



DEVELOPMENT AND MANUFACTURE
OF PROFESSIONAL
SEARCH EQUIPMENT AND ELECTROLABORATORIES



ANGSTREM is one of the leading research development enterprises in Russia.



OUR MISSION

is to make works related to maintenance of steady power supply easy and safe

HISTORY OF THE COMPANY

- 1992** – company establishment
- 2000** – launch of more than 20 instrument developments
- 2002** – implementation of a quality management system
- 2008** – serial production of new equipment
- 2016** – release of the first electrotechnical laboratories
- 2020** – start of operation of a new production building

Products manufactured by ANGSTREM won over 50 Russian and foreign awards in the area of product quality assessment.



High quality products, professional support, favorable terms of co-operation are the distinguishing features of ANGSTREM company.



PRODUCTION

6000 m² the enterprise territory makes

1720 m² the innovation center territory

340 m² the territory of electrolabs
production shop



SPECIALISTS

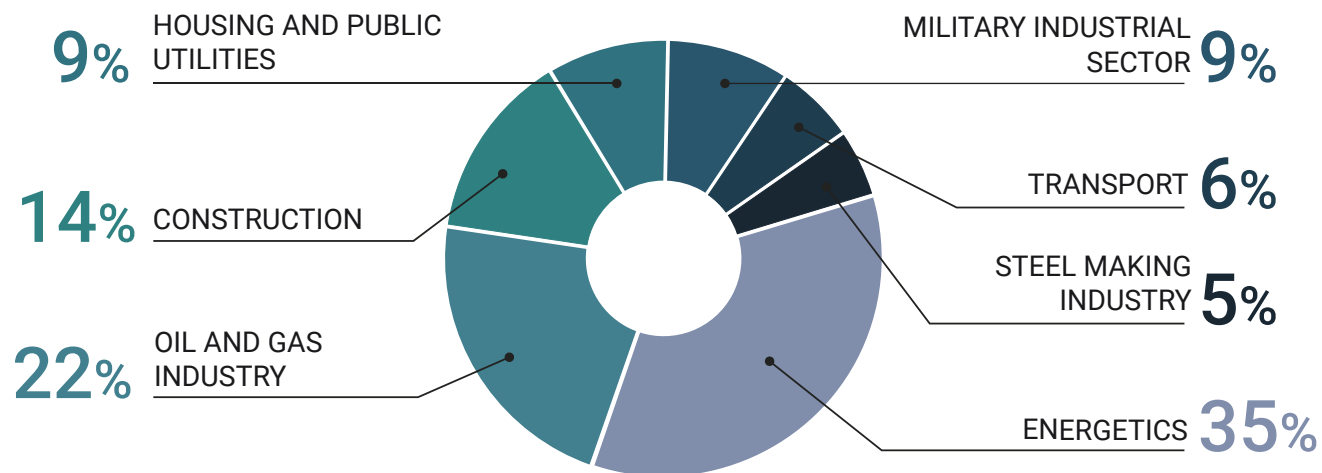
105 certified specialists

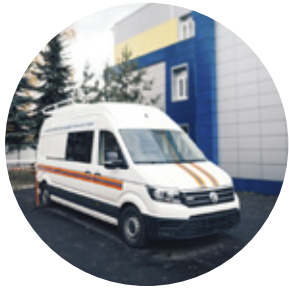
71 employees of the production
and engineering center

22 specialists in
the Electrolaboratory field

DISTRIBUTION OF THE COMPANY'S CUSTOMERS PER STATES AND BRANCHES

- Russian Federation
- Belarus
- Kazakhstan
- Moldova
- Uzbekistan
- Azerbaijan
- Kyrgyzstan
- Armenia
- Georgia
- Ukraine
- Poland
- Germany





1.

Customized product

- ANGSTREM electrotechnical laboratories
- ANGSTREM-1 Cable Electrical Laboratory
- ANGSTREM-2 Transformer Electrotechnical Laboratory
- ANGSTREM-3 Universal Electrotechnical Laboratory



2.

