

SDD STROYPRIBOR

Rebar Detector and Cover Meter

IPA-MG4.02

**Technical description
Operating manual**

**Chelyabinsk, Russia
2016**

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The technical description and operating manual (OM) are designed for Rebar Detector and Cover Meter IPA-MG4.02 (hereinafter referred to as the Instrument) operators and contain important information on its technical data, use and maintenance methods. The Instrument is only to be used for its designated purpose as described in this OM and by ones familiar with Instrument configuration, operating principles and OM.

1 DESCRIPTION AND OPERATION

1.1 Applications and Operating Conditions

1.1.1 Rebar Detector and Cover Meter IPA-MG4.02 (or the Instrument) is intended for nondestructive determining of single rebar axis and measuring of concrete cover depth (above the rebar) in reinforced concrete products and constructions by GOST 22904.

The Instrument determines rebar diameter according to known cover depth value as per Appendix G GOST 22904

1.1.2 Applications: measurement of cover depth and location of rebar axis in reinforced concretes in construction industry, at construction sites, buildings and structures under inspection.

1.1.3 Operating Conditions:

- ambient air temperature from minus 10 to 40 ° C
- relative humidity up to 95%
- atmospheric pressure from 84.0 to 106.7 kPa (630 to 800 mm Hg).

1.2 Metrological and Technical Characteristics

1.2.1 Concrete cover depth measuring range, mm:

- | | |
|--|----------------|
| – for rebar diameters of 3, 4, 5, 6, 8 mm | from 5 to 60 |
| – for rebar diameters of 10, 12, 14, 16, 18 mm | from 5 to 90 |
| – for rebar diameters of 20, 22, 25, 28 mm | from 5 to 110 |
| – for rebar diameters of 32, 36, 40, 50 mm | from 10 to 130 |

Rebar Detector and Cover Meter IPA-MG4.02

1.2.2 The limits of absolute error, mm:	
– for single rebar, up to $\pm (0,05hc + 0,5)$, (hc – the concrete cover depth value, mm);	
– for rebar grid, up to $\pm (0,05hc + 0,5)$, providing that:	
a) concrete cover depth, mm, up to	60
b) the minimum longitudinal bar pitch, mm:	
– for rebar diameters of 4-10 mm	100
– for rebar diameters of 12-22 mm	150
– for rebar diameters of more than 22 mm	200
c) the minimum cross bar pitch, mm:	
– for cross rebar diameter of 4 mm with longitudinal rebar diameter of 10 mm or less;	150
d) the minimum spacing between neighboring bars surfaces of the first and second layers (if the second layer is available), mm	50
1.2.3 The additional error caused by the temperature change from the normal value (20 °C) to extreme operating values, for each 10°C, up to	± 1
1.2.4 The permissible deviation of shown rebar axis location from its true position, mm, up to:	
– for rebar diameters of 3-10 mm and concrete cover depth up to 40 mm;	± 10
– for rebar diameters of 12-40 mm and concrete cover depth up to 80 mm.	± 10
1.2.5 Supply voltage (lithium polymer battery), V	$3,7 \pm 0,5$
1.2.6 Input current, mA, up to:	
– backlight off	77
– backlight on	125
1.2.7 Dimensions, mm, up to	$202 \times 113 \times 37$
1.2.8 Weight, kg, up to	0,37

1.3 Configuration

1.3.1 The IPA-MG4.02 delivery set includes:

IPA-MG4.02 (the electronic unit with integrated inductive sensor) itself	1
Calibration spacer (unit that imitates concrete cover of 20 mm depth)	1
PC transfer cable	1
Software CD	1
Battery charger	1
Carrying Strap	1

1.3.2 The Instrument will be supplied complete with carrying case.

1.3.3 The exterior view of the IPA-MG4.02 – see Fig 1.

1.4 The Measurement Principle, Available Functions and Settings

1.4.1 The Instrument induces impulse eddy currents in metal objects and measures secondary electromagnetic field generated by such currents.








Four sensors arranged symmetrically to Y-axis and X-axis are used as the electromagnetic field receivers. The Instrument analyzes the re-emitted signal, indicates the location of the object detected, then determines the concrete cover depth and (or) rebar diameter values and shows measurement results on the display.



Figure 1 The exterior view of the IPA-MG4.02

Rebar Detector and Cover Meter IPA-MG4.02

1.4.2 In general, the Instrument is the electronic unit with integrated inductive sensor. The front panel supplied with digital display, six operating buttons and ON/OFF button:

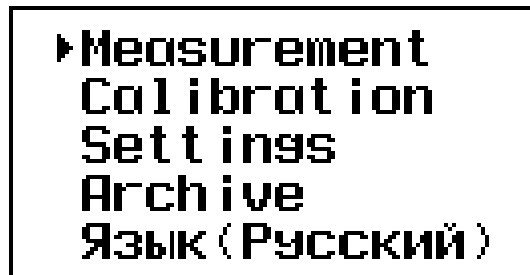
	switches the Instrument on/off (IPA-MG4.02 turns off automatically after 10 minutes of inactivity)
	returns to the main menu from any mode
	writes the results of measurements to the Archive, activates the variable parameters and fixes its values
 , 	change parameter values, select modes and view the Archive content
	clears the specified measurement result
	selects in Measurement Mode: – concrete cover depth measuring « h »; – rebar diameter (size) estimation « d »; – rebar diameter and cover depth determination « d & h » and « d,h »; Selects diameter and the Calibration Spacer depth value in the Calibration Mode.

