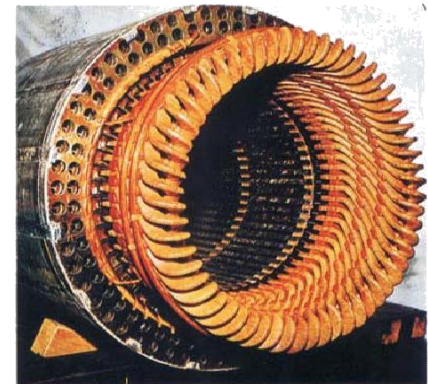
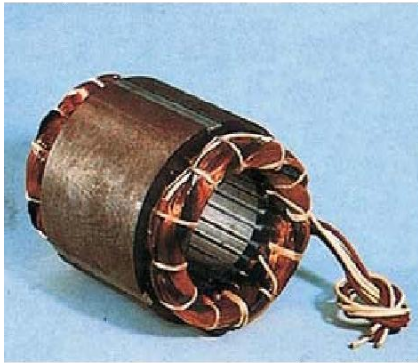


# Liv-Elir d.o.o



**REPAIR AND SERVICE  
/ PRODUCTION**

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# Liv-Elir d.o.o

## REPAIR AND SERVICE

Asynchronous, synchronous and collector machines of low and high voltage:

- Production of coil insulation class B, F, H
- Production of coil for voltage level 6kV to 10kV
- Impregnation of coils in the vacuum pressure impregnator
- Establishing accurate shop operation with SPM method vibration measurement, testing under load

Pumps, pump units and pumping substations, which are used for water supply, drainage in mining and similar

Oil immersed transformers and dry transformers

- Filtering and insulation oil testing
- Coil development

Welding devices. Generator sets and rectifiers

Electrical distribution equipment and machines in the anti explosive "Ex" version.

Dynamic balancing of rotating masses and spare parts development for electrical machines

## PRODUCTION PROGRAM

Low voltage metal strips and Silumin strip modules designed for industrial and residential construction

- Plants for electricity distribution
- Command distribution cabinets and counters with or without technological scheme for electric power supply, managing and monitoring Electric-motor plants

Medium voltage plants for use in mining

Silumin mold castings and sand castings

Light Silumin poles for street lightning and park lightning

Single-phase transformers up to P=15kVA

Three-phase transformers up to P=50kVA

Inductors and solenoid coils. Electro graphite and metal graphite brushes

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# Liv-Elir d.o.o

## HIGH VOLTAGE ELECTRICAL MACHINES

We refurbish and service high-voltage synchronous and asynchronous electrical machines voltage level up to 10 kV.

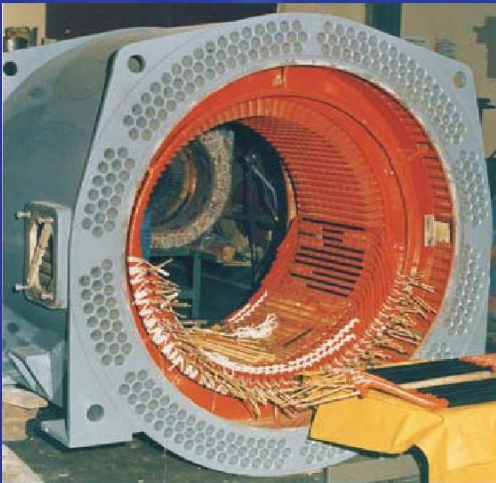


### High voltage service program includes:

- Degreasing, washing and drying of all parts of machines
- Refreshing the coil insulation
- Dynamic balancing of rotating masses
- Repair, construction and replacement of damaged parts
- Idle testing and development of test protocol

### The program overhaul of HV machines includes:

- Preparation and replacement of stator and rotor coils in the "F" class insulation
- Repair and development of the rotor cage
- Pre-packing tin metal packets for the stator and rotor
- Dynamic balancing of rotating masses
- Mechanical systems control
- Determining bearing validity with the SPM method
- Replace damaged parts with original parts or fabrication of new (shafts, bearing shields, fans, secretary case, terminal boards, sliding rings, etc.)
- Impregnation of the coils with high quality paint vacuuming process.



