



**ANGSTREM – IP**



Quality Management System certificate in DQS of the Standard  
DIN EN ISO 9001, Certificate Registration No. 318131 QM

**DETECTION**

**KIT**

**KP – 500K**

**DOCUMENTATION OF EXPLOITATION**



## 6. SAFETY PRECAUTIONS

6.1. It is prohibited to connect the headphones to the sockets and outlets of radio and power lines as well as to the outlets intended for other purposes.

6.2. While using the headphones adjust the desired volume with the help of the receiver volume control.

## 7. WARRANTY CONDITIONS

7.1 The device comes with a manufacture's warranty against construction defects that applies for 18 months.

7.2. The manufacture undertakes to repair the equipment which gets out of order free of charge within the period of the warranty validity.

7.3. The manufacture warranty does not cover the cases connected with misuse of the equipment and violation of operation rules.

## 8. ACCEPTANCE CERTIFICATE

8.1 The headphones TF - 500 serial number \_\_\_\_\_ meets the requirements of the 2<sup>d</sup> point of the present label, it has been subjected to checks and found suitable for operation.

Manufacturer's representative \_\_\_\_\_

Seal

\_\_\_\_\_  
(signature)

\_\_\_\_\_  
(name)

\_\_\_\_\_  
year, month, date



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## DETECTION

## KIT

## KP – 500K

## DOCUMENTATION OF EXPLOITATION

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|---------------------|
| HEADPHONES TF - 500 |
|---------------------|

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## 1. PERPOSE OF APPLICATION

1.1. The headphones TF-500 are to be used as part of the detection receivers.

## 2. SCOPE OF DELIVERY

- 2.1. Range of reproduced frequencies.....20...8000 Hz
- 2.2. Total electrical impedance..... $400 \pm 50$  ohm
- 2.3. Irregularity of the acoustic and frequency characteristics of the sound pressure ..... $\pm 6$  dB
- 2.4. Maximum voltage.....10 V
- 2.5. Maximum level of the sound pressure, not below .....130 dB
- 2.6. Coefficient of harmonics, mm, not exceeding .....5%
- 2.7. Attenuation of external noises in phones opening, weighted-mean in the range of 125...8000 Hz, not below.....31 dB.

## 3. SCOPE OF DELIVERY

- 1). Headphones TF-500 .....1 piece
- 2). Headphones TF-500. Label.....1 piece

## 4. PERFORMANCE SPECIFICATION

- 4.1. Range of working temperatures...from minus 30°C to plus 40°C.
- 4.2. Maximum relative humidity at 25°C, not exceeding.....90%.
- 4.3. Overall dimensions, not exceeding, mm .....210 x 130 x 95
- 4.4. Weigh, kg, not exceeding .....0,3

## 5. MAINTENANCE AND OPERATION INSTRUCTIONS

5.1. In case you have to adjust the headphones position, move them along the brackets.

5.2. The headphones as well as the bracket are to be cleaned regularly with mild warm soap solution.

5.3. Do not drop or knock the headphones. Avoid pulling hard at the cord or bending it at a sharp angle. Don't use detergents and avoid excess moisture; do not let soapy solution and water get inside the headphones openings.



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# KIT

# KP – 500K

# HEADPHONES

# TF - 500

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**D E T E C T I O N   K I T   K P - 5 0 0 K**

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## **TECHNICAL CERTIFICATE**



T1 + T2.

- 2.8. Electrical insulation strength of the circuits withstands breakdown voltage of direct current equal to 2 kV.
- 2.9. Particularity of the device design - is to be inserted into an electric power receptacle.
- 2.10. Ambient temperature (20 ± 5)°C.
- 2.11. Overall dimensions of the device 100 x 62 x 88 mm.
- 2.12. Weight of the device 560 grams.

**D E T E C T I O N   K I T   K P - 5 0 0 K**

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## 1. GENERAL INFORMATION

- 1.1 The detection kit KP-500K, which consists of the generator GP-500K and the receiver PP-500A, is intended for detection of faults, location of cable routes as well as evaluation of its depth, utilizing the inductive method.
- 1.2 The receiver PP-500A additionally provides possibilities for location of the cable route under load, as well as receives the signal from the acoustic pickup during fault location utilizing the acoustic method.

## 2. PERFORMANCE SPECIFICATION

- 2.1. Technical characteristics of the generator GP – 500K and the receiver PP-500A can be found in the corresponding technical certificates.

## 3. SCOPE OF DELIVERY

- 3.1. The scope of delivery comprises:
  - a) Detecting generator GP –500K .....1 piece  
with accessories:
    - 1) connecting device .....1 piece.
    - 2) earth conductor .....1 piece
    - 3) USB connector for the interface cable RS- 485.....1 piece
    - 4) interface cable RS-232.....1 piece
    - 5) CD with software and additional information..... 1 piece
    - 6) generator carrying case.....1 piece
  - b) Detecting receiver PP-500A :.....1 piece  
with accessories
    - 1) magnetic antenna MA-500.....1  
piece
    - 2) cable selection set NR 100.....1 piece
    - 3) acoustic sensor AD-500 .....1 piece

- 4) headphones TF-500.....1 piece
- 5) charging device UZ – 500.....1  
piece
- 6) carrying case for the receiver.....1 piece
- c) Detection kit KP – 500K  
technical certificate.....1 piece

**D E T E C T I O N   K I T   K P - 5 0 0 K**

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## 4. DESIGN AND PRINCIPLE OF OPERATION

