KONČAR Product Catalogue

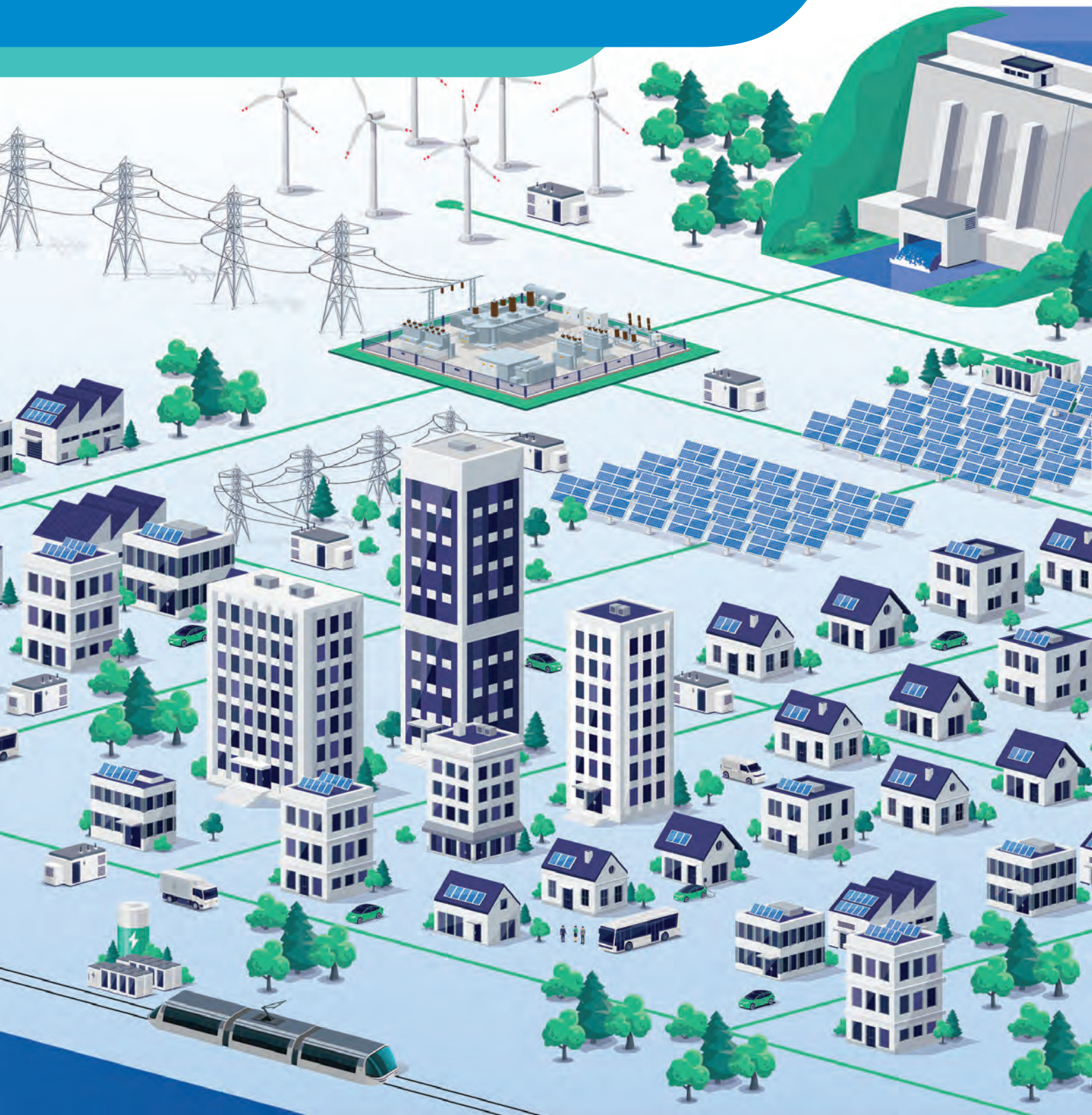


Table of **contents**

KONČAR Group 4
Power engineering 6
Hydro power plants 8
Renewable energy sources 10
Rotating machines 12
Welded and machined generator components 14
Excitation systems and condition monitoring systems for rotating machines 15
Transmission lines 16
Substations 18
Power transformers 20
Medium power transformers 22
Distribution and special transformers 24
Instrument transformers 26
Transformer tanks 28
Transformer monitoring system – TMS 29
Switchgear 30
Asynchronous machines 32
Low-voltage motors and fans 34
Digital solutions and platforms 36
Urban mobility and infrastructure 40
Rolling stock 42
Rolling stock converters and motors 44
Rolling stock control systems 46
Rail infrastructure 48
Contact network equipment 50
Battery charger for batteries onboard rail vehicles 52
Laboratory Center 54

KONČAR Group

Research, development, and innovation are at the heart of our business, driving us to push boundaries, advance technology, and pioneer new solutions. With a strong foundation in expertise, proprietary know-how, and cutting-edge technology, we tackle the most demanding projects, independently or in collaboration with leading global partners.

Inspired by challenge, we create innovative solutions, strengthen local production, and drive energy sustainability – shaping a smarter and more resilient future.

Today, KONČAR is well recognized and established in power engineering and rail solutions industry and operates in the fields of power generation, transmission and distribution, urban mobility and infrastructure, digital solutions and platforms, with an accent on proprietary development and innovation, as well as laboratory testing and certification.

We continuously develop segments which provide the highest added value, with a focus on wind, solar and water energy and we have pivoted to further development of technologies and products that will combine green and smart to enable our partners to keep up with the global initiative and direction in the power engineering field.

Based in Zagreb, Croatia, we export to the European Union, Asia, Africa, the USA and Australia, which makes us the largest Croatian net exporter of the decade.

Our Group consists of over 5400 people. The scientists, engineers, technologists, shop-floor workers are at the core of our success, and their invaluable contribution is key to our everyday success.