We ensure the quality of our work with tests during the technological process of repair and final testing by IEC regulations. Standard operation procedure involves:

- Partition control measures
- Control of the air gap
- Measurement of ohm resistance and coil impedance
- Measurement of insulation resistance
- Checking terminal markings and direction of rotation
- Measuring current, voltage and rotation speed during idle at nominal frequency
- High voltage test on stator coil
- Check the transmission ratio stator – rotor

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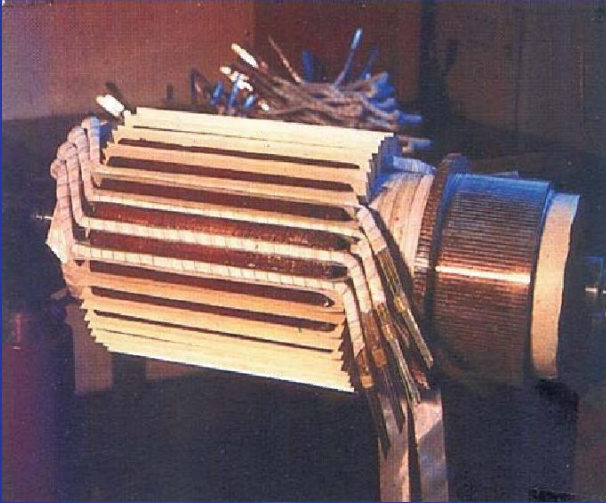
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**The work is done by arrangement with the customer, in our workshop or on site.**

# Liv-Elir d.o.o

## COLLECTOR ELECTRIC MACHINES

Our work program includes all types of ac-dc collector machines and voltage levels. It also includes various special machines such as multi-phase commutation motors, inverter, voltage converters, etc.



### Service program of collector machines includes:

- Degreasing, washing and drying all parts of machines
- Refresh the coil insulation
- Control of mechanical systems
- Dynamic balancing of rotating masses
- Processing collector sliding surface and Inter strip isolation
- Brush control devices

### The program overhaul collector machine includes:

- Preparation and replacement of stator and rotor coils in the "F" or "H" class insulation
- Creating rotor to collector coil connections with the latest procedure of automatic welding
- Coil impregnation with high quality paint vacuum procedure.
- If necessary, can produce and replace damaged parts of machines (shafts, bearing shields, fans, etc.)

We ensure the quality of our work with tests during the technological process of repair and final testing by IEC regulations, in idling as well as under load testing.

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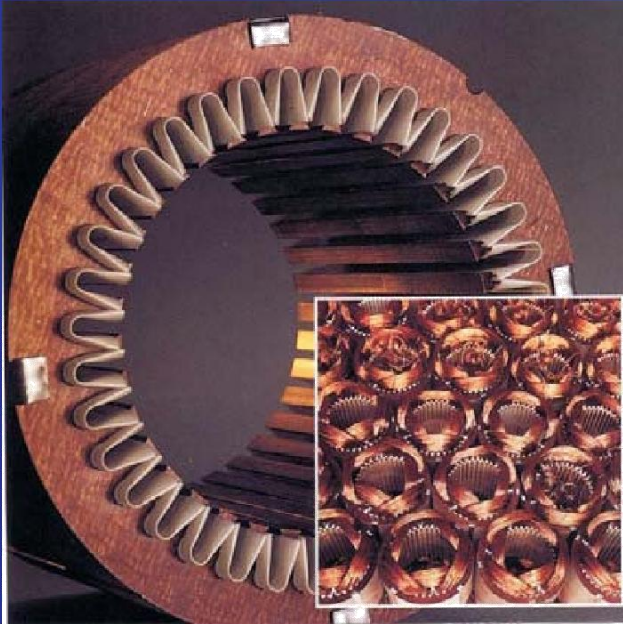
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# Liv-Elir d.o.o