Aftersales service of any manufacturer electrical laboratories

- Maintenance
- Modernization
- Revamping
- Field maintenance



3.

Developed and commercially available products

- Search kits
- Equipment for cable selection from bundle
- Search receivers
- Search generators
- Means for protective equipment testing



4.

Step-ahead solutions

- GP-36 search generator
- PPO-1 receivers to search for single-phase damages
- KR-90 cable reflectometric system
- LOCAL-2000 mobile system for locating cable damages
- VPK-6000 high-power maintenance-free burning complex

**CUSTOMIZED
PRODUCT**

ELECTROTECHNICAL LABORATORIES

Purpose:

- Testing of substation equipment.
- Testing of underground cable lines with any type of insulation.
- Determination of distance to power cables damage using the most modern and efficient methods:
 - by pulse-echo method,
 - by pulse-arc method,
 - by stress wave method,
 - by current wave method.
- High-precision detection of underground cables damages by induction, acoustic, acoustic-electromagnetic and potential methods.
- Location inspection and search for communications routes and cable lines, including those of 50 Hz.
- Determination of underground utilities depth.
- Selection of a specific 1-phase or 3-phase bundled cable.
- Burning of places of damage to power cables insulation.
- Measurement of parameters of high voltage insulation.
- Measurement of power transformers parameters at low voltage.
- Diagnostics of power cables insulation state by measuring partial discharge parameters at ultra-low frequency.



ANGSTREM mobile
electrotechnical laboratories
 certified under GOST R

Appointment

- **testing** of underground cable lines and substation equipment of voltage classes up to 35 kV
- **diagnostics** of underground cable lines and substation equipment of voltage classes up to 35 kV
- **search for places** of damage to underground cable lines.



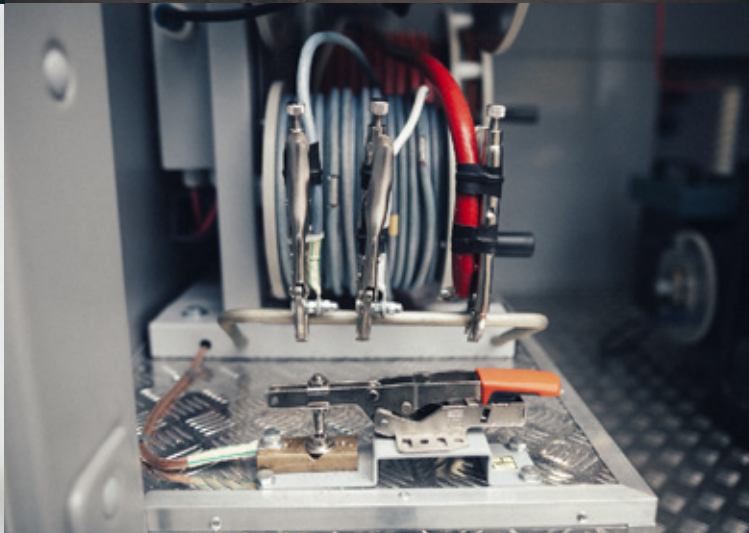
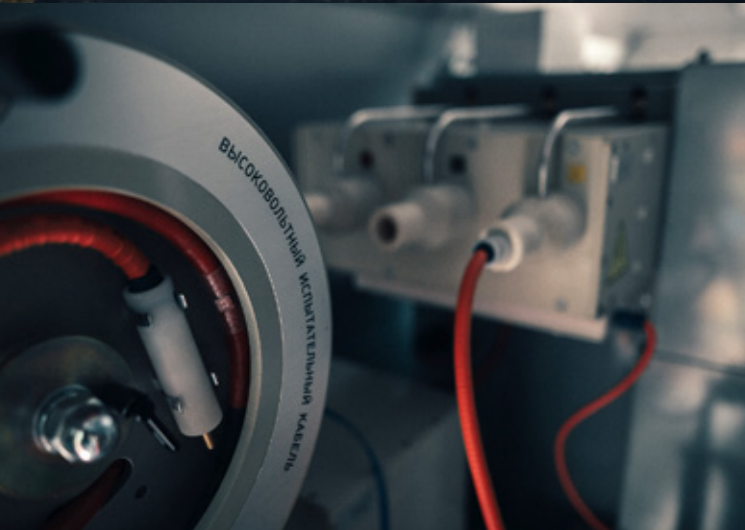
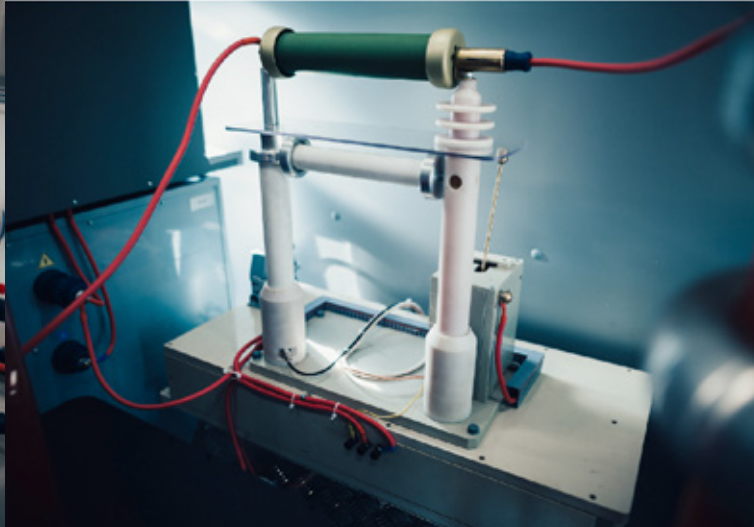
ANGSTREM-1 Cable Electrotechnical Laboratory