In the power engineering sector, the name KONČAR is a global synonym for tradition, trust, expertise, innovation and cutting-edge technology. In 2021 we celebrated a century of excellence and a century of operations across 130 markets.

Power **engineering**

Through several decades of experience, numerous references, and by keeping-up with modern technical and technological development trends, we have become successful and efficient in implementing turnkey projects involving design, construction and refurbishment of the most complex electric power facilities and plants in Croatia and worldwide.

Through proprietary development and business cooperation with domestic and foreign partners, we have mastered all necessary knowledge required to provide comprehensive engineering pertaining to construction of hydro power plants and substations, and to equip thermal power plants, biomass power plants, cogeneration plants and facilities using renewable energy sources.

Our engineering activities in the field of power engineering rely on primary (generators, transformers, switchgear) and secondary electrical equipment products (excitation systems, metering, protection and control devices, automatic control systems) not only from KONČAR Group manufacturing programme, but also from other globally renowned manufacturers.

In addition, we provide proprietary automation solutions for power systems, including SCADA systems, ensuring reliable and efficient energy management.

Electric power plant **services**

Engineering
Expertise and experience in turnkey project management

Maintenance
Continuous plant maintenance and servicing in order to extend the useful life of equipment

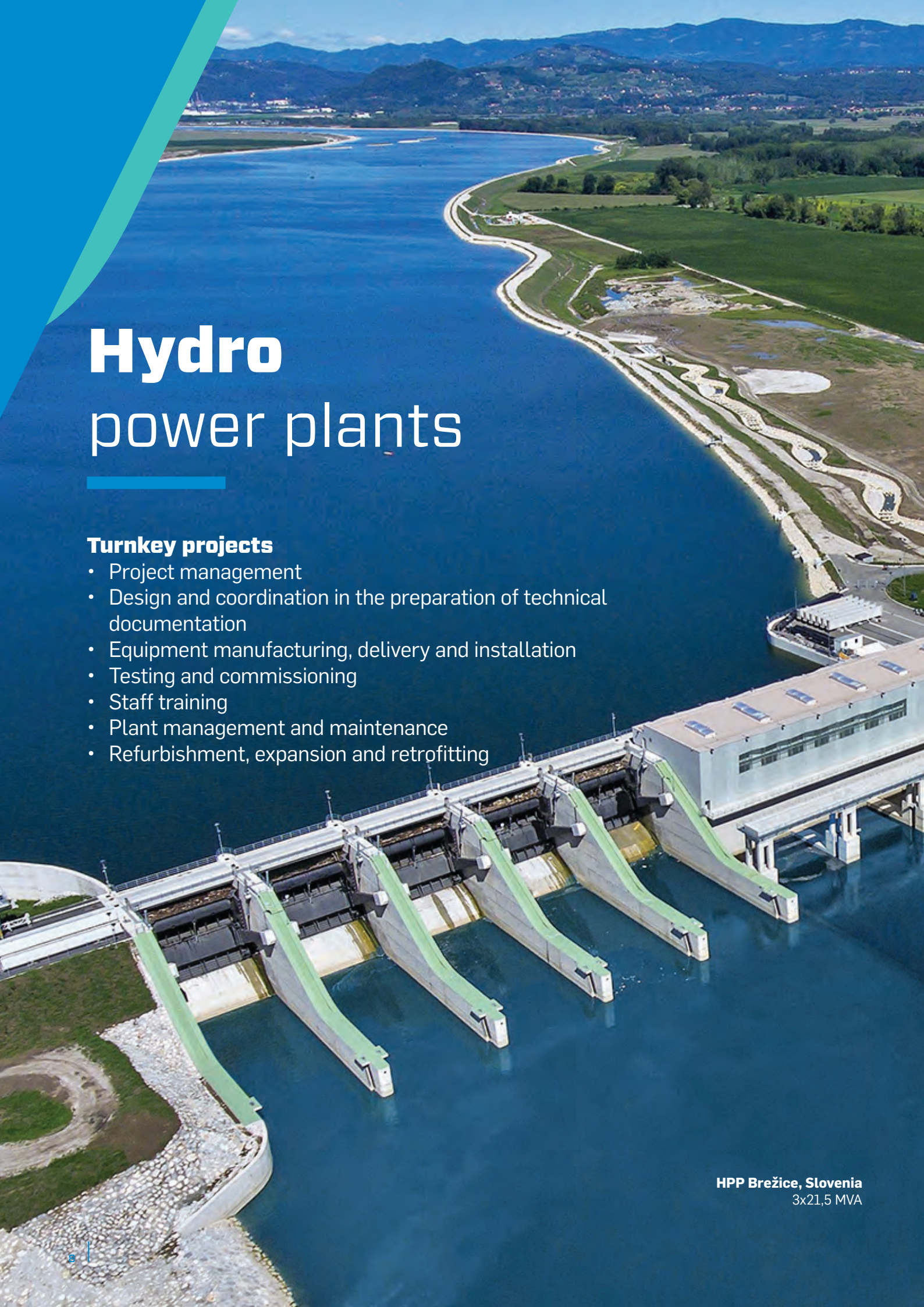
Training
Workshops designed to provide in-depth theoretical and practical understanding of the plant and installed systems

Technical support
Technical on-site support with 24/7 maintenance service upon project completion

Hydro
power plants

Turnkey projects

- Project management
- Design and coordination in the preparation of technical documentation
- Equipment manufacturing, delivery and installation
- Testing and commissioning
- Staff training
- Plant management and maintenance
- Refurbishment, expansion and retrofitting