1.4.3 The mini-USB socket is on the top panel of the Instrument. Special marks applied to top, bottom and side panels determine Y-axis and X-axis (see Fig 1). LED indicator is under the display on Y-axis line.

1.4.4 The Instrument provides five operating modes, each can be selected from Main Menu (see screen 1.1).

If the Instrument connected to PC by USB cable, the Data Transfer Mode will be activated automatically.

Another four modes can be selected from Main Menu by «↑, ↓» keys, that move the cursor to the selected menu line (mode) and **ENTER** key to activate it.

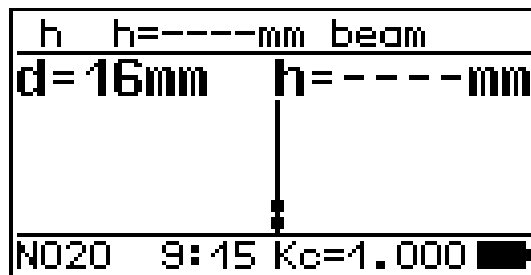


1.1

Switch the language (RUS/ENG) by moving the cursor to the lowest line of the Main Menu and pressing **ENTER**.

1.4.4.1 The Measurement Mode is used to measure the cover depth and to determine rebar diameter and rebar axis. To select a measurand press the «d/H» key.

When switched on, the Instrument enters the Measurement Mode automatically. For example:



1.2

and the previous measurement parameters and settings appear on the display. Press **MODE** to return to the Main Menu (1.1).

1.4.4.2 The Calibration Mode is used to determine Coefficient of coincidence (K_C) by known rebar diameter and cover depth values. To activate the Graduation Mode press **MODE** to enter the Main Menu (1.1), by pressing «↑, ↓» select the «*Calibration*» line and then press **ENTER**.

Press **MODE** to return to the Main Menu (1.1).

1.4.4.3 The Settings Mode is used to:

- setting of a single or continuous (scanning) measurement type;
- turning on/off backlight;
- turning on/off sound;
- date and time setting.

To activate the Settings Mode press **MODE** to enter the Main Menu (1.1), by pressing «↑, ↓» select the «*Settings*» line and then press **ENTER**.

Press **MODE** to return to the Main Menu (1.1).

1.4.4.4 The Archive Mode is used to view measurement results and settings written to the Archive.

To activate the Archive Mode press **MODE** to enter the Main Menu (1.1), by pressing «↑, ↓» select the «*Archive*» line and then press **ENTER**.

Press **MODE** to return to the Main Menu (1.1).

1.4.4.5 The Data Transfer Mode is used to transfer data and settings from the Archive to PC.

To activate the Data Transfer Mode connect the Instrument to a computer using the supplied USB cable.

NOTE: If connect the Instrument to PC its battery will charge.

1.5 Labeling and sealing

1.5.1 Labeling

The front panel surface contains:

- manufacturer's trademark;
- the product name and modification;

The rear panel surface contains the table with:

- manufacturer's trademark;
- the product name and modification;
- serial number, month and year of manufacture.

Controls are marked according to their functions.

1.5.2 Sealing

The Instrument shell is sealed by the manufacturer. The warranty seal is made by applying a stamp on the ductile material that has been placed in a recess for the screw at the upper left corner on the rear panel.

Keep the seal undamaged throughout the Instrument lifetime, once the seal is violated the Instrument no longer be under warranty.

Undamaged seal is an obligatory condition for acceptance of claims in the event of the Instrument failure.

1.6 Packaging

1.6.1 To ensure the safety and amortization during transportation the Instrument and its delivery set are wrapped into air-bubble film and come with carrying case. (Packaging category KU-1 as per GOST 23170).

Operational documentation is packed in a plastic bag. Packaging marks are made in accordance with GOST 14192.

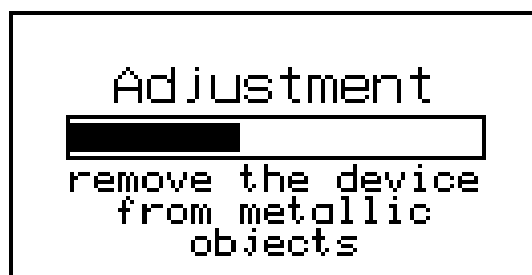
2 MEASURING OPERATIONS

2.1 Getting Started

2.1.1 Read through the manual carefully before the first use of the Instrument.

2.1.2 Take the Instrument away from any metals (the distance between the Instrument and any metal objects must be at least 500 mm. Any ferromagnetic material within the distance may influence on ensuing measurements) and switch it on.

2.1.3 When switched on the display briefly shows the product name and modification, remaining battery power; after that the adjustment begins immediately:

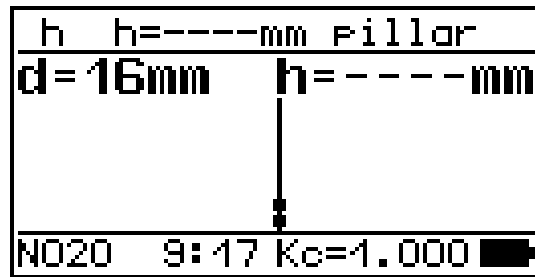


2.1

NOTE: The adjustment can be done at any time during measurement if necessary. Place the Instrument away from any metal things and press «↑».

2.1.4 After the adjustment end the Instrument enters the Measurement Mode automatically and the previous measurement parame-

ters and settings appear on the display. For example:



2.2

Change settings if necessary and continue measuring.