- 4.1. The kit components and their design.
  - 4.1.1. The detecting generator consists of the frequency synthesizer, the power amplifier, the power supply unit and the transformer switching device, controlled by a microprocessor. The frame of the generator allows to build it in into bearing constructions of various mobile electrical laboratories. The names of operating controls, commutation and indication as well as their allocation are specified in the point 4 of the certificate.
  - 4.1.2. The detection receiver with an integral battery has the channel of an inductive reception and the channel of an acoustic reception. The headphones and the magnetic antenna (or the cable selection set or the acoustic sensor) are connected to it. Allocation of operating controls is specified in the point 4 of the receiver technical certificate.
- 4.2. The kit operation principle is based on an inductive method: the generator current, running through the cable, creates electro-magnetic radiation, the level of which depends on the position of the receiving antenna in respect of the cable cords and shielding lays, which enables the user to detect the place of the faulty insulation, broken cords, sleeves position, depth and cable route. The present kit is intended for operation with the cable routing up to 10 km long and up to 10 meters deep. Accuracy of the fault location and finding depth of the cable placement depends on certain objective circumstances (phase cable sheath fault, interphase fault, broken cord with earthing or without earthing) skills and proficiency of the user and can fall within the range of ± 0,3 m.



## LABEL



**ANGSTREM-IP**



Quality Management System certificate in DQS of the Standard  
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**CHARGING**

**DEVICE**

**UZ - 500/1,2**

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A C O U S T I C   S E N S O R   A D - 5 0 0

### 5. WARRANTY CONDITIONS

- 5.1. The device comes with a manufacturer's warranty against construction defects that applies for 18 months.
- 5.2. The manufacturer undertakes to repair the equipment which gets out of order free of charge within the warranty period.
- 5.3. The manufacturer warranty does not cover the cases connected with misuse of the equipment and violation of operation rules.

### 6. ACCEPTANCE CERTIFICATE

- 6.1. The acoustic sensor AD - 500 serial number \_\_\_\_\_ meets the requirements of the 2<sup>d</sup> point of the present label, it has been subjected to checks and found suitable for operation.

Manufacturer's representative \_\_\_\_\_

Seal

\_\_\_\_\_  
(signature)

\_\_\_\_\_  
(name)

## 5. SAFETY PRECAUTIONS

5.1. People, working with the kit must pass special examination on safety of electrical equipment operation, which correspond at least to the fourth degree as per the Russian norms. Those who work with the high voltage line must be specially trained and possess a corresponding permission.

Those, who operate the equipment, must thoroughly study the present technical certificate and the corresponding documentation to the components of the kit.

5.2. While maintaining and operating the detecting kit observe the requirements of the "Safety Rules for Operation of Electrical Devices" as well as requirements of the present certificate.

5.3. Before beginning of operation make sure that the generator and the power line supply unit are properly earthed. **Operation of inoperative or unearthed generator is strictly prohibited.**

5.4. The generator output can be connected only to the de-energized cable line, all phases of which should have been preliminary earthed.

5.5. After moving the generator from the environment of below-zero temperatures to the premises of above-zero temperatures, it is necessary to observe enough waiting time till condensation disappears before starting it.

**Formation of condensate inside or outside the generator or the receiver during operation is not allowed.**

5.6. Don't cover ventilation openings and holes on its covers. The generator and its internal components must be kept free of foreign objects

and dirt. During a long-term storage the generator as well as the power supply unit must be protected from dust.

5.7. During operation protect the acoustic detector from shocks.

5.8. **ATTENTION.** Internal parts of the generator are under hazardous high voltage. The generator can be opened and subjected to repairs only at the manufacturer's premises or by specially trained personnel, utilizing the methods, recommended by the manufacturer.

## 6. PREPARATION FOR OPERATION

6.1. Before operation the charge of the receiver battery must be checked. To check the charge switch on the receiver and press the supply control button. The indicator pointer must be within the range of the reference sector.

In case of necessity the user should charge the battery according to the procedure described in the technical certificate PP – 500A.

6.2. In order to increase efficiency of operation it is necessary to reduce resistance in the place of fault (carry out its burning down) to the value not exceeding 1 ohm.

6.3. Prepare the generator for operation as described in the point 4.3.1 of the generator certificate.

6.4. Connect the magnetic antenna and the headphones to the receiver.

6.5. Set operating controls into initial position: the power supply switch – to a "switched off" position; all controls into a midposition.

6.6. Kit preparation of operation

6.6.1. Connect the generator to a cable line in compliance with p.4.3 of the generator certificate. Perform matching of the generator with the cable (load) in the automatic or fixed mode in compliance with p.4.3.2 or 4.3.3 of generator certificate.

**RECOMMENDATION.** If you leave generator unattended, take into account the particularities of the modes operation after matching (see p.4.3.4 of the generator certificate).

6.6.2. Check functioning of the receiver:

- switch on receiver;
- set the working generator frequency on the receiver;
- from the distance of at least 2 meters direct the magnetic antenna on the connecting wires coming from the generator, and, utilizing regulators of sensitivity and volume, set the required sensitivity of the indicator as well as volume of the headphones;
- deflecting the antenna from the connecting wires, check its directivity - the indicator readings of the receiver will decrease.

In case of using the impulse mode press the button M50 on the receiver. The button activates the noise-suppressor in a pause.

ACOUSTIC SENSOR AD - 500

### 1. PERPOSE OF APPLICATION

1.1. The sensor is intended for conversion of mechanical vibrations of the ground surface into electrical signals.

It is utilized together with the detection receiver to locate faults in power cables on the basis of acoustic method.

### 2. PERFORMANCE SPECIFICATION

- 2.1. Pick-up frequency range .....10<sup>2</sup> .....10<sup>3</sup> Hz
- 2.2. Range of working temperatures.....from -30°C to +40°C
- 2.3. Maximum relative humidity at 25°C.....90%
- 2.4. Overall dimensions, mm
  - .....68 H
  - .....38 Ø
- 2.5 Weigh as an assembly, kg, not exceeding .....0,55

### 3. SCOPE OF DELIVERY

- 1). Acoustic sensor AD - 500.....1 piece

- 2). Tripod .....1 piece
- 3). Rod .....1 piece
- 4). Handle .....1 piece
- 5). Acoustic sensor AD – 500. Label.....1 piece

## 4. MAINTENANCE AND OPERATION INSTRUCTIONS

- 4.1. The sensor must be handled with care and protected from moisture.
- 4.2. The sensor is to be set on the ground according to the recommendations, specified in the trouble-shooting instruction.