HPP Brežice, Slovenia
3x21,5 MVA

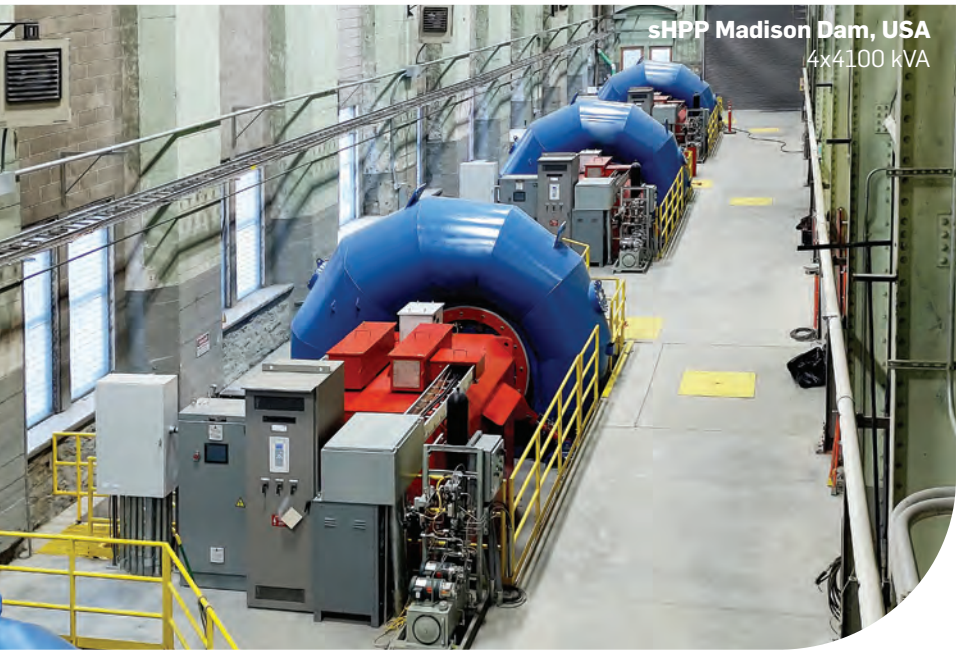
HPP Haditha, Iraq
6x128 MVA

Renewable energy sources

Small hydro power plants

Turnkey projects – electrical and mechanical equipment

- Generator and turbine
- Control, measuring, protection and remote control
- LV and MV plants
- Hydro-mechanical equipment – water intake



sHPP Madison Dam, USA
4x4100 kVA

Ssubmersible machines for low-head small hydropower plants

The technical solution of the newly developed submersible machine and fixed-blade turbine allows for the utilization of low-head waterfalls eliminating the need for an engine room. The machine connects to the grid via a frequency converter with a drive-blade control system.

Solar power plants

Turnkey projects – photovoltaic power plants

Project contracting based on the principles of functionality and integrity

HPP Ering-Frausenstein, Austria/Germany
3x35 MVA

Rotating machines

Hydro generators

- Rated output ranging from 300 kVA to 300 MVA, rated voltage up to 18.5 kV
- Large generators
- VPI, Global VPI and RR insulation systems
- Generators for Francis, Kaplan, Pelton and Saxo turbines
- Bulb-type generators
- Reversible motor-generators
- Compact generators for small hydro power plants
- Overhaul, servicing and current state assessment for all generator types
- Power upgrade and refurbishment of all hydro generator types

Turbo generators

- Major overhaul
- Maintenance
- Service and delivery of replacement parts
- Available for turbo generators manufactured by KONČAR or by other manufacturers

Special synchronous generators

- Diesel engine-driven generators for nuclear power plants, shipbuilding industry and other
- Motor-generators for transformer testing stations

Synchronous motors

- Constant rotational speed and torque
- Reactive power compensation
- Electric motor drives for rolling mills and compressors
- Rated power from 500 kW up to 10 MW

Welded and machined generator components

- Welded and machined generator and high-voltage electrical motor components (generator stator frames, brake rings, fans, pole wheels, rotor spiders, bearing supports, brackets)
- Welded generator and motor steel components for nuclear power plants

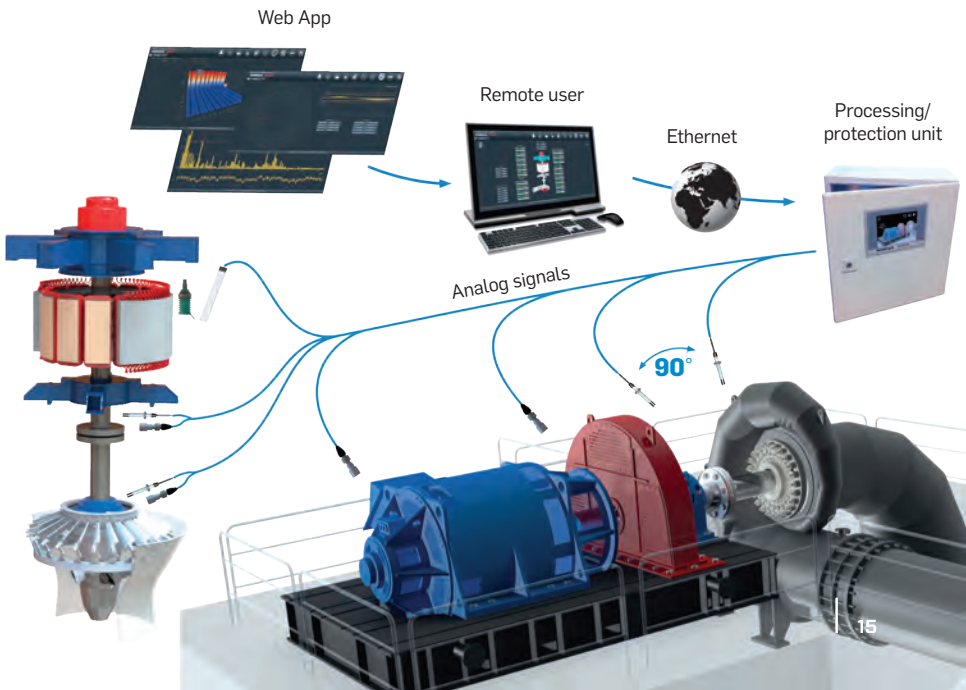
Excitation systems and condition monitoring systems for rotating machines