ANGSTREM-2 Transformer Electrotechnical Laboratory



ANGSTREM-3 Universal Electrotechnical Laboratory





**ELECTRICAL LABORATORIES
AFTERSALES SERVICE**

TYPES OF AFTERSALES SERVICE



Maintenance



Modernization



Revamping



Field maintenance

ANGSTREM provides aftersales service of electrical laboratories of any manufacturer.

Why ANGSTREM service is better?

- Top technical specialists
- All staff is certified
- Availability of all required equipment
- Reduced repair period due to availability of spare parts in stock
- Preliminary approval of all required activities
- Monitoring at all repair stages
- Compliance with deadlines
- Warranty on all types of service
- Best compromise between the high quality and affordable cost of works





**DEVELOPED
AND COMMERCIALY
AVAILABLE PRODUCTS**

Developed and commercially available products.

KP-500K, KP-250K, KP-100K search kits

angstrem.tech

Purpose

- **High-precision detection of underground cables damages** by induction, acoustic, acoustic-induction and potential methods.
- **Location inspection and search for communications routes**, including those under voltage.
- **Determination** of underground utilities **depth**.
- **Cable selection from a bundle**.
- **Localization of cable sheath damage**, including of those with XLPE insulation.
- **Afterburn** of defective cable insulation.

Brief description

Parameters	KP-500K	KP-250K	KP-100K
Cable line length	to 50 km	to 30 km	to 20 km
Cable depth	to 12 m	to 10 m	to 8 m
Generator power output	500 W	250 W	100 W
Maximum output current	39,5 A	31,5 A	19,2 A



The Search kits quality is confirmed by the Conformity Declaration



Developed and commercially available products.

