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Saint-Petersburg, Russia

MAGNETIC-EDDY-CURRENT FLAW DETECTOR

VID-345

Operation Manual
VID-345 OM

TABLE OF CONTENTS

This operating manual contains the information on the purpose, operation principle, technical characteristics, construction and operation of the Magnetic-eddy-current flaw detector VID-345 (hereinafter Flaw detector) and the rules for its operation, transportation and storage.

1. DESCRIPTION AND OPERATION

1.1 Designation

Flaw detector VID-345 is intended for detecting cracks and measuring their depth (detecting stress- corrosive cracks in metal ferromagnetic constructions) even under layer of corrosion and/or protective coating.

Flaw detector enables to measure depth of corrosive damage as well as thickness of protective coating.

Flaw detector can be used for inspection of pipelines, pressure vessels, building structures, machine parts and mechanisms.

1.2 Technical characteristics

Basic technical characteristics of the Flaw detector are listed in Table 1.

Table 1

Parameter	Value
Sensitivity threshold of determining of parameters of notch-type defect: - defect width - defect depth	 not more than 0.25 mm not more than 0.20 mm
Min detectable crack depth	0.2 mm
Min crack opening	0.05 mm
Min detectable crack length	5 mm
Min diameter of test object	not less than 100 mm
Crack depth measurement range	0.2 – 2.0 mm
Defect depth measurement range	0.2 – 5.0 mm

Crack depth measurement accuracy	±(0.2 h + 0.15) mm, where h is a defect depth
Measurement range of protection coating thickness or corrosion damage depth	0 – 10 mm
Accuracy of measurement of protection coating thickness or corrosion damage depth	10 %
Max thickness of insulation layer for crack depth measurement	4 mm
The temperature range	-15 to +35 °C
Dimensions of Flaw detector electronic unit	160 × 85 × 35 mm
Dimensions of N-345 standard probe	not more than 25 × 25 × 60 mm
Weight of electronic unit	0.5 kg or less
Power supply	is self-contained from 2 Ni-MH batteries (1.2 V) or similar or from battery type AA 1.5 V ALK
Continual working time from battery is	10 hours
Control of battery discharge	yes
Service life	5 years

1.3 Delivery set

Flaw detector delivery set is given below in Table 2.

Table 2

Article	Quantity (pcs)	Notes
Flaw detector electronic unit	1	
N-345 standard probe	1	№_____
Probe connection cable	1	
KM-345 Reference block with crack imitation	1	_____ mm
KM-345.00.00.00 reference block data sheet	1	

2 mm thick insulating layer reference block	1	
Ni-MH batteries (1.2 V, at least 2000 mAh)	2	installed in the device
Charger	1	
Headphones with adapter	1	
Soft case and device arm cuff	1	
Operation manual	1	
Calibration certificate	1	
Suitcase for storage and transporting	1	
Additional accessories		
N-345 standard probe		№_____
Probe connection cable		
Ni-MH batteries		

1.4 Construction and functioning

1.4.1 Operating principle

Principle of operation is based on magnetic-eddy-current method. Probe establishes alternating magnetic field. Under its influence eddy currents are excited in the controlled area of controlled object. These eddy currents establish stray magnetic fields near the crack that are registered by probe.

Simultaneously distance between probe and controlled metal surface is measured by means of alternating magnetic field.

Registration of mentioned parameters enables to measure thickness of protective coating or depth of corrosive damage as well as detect and measure depth of crack regardless of protective coating thickness or depth of corrosive damage.

1.4.2 Construction of Flaw detector

Flaw detector consists of probe, electronic unit (receives and transforms probe signal) and charger.

Electric signals of probe are transformed into number code and move to controller's microprocessor.

Controller includes random-access memory (RAM) (for storing intermediate result of calculation), read-only memory (ROM) (for recording working program) and a microprocessor (for calculating and organizing interconnection of work of all controller blocks).