## LOW VOLTAGE ROTATION ELECTRIC MACHINES

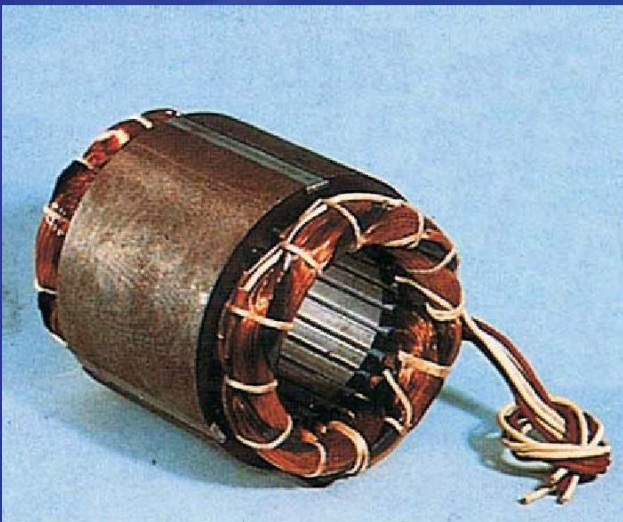
Work program includes synchronous and asynchronous high voltage machines, single phase, and three-phase machines with short connecting and ring rotor.



The program overhaul of low voltage rotating electrical machines (synchronous and asynchronous) includes:

- Fabrication and replacement of stator and rotor coils regardless of the type of winding, type of machinery and temperature class
- Repair or rotor cage fabrication
- Pre-packing tin metal of the stator and rotor
- Control of mechanical systems
- Replacement of damaged parts with the original parts or fabrication of new parts (shafts, bearing shields, fans, secretary cases, docking plates, sliding rings, etc.)
- Quality-winding impregnation- high quality paint with vacuum procedure.

We ensure the quality of our work with tests during the technological process of repair and final testing by IEC regulations.



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## PUMPS AND PUMP UNITS

Repair and service of all types of pumps, pump units and pumping substations used for water supply, drainage in mining, sewage systems, etc.



### Pump and pump units rebuild program includes:

- High pressure rotary dynamic pumps power to 400 kW and voltage to 1000 V
- Low compressive drowing (slurry) pumps for dirty and clean water, power up to 150 kW and voltage to 500 V
- Horizontal and vertical rotary dynamic pumps
- Circulation centrifugal pumps for hot water

### During Pump rebuild we perform:

- Preparation and replacement of stator coils
- Replacement or repair of damaged parts
- Spare parts fabrication by sample

All rebuilt pumps and pumping aggregates are tested at the test station along recording Q-H diagrams, electrical load and other relevant parameters, and developing an appropriate test protocol.

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# Liv-Elir d.o.o

## POWER TRANSFORMERS



### Rebuild program of the power transformers includes:

- All types of dry power transformers up to 1600 kVA, the standard version voltage level up to 20 kV
- All types of oil power transformers up to 2500 kVA, voltage levels up to 20kV
- Mining sub -station in Ex version, production "KONCAR", power 200 630 kVA and 7.2 kV voltage level



### During power Transformer rebuild we perform:

- Preparation and coil replacement
- Filtering and replacement of transformer oil
- Audit connections, clamping yokes, voltage regulator, thermal and Buholtz protection
- Overview of the boiler, and conservator and air dryer
- Control of transformer oil penetrability

**WE PRODUCE DRY TRANSFORMERS UP TO 50 kVA**

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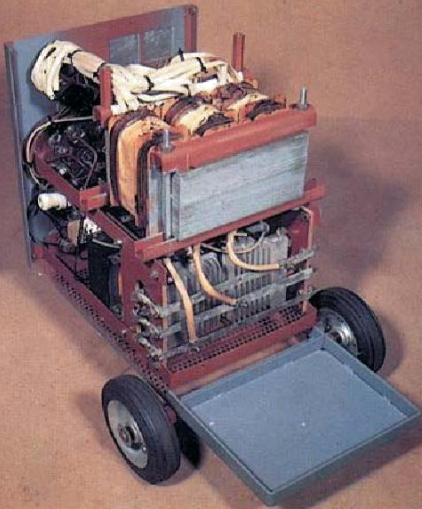
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# Liv-Elir d.o.o

## WELDING MACHINES

Repair and service equipment for arc and resistance welding, automatic and semi-automatic welding devices, and procedures MAG, TIG, MIG rotary welding machines.