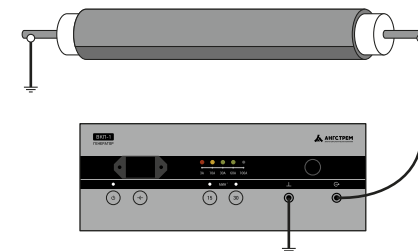
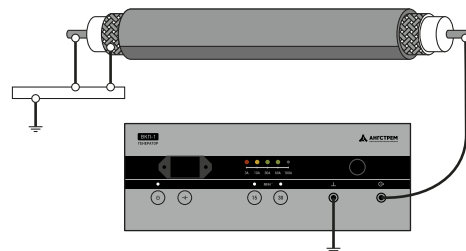
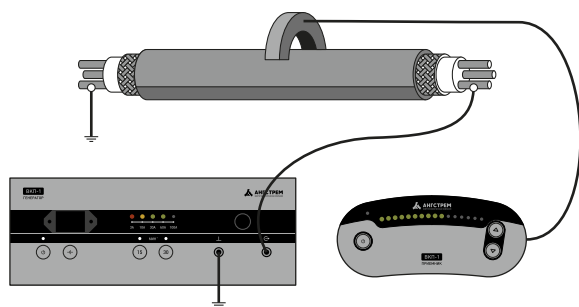
VKP-1 cable selection system

Purpose

- **Cable selection** from a bundle after excavation.
- **Determination of phases sequence** on the cable being repaired.



Scheme of cable selection from the bundle





Developed and commercially available products.

PP-500K search receiver

Brief description

Number of search channels	10
Search methods	induction, acoustic, acoustic-induction (acoustic-electromagnetic), potential

It is used as a part of KP-100K, KP-250K, KP-500K Search kits.

Purpose

- High-precision **detection of underground cables damages** by induction, acoustic and potential methods.
- **Estimation of distance to damage location and cable routing** when using the acoustic-induction method.
- **Location inspection and search for communications routes**, including those under voltage (cable lines, pipelines, etc.).
- **Determination** of underground utilities **depth**.
- **Cable selection from a bundle**.
- **Localization of cables sheath damage**, including of those with XLPE insulation.
- **Search** for pipeline fluid **leakage**.





Developed and commercially available products.

PA-1000K acoustic receiver

Brief description

Number of search channels	5
Search methods	acoustic

Used together with a shock pulse high-voltage generator.

Purpose

- **Search and exact localization** of underground power electrical cables damages with acoustic method.
- **Estimation of distance to the damage** according to the delay in the acoustic test signal compared to the electromagnetic one.





Developed and commercially available products.

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I-20M high-voltage unit

Brief description

Output current	0 – 22,5 mA
Output voltage	0 – 20 mV
Power consumption	max. 0,6 kVA



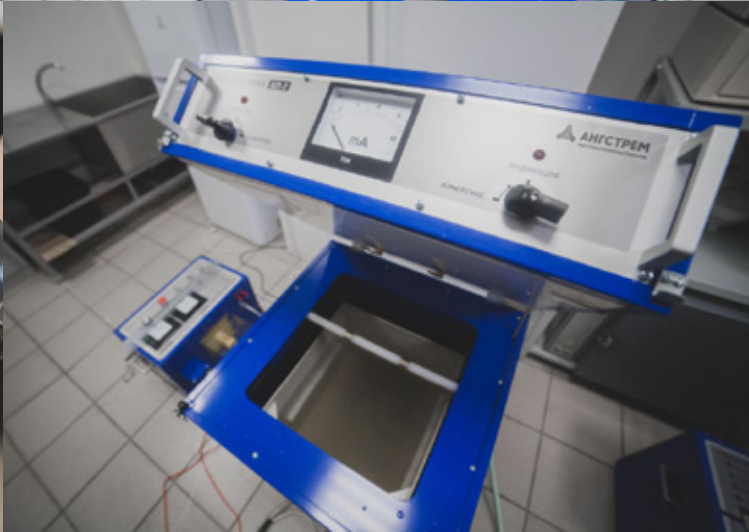
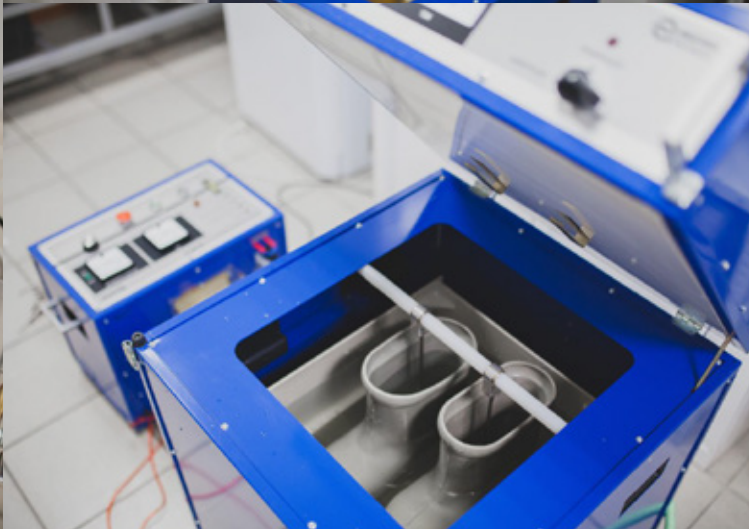
Purpose