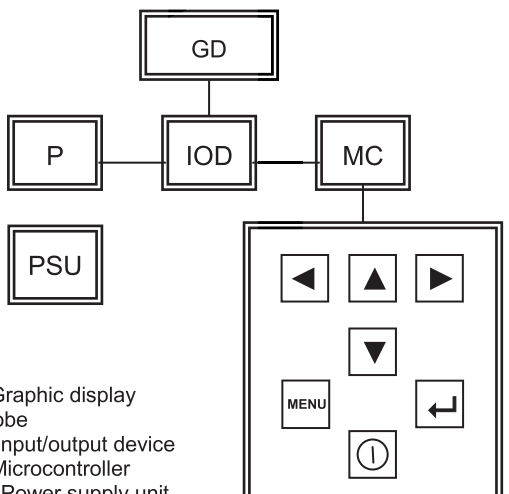
All the blocks of controller are connected by means of bidirectional data bus and unidirectional bus of address and control.

Feed of all the controller blocks is implemented by means of self-contained power supply.

Using of controller enables to:

- See a result of crack depth and coating thickness measurement in mm on graphic display;
- Abstract from influence of protective coating thickness on crack depth value during work with flaw detector.

Structural scheme of Flaw detector is represented on Figure 1.



GD – Graphic display
P – Probe
IOD – Input/output device
MC – Microcontroller
PSU – Power supply unit

Figure 1

1.4.3 Flaw detector design

The Flaw detector is made as a portable device.

On the front panel there are:

- graphic display (further Display);
- keyboard with buttons «▲», «▼», «◄», «►», «MENU»;
- «↵» input of information;
- «⏻» switching on/off of the device, processor reset to the beginning of the program execution («RESET»).

The following sockets are located on the upper end wall of the electronic unit:

- probe connection socket;
- headphones / charger connection socket.

The battery compartment cover is located on the lower end wall of the electronic unit.

The probe has a metal housing covering the elements of magnetic field excitation and receiving. The contact part of the probe is made of wear-resistant ceramics.

The following sockets and indicators are located on the probe housing:

- electronic unit connection socket;
- red LED indicator of a crack with the depth equal to or exceeding the threshold value set by user;
- yellow LED indicator of insulating layer thickness or corrosion damage depth equal to or exceeding the threshold value set by user.

1.4.4 Operation algorithm of Flaw detector

Operation of Flaw detector is organized according to the program written in ROM.

User manages the modes of work by means of menu.

Access to the modes menu of Flaw detector is realized by means of «MENU» button.

Flaw detector has following operation modes:

- Mode «Scan-depth»
- Mode «Scan»
- Mode «Settings»
- Mode «Correction»

Mode «Scan-depth» enables to detect, register and measure crack depth, thickness of protective coating or depth of corrosive damage. It also enables to settle necessary thresholds of signaliza-

tion (light and sound registering) of crack depth, thickness of protective coating or depth of corrosive damage.

Mode «Scan» enables to detect and register cracks. This mode is recommended for use in case of thick protective coating on controlled surface (from 4 mm). This mode enables to regulate sensitivity of functioning and threshold of flaw detector signalization.

Mode «Settings» enables to:

- Set the duration of light and sound signalization;
- Turn on/off sound signal;
- Turn on/off display backlight.

In «Correction» mode user can control and correct the mode of flaw detector functioning during calculation of crack depth and thickness of protective coating with help of control samples (included in basic delivery set). This mode is recommended for use in case of replacement of the probe, deterioration of contact surface of the probe and in case of work in unusual climate conditions.

All the modes programmed by the User are saved during all the periods of exploitation. They can be changed by the User if necessary.

1.5 Marking and sealing

1.5.1. The electronic unit of the Flaw detector on the back side has a plate according, on which the following is indicated:

– name of the manufacturer;
– name of the Flaw detector;
– serial number of the Flaw detector.

1.5.2 The inscriptions, signs and images on the plate are made in the manner that ensures their safety during storage and during the operation of the product, on which the plate is installed.

1.6 Packing

The suitcase, included in the delivery set, is used for carrying and storing the Flaw detector. The suitcase has elements for fixing the components, which are included in the delivery set.

2. OPERATION

2.1 Connection and getting ready for work

2.1.1 Connect the probe to the socket on the end wall of the electronic unit.

2.1.2 Turn on the flaw detector by pressing «⏻» button. The flaw detector will automatically launch the last used mode: «Scan-depth» or «Scan».