Excitation systems and voltage regulators for synchronous machines

- Digital regulator (AVR)
- Excitation converter - with natural or forced cooling (air or water)
- Excitation transformer
- De-excitation circuit and overvoltage protection
- Field flashing
- Electrical braking (HPP) equipment

Condition monitoring systems for rotating machines

- Online condition monitoring systems for all types of rotating machines
- Real-time protection based on international standard (ISO 20816 – Mechanical vibration)
- Modular and customized solution for new or existing machine
- Early fault detection and failure prevention



Transmission lines

Our engineering services cover the design and development of various energy and infrastructure projects, including:

- Overhead transmission and distribution lines up to 500 kV
- Underground power cables up to 220 kV
- Transformer substations up to 500 kV
- Switchgear facilities up to 500 kV
- Wind farms, solar power plants, and other renewable energy sources
- Lighting solutions for roads, sports venues, and industrial sites
- Steel structures and foundations for transmission lines
- Antenna towers
- Railway electrification contact networks
- Electrified traction power facilities
- Metal structures and foundations for energy, traffic control, and road safety systems
- Submarine power and telecommunication cables
- Buildings, garages, sports halls, industrial facilities, schools, and kindergartens

DALEKOVOD
KONČAR GROUP MEMBER

Transmission line 420 kV in Norway

Manufacturing excellence

We design and manufacture a wide range of metal structures for power substations up to 500 kV, telecommunication facilities, and various network and antenna systems. Our production expertise encompasses structural components for transportation infrastructure, including road lighting, protective barriers, and traffic signage, as well as metal components for tunnel lighting. Additionally, we develop traffic management equipment and electrification infrastructure for railway and tram systems.

Substations

Transmission and distribution system operators are facing a variety of diverse challenges arising from continuous growth of the energy industry and increasing demand for renewable energy sources. We are specialized in complex market and industry-specific solutions and deliver turnkey projects to meet the needs of the global energy industry.

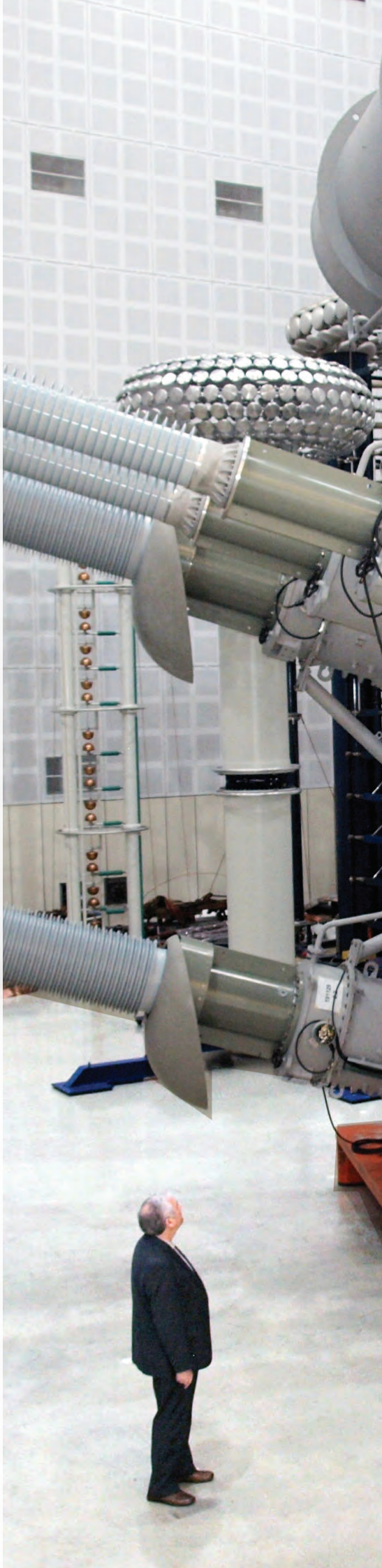
We offer customer-specific solutions, construction, reconstruction, refurbishment and retrofitting of transmission and distribution power facilities within voltage ranges up to 400 kV for AIS and 220 kV for GIS.