Testing of personal protective equipment:

- dielectric gloves,
- boots, rubber overshoes,
- hand electric tools,
- insulating rods,
- voltage gauges.

Features

- Does not require placement in a specially equipped room.
- Only reliable grounding is required.
- Advanced functionality. Two measuring channels allow simultaneous testing with alternating voltage and monitoring conduction current of 2 pairs of gloves or 1 pair of dielectric boots (rubber overshoes).
- Information content. All measuring devices, controls and displays are on the front panel.
- Current is measured with the built-in milliamperemeter.
- Safety. Due to the unit design features the accidental contact of high-voltage elements is completely eliminated.
- User friendly.
- Ease of maintenance.



**EP-AHEAD
SOLUTIONS**

PPO-1 receiver to search for single-phase damages



Purpose

- **Localization of cable damage** at single-phase circuit using a pulse-wave (pulse-induction) method

Features

- Determination of cable damage in case of “ground” and “shell” fault.
- Sensitivity adjustment with convenient visual monitoring.
- Light and sound indication of each received pulse, which makes constant visual indicators monitoring unnecessary.
- The battery charge is estimated using a multi-color scale.
- Automatic adjustment of the screen backlight is provided depending on the day time and illumination at the work site.
- The receiver is compatible with any high-voltage pulse generator.
- Due to the lithium-ion battery the receiver operating time exceeds 100 hours. Thereat, the device remains the small weight.
- User friendly operation.

VPK-6000 high-power maintenance-free burning complex



Brief description

Output current	0–91 A
Output voltage	0–15 kV
No. of taps	7
Power consumption	max. 6 kVA

Purpose

Burning of power cables insulation to reduce the transient resistance at damage point to a value allowing the use of induction or acoustic methods of damage search.

Features

- High efficiency during burning resulted from continuous switching of output voltage taps.
- High efficiency of afterburning with large currents due to ultra-low output resistance of the complex.
- Monitoring from the electrical laboratory panel.
- Operation in automatic and semi-automatic mode.
- Power supply from maximum 7 kVA benzo-generator.



Brief description

Output voltage ranges	9, 18, 36 kV
Maximum output current	5 kA
Energy	2600 kJ

Purpose

Supply of powerful high-voltage potential pulses to facilities when searching for damages to underground electrical cables with acoustic method.

Features

- Continuously adjustable output voltage.
- Improved working key significantly reduces energy loss inside the device.

SVI-100/140 high voltage measuring system



Intended purpose

Measurement of direct and alternating power current high voltage

Features

- The measurement system's resistive-capacitive divider reduces influence of the environment on the accuracy of measurements.
- The voltage meter has accuracy class 2 within the range of 10 kV to the maximum value.
- The verification interval is 2 years.
- It allows to measure the load current, DC and AC voltage simultaneously, estimate the level of ripple during measurements of DC voltage or check the state of the test power source for presence of a rectifier bypass.
- The charging time is 2 minutes and duration of operation with the power source fully charged is about 1 hour.
- Readings of the voltmeter and ammeter are taken remotely.
- The instrument is used in electrical laboratories.
- The instrument has two versions: SVI-100/140 and SVI-100/140T (with current meter).