2.1.3 Press «MENU» button to switch mode or to change settings. List of modes will be shown on the screen as given in Fig. 2.

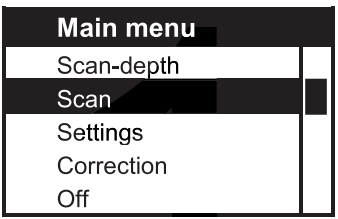


Figure 2

Press «▼» and «▲» to move through the menu. Press «↵» to select the menu item.

2.2 «Settings» mode

The selected mode is shown on the screen as given in Fig. 3

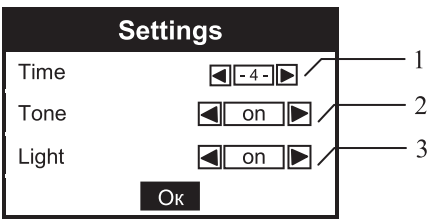


Figure 3

1 – is a duration (in seconds) of light and sound alarm after detection of the crack or the defect of protection coating or corrosion damage;

2 – is a turn on / turn off of the sound alarm;

3 – is a turn on / turn off of the screen backlight.

Press «▼» and «▲» to move through the options 1, 2, and 3. Press «◄», «►» to set the option parameter.

Press « ↵ » to save changes and exit «Settings» mode. The screen turns back to that shown in Fig. 2.

All the changes made are applied to all modes.

2.3 «Correction» mode

Use this mode after changing the probe, in case of wearing of the probe contact surface, or when current working conditions differ a lot from that at previous operation. The correction has to be done for the crack and for the thickness separately.

To perform the correction, use a reference block with crack imitation and an insulating layer reference block included in the delivery kit.

When «Correction» mode is selected, the screen looks as shown in Fig. 4.

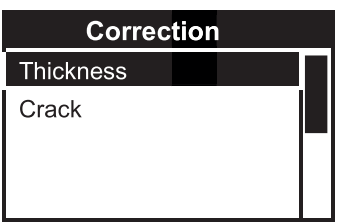


Figure 4

2.3.1 Thickness correction

When «Thickness» mode is selected, the screen looks as shown in Fig. 5.

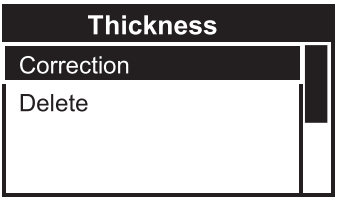


Figure 5

When «Correction» mode is on, a flashing mes-sage «SET ZERO POINT» appears on the screen.

Place the probe contact surface on a defect-free area of the reference block with crack imitation as shown in Fig. 6.

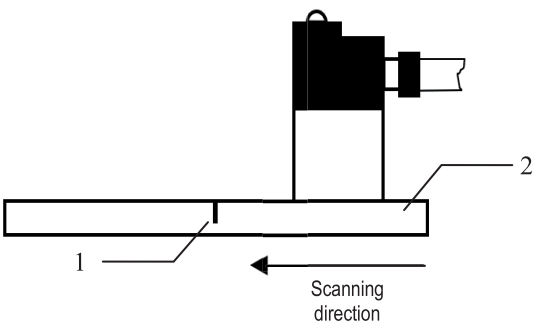


Figure 6

1 – Crack;
2 – Reference block with crack imitation

Press «↵ », the screen will look as shown in Fig. 7.

Figure 7

Place the probe contact surface on an insulating layer reference block on a defect-free area of the reference block with crack imitation as shown in Fig. 8.

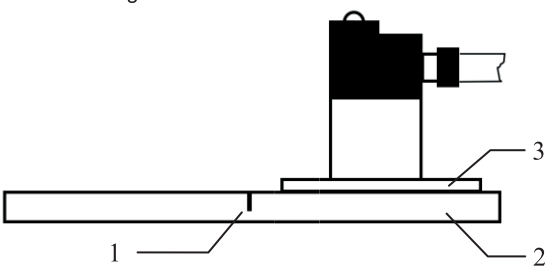


Figure 8

1 – Crack;
2 – Reference block with crack imitation;
3 – Reference block of the insulating layer

Press « ↵ » to record the thickness readings. The screen will blink briefly and will look as shown in Fig. 9.