**The repair and rebuild program covers all types of machinery and welding machines:**

- Converter for arc welding
- Diesel electric generators for welding
- Adjusters for arc welding
- Transformers for arc-welding
- Devices for semi-automatic arc welding in a protective gas atmosphere
- Devices for semi-automatic arc welding
- Devices for TIG welding

**During rebuild and service of welding machines we perform:**

- Production and coil exchange in the "B", "F" and "H" class
- Replacement of defective parts, such as: bearings, thyristors, diodes, electronic assemblies, the bearing housing, terminal case, carriers brushes, brushes, switches, etc.
- Collector processing, control and adjustment by the recommendations of the producers.

All rebuilt and serviced appliances are tested in a test station with development of test protocols, which contains all the technical data of the rebuild devices, and test results.

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# Liv-Elir d.o.o

## ELECTRICAL EQUIPMENT



### Measuring cabinets for individual installation:

- Cabinets for house connections made of corrosion protected steel sheet painted with RAL 7032.
- Meet the Electricity Regulations-BiH.

### Cable connection cabinet type SPO:

- Made of cast Silumin, colored with varnish RAL 7032, the degree of mechanical protection IP 55.
- Installed one fuse EC 25

### Cable terminal box KPO:

- Housing cabinets made of cast Silumin painted light gray varnish RAL 7032
- The degree of mechanical protection IP 55
- Made in three versions (depending on the mounted fuse base):
  1. KPO 3 x 160 A;
  2. KPO 3 x 250 A KPO 3 x 400 A;
  3. KPO 6 x 160 A; KPO 6 x 250A; KPO 6 x 400 A;

### Battery Junction:

- Silumin alloy boxes that are made in four basic dimensions: K1, K2, K3 and K4
- Closing the box is performed by the lid or door
- Boxes K1 and K3 have four side opening, and K2 and K4 six side opening
- Box Dimensions K1 and K2 same as K3 and K4 are engineered to the size ratio 1:2, so that their combination can make the two systems.

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# Liv-Elir d.o.o

## FREE-STANDING DISTRIBUTION CABINETS

A free standing distribution cabinets are used in electrical power and Industrial plants for the supplying consumers with electricity as well as management technological processes. Made as a field with one or two doors, which are compiled depending on project requirements and client demand.



### HOUSING:

- Stable housing
- Specially made with a fivefold profile groove against rain and dust on the front side  
If used as a separate casing, then made from steel, so that the sides and cross-section create unit on which is mounted lid from the back and door from the front side
- Anti-Corrosion protection is performed by electrostatic application method of powder (RAL 7032)

### MOUNTING PLATE:

- The mounting plate adjustable in depth and reinforced

### GROUND:

- Performed on the case, door and mounting plate

### SIDE PANELS:

- Used as the final elements of the serial connection cabinet

### MECHANICAL PROTECTION:

- IP 43 / IP 54

- Mounting bracket on the perforated side of the cabinet for deep setting mounting plates, other devices and elements

- Prepared openings for: transportation eyebolts, hinges, reinforce on the stand or floor.
- Simply connect the individual cabinets without inner frame
- Sealing closet flange to the ceiling make easier introduction of cables from above

### DOOR:

- Stable door additionally reinforced with vertical perforated mounting rails.
- Seal on the entire perimeter
- Water-resistant closure.

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# Liv-Elir d.o.o

## FREESTANDING DISTRIBUTION CABINET DURING INSTALATION



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# Liv-Elir d.o.o

## **FREESTANDING CABINETS FOR ELECTRIC ENERGY DISTRIBUTION Type NNRO**



Free-standing distribution cabinets are equipped with main switch that contains electromagnetic and thermal protection, and fuse-disconnecting drains stripes. Possible solutions are also without the switch to direct supply cable or Bus connection to the bus NNRO. In both variants NNRO is equipped with instruments for measuring voltage and current.

They are used in substations, as well as industrial plants, and technical solutions meet the recommendations and regulations EP BiH.

NNRO are made from steel plate protected final varnish RAL 7032.