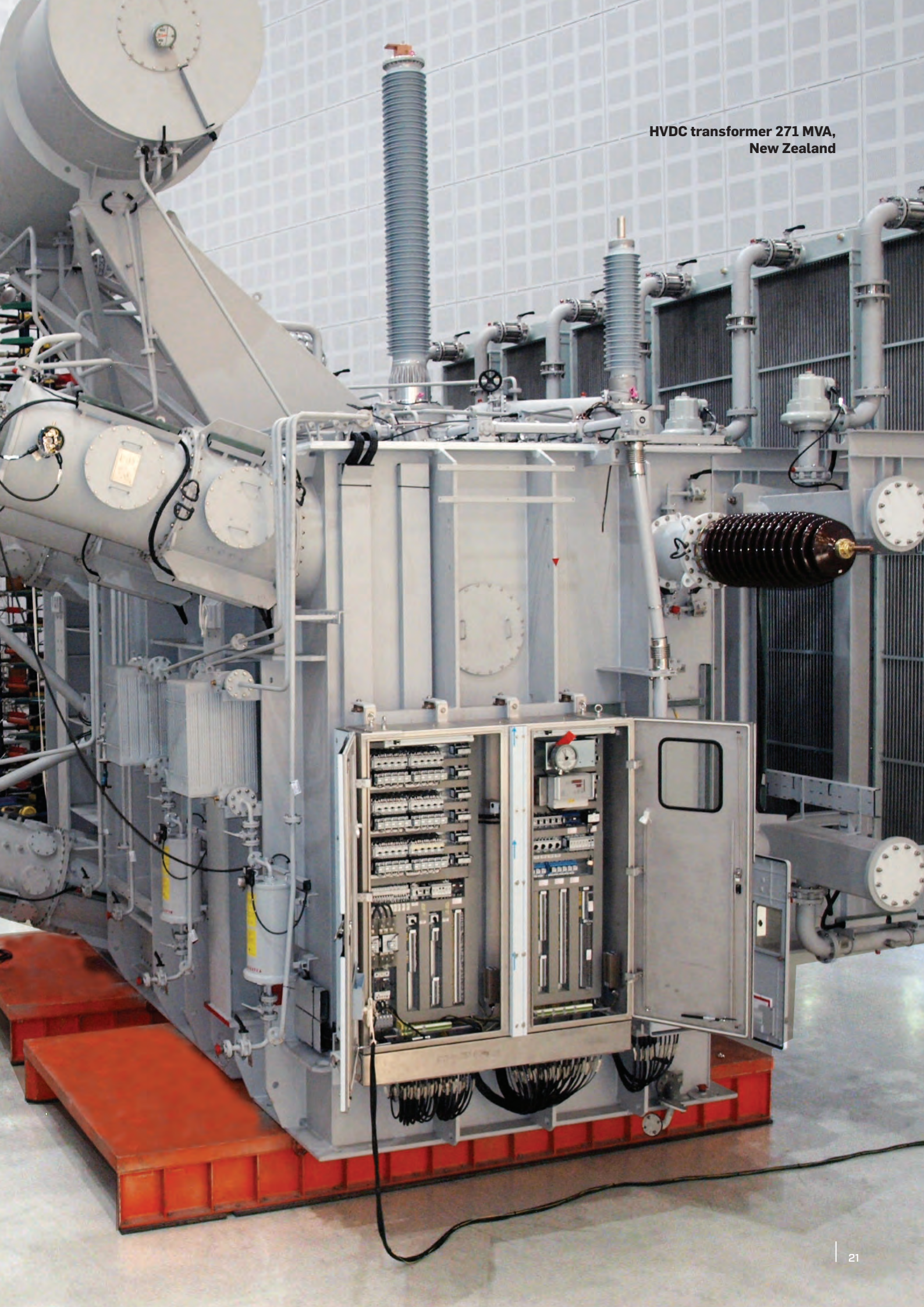
Our solutions include:

- Turnkey projects
- Equipment manufacturing
- Secondary control and protection systems
- Metering
- Telecommunications
- Remote control centers
- Proprietary programming solutions for supervision, control and diagnostics

Power transformers

- Generator transformers, transmission transformers and autotransformers up to 1000 MVA, rated voltage up to 550 kV
- HVDC power transformers up to 550 kV





**HVDC transformer 271 MVA,
New Zealand**

Voltage regulation transformer 63 MVA containing CO_2-reduced Bluemint transformer steel, Germany

Medium power transformers

Rated power up to 160 MVA and voltage up to 170 kV

- With on-load tap changer
- With off-circuit tap changer
- Without regulation tappings

Distribution and special transformers

Oil-immersed distribution transformers, rated power up to 8000 kVA and voltage up to 36 kV

- Standard transformers with off-load regulation
- Transformers with on-load regulation
- Transformers with low electromagnetic radiation
- Amorphous core transformers

Eco-friendly distribution transformer

Special transformers

- Earthing transformers
- Converter transformers
- Transformers for locomotives and EMUs
- Furnace transformers
- Vibration-proof transformers
- Transformers with reduced width for installation in wind turbine towers
- Transformers for offshore application
- Autotransformers
- Transformers for mobile substations
- Traction transformers for fixed installations
- Dry-type transformers, rated power up to 5000 kVA and voltage up to 24 kV
- Reactors for compensation, metallurgical plants, rectifying devices, short-circuit and ground-fault current limitations

Earthing transformer for an offshore wind farm in the North Sea

Instrument transformers

- Current transformers from 72.5 to 800 kV
- Inductive voltage transformers from 72.5 to 550 kV
- Capacitor voltage transformers from 72.5 to 800 kV
- Combined transformers from 72.5 to 550 kV
- Power voltage transformers from 72.5 to 550 kV // from 10 to 333 kVA
- Earthing reactors for HVDC systems from 72.5 to 550 kV
- Medium-voltage current and voltage transformers up to 52 kV
- Low-voltage current transformers
- Special transformers for laboratory purposes
- Transformers with reduced environmental impact – GREEN LINE

Power voltage transformers type VPT, 362 kV

GREEN LINE SERIES
Instrumental transformers with reduced environmental impact

Transformer **tanks**

- Customer-specific transformer tanks for large (LPT) and medium (MPT) power transformers
- Capable of meeting the highest demands such as offshore, low-temperature exploitation, girder tanks and HVDC tanks

Transformer monitoring system – TMS

- Online condition monitoring systems for all types of power transformers and shunt reactors
- Modular and adaptive solutions for new and existing transformers on the market
- Monitors and checks all vital transformer components (bushings, active parts, OLTC and cooling system)
- Asset management: condition assessments, diagnostics and fleet wide prognostics

Switchgear

High-voltage switching apparatus and switchgear

- High-voltage circuit breakers, rated voltage up to 145 kV, 8E1 series
- Disconnectors and earthing switches, rated voltage up to 420 kV, CB-N2 and Z series
- Metal-enclosed gas-insulated switchgear, rated voltage up to 145 kV