Set the thickness value indicated on the insulating layer reference block using «▲» and «▼» buttons and press « ↵ ». A message «Correction is set» appears on the screen. The thickness correction is done.

If necessary, correction can be deleted and the factory settings can be restored in «Delete» mode.

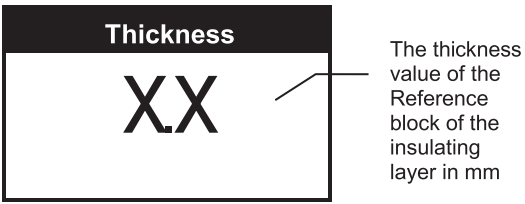


Figure 9

2.3.2 Crack correction

When «Correction» - «Crack» mode is on, a flashing message «SET ZERO POINT» appears on the screen.

Place the probe contact surface on a defect-free area of the reference block with crack imitation as shown in Fig. 6.

Press «↵», the screen will look as shown in Fig. 10.

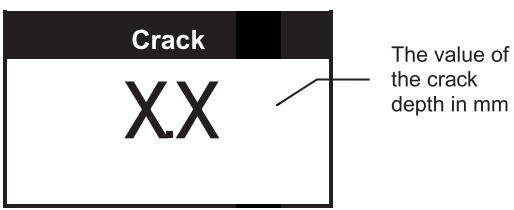


Figure 10

Moving the probe in the direction indicated in Fig. 6, place it in a position corresponding to the largest crack depth reading. Press «↵» to record the crack depth readings. The screen will blink briefly and will look as shown in Fig. 10.

Set the crack depth value indicated on the reference block with crack imitation using «▲» and «▼» buttons and press «↵». The crack correction is done.

If necessary, correction can be deleted and the factory settings can be restored in «Delete» mode.

2.4 Operation in «Scan-depth» mode

2.4.1 When «Scan-depth» mode is selected, the screen looks as shown in Fig. 11.

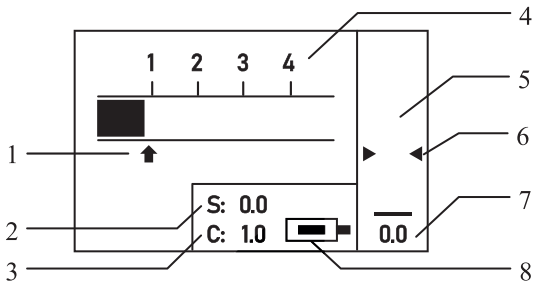


Figure 11

1 – is a magnitude of required threshold of crack depth alarm;

2 – is a value of required threshold of protection coating thickness alarm or corrosion damage depth alarm («S»);

3 – is a value of required threshold of crack depth alarm («C» means «Crack»);

4 – is a crack depth scale: 1 mm, 2 mm, 3 mm, 4 mm;

5 – is a protection coating thickness scale or corrosion damage depth scale;

6 – is a magnitude of required threshold of protection coating thickness alarm or corrosion damage depth alarm;

7 – is a measured value of protection coating thickness or corrosion damage depth;

8 – is a battery charge level control.

Note. The values of positions 1, 3 and 2, 6 are set at the previous use of the «Search-Depth» mode.

2.4.2 Set the value of required threshold of crack depth alarm by pressing and holding «►» or «◄» buttons. The magnitude of the threshold set can be seen from positions 1 and 3 in Fig. 11. It must be taken into account that the minimum value of the threshold set must be at least 0.2 mm.

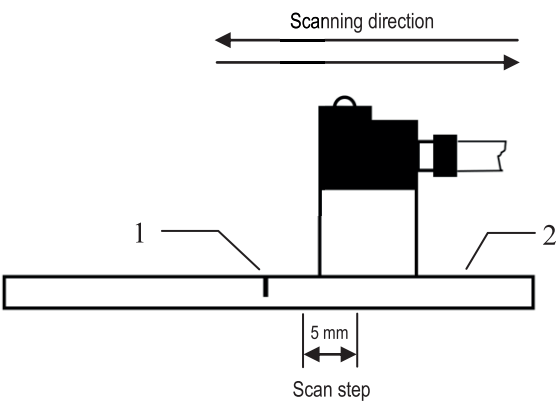
2.4.3 If necessary, set the value of required threshold of protection coating thickness alarm or corrosion damage depth alarm by pressing and holding «►» or «◄» buttons. The magnitude of the threshold set can be seen from positions 2 and 6 in Fig. 11.