NOTE: Each measurement can be «marked» by type of sample or construction observed, as follows:

- beam;
- pillar;
- block;
- wall;
- slab;
- girder;
- truss;
- pile;
- panel.

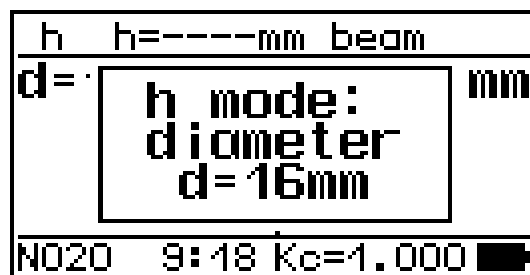
The selected «mark» does not affect measuring results.

2.1.5 To select or change a «mark» press **ENTER**, so the name of sample type will become inverse (font and background will have changed). By « \uparrow , \downarrow » select a new type and press **ENTER**. After that the Coefficient of Coincidence (K_c) becomes inversely highlighted.

NOTE: K_c is a correcting coefficient to measurand (h) (its value is accepted as 1 by default). K_c value is taken not equal to 1 (one) if magnetic properties or rebar diameter differ significantly from the requirements of GOST 6727, 5781

By pressing « \uparrow , \downarrow » keys set a new K_c value and press **ENTER**.

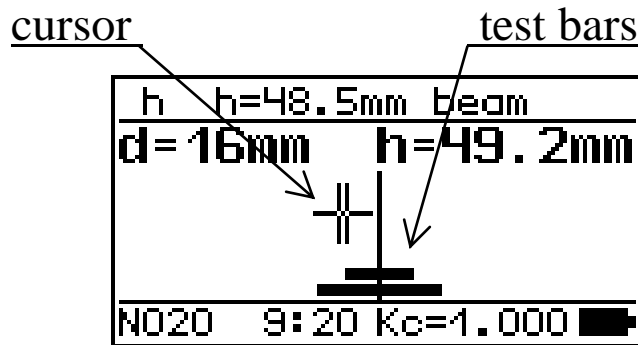
To change a rebar diameter value press «**d/H**», the display shows following:



2.3

By pressing « \uparrow , \downarrow » keys set a new diameter value and press **ENTER**.

2.1.6 Check the Instrument operability by approaching to metal objects: cursor (a pair of lines crossing another one) shows the object location relative to the Instrument Y-axis and two horizontal bars show its location relative to the Instrument X-axis. For example:



2.4

The cursor appears if any metal object enters inductive sensor coverage area. Moving horizontally on the screen the cursor shows the distance between the object and the Instrument Y-axis.

Test bars indicate the distance (orientation) of the object relative to the X-axis, their length is proportional to this distance.

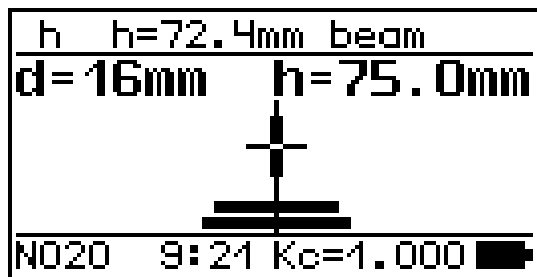
ATTENTION! Check the Instrument operability every time you switch the Instrument on (after every switching on).

2.2 Rebar Location/ Rebar Axis Detection Mode

2.2.1 Rebar axis location can be made in the Measuring Mode, whichever Rebar diameter value « d » or cover depth value « h » were set up in the Instrument memory before.

2.2.2 Prepare the Instrument to operation in accordance with p. 2.1. Enter the Settings Mode and select a «*Scanning*» type of measuring operation.

2.2.3 Place the Instrument on the test surface and by moving it slowly from side to side (sliding on the surface), turning it about vertical axis, ensure that the cursor is in the closest position to center of the display, and two bars below have taken the minimum size, for example:



2.5

When the cursor is exactly in the center, the LED Indicator will light and the acoustic signal will sound. Move the Instrument until the cover depth value (h) shown in the top line of the display has become minimal.

If you move the Instrument along the Y-axis and cursor position and length of the test bars do not change - the Instrument axis coincides with the rebar axis (Figure 2). The rebar is directly beneath the Instrument.