Medium-voltage switching apparatus and switchgear

- Air-insulated MV switchgear, metal-enclosed and compartmented, for rated voltages 7.2 kV, 12 kV, 24 kV and 38 kV, BVK series
- Metal-enclosed gas-insulated compact switchgear modules for primary distribution of electrical energy, for rated voltages up to 24 and 38 kV, KSMV and KSMA series
- Metal-enclosed gas-insulated ring main units (RMU) for secondary distribution of electrical energy, rated voltage up to 24 kV, VDA∑, VDA and VDAP series
- Factory pre-assembled concrete and containerised substations for secondary distribution of electrical energy in distribution and industrial networks, types KTS and VTS
- Vacuum circuit-breakers, rated voltage from 12 to 38 kV, VK and VK∑ series
- Three-pole and single-pole disconnectors for indoor installation, rated voltage from 12 to 38 kV, RU series

Numerical protection

Feeder terminal units for MV power systems
- Protection, measurement and control
- Fault analysis

Numerical protection relay KONPRO2 - Bay terminal RFX

Low-voltage power distribution cabinets

- Low-voltage switchgear VMF series, with fixed apparatus groups and VMI series with withdrawable apparatus groups for power distribution and industry-related applications
- Low-voltage switchgear VMF-K series, with fixed apparatus groups, intended for reactive power compensation

Industrial LV power distribution cabinet for industrial plant

Uninterruptible power supply systems for 24, 48, 60, 110 and 220 V

- Highly reliable integrated power supply systems
- Modular rectifiers in redundant parallel mode
- Integrated maintenance – rechargeable batteries
- Battery short-circuit protection, deep discharging and inadequate charging protection
- DC distribution board with fully selective circuit breakers
- Insulation monitoring and ground fault locating
- Real-time local and remote system control

Rectifiers type CFS
New generation of high-frequency rectifiers

Asynchronous machines

Explosion-proof motors

- Designed for oil and gas industry and mining
- ATEX motors with Ex protection “d”, “e”, “p”, “n”

Motors with special water cooling

- Designed for application in speed-regulated drives (ship propulsion, winches, pumps)
- Rated power from 315 kW to 3800 kW; rated voltage from 400 V to 690 V

Asynchronous motors and generators

- HV and LV squirrel-cage and slip-ring motors for pumps, fans, compressors, crushers, conveyers, propulsion, thrusters, winches and traction
- Asynchronous generators for small HPPs
- Rated power from 160 kW to 10 MW; rated voltage up to 13.8 kV

Shaftless motors

- Motors for compressors
- Rated power from 160 kW to 550 kW; rated voltage up to 6 kV

Water-jacket cooled motor is designed for regulated drives on ships

Water-jacket cooled shaftless compressor motors

Explosion-proof motors

Low-voltage motors and fans

Asynchronous motors

- Three-phase asynchronous induction motor, power up to 200 kW (efficiency IE1/IE2/IE3/IE4)
- Other versions: multispeed motors, motors with brake, winch motors
- Special design – stainless steel housing three-phase asynchronous induction motors
- up to 1.5 kW
- Synchro reluctance motors (efficiency IE4/IE5)
- Electric motors for marine application (with type certificate: CRS, BUREAU VERITAS)

Marine motors

Brake motors

Explosion-proof motors

- Explosion protected motors, power up to 200 kW (efficiency IE1/IE2/IE3/ IE4) in protection type:''db'',''eb'', ''ec'',''tb'',''tc''
- Certificate: ATEX, IECEx, UKEx, EAC
- Explosion protected motors for marine application (type certificate: CRS, BUREAU VERITAS)

Stainless steel motors

Explosion protected motors

Fans

- Axial fans from 315 to 1600 mm diameter
- Centrifugal fans from 160 to 1120 mm diameter
- Specialized fans for transformer cooling, HVAC systems, and data centers (DOL AC fans and EC fans)
- Special industrial solution in ventilation
- Explosion protected fans in protection type „h“ (certificates ATEX)
- Fans for marine application (with type certificate: CRS, BUREAU VERITAS)

Axial fans for transformer cooling

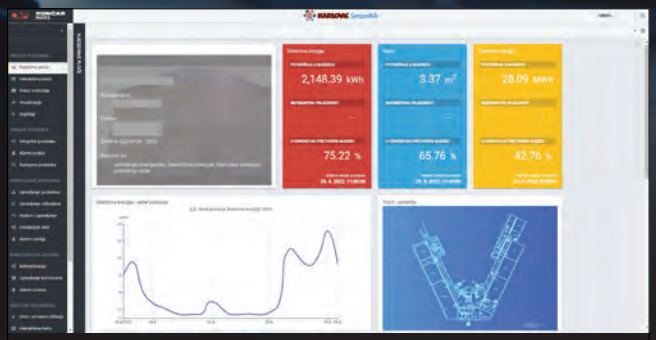
Digital solutions and platforms

Remote critical and urban infrastructure monitoring and control

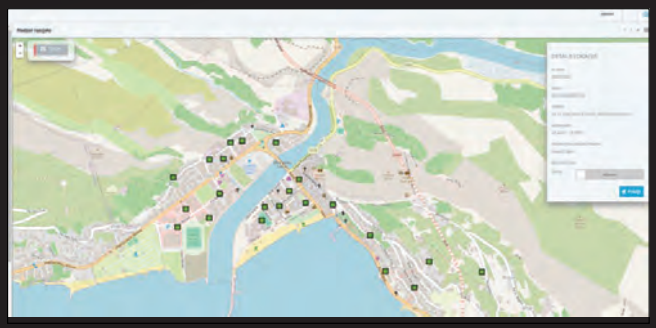
- Development of process information systems for automatic monitoring and regulation of facilities in the energy industry, gas distribution and transmission, water management and drainage, district heating and transport sectors and superordinate dispatch control centres
- Predictive equipment maintenance and maintenance process management

MARS – software IIoT platform for energy, critical infrastructure and smart cities

- Real-time monitoring, management, analysis and reporting
- Receives a variety of technology-independent data from IIoT devices, smart meters and sensors
- Reads data from a large number of devices simultaneously
- Areas of application:
  - Electric power
  - Public lighting
  - Water supply and drainage
  - Energy efficiency for buildings
  - Waste management
  - Parking
  - E-mobility
  - Environmental monitoring