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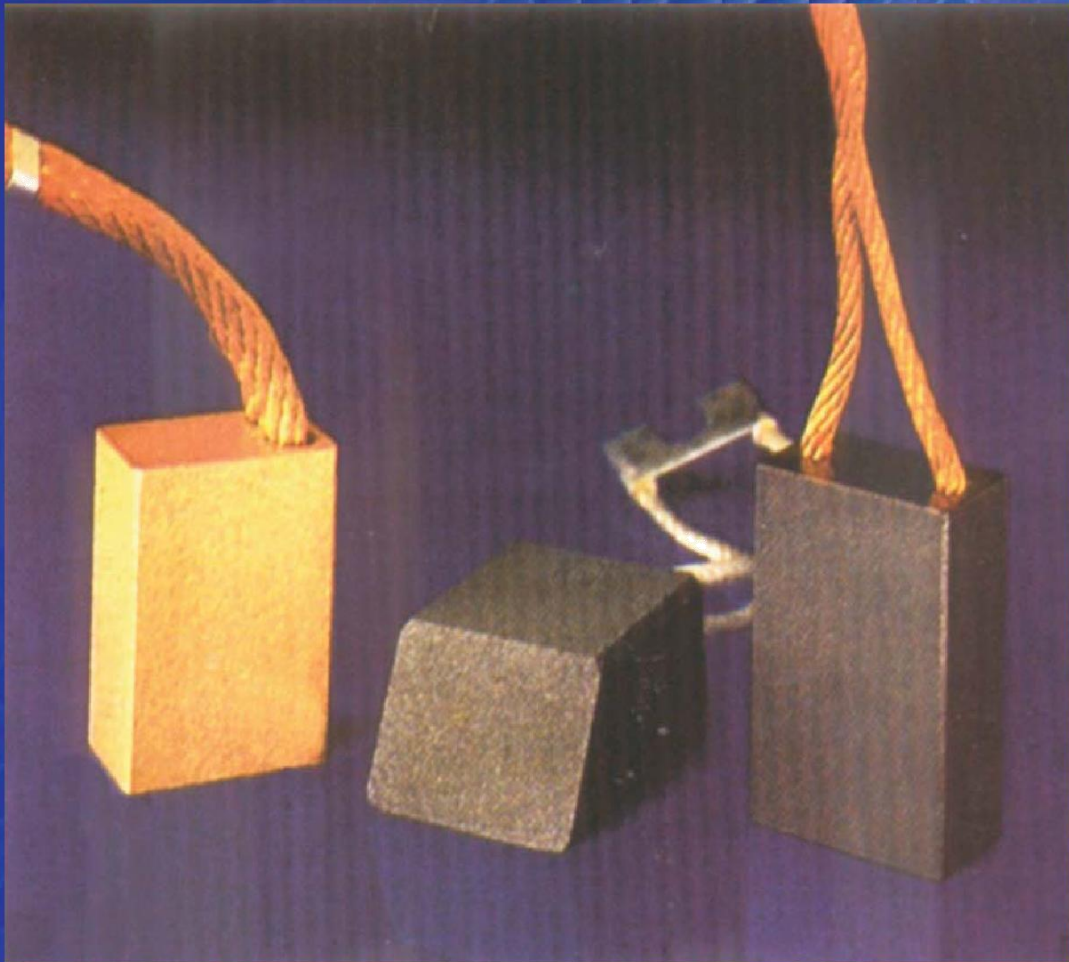
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# Liv-Elir d.o.o

## PRODUCTION OF BRUSHES FOR ELECTRIC ROTATION MACHINES



## PRODUCE ELECTRICAL AND METALGRAPHITE BRUSHES

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# Liv-Elir d.o.o

## MACHINING PROCESSES, SILUMIN FOUNDRY AND DYNAMIC C BALANCING ROTATION MASS



### Machining program includes:

- Processing on the lathe to the diameter of 1410 mm
- All types of milling process
- All types of processing by drilling
- Flat grinding length up to 1000 mm

### Production program Silumin foundry:

- Production of models in its own pattern shop
- Making tools for casting
- Casting of Aluminium alloys in sand and molds
- Production of Aluminium parts for a variety of purpose

### Dynamic balancing of rotating masses includes:

- Diameters up to 1600 mm
- Length to 3600 mm
- Weight to 5000 kg
- Number rpm per minute to 5000

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## LIGHT SILUMIN POLES FOR STREET LIGHTING AND PARKS



Pole is made from Silumin elements, on which are assembled various types of lamp posts on various heights.

### Lamp post heights:

h1 = 1.040 mm  
h2 = 1.600 mm  
h3 = 1.920 mm  
h4 = 3.160 mm

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