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ACOUSTIC

SENSOR

AD - 500

## LABEL

DETECTION KIT KP - 500 K

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### 7. SEQUENCE OF OPERATION

#### 7.1. Location of the cable route:

- place the axis of the magnetic antenna parallel to the earth plane and perpendicular to the cable axis. After this the maximum reading of the indicator (and maximum signal volume in the headphone) will be observed over the cable. During deviation the volume of the signal will be gradually diminishing.

- if the magnetic antenna axis is positioned vertically and perpendicular to the cable axis, the signal over the cable will reach its minimum, but at deviation to any side it will sharply increase and will gradually diminish while the distance is being increased.

#### 7.2. Evaluation of the cable depth placement:

- determine the cable run while the magnetic antenna axis is vertical and draw a line over it;

- place the magnetic antenna at 45° to the vertical axis;

- changing the antenna position, find the zone of signal absence and register this point;

- the distance between the line and the point is the depth of the cable location.

It is recommended to perform it during continuous mode of generation.

#### 7.3. Fault location:

- the procedure can be carried out during the continuous as well as the impulse mode of oscillation;
- place the antenna coil perpendicular to the cable axis;
- while the user travels along the cable run, the signal will periodically intensify and weaken according to the lay of the cable conductors;
- the signal will be more intensive at connecting sleeves;
- at places of faults the signal will noticeably increase and then sharply diminish.

RECOMMENDATION. If the phase wire contacts the cable sheath, the cable selection sets (frame) must be used to pinpoint the fault.

7.4. Location of the cable run under load is possible for a detached cable. In order to achieve this switch on the channel of inductive reception at 50 Hz and press the button M50, which will improve selectivity. The cable run is to be determined according to the point 7.1 of the present technical certificate.


DETECTION KIT KP - 500 K

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### 8. TECHNICAL MAINTENANCE

8.1. Periodically, but not less than once a year carry out technical maintenance of the kit:

- check the insulation resistance;
- check the transient resistance of earth connection;

Follow the recommended procedure to check the generator isolation: with a high-resistance ohmmeter set at 1500 V check the resistance of insulation between the short-circuited contact of the supply plug and the terminal "earth", while the switch «» is activated. The obtained values of the insulation resistance must not fall below 10 Megaohm.

Follow the recommended procedure to check the transient resistance of earth connection at de-energized power supply line: with the ground connection resistance meter or low-resistance ohmmeter check the transient resistance between the terminal "earth" and the contact of the supply plug ground.

The obtained resistance values must not exceed 0,1 Ohm.

### 9. ACCEPTANCE CERTIFICATE

9.1. Detection kit:

- detecting generator GP – 500K serial No \_\_\_\_\_
- detecting receiver PP – 500A serial No \_\_\_\_\_

meets the technical requirements TU 4389-001-18080198-2005; it has been subjected to checks and found suitable for operation.

Manufacturer's representative \_\_\_\_\_

Seal

\_\_\_\_\_  
 (signature) (name)

year, month, date

|   |    |
|---|----|
| C A B L E S E L E C T I O N S E T N R - 1 0 0 | 35 |
|---|----|

### 5. WARRANTY CONDITIONS

- 5.1 The device comes with a manufacture's warranty against construction defects that applies for 18 months.
- 5.2. The manufacture undertakes to repair the equipment which gets out of order free of charge within the warranty period.
- 5.3. The manufacture warranty does not cover the cases connected with misuse of the equipment and violation of operation rules.

### 6. ACCEPTANCE CERTIFICATE

6.1. The cable selection set (frame) NR - 100 serial number \_\_\_\_\_ meets the requirements of the 2<sup>d</sup> point of the present label, it has been subjected to checks and found suitable for operation.

Manufacturer's representative \_\_\_\_\_

Seal

\_\_\_\_\_  
 (signature) (name)

year, month, date

|    |   |
|----|---|
| 34 | C A B L E S E L E C T I O N S E T N R - 1 0 0 |
|----|---|

### 1. PURPOSE OF APPLICATION

- 1.1. The cable selection set (frame) is intended for detection of a single faulty cable in a bunch of cables.  
 For the inductive method of fault detection it is used together with the detection receiver or special headphones.

### 2. PERFORMANCE SPECIFICATION

- 2.1. Pick-up frequency range .....50 ...10<sup>4</sup> Hz
- 2.2. Inductivity.....100 mHn
- 2.3. Range of working temperature.....from minus 30°C to plus 40°C
- 2.4. Maximum relative humidity at +25°C.....90%
- 2.5. Overall dimensions as an assembly, mm .....112 x 28 x 74
- 2.6. Weight, grams, not exceeding.....320

### 3. SCOPE OF DELIVERY

- 3.1. Cable selection set (frame).....1 piece
- 3.2. Cable selection set. Label.....1 piece

### 4. MAINTENANCE AND OPERATION INSTRUCTIONS

- 4.1. The device must be handled with care and protected from moisture.
- 4.2. The cable selection set is to be placed on a cable according to the recommendations, specified in the trouble-shooting instruction.

|                          |    |
|--------------------------|----|
| DETECTION KIT KP - 500 K | 11 |
|--------------------------|----|

### 10. WARRANTY CONDITIONS

- 10.1. Life time of the kit is 6 years.
- 10.2. The kit comes with a manufacture’s warranty against construction defects that applies for 18 months.
- 10.3. The manufacture undertakes to repair the equipment which gets out of order within the period of warranty free of charge.
- 10.4. The manufacture warranty does not cover the cases connected with misuse of the equipment and violation of operation rules.