Ep-ahead solutions.

KR-90 cable reflectometric system

angstrem.tech

Brief description

Maximum measured distance	250 km
Probe pulse amplitude	30, 60, 90 V
Cable type	wire rope

Purpose

- **Determination of distance** to wave impedance discontinuity in cable lines.
- **Measurement of cable line length** with the known pitch coefficient.
- **Measurement of cable line pitch coefficient** with the known length.
- **Distance measurement to burning arc** when using the pulse-arc method (ARC).
- **Measurement of distance to a breakdown** with the oscillatory discharge method according to voltage (DECAY) and current (ICE).





Ep-ahead solutions.

angstrem.tech

Digital electric laboratory control system. Software ANG24

The digital electrical laboratory is controlled by special-purpose software ANG24® developed by ANGSTREM, LLC

Intended purpose

- Automation of the digital electric laboratory control system.

Features

- Two-way data exchange with databases.
- Centralized control of measurement processes.
- Creation and maintenance of the operated power facilities database.
- Automatic synchronization of the digital electric laboratory and its servers, other laboratories or personal computers anywhere in the world.
- Comprehensive on-line monitoring of safety parameters.
- Library of normative and technical documentation built in ANG24®.
- Complete on-line diagnostics function ensures operative technical support and prompt solutions.
- User-friendly menu and controls.
- Displaying of all information on a color video monitor.



Электротехническая лаборатория
Лигстрем 1

Модуль коммутации
L1 Испытание
L2 Рабочее заземление
L3 Рабочие заземления

Система безопасности
Опасный потенциал
Дверь левая
Дверь правая
Стекла собрана
Контроль земли
Авария

Оборудование Настройка

Испытания переменным напряжением
Испытания постоянным напряжением
Высоковольтный прожиг
Совместный прожиг
Прожиг
Рефлектометр
Низковольтные измерения

Режим измерения
Генератор высоковольтных импульсов
Генератор звуковых частот
Управление обменом данными
Мост переменного тока

Электротехническая лаборатория
Лигстрем 1

Модуль коммутации
L1 Испытание
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Стекло
Дверь левая
Дверь правая
Кнопки безопасности
Контроль земли

Оборудование Настройка

Высоковольтное испытание переменным напряжением
Режим готов к работе

Параметры: U зад, кВ T зад, мин. I макс, mA U макс, кВ T, мин

Ручной Авто

Регулятор напряжения:
Вверх
Вниз

Защита по току:
20mA
100mA

Управление:
Пуск
Стоп

Результаты измерений:
Напряжение: 4.29 кВ
Ток: 1.61 mA
Время: 00:01:20
Измерение

Электротехническая лаборатория
Лигстрем 1

Модуль коммутации
L1 Испытание
L2 Рабочее заземление
L3 Рабочие заземления

Система безопасности
Опасный потенциал
Стоп
Кнопки безопасности
Контроль земли

Оборудование Настройка

Высоковольтное измерение постоянным напряжением
Режим работы

Параметры: U зад, кВ T зад, мин. I макс, mA U макс, кВ T, мин

Ручной Авто

Регулятор напряжения:
Вверх
Вниз

Защита по току:
20mA
100mA

Управление:
Пуск
Стоп

Результаты измерений:
Напряжение: 38.63 кВ
Ток: 2.57 mA
Время: 00:02:41
Сброс результатов