2.2.4 Mark on test surface the position of the rebar axis according the special marks on the Instrument side panels.

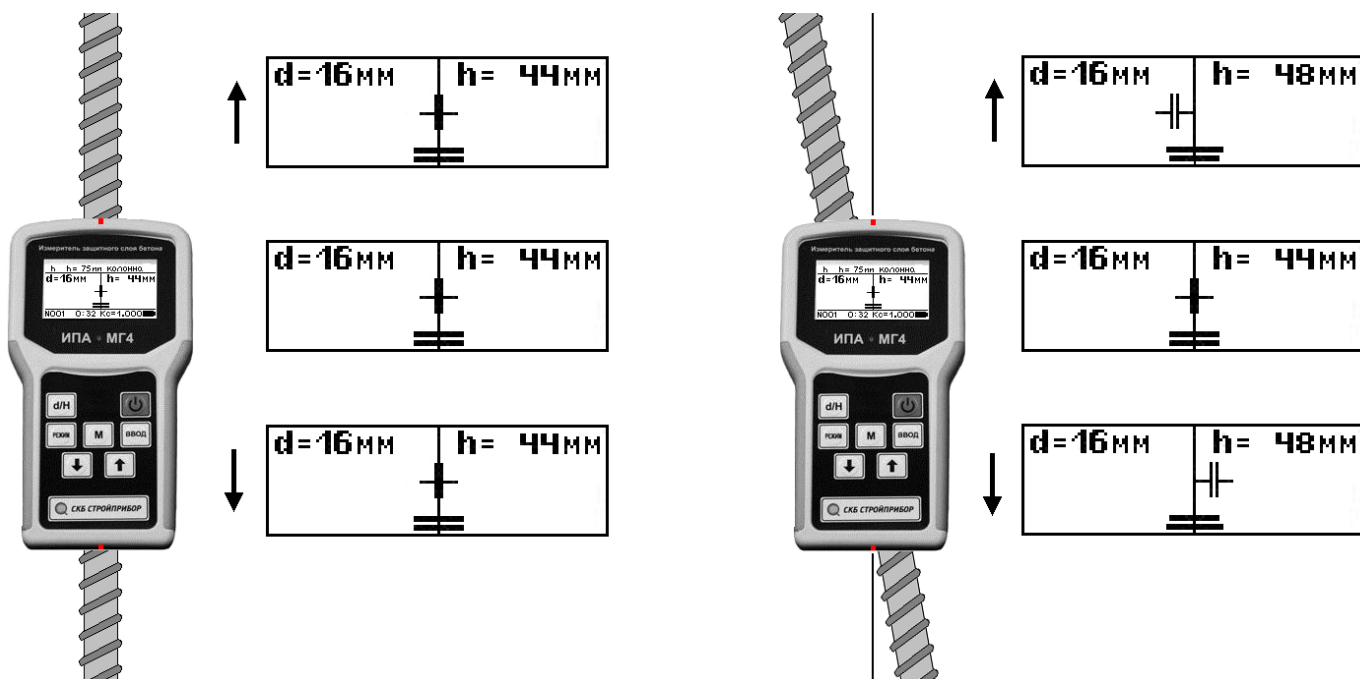


Figure 2 – The rebar axis determining

For a more precise definition of the rebar axis, turn the Instrument 90 °.

While moving the Instrument perpendicular to rebar direction

cursor position does not change and the test bars length varies depending on the measuring position (Figure 3).

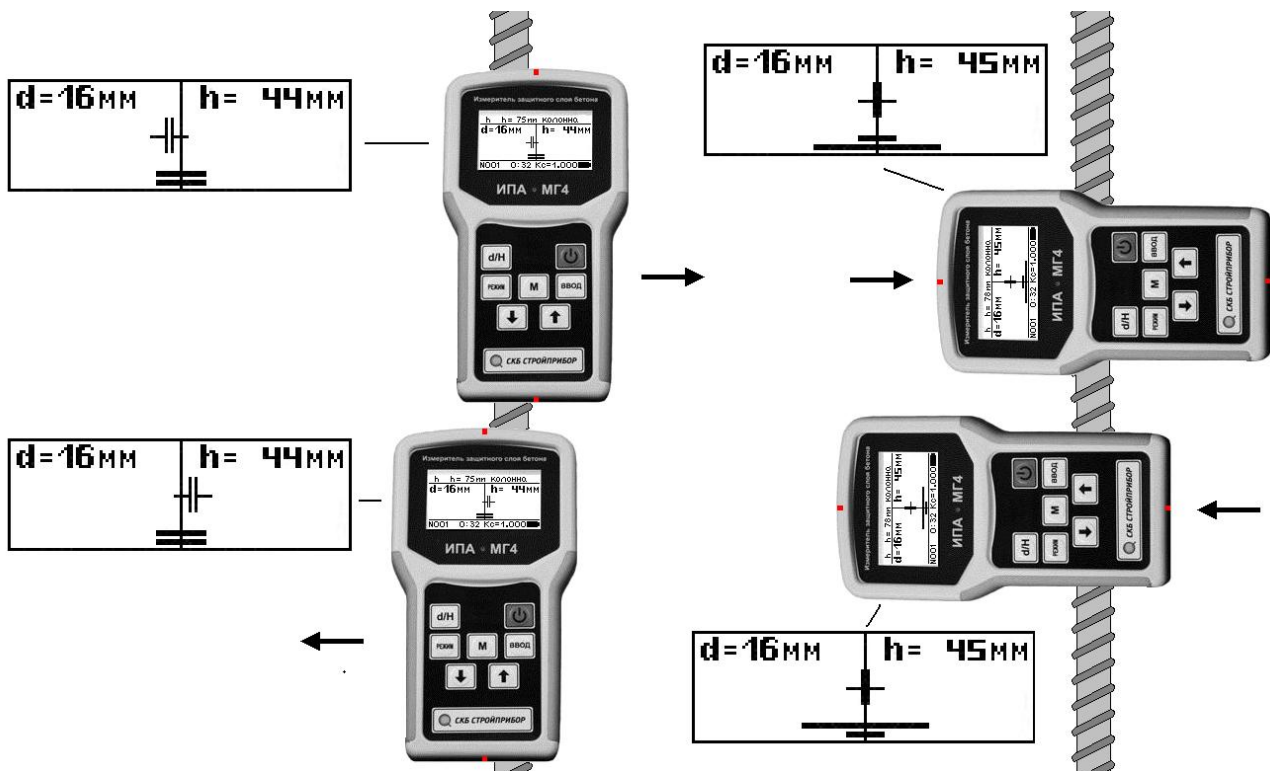


Figure 3 – The rebar axis determining when the Instrument is turned 90°

NOTE: When the display shows the message «Charge the battery!» You must turn the power off and charge the battery by connecting the meter via USB to a computer or using the charger included in the Instrument delivery set.