2.4.4 To increase the accuracy, before scanning it is advisable to measure the electromagnetic properties of material for further automatic adjustment.

Press « ↵ » and hold it for at least 3 seconds, a flashing message «SET ZERO POINT» appears on the screen. Place the probe contact surface on a test object area without protection coating, visible corrosion damage or cracks. Press « ↵ », the screen will look as shown in Fig. 11.

2.4.5 When using headphones, use the cable included to the delivery kit to connect them to a socket on the end wall of the electronic unit of the flaw detector.

2.4.6 Place the probe contact surface on the test object and start scanning with 5 mm scan step as shown in Fig. 12.



1 – is a crack;
2 – is a controlled surface

Figure 12

2.4.7 When performing operations according to clause 2.4.6, depending on the controlled surface the screen will look as shown in Fig. 13

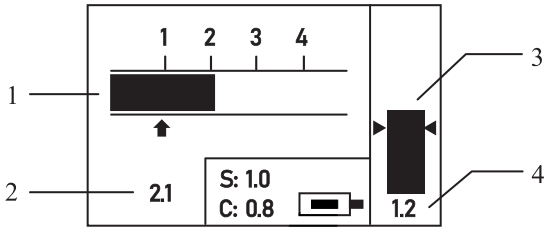


Figure 13

1 – is a graphical display of the crack depth;

2 – is a measured value of crack depth (mm), displayed only when the crack depth exceeds the set threshold value;

3 – is a graphical display of the protection coating thickness or the corrosion damage depth;

4 – is a measured value of the protection coating thickness or the corrosion damage depth.

Note. The value of required threshold of crack depth alarm or of corrosion damage depth alarm («S»: 1.0) and value of required threshold of protection coating thickness alarm («C»: 0.8) are set by user. The values of positions 1, 2 and 3, 4 are the actual measurement results obtained at a specific time (these values are not recorded and only shown on the display).

2.4.8 If the crack depth equals to or exceeds the value of set alarm threshold, a red LED indicator lights up on the probe and an audible alarm signal is on (in case the sound alarm was turned on in «Settings» mode). The measured value of the crack depth is displayed on the screen (position 2) as shown in Fig. 13.

2.4.9 If the protection coating thickness or the corrosion damage depth exceeds the value of set alarm threshold, a yellow LED indicator lights up on the probe and an audible alarm signal is on (in case the sound alarm was turned on in «Settings» mode).

The current measured value of coating thickness or the corrosion damage depth is displayed on the screen (position 4) as shown in Fig. 13.

2.5 Operation in «Scan» mode

2.5.1 When «Scan» mode is selected, the screen looks as shown in Fig. 14.

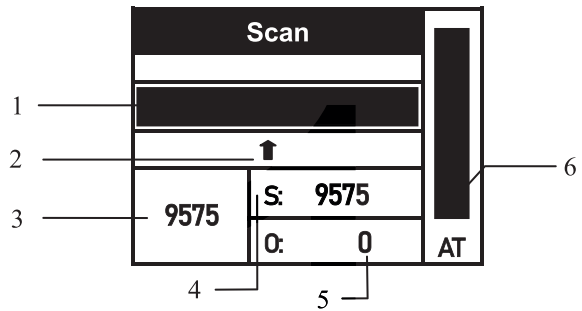


Figure 14

1 – is a graphical display of the probe signal/compensated signal;
2 – is a value of required alarm threshold of crack presence;
3 – is a value of the probe signal/compensated signal;
4 – is a probe signal value;
5 – is a signal offset value;
6 – is a signal amplification.

Note. Values of positions 2 and 6 are set at previous operation. All the values in Fig. 14 to Fig. 17 are examples to illustrate a specific specimen measurement.