### 11. DEFICIENCY REPORT AND SUGGESTION

11.1. In case of problems and malfunction of the equipment as well as your recommendations, aimed at improving operation of the product, don’t hesitate to contact us:

150000, Russian Federation,  
Yaroslavl, A/Ya 917  
ZAO “Angstrem-IP”  
Telephone/fax: +7- 4852- 21 16 15; +7- 4852- 72 63 66,  
E – mail: [angip@mail.yar.ru](mailto:angip@mail.yar.ru) , [aip@yarmet.ru](mailto:aip@yarmet.ru)  
[www.angip.yar.ru](http://www.angip.yar.ru)



Quality Management System certificate in DQS of the Standard  
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# DETECTION

# GENERATOR

**GP – 500K**

Version of Pr. 4.01.

**SET**

**NR - 100**

**TECHNICAL CERTIFICATE**

**LABEL**



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M A G N E T I C   A N T E N N A   M A - 5 0 0

## 5. WARRANTY CONDITIONS

- 5.1. The device comes with a manufacturer's warranty against construction defects that applies for 18 months.
- 5.2. The manufacturer undertakes to repair the equipment which gets out of order free of charge within the warranty period.
- 5.3. The manufacturer warranty does not cover the cases connected with misuse of the equipment and violation of operation rules.

**CABLE SELECTION**

**6. ACCEPTANCE CERTIFICATE**





- relative air humidity not exceeding.....80% at 25°C
- atmospheric pressure.....84.0 ÷ 106.7 kPa  
(630 ÷ 800 mm of mercury column).

2.2. Additional operation factors (standard value) and field-performance data.

2.2.1. Irregularity of output power or current at automatic load matching ranges, %, not exceeding

- output power at simple matching .....6
- output power at stabilization power mode.....2
- current at stabilization current mode .....2

2.2.2. Limitation of maximum voltage (Um) in relation to the matched value,%.....  
..125

2.2.3. Limitation of maximum current (Im) in relation to the matched value,%.....  
..117

2.2.4. Total adapting range, Ohm .....from 0.35 to 362

2.2.5. Load ratio within one matching range.....2

2.2.6. Power consumption, Wt, not exceeding.....800

2.2.7. Generator operation blocking:

- at amplifier heat sink warming-up up to 93°C;
- at failure or insufficient rotation speed of the power unit fan;
- at low voltage of the electric mains (below 170 V);
- at high voltage of the electric mains ( over 260 V );
- at overrun of the internal power source voltage limit;
- at operation in remote mode and in case of absence or wrong connection of interface cables.

2.2.8. The generator has the systems of the output voltage, current and power limitation, which ensure continuous operation under reactive load, short-circuited and idling conditions without degradation of the signal parameters (nonlinear-distortions coefficient).

The generator can be operated at the ambient temperature not exceeding +55°C. When the ambient temperature reaches the abovementioned value, the output power is automatically reduced by the

M A G N E T I C   A N T E N N A   M A - 5 0 0

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## 1. PERPOSE OF APPLICATION

1.1. The magnetic antenna is utilized in combination with the detection receiver for inductive method of cable routes location as well as detection of cable faults.

## 2. PERFORMANCE SPECIFICATION

- 2.1. Pick-up frequency range.....50 ...10<sup>4</sup> Hz
- 2.2. Inductivity at 1 kHz frequency .....43.5 ± 1 mHn
- 2.3. Range of working temperatures from minus 30°C to plus 40°C
- 2.4. Maximum relative humidity at 25°C, not exceeding,.....90%
- 2.5. Overall dimensions, mm.....∅ 85 x 70 x 890
- 2.6. Weigh, grams, not exceeding .....680

## 3. SCOPE OF DELIVERY

- 1). Magnetic antenna MA - 500.....1 piece
- 2). Carrying case.....1 piece
- 3) Magnetic antenna MA – 500. Label .....1 piece

## 4. MAINTENANCE AND OPERATION INSTRUCTIONS

- 4.1. The antenna must be handled with care and protected from moisture.
- 4.2. The antenna is to be positioned on the ground according to the recommendations, specified in the trouble-shooting instruction.



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# MAGNETIC

# ANTENNA

# MA - 500

## LABEL

DETECTION GENERATOR GP - 500K

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limiting system, which keeps the temperature of the amplifier radiator below + 85°C.

2.2.9. Independent control of the generator is carried out with the help of 4 buttons. A character cathode-luminescent indicator displays the mode of operation. There is a remote mode of operation as well, carried out by means of a computer or any other controller via the interface RS-232 or RS-485.

2.2.10. The generator can maintain and store the operation mode set by the operator and call it when required.

2.2.11. The warm-up time:

- If the ambient temperature exceeds - 10°C.....5...7 second.

- in case the temperature is below - 10°C.....1...2 minutes.

2.2.12. Operation position – horizontal; the generator can be operated in other positions on condition that it is securely fixed.


2.2.13. Time of nonstop operation is not limited.

## 3. SCOPE OF DELIVERY

- 1) Generator GP – 500K.....1 piece.
- 2) Connecting device .....1 piece.
- 3) Earth conductor .....1 piece.
- 4) Connector for the interface cable RS-485.....1 piece.
- 5) Interface cable RS-232.....1 piece.
- 6) Technical certificate.....1 piece.
- 7) Generator carrying case.....1 piece.