2.3 Measurement of Concrete Cover Depth «h» Mode

2.3.1 Prepare the Instrument to operation in accordance with p. 2.1. Enter the Measurement Mode and press «d/H» key to select a «Mode h» type of operation. Press «↑, ↓» keys to enter the rebar diameter value and then press **ENTER**.

2.3.2 Determine the rebar axis according to p. 2.2.

ATTENTION: It is strongly recommended to perform the adjustment after every 20-30 minutes of the Instrument continuous operation: Take the Instrument away from any metals (the

distance between the Instrument and any metal objects must be at least 500 mm) and press «↑».

2.3.3 While in the Settings Mode select a «*Scanning*» or «*Single*» type of measuring as per p. 2.7. The measuring result at «*Single*» type remains on the screen even if the Instrument has moved out from the test object.

2.3.4 Slide the Instrument slowly parallel to the rebar axis until the cover depth value (h) shown in the top line of the display has become minimal.

When the cursor is exactly in the center, the LED Indicator will light, the acoustic signal will sound and the result of cover depth measuring (h) will be shown in the middle field of the screen.

2.3.5 To save measuring result in the Instrument archive press **ENTER**.

2.3.6 (For «*Single*» type of measuring only). To repeat measurement (under the same settings and conditions – when changes aren't needed) at «*Single*» type press «M» key and follow the operations as per p. 2.3.4.

2.4 Rebar Diameter «d» Estimation Mode

Attention! This and the following modes are reference ones, the error of «d» and «h» measuring results is not normalized.

2.4.1 Prepare the Instrument to operation (as per p. 2.1). Enter the Measuring Mode and press «d/H» key to select a «*Mode d*» type of operation, the display shows the following, for example:



2.6

By pressing «↑, ↓» and **ENTER** keys set the cover depth value (for example, 20 mm).

2.4.2 Place the Instrument on the test surface and find the rebar axis according to p. 2.2.

2.4.3 Enter the Settings Mode and select a «*Scanning*» or «*Single*» type of measuring as per p. 2.7. The measuring result at “Single” type remains on the screen even if the Instrument has moved out from the test object.

2.4.4 Move (slide) the Instrument slowly parallel to the rebar axis until the cover depth value (h) shown in the top line of the display has become minimal.

When the cursor is exactly in the center, the LED Indicator will light, the acoustic signal will sound and the result of rebar diameter measuring (d) will be shown in the middle field of the screen.

2.4.5 To save measuring result in the Instrument archive press **ENTER**.

2.4.6 (For «*Single*» type of measuring only). To repeat measurement (under the same settings and conditions – when changes aren't needed) press «M» key and follow the operations as per p. 2.4.4.

2.5 Rebar Diameter «d» and Concrete Cover Depth «h» Estimation Mode (when both values are unknown)

2.5.1 The Instrument determines the rebar diameter value and the cover depth value in two ways:

1. By scanning (moving the Instrument parallel the rebar axis). This way can be used if the cover depth is less than 60 mm the and distance between neighboring rebars is more than 100 mm «**Mode d,h**»;

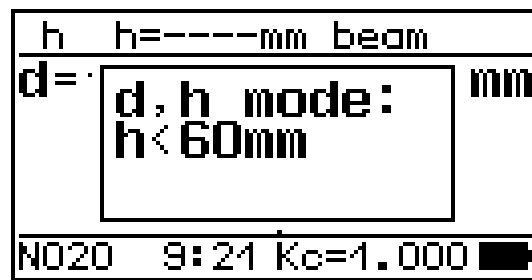
2. By using the Calibration Spacer that imitates concrete cover of 20 mm depth (supplied with delivery set) «**Mode d & h**». This way can be used in all cases/ conditions.

2.5.2 Prepare the Instrument to operation according to p. 2.1. Place the Instrument on the test surface and find the rebar axis according to p. 2.2.

2.5.3 «**Mode d,h**»

Enter the Measuring Mode and press «**d/H**» key until a «*Mode*

d,h» type is selected, the display shows the following:

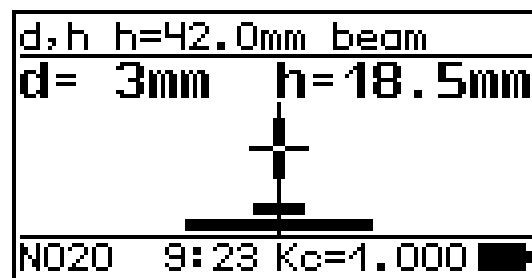


2.7

Press **ENTER**. Place the Instrument (the right or left from the rebar axis) so that its Y-axis be parallel to the rebar one and at a distance not less than 40 mm.

Move the Instrument smoothly and not faster than 10 mm/s (keep its position parallel to the rebar axis) along X-axis approaching to the rebar axis.

When both axes coincided, the acoustic signal will sound and the results of rebar diameter measuring (*d*) and cover depth measuring (*h*) will be shown on the screen, for example:



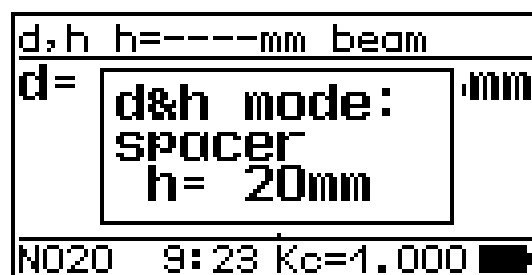
2.8

To save measuring result in the Instrument archive press **ENTER**.