2.5.2 To check the validity of the set alarm threshold of crack presence as well as signal offset value and signal sensitivity values, it is necessary to prepare a specimen of the controlled item with a precrack of minimum depth.

The specimen must correspond to the characteristic geometric parameters, as well as electric and magnetic properties of controlled item material. Notches that imitate a surface crack-type defect are done by electrical erosion method or milling.

It is also necessary to prepare a sample of insulating coating of thickness equal to maximum possible thickness of protection coating.

2.5.3 Place the probe contact surface on the insulating coating sample on the defect-free area of specimen with a precrack. Press «↵» and hold it until a «Settings» message appears on the screen (see Fig. 15).

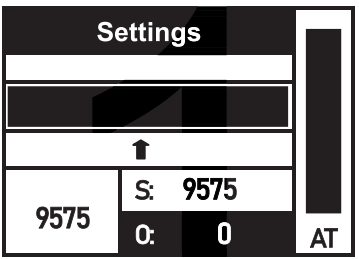


Figure 15

2.5.4 Press «↵» again and hold it to automatically set a signal compensation to zero level on a defect-free area (see Fig. 16). In this way part of signal that does not carry an information about crack presence is cut off.

Scan in accordance to Fig. 12 the surface on the insulating coating sample placed on the specimen with a precrack to observe a crack detection and light / sound alarm.

2.5.5 If necessary, set the flaw detector sensitivity level required to detect a crack on the test object wit maximum thickness of insulating coating. Use «▲» / «▼» (signal amplification) buttons and «◄» / «►» (signal offset) buttons. If none of the buttons is pressed, the detector automatically turns to «Scan» mode (see Fig. 17).

2.5.6 The value of required alarm threshold of crack presence can be set in «Scan» mode only using «◄» and «►» buttons.

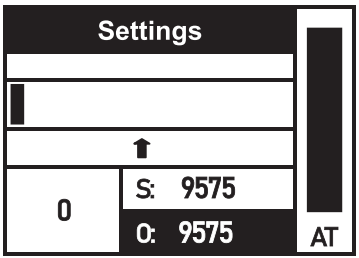


Figure 16

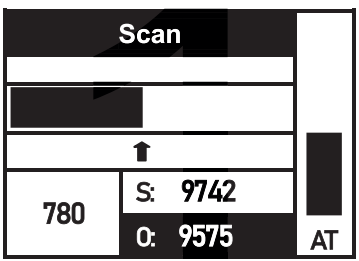


Figure 17

2.5.7 Place the probe contact surface on the controlled surface in the beginning of the controlled zone and start scanning with scan step in accordance to Fig. 12.

2.5.8 When a crack is detected, a red LED indicator lights up on the probe and an audible alarm signal is on (in case the sound alarm was turned on in «Settings» mode).

2.6 Switching off

The Flaw detector can be turned off by two ways:

- press «⏻» and hold it for at least 3 seconds. When «⏻» is released the flaw detector will turn off;
- go to «Switch off» mode.

2.7 Power supply monitoring and battery charge

Battery charge level control is performed both automatically and visually using a conventional icon in position 8 in Fig. 11.

The battery charge level corresponds to a column length in the conventionally depicted battery. When the battery is discharged the column length shortens. When approaching the critical discharge value, a flashing «BATTERY DISCHARGED» message appears on the screen.

To charge the batteries use the charger included into the delivery kit.

The batteries can be charged by two ways:

- plug the charger to the headphones / charger connection socket without removing batteries from the device;
- remove the batteries and insert them directly to the charger.

Plug in the charger. When the batteries are charged a LED indicator lights up on the charger. Typical charging time is 14 hours.

3. TECHNICAL MAINTENANCE

3.1 Checking the technical condition of the Flaw detector in order to ensure its operability during the entire period of operation is carried out at least once a year in the following sequence:

– examine the exterior of the device;

– check the completeness of the device according to p.1.3;

– visually check the serviceability of electronic unit, connecting wires, the state of paint-and-lacquer coatings;

– calibration of the Flaw detector must be carried out in accordance with the «CALIBRATION».