## 4. MAINTENANCE AND OPERATION INSTRUCTIONS

4.1. Operating controls of the generator are situated on the front panel (see drawing):


- illuminated power switch of generator «  » on/switch off;
- four buttons: « - », « + », «MODE», «AUT/F» and indicator display);

4.2. The rear panel contains:

- socket OUT, through which the load is connected;
- connectors for connection of the interface cables RS –232 and RS-485 (under caps);
- earthing terminal;
- supply-line power cord, the plug of which has an earth contact;
- two line fuses (6.3 A).

## 4.3. Operation sequence.

4.3.1. Connect ground to the generator, using the earth terminal and the earth conductor (from the assembly kit) or the earth contact of the plug.

When the plug is being connected to the mains, the switch «  » must be switched off.

**DO NOT OPERATE THE GENERATING WITHOUT EARTHING!**

Connect generator output to the DISCHARGED power cable (load) via the connecting device.

**ATTENTION!** It is forbidden to connect and disconnect the load if the generator is powered. Remember, that the voltage at the generator output might reach a high level (up to 450 V), which can lead to accidents and death.

After the generator is switched on, the buttons and the indicator are illuminated. The fans will start rotating, and the indicator approximately after 3 second will display a screen on which the line with the following information will appear:

- device type and the company's name «GP-500K ANGSTREM-IP»
- software version «Version of Pr. 4.01»
- device serial number «Ser. Number 463»
- indexing of rectangles, which being consequential in time,

symbolizes the process of initial installation of the device controller. Then the indicator highlights the generator's mode of operation: off-line or remote. If within 5 seconds either of the 2 buttons « - » or « + » are pressed the generator correspondingly changes over either to the off-line or remote control mode. If neither of the buttons has been pressed and no connected cables are available, the generator switches over to an off-line mode. If one out of the two interface cables is detected, the device switches over to the remote mode.

If two cables have been connected, the device displays the following message: "False Connection Of Front-End Cables". If the device is in the remote mode, but the interface cable is not connected, the message "Front-End Cable Not Connection" is displayed.

In order to change the generator control mode, it is necessary to reboot it. To achieve this press simultaneously the buttons « - » and «AUT/F».

If the cable is connected correctly, the «Main» screen will be displayed.

|          |            |          |     |   |
|----------|------------|----------|-----|---|
| 1069Hz   | Cnt        | 0,5Ω     | Fix |   |
| U        | ■■■■■ ■■■■ | 25%      | ▼   | S |
| I        | ■■■■■ ■■■■ | 23%      | ▼   | T |
| UL=1,8 V |            | IL=3,40A |     |   |

## 5. TROUBLESHOOTING

|  |   |
|--|---|
| 5.1. The receiver fails to turn on; when the button "BATT" is pressed, the LED is on.                                  | Charge (replace) the storage battery.   |
| 5.2. No self-generated noise is heard in the headphones when the resistors of volume and amplification are set to MAX. | Check if the toggle switch "PH/OFF" is operable; make sure the telephone cable is intact. |
| 5.3. No reception or the receiver sensitivity is very low.   | Check if the circuit of the magnetic antenna is intact.                                   |

## 6. WARRANTY CONDITIONS

6.1 The device comes with a manufacture's warranty against construction defects that applies for 18 months.

6.2. The manufacture undertakes to repair the equipment which gets out of order free of charge within the period, specified by the warranty.

6.3. The manufacture warranty does not cover the cases connected with misuse of the equipment and violation of operation rules.

## 7. ACCEPTANCE CERTIFICATE

7.1. The receiver PP – 500A serial number \_\_\_\_\_ meets the requirements of the 2<sup>d</sup> point of the present certificate; it has been subjected to checks and found suitable for operation.

Manufacturer's representative \_\_\_\_\_

Seal \_\_\_\_\_

(signature)

(name)

year, month, date

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DETECTION RECEIVER PP - 500A

## 4. MAINTENANCE AND OPERATION INSTRUCTIONS

4.1. Description of controls on the front panel of the receiver:

1) buttons:

BATT – charge level of storage battery;

50, 480, 1к, 10к - activation of inductive channel of reception at the corresponding frequency (50 – RL mode, the rest are used for detection of faults);

ACH - switching on of the acoustic channel reception;

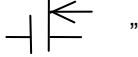
M50 – switching on of additional modes;

2) LED BATT - indication of the battery discharging and activation of saving mode (lights up when the button BATT is pressed);

3) the control “AMPL” - change of amplification in the cycle of reception for all modes. The amplification is to be adjusted in such a way that the pointer remains within the range 0,5 – 0,75 of the indicator’s scale. Area MAX corresponds to overload of receiver section.

4) the control “VOL” - volume control in the headphone; switching the receiver on /off.

4.2 The phones, antenna or the cable selection set (frame) as well as the acoustic sensor are connected to the connector PHONE, MA, AS, situated on the back panel of the receiver. The switch for immediate deactivation of listening is situated there as well.

4.3. The storage battery is charged via the jack  (on the back panel).

Charging is to take place at the ambient temperature  $20 \pm 5^{\circ}\text{C}$  according to the follow instruction:

1) plug the charging devices into the electric power receptacle 220 V / 50 Hz (the LED of the charging device must light up) ;

2) connect the cord of the charging device to the receiver (the receiver controls can be in any position, the headphones should be disconnected), the LED will go out;

3) the battery is to be charged till the LED lights up; after that disconnect the cord of the charging device from the receiver and unplug it.