(For «*Single*» type of measuring only) to repeat measurement (under the same settings and conditions – when changes aren't needed) remove the Instrument from the surface and press «M» key.

2.5.4 «Mode d & h»

2.5.4.1 Enter the Measuring Mode and press «**d/H**» key until a «*Mode d & h*» is selected, the display shows the following:

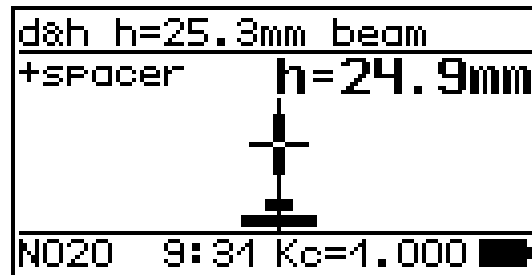


2.9

Press **ENTER** key.

2.5.4.2 Place the Instrument right above the rebar so that its Y-axis coincides to the rebar axis.

Move the Instrument smoothly until the cover depth value (h) in the top screen line has become minimal, then press «↓». The display shows the following, for example:

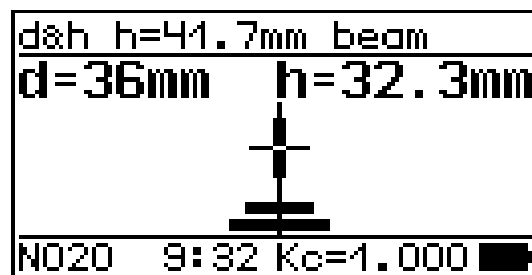


2.10

2.5.4.3 Make the next measurement with the basic calibration device – imitation of concrete cover of 20 mm depth (supplied with delivery set) placed between the Instrument and testing surface.

Place the Instrument so that both axes (the Instrument and the rebar) coincide. Move (slide) the Instrument smoothly until the cover depth value (h) in the top screen line has become minimal, then press «↓».

After that the results of rebar diameter (d) and cover depth (h) measuring appear on the screen, for example:



2.11

To save measuring result in the Instrument archive press **ENTER**.

(For «Single» type of measuring only) to repeat measurement remove the Instrument from the surface and press «M» key.

2.6 Calibration Mode

2.6.1 This mode is used for calculating and recording in the Instrument memory of K_C – the Coefficient of coincidence value.

The calculation of K_C is necessary if the magnetic properties of rebar, as well as its diameter deviate from table values set in the Instrument memory.

2.6.2 The calibration can be made in two ways:

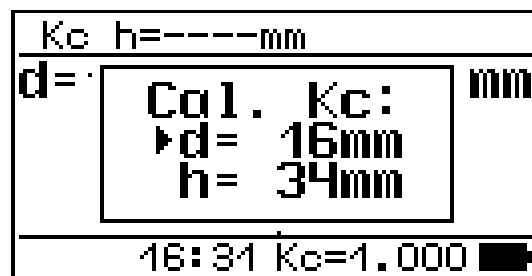
– if the rebar specimen and a pad of non-magnetic, non-conductive material with a certain thickness (the basic calibration device) are available.

– while construction examinations where there is no rebar specimens, the calibration curve correction should be made after determining the rebar diameter through destructive means: drilling an inspection hole and measuring the rebar diameter and cover depth by caliper.

2.6.3 Take the Instrument away from any metals (the distance between the Instrument and any metal objects must be at least 500 mm), switch it on and enter the Calibration Mode (see p. 1.4.4.2).

2.6.4 Determine the rebar axis as per p. 2.2.

2.6.5 Press «**d/H**» key, then the display shows the following, for example:



2.12

By pressing «**↑, ↓**» set the rebar diameter value (of specimen or measured by caliper) and press **ENTER**, then the cursor moves to the cover depth value, also by pressing «**↑, ↓**» set the cover depth value (of the Calibration Spacer or measured by caliper) and press **ENTER**.

Take a measurement of the cover depth value according to p. 2.3 and press **ENTER**.

The Coefficient of coincidence is calculated from the obtained measurements by formula:

$$K_c = \frac{h_d}{h_u}, \quad (1)$$

where h_d – the true cover depth measured by caliper (or the Calibration Spacer depth value), mm;

h_u – h value shown by the Instrument, mm.

The obtained K_C will be shown in the lowest line of the screen.

ATTENTION! Set K_C value will be saved in the Instrument memory. All the next measured values will be multiplied by this coefficient.

You can change K_C value in two ways:

- follow the steps of p. 2.1.5 skipping the «marking» of samples;
- enter the Calibration Mode again.

2.7 Settings

2.7.1 Enter the Settings Mode, made operations according to p. 1.4.4.3. The display shows mode menu:

```

▶Single
Backlight    on
Sound        on
Date and Time
    
```

2.13

By pressing «↑, ↓» move the cursor at desired menu line and press **ENTER**.

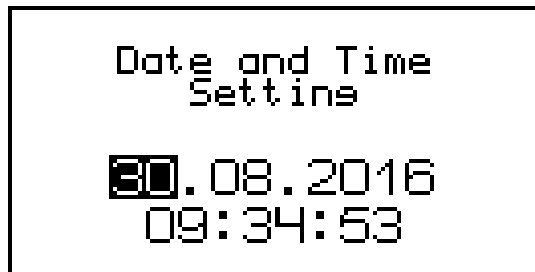
2.7.2 There are two measuring types: «*single*» or «*scanning*» measurement operations.