Электротехническая лаборатория
Лигстрем 1

Модуль коммутации
L1 Прожиг
L2 Рабочее заземление
L3 Рабочие заземления

Система безопасности
Опасный потенциал
Стоп
Кнопки безопасности
Контроль земли

Оборудование Настройка

Прожиг
Режим работы

Степени: 1 2 3 4 5 6 7

U макс	15	8	4	2	0.75	0.25	0.058	kV
I макс	0.34	0.65	1.3	2.6	7	24	91	A

Ток: 70% 100%

Ручной Авто

Регулятор напряжения:
Вверх
Вниз

Управление:
Пуск
Стоп



**ADVANTAGES
OF ANGSTREM PRODUCTS**



Import-substituting products

Replacement of European analogs with ANGSTREM equipment



Home development

Increasing the life and efficiency of the devices



Reliability of operation

Within 27 years only 7 instruments were returned



Warranty

Warranty period is 24 months



Process run

Equipment testing before shipping



Operating performance

Equipment trouble-free service within 15 years



User feedback

Constant feedback allows timely equipment modernization



Materials

High-quality assemblies and accessories



Technology

Unique multi-level production technology



Monitoring at all stages

Implementation of technical inspection at all production stages



PJSC "ROSSETI"



PJSC "Severstal"



OOO "Gazprom energy"



PJSC "SIBUR Holding"



PJSC "NK" ROSNEFT "



JSC "Oboronenergo"



GK "Rosvodokanal"



State Unitary Enterprise
"Moskovsky subway"



JSC "International airport
"Vnukovo "



LLC "EvrazHolding"

Please, follow [the link](#) to see the complete feedback archive.




20.07.2018 № 13/05/18+48-инв

Директору ООО «АНГСТРЕМ»
 Е.В. Завитухину
 Тормозное шоссе, д. 1,
 Строение 2, помещение 3.11,
 г. Ярославль, 150022

Отзыв о поисковом
 комплекте КП-500А

Уважаемый Евгений Владимирович!

В филиале ПАО «МРСК Сибири»-«Красноярскэнерго» 2 поисковых комплекта КП-500 эксплуатируются с 2004 года. Основным достоинством данного оборудования является высокая помехозащищенность приемного устройства, которая позволяет успешно определять трассу и места повреждений кабельных линий, пролегающих под электрифицированными железными дорогами, вблизи нагруженных коммуникаций, под ЛЭП. Достоинством также является мощный генератор звуковой частоты с широким диапазоном частот, что позволяет определять трассу кабельных линий практически на любой глубине залегания. Высокочастотный диапазон позволяет определять трассу кабельной линии без установки заземления на противоположном конце кабеля.



К недостаткам можно отнести только то, что иногда приходится организовывать ремонт поискового комплекта. Этот недостаток компенсируется положительной позицией ООО «Ангстрем» по отношению к потребителям продукта в части ремонта и технического обслуживания в плане проведения бесплатных акций.

И.о. заместителя директора
 по техническим вопросам –
 главного инженера

 З.А. Тимиргалеев

Г.П. Канонский,
 8(391)2-566-882

146055

ФИЛИАЛ ПУБЛИЧНОГО АКЦИОНЕРНОГО ОБЩЕСТВА
 ЭНЕРГЕТИКИ И ЭЛЕКТРИФИКАЦИИ «ЛЕНЭНЕРГО»
 «КАБЕЛЬНАЯ СЕТЬ»

Савловская набережная, д. 60-62, лит. А, Санкт-Петербург, 191124
 тел: 313-42-22, факс: 385-16-50, e-mail: KS@lenergo.com
 ИНН/КПП 7803002209/784243002, ОКТМО 40911000 , ОГРН 1027809170300, ОКВЭД 40.10.2

29.09.2014 № КС/033/4234

На № _____ от _____

Директору
 ООО «Ангстрем»
 Завитухину Е.В.

Отзыв об использовании поискового
 комплекта КП 500

Уважаемый Евгений Владимирович!

В этом году исполнилось 13 лет с момента поставки первого поискового комплекта типа КП-500 вашего производства в Службу испытаний и измерений Филиала ПАО «Ленэнерго» «Кабельная сеть». В настоящее время большая часть электротехнических лабораторий в своем составе имеет данный поисковый комплект для поиска мест повреждений КЛ индукционным методом, снятия трасс КЛ и определения КЛ в пучке.