**NOTE .** If is forbidden to leave the charging device connected to the receiver after charging.


DETECTION GENERATOR GP - 500K

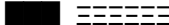
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The following data will be shown line-wise:


- frequency, generated by the device, continuous “Cnt”, impulse “Imp”, multifrequency 2 “MF2” or multifrequency 3 “MF3” mode, current matching range of the device as per load, fixed “Fix” or automatic “Aut” device range search of matching load, for example,

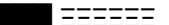

“1069Hz Cnt 0.5Ω Fix”;

- voltage symbol “U”, imitation of the analogue voltage scale on the primary winding of the output transformer, percentage volume relatively of 64 V, the symbol of level limitation «» which appears when the voltage on the output transformer primary winding reaches the value of  $U_m=80\text{ V}$ , the symbol of the range limit «S», appearing when the power of  $(U \times I)$  of the value  $P_m=512\text{ V}$  is reached, for example,

«U  25% »;

- current symbol «I», imitation of the analogue current scale on the primary winding of the input transformer, percentage volume relatively of 8 A, the level limitation symbol «», which comes up when the current in the primary winding of the output transformer reaches the meaning of  $I_m=9,4\text{A}$ .

The symbol of temperature limitation «T», which appears when the radiator temperature of the amplifier reaches the value of  $T_1=85^{\circ}\text{C}$ , for example,

«I  23% T»;

- output voltage value and output current value of load:

- «UL=1.8 V IL=2.14 A».

Utilizing the buttons « + » and « - » in the «Main» screen, it is possible to increase or decrease the power level; if the button is pressed momentarily, a single increment change of the level takes place, if the button is not released for a longer time, the power level is changed faster.

If the voltage, current or power limitation triggers, pressing of the button « + » does not lead to increase of the specified parameters.

When the amplifier radiator temperature limitation triggers, the generator will independently reduce the power to the maximum permissible value. In case operational conditions change (overload, frequency, impulse mode activation), the power can be either increased or decreased. The changes take place approximately once every 20 seconds.

To change the generator mode of operation to press button «REG». If the button « REG » is pressed once, the bottom row of the indicator will show the level set by the operator in discrete and in brackets present level. The latter might not match the level set by with the operator, if limit system is actuated or in power (P) or current (I) stabilization mode. Instance of bottom row:

**Level = 241 (240) (P)**

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|   |
|---|
| D E T E C T I O N   G E N E R A T O R   G P - 5 0 0 K |
|---|

If the button « REG » is pressed again, frequency indication will start blinking, which means that the frequency value can be changed. By pressing the buttons « - » or « + » change the working frequencies.

The subsequent pressing of the button « REG » will initiate blinking of the mode indicator «Cont»; by pressing the buttons « + » or « - » change mode to «Imp», «MF2», «MF3». «Imp» mode will set sinusoidal impulse of generator with period 1 second and off-duty 2. «MF2» mode will set on output sequential change of two frequencies every 0,5 second. «MF3» mode will set on output sequential change of three frequencies every 0,5 second.

The subsequent pressing of the button « REG » will initiate blinking of the range indication for example «0.5Ω»; in a fixed mode using the button « + » subsequently select the ranges load matching: «0.5Ω», «1Ω», «2Ω», «4Ω», «8Ω», «16Ω», «32Ω», «64Ω», «128Ω», and «256Ω». Pressing the button « - » will decrease the matching load range. In the automatic load matching mode the buttons « + » and « - » can not be activated.

The subsequent pressing of the button «REG» will initiate blinking frequency indication, mode indicator «Cont» and the range indication. Press the buttons « + » or « - » to call the additional screens and rotate them sequentially. The additional screens display information about the internal modes of the generator. In order to cancel the additional screens and call the «Main» screen press the button «REG».

Pressing the button « AUT/F » in the «Main» screen will lead to the change of the matching mode of the generator with the load – from a fixed one to the automatic or back.

Simultaneous pressing of the buttons « - » and « AUT/F » will initiate rebooting of the generator's controller and is similarly to energize the device.

Simultaneous pressing of the buttons « - » and « + » will reset the power level to 0.

Simultaneous single pressing of the buttons « - » and « REG » will displays in lower row of screen power and resistance load: PL=18W and ZL=0.5Ω.

Second simultaneous pressing of the buttons « - » and «REG» will displays in lower row of screen voltage, current and resistance value applied to the primary winding of the output transformer, for example: «16.0V 1.92A 8.33Ω». Further simultaneous single pressing of the buttons « - » and «REG» will call the initial state of main screen.

To store the mode selected by the operator press simultaneously the buttons «REG» and «AUT/F» having set the required mode. This will display the store mode screen shown on drawing 3:

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|   |
|---|
| D E T E C T I O N   R E C E I V E R   P P - 5 0 0 A |
|---|

2.2.6. The range of gain control at all modes of reception, not below 80 dB.

2.2.7. Evaluation of the signal level - on the basis of the volume in the headphones and via the pointer indicator. Two additional modes are provided: "high legibility" at "LCR" and with noise suppression at IM.

2.2.8. Listening frequency in all modes of IM - 1 kHz , in the mode of RL - 50 Hz (1,5 kHz in the additional mode).

2.2.9. A switch for instantaneous termination of listening is available.

2.2.10. Non-stop operation time utilizing the integral storage battery (SB) is not below 200 hours.

2.2.11. In case the battery charge falls below the acceptable level, the integral power supply is disconnected to avoid the overdischarge. The mode is activated automatically in case the supply voltage decreases by 5 %. The consumed current value in this case doesn't exceed 50 microamperes.

2.2.12. The level of the battery charge can be checked with the help of the pointer indicator and light indication of the power supply mode.

2.2.13. The storage battery is charged from the external charging device (the battery remains inside the receiver), utilizing the IU DIN41773 method. The value of the charging current is 0,1 A;

The charging time doesn't exceed 15 hours. When the storage battery is fully charged the corresponding light indicator on the charging device comes up.