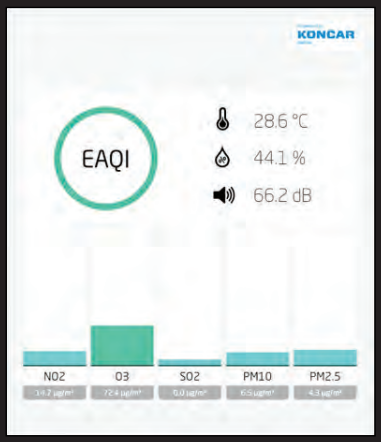


Industrial Internet of Things (IIoT) software platform



Advanced public lighting

- Digital platform with open and modular architecture
- Advanced regular and automated reporting and alarming system
- Advanced real-time data visualization capabilities
- Integration with various business and process systems, independent of hardware and software manufacturers
- Data analysis, validation and calculation
- Data integrity and ability to connect with cyber-secure systems



Environmental and air quality monitoring

Development of SCADA software solutions in substation automation

PROZA HAT EDS is a proprietary system for power plants and substation automation

- Complete SCADA functionality
- Operates on secure Linux virtual or physical systems
- Graphical interfaces based on web technology
- One editor tool for complete engineering process
- KONČAR proprietary solution

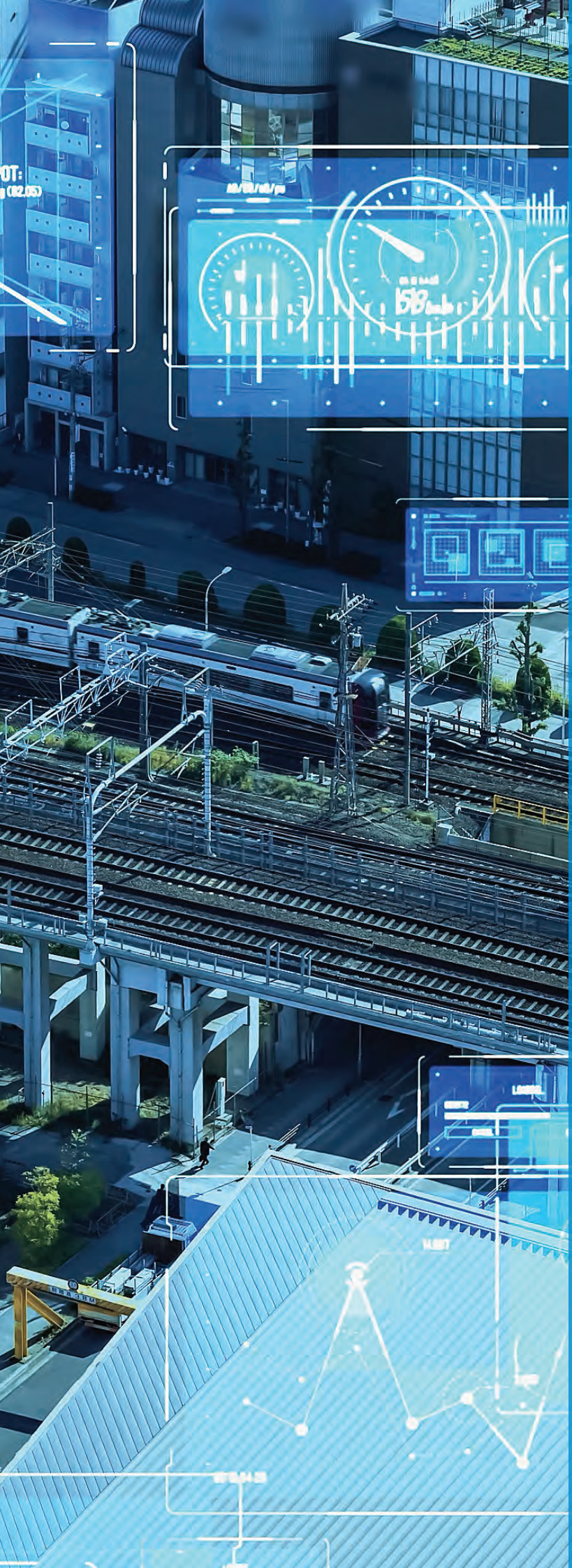
Features

- New generation SCADA system Proza HAT EDS introduces architectural upgrades which enable integration of solutions with different operating platforms using physical and virtual environments
- Core of the system is based on the new Proza HAT platform – open source code
- Secured with Linux OS, user authentication, centralized event logging and secure control operations
- Communication protocols: IEC61850 Client, IEC60870-5-101/103/104, Modbus RTU/TCP
- Standalone configuration tool enables easy and efficient engineering

Development of microgrid-related software solutions

PROZA MEMS Microgrid energy management system

- Microgrid planning, optimization and generation system
- Battery storage system optimization
- Electric vehicle charging stations
- Advanced metering/Industrial Internet of Things software platform
- Grid connection and voltage regulation
- Highly-scalable, flexible and extensible – can be adapted as your microgrid configuration changes and supports up to 100% renewable energy systems
- Cybersecure – it supports multi-layer password protection, encrypted data, VLANs for traffic segregation, firewalls and smart switches in accordance with IEC 62443
- Self-renewable microgrid – maintains system integrity, reliability and stability should a power generation source go offline
- Applying experience from successful H2020 research projects dealing with flexibility and active demand response



PROZA AGC – Automatic Generation Control

- PROZA AGC system, proprietary development
- Load frequency control (LFC) for transmission system operators (TSOs)
- LFC and automatic schedule execution in generation control centres (GCCs)

Features

- Input and output data pre-processing
- Control area and control block support
- Unlimited sources for input measurement
- Imbalance netting support
- PI regulation algorithm
- Priority order list for AGC unit selection
- Optimal power distribution based on AGC price

Urban mobility and infrastructure

KONČAR today stands as a provider of comprehensive rail solutions, offering a full suite of products and services ranging from the development and design to the manufacturing, retrofitting, and maintenance of rolling stock tailored for railway, industrial, regional, and urban-suburban applications. Our diverse portfolio includes electric locomotives, Battery Multiple Units (BMU), Battery Electric Multiple Units (BEMU), Electric Multiple Units (EMU), Diesel Multiple Units (DMU), low-floor trams and special vehicles.