Данное оборудование характеризуется высокой надежностью, случаи выхода из строя крайне редки. Важно отметить, что в этих случаях сервисная служба предприятия осуществляет ремонт качественно и в сжатые сроки.


За все время эксплуатации поисковые комплекты хорошо себя зарекомендовали в различных режимах работы и активно используются.

Работа поискового прибора совместно с акустическим датчиком не является сильной стороной универсального оборудования.

В качестве пожеланий, в целях усовершенствования и расширения функционала поискового комплекта предлагаем Вам выполнить следующие преобразования:

- расширить (сместить) диапазон частот пьезодатчика (фильтра) в сторону низких частот (во многих случаях улучшит слышимость разрядов при акустике);
- сделать ветрозащиту акустического датчика и обеспечить его ветроустойчивость;
- добавить в акустический датчик индукционную катушку, вывести её на индикатор для контроля величины электромагнитных импульсов при акустике (в процессе поиска места повреждения это позволит контролировать нахождение над трассой КЛ, а также выделить акустический сигнал из общего шума), или обеспечить для этой цели возможность одновременного использования штатных датчиков;
- в индукционную часть ввести полосовые фильтры гармоник (повысит точность определения кабеля в пучке).

Первый заместитель директора –
 главный инженер

 Н.Н. Соловьев

Бартолев А.В.
 тел. 8(812)322-04-08



**TRAINING
AND INFORMATION SUPPORT**

ANGSTREM provides training in electrical laboratories and equipment operation



Types of training:

- at own testing area
- on-site training under customer operating conditions



Sections of training:

- theoretical foundations of work
- practical experience in finding fault locations and conducting high-voltage tests



Specialists who have completed the training receive certificates on obtaining theoretical knowledge and practical skills

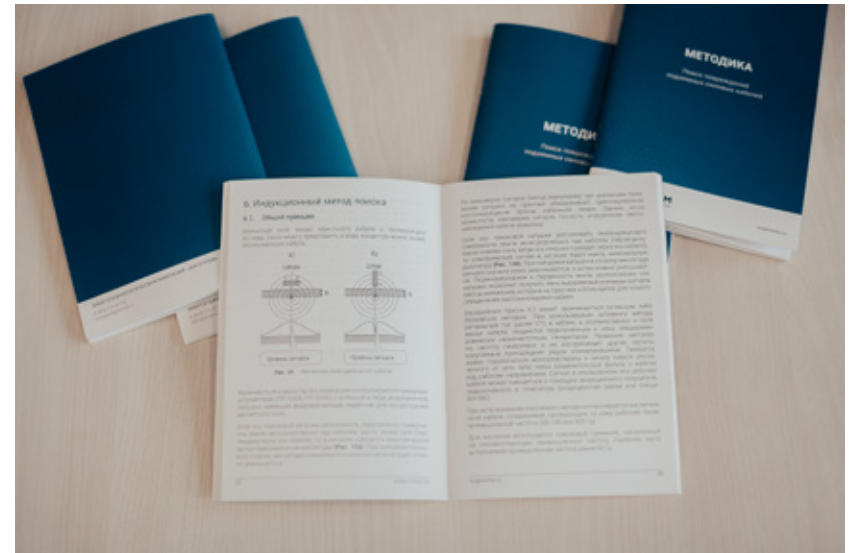
Information support

ANGSTREM always provides its customers with the support

Types of information support:

- constant communication with customers
- technical advices
- distribution of useful technical information
- free guidance manual describing procedures of underground cables damage searching


The Underground Power Cables Damage Search procedure developed by ANGSTREM employees includes generalized long-term experience of practitioners.





ANGSTREM

POWER TECHNOLOGY COMPANY

 +7 (495) 532 33 58

 angstrem.tech