2.2.14. The receiver can be operated in any position.

### 3. SET OF ACCESSORIES

- 1) receiver PP-500A.....1piece
- 2) charging device UZ - 500/1,2.....1piece
- 3) magnetic antenna MA-500.....1piece

- 4) cable selection set NR -  
100.....1piece
- 5) acoustic sensor AD-  
500.....1piece
- 6) headphones TF-500.....1piece
- 7) carrying case for the receiver .....1piece
- 8) packing bag.....1piece
- 9) detection receiver PP-500A. Certificate.....1piece

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DETECTION RECEIVER PP - 500 A

## 1. PERPOSE OF APPLICATION

1.1 The receiver is intended for detection of faults, location of cable routes (LCR), utilizing the inductive (IM) as well as the acoustic methods (AM). When utilizing the inductive method combined with the generator GP-500 (GP-100) of any modification it provides instant (non-tuning) signal reception at the generator frequencies.

## 2. PERFORMANCE SPECIFICATION

2.1. Key performance characteristics are to be found in the table below:

| Description  | Mode of operation |           |      |      |           |
|--|-------------------|-----------|------|------|-----------|
|  | RL                | IM        |      |      | AM        |
| 1. Working frequency, Hz                                 | 50                | 480       | 1069 | 9796 | -         |
| 2. Bandwidth at the level – 3 dB, Hz                     | 40...180          | 6 ± 1     |      |      | 160...400 |
| 3. Attenuation at detuning within ± 20 Hz, dB, not below | -                 | 40        |      |      | -         |
| 4. Sensitivity, not exceeding, micro volts               | 40                | 20        | 20   | 40   | 40        |
| 5. Noise-suppresser threshold, dB                        | -                 | -(20 ± 3) |      |      | -         |

|  |                           |
|--|---------------------------|
| 6. Current consumption at an average volume, mA, not exceeding | 10                        |
| 7. Overall dimensions, mm, not exceeding:                      |                           |
| 8. Weight, kg, not exceeding                                   | 175 x 75 x 186            |
| 9. Operating condition:  | 1.4                       |
| - ambient temperature, °C                                      |                           |
| - relative air humidity, %, not exceeding                      | from minus 30 to plus 40  |
| - atmospheric pressure, kPa                                    | to 80<br>from 84.0 to 107 |

2.2. Additional characteristics.

2.2.1. Reception image attenuation at frequency 480 Hz, not below 80 dB.

2.2.2. Attenuation of combination channels of reception, not below 60 dB.

2.2.3. Range for blocking the off-bands interference (50...399Hz) in channel IM, not below 70 dB.

2.2.4. Sensitivity along the electric field at IM mode, not exceeding 50 microampere/m. 2.2.5. Signal-to-noise ratio, not below 46 dB

DETECTION GENERATOR GP - 500 K

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**Mode Conservation +**  
**Mode Call -**  
**Cancel REG**

Drawing 3

To store the set mode press the button « + ».

In order to call the saved operating mode, enter the mode saving screen using the buttons «REG» and «AUT/F». After this press the button « - ». In order to exit the saving screen it is necessary to press the button «REG».

At emergency situations the generator will automatically reset the power to 0 and a failure message is pups up on the indicator:

- "! Int.l Volt. " – service voltage is outside tolerances;
- "!! Ep" – power voltage of the power amplifier is outside tolerances;
- "!!! Unsymmetry Ep " - voltage non-symmetry of the power amplifier supply is outside tolerances;
- "!!! Current Limiting Of Power Supply " - the power supply generated a signal of current limitation;

- "!!! Amplifier Overheating " – the amplifier radiator temperature exceeded  $T_{lim2}=93$  °C;
- "!! Fan Failure Of Power Supply " – failure of the power supply source or voltage fan or drop of its voltage;
- "! Failure Of Temperature Probe";
- "!!! Vmain Drift " - voltage outside tolerable limit.

In order to exit the emergency situation it is necessary to press the button « - », which will return the generator to its initial state. If the buttons « - » and « AUT/F » are pressed simultaneously, the generator controller will be rebooted.

The interface cable circuits can be found in the Supplement 1.

At necessity to organization distantly control maybe delivery follow information

- a demonstration programme of the generator remote control GP-500K via a personal computer;
- user's guide of the demonstration program;
- user's manual for the generator remote control setup.

#### 4.3.2. Matching procedure in the automatic mode.

After connecting to the power supply line the generator stays in the state of nonstop generation of the 1069 Hz frequency, in the fixed matching range of 0,5 Ohm.

In order to match the generator with the load in the automatic mode it is necessary set the required frequency and with the help of the button « + » set the level of power, which ensures the readings of voltage or currency of at least 20%. Pressing the button « Aut/F » put the generator into the mode of automatic matching with the load.

The process of search lasts for about 5 seconds, after which the matching range is selected.

*Automatic matching with the load is established in the impulse mode of generation.*

#### 4.3.3. Procedure of manual matching.

Utilizing the button « Aut/F » activate fixation mode (if necessary). Set the required frequency for continuous or impulse mode or pair frequencies for mutifrequency mode 2 "MF2". Switch on "MF2" or "MF3" modes set

automatic fixed mode of matching range. Set the level of power, which ensures the readings of voltage or currency of at least 20% and with the help of the buttons « + » and « - » set the required load matching range. Similar levels of the analogue voltage and current scales correspond to the best quality of generator matching with the load.

#### 4.3.4. Description of the generator modes utilization.

Utilizing the generator with activated mode of automatic matching, provides power support on the set level for load values within ranges of matching. If the range is fixed, support is provided only for the load values of the particular range (due to generator's current the load might shift over the range boundary, thus, leading to power drop). Default mode of generator is trivial matching mode. In this mode output power in every range depend from matching grade.

The generator has two additional mode: stabilization power (P) and stabilization current (I) on load. For jump to this regime require at indication in lower row of screen "Level = XX (XX)" simultaneous pressing of the buttons « + » and « REG ». Stabilization power and stabilization current mode will be displayed by sign (P) and (I).

