М (PMA-4М) pulse magnetic analyzer is designed for nondestructive testing of mechanical properties (hardness, ultimate strength, yield point, elongation at rupture) and microstructure (grain size) of low-carbon steels of thickness from 0,15 up to 4,0 mm without their destruction. The testing of some medium-carbon and low-alloyed cold-rolled and some hot-rolled steels is possible.

The analyzer ИМА-4М (PMA-4М) as the gauge for the measurement of the gradient of the residual field strength can be used.

**PRINCIPLE OF OPERATION**

The testing is realized by periodical local pulse magnetization of steel products with subsequent measuring of gradient of normal component of residual field strength. The dependence between the indications of the device and the properties of metal under test the consumer determines by establishing the corresponding correlation.

**CONSTRUCTION**

The device ИМА-4М (PMA-4М) is designed as a portable one consisting from the electronic block and the transducer, connected by the electrical cable with the length of 1,5 meters.

**SPECIFICATIONS**

For the low-carbon cold-rolled steels the device ИМА-4М (PMA-4М) ensures the testing of: **hardness** from 30 up to 100 units on a dial HRB<sub>30/100</sub>; **a yield strength**  $\sigma_T$  from 20 up to 75 kgf/mm<sup>2</sup>; **ultimate strength**  $\sigma_B$  from 20 up to 85 kgf/mm<sup>2</sup>; **relative elongation**  $\delta_{10}$  from 2 up to 50, and also estimation of **depth of indentation on Erixen, average size of ferrite grain, point of ferrite and carburization grain.**

**The thickness of the tested articles** is from 0,15 up to 4,0 mm; **the range of measuring the gradient of magnetic residual field strength**  $\nabla H_r$  from 200 up to  $2 \cdot 10^4$  A/m<sup>2</sup>; **the error because the gap changes** is not more than 1,5% for every 0,1 mm of gap change; **the amplitude of magnetizing pulses** is  $2,1 \cdot 10^5$  A/m; **the duration of testing** (magnetization – measurement) is not more than 10 seconds; **the transducer contact pad diameter** is 18 mm; **the edge effect zone** is 100 mm; **overall dimensions** are 320×320×100 mm; **the weight** is 7 kg.

The use of the device helps to save the metal and to enhance the productivity 8-to-10 times as compared to direct methods of testing. The instrument readings are insensitive to a thin layer of dirt, paint or scale on the metal to be tested.

The metrological supervision is assured with the help of a magnetic field gradient gauge type МГП (MGF), without the use of standard metal specimens. The device is provided with a digital indicator of measurement results, may be connected to a PC, and is able to hold the test results upon termination the magnetization – measurement cycle.

Analyzer ИМА-4М (PMA-4М) has passed the State tests and is filed in the State record of the measuring devices of Republic Belarus under the No. РБ 03 14 1018 99.

**Address for inquiries:**

**16, Akademicheskaya Str., 220072, Minsk, Republic Belarus**

**Tel. +375-17-2841740**

**Fax: +375-17-2841740**

**E-mail: *kulagin@iaph.bas-net.by***