When «*scanning*» type is selected, the Instrument takes measurement continuously; such type should be used at the rebar axis searching. At «*single*» type the cover depth value enrolls only when both axes (the Instrument Y-axis and the rebar one) are coincided.

2.7.3 Backlight. In the lack of light it is recommended to enable the display backlight. While the display is backlit the Instrument bat-

tery operation time is reduced by 1.6 times.

2.7.4 If date and time are need to be changed, by pressing «↑, ↓» move the cursor at «*Date and Time*» menu line, then press **ENTER**. Display shows the following, for example:



2.14

The date value becomes inversely highlighted, by «↑, ↓» set a correct value and press **ENTER** to activate. By the same way set the month/ year/ hour/ minute/ second value.

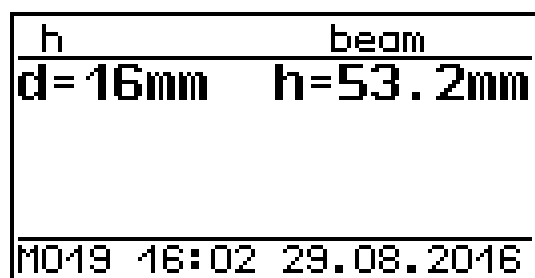
Specified type of date and time will has been stored in the Instrument software during the battery lifetime. The battery must be replaced only in factory conditions.

Press **MODE** to return to the Main Menu (1.1).

2.8 Archive Mode

2.8.1 The Archive volume – 999 measuring results.

2.8.2 View stored measurement results and settings at any time you want: press **MODE** to enter the Main Menu (1.1), by «↑, ↓» keys move the cursor at the «*Archive*» menu line and press **ENTER**. The last measurement will be shown on the screen, for example, M 123:



2.15

To view all measuring results, from M001 to M123, press «↑ » or «↓» keys. The above screen example shows the result of the cover depth measuring (h = 21,1 mm, the observed type is «slab»).

2.8.3 To clear the Archive press **ENTER** and hold it pressed about

1 second. The display shows the following:



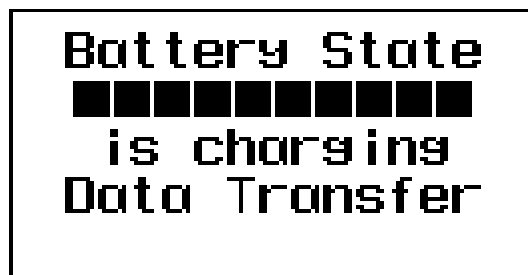
2.16

The «↑» key clears all archive content, the «↓» key cancels the Archive clearing.

Press **MODE** to return to the Main Menu (1.1).

2.9 Data Transfer Mode

Connect the Instrument to a computer using the supplied USB cable and the Data Transfer Mode (from the Instrument Archive to PC) will be activated automatically. The display shows the following:



2.17

2.9.1 PC system requirements

The Instrument software will be supported by the following system: Windows 2000, ME, XP, 7, 8, 8.1 Microsoft Corp;

Also one free USB port must be available.

2.9.2 PC connection

Use vacant USB port for data transferring. Connect one end of the PC transfer cable to computer USB port and other end to USB socket of the Instrument.

2.9.3 Software purpose, installation and capabilities

2.9.3.1 Software purpose

The Data Transfer Software (the Software) is designed to communicate with Rebar Detector and Cover Meter IPA-MG4.02 of SDD Stroypribor.

The Software allows to transfer data stored in the Instrument Archive to PC (stationary or portable).

2.9.3.2 Software Installation

To install a software program do the following:

- insert CD to PC via CD-ROM;
- open the folder «Programs» on the CD;
- find and open the folder «Stroypribor Data Transfer»;
- begin the installation, simply double click an *Install.exe* file.

When files uploaded, press «*Extract*». After the installation end new program will be accessible via menu «START» – «Programs» – «Stroypribor» – «Data Receiving».

2.9.3.3 Software Capabilities:

- viewing the data and entering the service information within «NOTE» field for each measuring result;
- sorting by any table column;
- printing the reports;
- tables supplementation by new data received from the Instrument Archive (criterion: the date of the last record in the table);
- export of the reports to Excel.

2.9.4 Data Receiving

2.9.4.1 Switch on the PC and run the program via menu «START» – «Programs» – «Stroypribor» – «Data Receiving».

2.9.4.2 Connect the Instrument to PC as per p. 2.9.2.

2.9.4.3 At the end of the process of determining the Instrument by PC, it is necessary to enter the «Operations» section of menu and activate the line «Read the Archive» by clicking the left mouse button on it. The data read from the Archive will appear on the screen in tabular form.

2.9.4.4 To edit the existing data enter the «File» section of menu and activate the line «New» by clicking the left mouse button on it. The file «Table 1» will appear on the screen above the already existing «Data Receiving» file.

2.9.4.5 Form your own table of the necessary data by results (rows) dragging and dropping (simply press and hold pressed the left

mouse button) from the «Data Receiving» table in the «Table 1». Now it is possible:

- to remove unnecessary data;
- to add a note;
- to export data to Excel;
- to print the report.

2.9.4.6 The detailed description of the program you can find via menu «START» – «Programs» – «Stroypribor» – «Help – Data Receiving».