3.2 If malfunctions occur, the flaw detector must be repaired at the manufacturer.

4. TRANSPORTATION AND STORAGE

4.1 The Flaw detector in the transport package can be transported by railway and road transport in compliance with the Rules for carriage of goods in force for these types of transport.

4.2 The Flaw detector is stored in the case in the closed heated room with air temperature (25±10)°C, relative humidity from 45 to 80%, atmospheric pressure from 630 to 800 mm Hg.

5. DISPOSAL

The Flaw detector does not pose a threat to life, to health of people or the environment after the end of life and does not require the special disposal methods.

Batteries are disposed of in accordance with the current regulations for the disposal of these products.

6. WARRANITY

6.1 The manufacturer guarantees the compliance of Flaw detector with the requirements of given Operation manual (combined with the product data sheet), during the warranty period.

The warranty period for the Flaw detector is **12 months from the date of sale, but not more than 15 months from the date of manufacture**, subject to compliance with the requirements of given Operation manual, maintenance, transportation and storage of the device.

The specified warranty period applies to the electronic unit and probe.

Warranty for the connection cable and charger is **6 months.**

6.2 If faults are detected during the warranity period, the consumer should draw up a fault report. The device and the one copy of the fault report have to be sent to the manufacturer or to the supplier (representative of the manufacturer).

6.3 Devices damaged due to violation of operating requirements and precautions during operation as well as requirements to maintenance, transportation and storage are not subject to warranty repair.

6.4 Devices with mechanical damage (with the exception of traces caused by normal operation), as well as traces of liquid ingress, and other influences leading to failure are not subject to warranty repair.

6.5 Devices that show signs of opening and/or attempts of self-repair are not subject to warranty repair.

6.6 The manufacturer's warranty does not apply to:

- natural wear of the probe contact zone;
- batteries and devices from other manufacturers (chargers, grinders, etc.) supplied with Flaw detector.

6.7 Warranty and post-warranty repairs of the device are carried out at the manufacturer upon presentation of this Operation manual (combined with the product data sheet).

7. ACCEPTANCE CERTIFICATE

Magnetic-eddy-current flaw detector VID-345 serial number _____ corresponds to the VID-345 operating manual OM and is recognized as suitable for operation.

Release date

“_____” _____ 20

Signatures of persons, responsible for acceptance:

_____

_____

CALIBRATION

1. PROCEDURES

1.1 Calibration procedures are listed in Table 1.

Table 1

No.	Operation	Clause No.
1	Checking the appearance and contents of delivery	4.1
2	Verification the software identity data	4.2
3	Test run	4.3
4	Estimation of sensitivity threshold of determining the notch-type defect parameters. Determination of defect depth measurement range. Calculation of measurement absolute error value.	4.4

1.2 If a non-compliance with the established requirements is detected, the calibration is suspended, the causes of the discrepancy are identified and eliminated. After this, the calibration is repeated for the operation for which the discrepancy was detected.

2. CALIBRATION TOOLS AND INSTRUMENTS

2.1 The following tools and instruments are used for calibration:

- a standard of length with the range of nominal values from of 0.2 mm to 2.0 mm with an absolute error of ±0.01 mm according to the local calibration scheme for length measurement instruments in the range from 0.2 mm to 2.0 mm;
- a thermohygrometer with measurement ranges of relative humidity from 10% to 100% and temperature from -20°C to +60°C, with permissible absolute measurement error limits Δ=±2,5%, Δ=±0,7°C.

2.2 It is allowed to use calibration tools and instruments not specified in clause 2.1 provided they ensure the determination of metrological characteristics with the required accuracy.

3. ENVIRONMENTAL CONDITIONS AND PREPARATION FOR CALIBRATION

The calibration shall be carried out at the following conditions:

- ambient temperature of between 18°C and 25°C;
- relative air humidity not exceeding 80%.

4. CALIBRATION PROCEDURE

4.1 Checking the flaw detector appearance and contents of delivery.

4.1.1 Visually check the device appearance. The flaw detector must meet the following requirements:

- no mechanical damages are visible of the electronic unit;
- a serial number is printed on the electronic unit;
- all the inscriptions on the electronic unit are clear and readable;
- all the sockets are clean.