If the maximum level of power  $P_m$ , output current  $I_m$  or maximum output voltage  $U_m$  are obtained, the level of the output power can be limited. Limitations of  $I_m$  or  $U_m$  occur outside the ranges of load matching.

In case of frequency overrun with activated mode of automatic matching a change to another load range might occur during the generation. This happens due to the reactive component of the load. The matching procedure is to be repeated during range fixation.



# ANGSTREM-IP



Quality Management System certificate in DQS of the Standard  
DIN EN ISO 9001, Certificate Registration No. 318131 QM

# DETECTION

# RECEIVER

## PP – 500A

### TECHNICAL CERTIFICATE

| Buttons                 | « + » or « - »   | « + » and « - » | « - » and «MODE»     | « - » and «AUT/F» | «MODE»  | «AUT/F»   | «MODE» and «AUT/F»        | « + » and «MODE»  |
|-------------------------|--|-----------------|----------------------|-------------------|---|---|---------------------------|---|
| Screen                  |  |                 |                      |                   |   |   |                           |   |
| Main                    | Change level of Output signal;<br>Change parameters (level, frequency, Cnt/Imp/MF2 /MF3, Range);<br>jump to additional Screen. | Level unset     | Change og bottom row | Reset             | Jump to Change parameters modes – blink of suitable parameter | Change mode of matching with the load (Aut and Fix) | Jump to store mode screen | In row «Level» change regimes trivial matching , stbilization power (P) and current (I) |
| Store mode screen       |  | --/--           | —                    | --/--             | Jump to main screen   | —   | —                         | —   |
| Additional              | Jump to follow or last additional screen   | --/--           | —                    | --/--             | Jump to main screen   | Change mode of matching with the load (Aut and Fix) | —                         | —   |
| Alarm                   | Press « - » for quit to initial state of screen. Press « - » and «Aut/F» - Reset.  |                 |                      |                   |   |   |                           |   |
| Choice remote/ off-line | Correspond to screen   | —               | —                    | —                 | —   | —   | —                         | —   |

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SUPPL

DETECTION GENERATOR GP - 500K

DETECTION GENERATOR GP - 500K

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#### 4.3.5. Generator operation blocking.

If the ambient temperature reaches 40°C and operation on the reactive load is on, the system of thermal protection might reduce the power. If the power is insufficient, it is recommended to use lower frequencies, impulse mode.

If any of the conditions, specified in the point 2.2.7 take place, the generator's operation can be blocked. It is accompanied by a drop of the output power and a corresponding message will appear on the display.

#### 4.4. General directions.

The generator can be transported by railway or truck in its operating position. The generator packing must protect it from dust, moisture, salt spay as well as mechanical damage. Do not switch on the generator if condensate or white frost has formed on it. Do not undertake any attempts to repair the generator on your own!



## 5. MANUFACTURER'S WARRANTY

5.1 The device comes with the manufacture's warranty against construction defects that applies for 18 months.

5.2. The manufacture undertakes to repair the equipment which gets out of order free of charge within the warranty period.

5.3. The manufacture warranty does not cover the cases connected with misuse of the equipment and violation of operation rules as well as the cases listed below:

- mechanical damages of the body, operation controls and indicators, caused by the user, which might put the device out of operation;
- connection of the generator's output to the power source of direct current, which voltage exceeds 1V;
- connection of the generator's output to the power source of alternative or impulse current, which voltage exceeds 36V;
- connection of the generator's output and (or) outputs of the power line plug in respect of the body to the source of the direct, alternative or impulse current, which voltage exceeds 1.5 kV.

\_\_\_\_\_  
(signature)

\_\_\_\_\_  
(name)

\_\_\_\_\_  
date

\_\_\_\_\_  
year, month,

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DETECTION GENERATOR GP - 500K

## 6. ACCEPTANCE CERTIFICATE

6.1. The generator GP – 500K serial number \_\_\_\_\_ meets the requirements of the point 2.1 of the present certificate and was found suitable for operation.

Manufacturer's representative \_\_\_\_\_

Seal

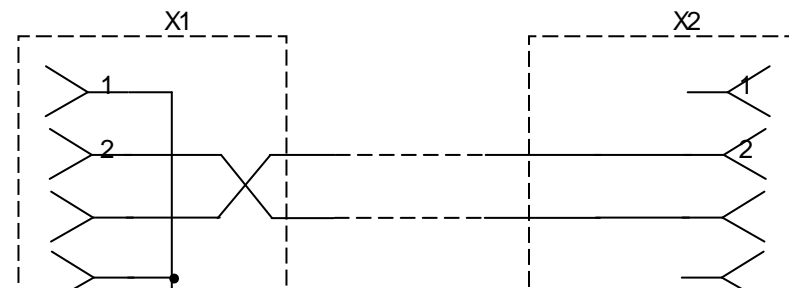
DETECTION GENERATOR GP - 500K

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SUPPLEMENT 1

### INTERFACE CABLES DIAGRAM

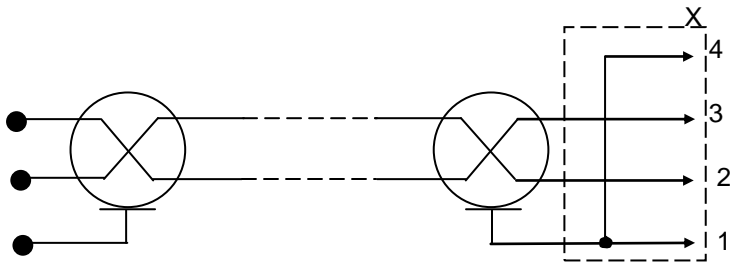
Cable for the RS – 232 interface





X1, X2 – connectors DB9-F  
 NOTE. Cable length 1...2 meters

Cable for the interface RS - 485



X – connector USB 42 – 709 – 22  
 (as per the parts book WEST- EL)