2.9.4.7 If failure occurs while data transfer, the following message will appear on the screen «The Instrument isn't detected. Check the Instrument connection according to the Operating Manual and make sure that the Instrument is in the Data Transfer Mode». Check the Instrument connection, cable integrity and the taken USB port operability, then run the Data Receiving program again.

2.9.5 Disconnect the Instrument from PC to return to the Measuring Mode.

3 MAINTENANCE

3.1 Safety Precautions

3.1.1 The Instrument is allowed to be operated by persons instructed in safety precaution regulations at nondestructive testing of concretes and reinforced concretes in construction industry, at construction sites, buildings and structures under inspection. The instrument is only to be used for its designated purpose as described in this Operating Manual and each user must be familiar with this OM.

3.1.2 Additional safety precaution events and acts related to the specifics of control must be provided in the technical charts (control charts).

3.2 Maintenance Procedure

3.2.1 Maintenance procedure includes:

- the Instrument operability checking (see paragraph 2.1.6.);

- routine inspection;
- scheduled and preventive maintenance.

3.2.2 The frequency of routine inspections is determined depending on the intensity of exploitation, but not less than once a year.

At routine inspection should be checked mounts of controls, smoothness of their actions and clarity of their fixation as well as condition of connectors, cables and covering paint.

3.2.3 Scheduled preventive maintenance is carried out after the expiration of the warranty period at least once a year. Repair includes external inspection, replacement of the controls and covering paint restoring (if necessary).

3.2.4 At the current repair and maintenance eliminate faults discovered during the Instrument operation as well as replace the battery (if necessary).

The calibration of the Instrument should be carried out after each repair. The current repair have to be carried out by the manufacturer.

**Technical Datasheet
of Rebar Detector and Cover Meter IPA-MG4.02**

1 The Instrument Overview

1.1 Cover meter/rebar locator IPA-MG4.02 (or Instrument) is intended for nondestructive determining of single rebar axis and measuring of concrete cover depth (above the rebar) in reinforced concrete products and constructions by GOST 22904.

The Instrument determines rebar diameter according to known cover depth value as per Appendix G GOST 22904

1.2 Applications: measurement of cover depth and location of rebar axis in reinforced concrete at the concrete product plants, construction sites, as well as during the maintenance and examination of the exploited buildings.

1.3 Operating Conditions:

- ambient air temperature from minus 10 to 40 ° C
- relative humidity up to 95%
- atmospheric pressure from 84.0 to 106.7 kPa (630 to 800 mm Hg.).

2 Metrological and Technical Characteristics

2.1 Concrete cover depth measuring range, mm:

- for rebar diameters of 3, 4, 5, 6, 8 mm from 5 to 60
- for rebar diameters of 10, 12, 14, 16, 18 mm from 5 to 90
- for rebar diameters of 20, 22, 25, 28 mm from 5 to 110
- for rebar diameters of 32, 36, 40, 50 mm from 10 to 130

2.2 The limits of absolute error, mm:

– for single rebar, up to $\pm (0,05hc + 0,5)$, (hc – the concrete cover depth value, mm);

– for rebar grid, up to $\pm (0,05hc + 0,5)$, providing that:

- a) concrete cover depth, mm, up to 60
- b) the minimum longitudinal bar pitch, mm:

Rebar Detector and Cover Meter IPA-MG4.02

– for rebar diameters of 4-10 mm	100
– for rebar diameters of 12-22 mm	150
– for rebar diameters of more than 22 mm	200
c) the minimum cross bar pitch, mm:	
– for cross rebar diameter of 4 mm with longitudinal rebar diameter of 10 mm or less;	150
d) the minimum spacing between neighboring bars surfaces of the first and second layers (if the second layer is available), mm	50
2.3 The additional error caused by the temperature change from the normal value (20 °C) to extreme operating values, for each 10°C, up to	± 1
2.4 The permissible deviation of shown rebar axis location from its true position, mm, up to:	
– for rebar diameters of 3-10 mm and concrete cover depth up to 40 mm;	± 10
– for rebar diameters of 12-40 mm and concrete cover depth up to 80 mm.	± 10
2.5 Supply voltage (lithium polymer battery), V	3,7±0,5
2.6 Input current, mA, up to:	
– backlight off	77
– backlight on	125
2.7 Dimensions, mm, up to	202×113×37
2.8 Weight, kg, up to	0,37

3 The Delivery Set

Description and designation	Q-ty, pcs	Note
Rebar Detector and Cover Meter IPA-MG4.02	1	
Operating Manual. Technical Datasheet	1	
Calibration spacer (unit that imitates concrete cover of 20 mm depth)	1	
PC transfer cable	1	Provide data transfer from the Archive to PC
Software CD	1	
Battery charger	1	
Carrying Strap	1	

4 Warranty

4.1 The manufacturer guarantees the compliance of the Instrument with the requirements of the specifications. However, any failure to observe the rules of operation and storage provided in this Operations Manual will void this warranty.

4.2 Guaranteed service life: 18 months from the date of putting into operation. Guaranteed storage life: 6 months from the date of manufacture.

4.3 The above warranty shall not spread on Instruments with broken seals and severe mechanical damages.

5 The Certificate of Acceptance

Rebar Detector and Cover Meter IPA-MG4.02 № ____ meets the requirements of KBSP.427672.62 TU and declared to be fit for use.

Date of manufacture « ____ » _____ 201__ г.

Date of sale « ____ » _____ 201__ г.

M.P. _____
(signature of authorized quality inspector(s))

Manufacturer addresses:

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