4.1.2 The delivery kit must meet the contents of delivery specified in clause 1.3 of the present operation manual.

4.2 Verification the software identity data.

Turn on the electronic unit to verify the software identity data. The data shown on the screen must correspond to Table 2.

Table 2

Software identity data	Value
ПО Software identification name	VID345
Software version number (identification number)	not lower V1.01.345
Digital software ID	-

4.3 Test run

4.3.1 Turn on the flaw detector.

4.3.2 Connect the probe to the flaw detector.

4.3.3 Place the probe on the KM-345 reference block from the delivery kit. Check the probe performance moving it along the reference block: the defect depth value should appear on the screen of the electronic unit.

4.4 Estimation of sensitivity threshold of determining the notch-type defect parameters. Determination of defect depth measurement range. Calculation of measurement absolute error value.

4.4.1 Place the Eddy current probe on the defect-free area of the standard of length with the range of nominal values from of 0.2 mm to 2.0 mm (hereinafter referred to as “the standard of length”) and set the compensation of the initial signal.

4.4.2 Scan the standard of length with the Eddy current probe to verify a reliability of detecting of defect with 0.20 mm depth and 0.25 mm opening width nominal values. An automatic defect presence alarm should trigger. The above-mentioned nominal values correspond to the sensitivity threshold of determining the notch-type defect parameters as well as to the lower value of depth measurement range.

4.4.3 Scan the standard of length with the Eddy current probe and measure the depth of each defect.

4.4.4 Calculate the absolute error value of depth measurement (Δj, mm) for each defect using the formula below:

$$\Delta_j = h_j - H_j ,$$

where

- h_j is a depth value (in mm) of *j*-th defect measured by flaw detector;
- H_j is an actual depth value (in mm) of *j*-th defect.

4.4.5 The minimum depth value of the detected defect should be 0.20 mm, and the minimum width value of the detected defect should be 0.25 mm.

4.4.6 The absolute measurement error value should be within ±(0.2×H + 0.15) range, where H is a defect depth (in mm).

ANNEX A
(recommended)

CALIBRATION PROTOCOL

Calibration report № _____

A.1 Device type and model Magnetic-eddy-current flaw detector VID-345

A.2 Serial No _____

A.3 Manufacturer NPP Mashproject LLC

A.4 Owner _____

A.5 Metrological characteristics:

Sensitivity threshold of determining of parameters of notch-type defect:

- defect width……..…not more than 0.25 mm
- defect depth……not more than 0.20 mm

Defect depth measurement range 0.2 mm – 2.0 mm.

Defect depth measurement accuracy ±(0.2×H+0.15) range, where H is a defect depth (in mm).

A.6 Calibration tools and instruments used: _____

A.7 Environmental conditions at calibration: temperature ____°C, humidity____%

Calibration results

A.8 Estimation of sensitivity threshold of determining the notch-type defect parameters. Determination of defect depth measurement range. Calculation of measurement absolute error value.

A defect of 0.20 mm depth and 0.25 mm opening width can be detected / cannot be detected using a flaw detector.

(cross out what is unnecessary)

Table A.1 – Defect depth measurement range and absolute error value of the defect depth measurement

Actual depth value H_j of *j*-th defect of the standard of length, mm	Depth value h_j of *j*-th defect measured by flaw detector, mm	Absolute error value Δ_j of depth measurement of *j*-th defect, mm	Range of defect depth measurement accuracy ±(0.2×H + 0.15), where H is a defect depth (in mm)

Conclusion: Sensitivity threshold of determining of parameters of notch-type defect, defect depth measurement range, and measurement absolute error value meets, does not meet the requirements. *(cross out what is unnecessary)*

Resolution

A.9 Magnetic-eddy-current flaw detector VID-345 meets, does not meet the requirements.
(cross out what is unnecessary)
A.10 Magnetic-eddy-current flaw detector VID-345 has been tested in the measurement range specified in the device type description.
Calibration carried out at:

_____
(company name)

_____

Calibration technician _____ _____
(signature) *(name)*

Calibration date «_____» _____ 20_____

NOTES

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