Beyond rolling stock, our expertise extends to the design, development, and manufacture of critical components and subsystems, encompassing power and instrument transformers, control and communication systems, static voltage converters for both main and auxiliary drives, advanced control and signalling devices, traction motors, and essential structural components such as car bodies and bogie frames.

Battery Electric Multiple Unit

Rolling stock

Our state-of-the-art solutions are the result of proprietary knowledge and development of our engineers and skilled professionals.

EMU for efficient commuter transit

Low-floor tram TMK 2400

Trains

Our low-floor trains combine advanced construction, innovative design, and high-performance features to deliver exceptional energy efficiency and superior passenger comfort, making them the ideal solution for both regional and urban-suburban transit.

Trams

Our 100% low-floor trams provide a modern, functional solution for public transportation, showcasing unique design and exceptional technical specifications.

High-precision measurement train

Modernized locomotive

Special vehicles

Measurement train is self-propelled vehicle designed to monitor, measure, and record track conditions with precision. Built on the reliable platform of our current electric and diesel-electric trains, this high-floor vehicle is powered by a diesel engine and can reach speeds of up to 140 km/h on both electrified and non-electrified tracks.

Electric locomotives

At KONČAR, we have been modernizing electric locomotives for decades, bringing them to the forefront of technological advancement. Our expertise in modernization, including advanced thyristorization, has earned us the trust of numerous operators across Southeast Europe.

Rolling stock **converters and motors**

KONTRAC GN720MS/BS
all in one propulsion and auxiliary converter for battery and electric-battery trains

KONTRAC GP550AC
propulsion converter for EMUs

KONTRAC GP550DE
propulsion and auxiliary converter for DEMUs

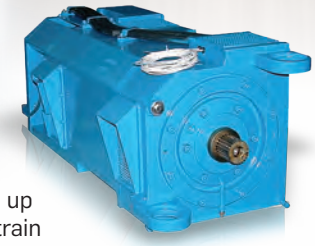
Converters

- Propulsion converters for electric and diesel-electric trains, trams and locomotives
- Self-consumption inverters and battery chargers for electric and diesel-electric trains, trams, locomotives and passenger rolling stock

Traction motors

- Asynchronous squirrel-cage motors
- Rated power from 65 to 525 kW
- Rated voltage up to 1000 V
- Rated speed up to 5280 rpm for EMU train motors and 4580 rpm for tram motors
- Insulation class index 200

KONTRAC GP170DC
propulsion converter
for trams

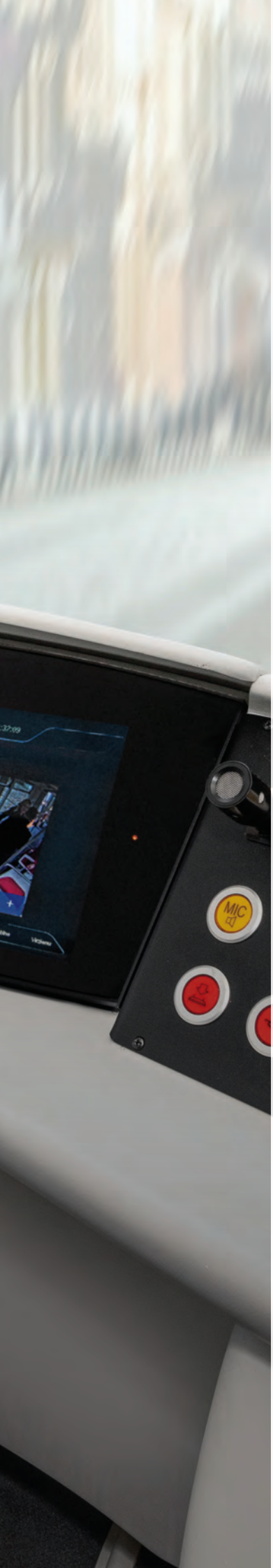


TRACTION MOTORS
Rated speed up to
4580 rpm for tram and up
to 5280 rpm for EMU train

KONTRAC PN90DC
auxiliary converter for
multi-system trains

Rolling stock **control systems**

For nearly three decades, KONČAR has been a trusted partner in addressing the complexities of control systems, electronics, communication, and ICT within the railway industry. Our focus on research, development, and innovation (RD&I) enables us to create highly customized solutions tailored to meet the distinct needs of each customer. We are deeply committed to delivering the most effective solutions, ensuring our customers benefit from unparalleled efficiency and reliability.



Train Control and Management Systems (TCMS) & Energy Metering Systems (EMS) for electric rolling stock

KonHMI 101A
Human-Machine Interface

KonHMI 102A
Human-Machine Interface

KonHMI 103A
Human-Machine Interface

VCU
Vehicle Control Unit

KonEMS
Energy Metering System

Rail infrastructure

DC traction power supply systems

- Compact DC switchgear with integrated rectifier
- Nominal voltage of 750 V, nominal busbar current up to 4000 A
- Metal-enclosed withdrawable feeder 2600 A
- Twelve-pulse diode rectifier up to 3000 A

Signalling and safety systems

- Level crossing protection and signalling devices
  - Electronic level crossing device KLC3
  - Safety human-to-machine interface
  - SafeHMI and safety input-output devices – SafeI/O
  - Electrohydraulic drive for half-barriers
- Power supply for safety and signalling devices
- Track circuits for control of insulated and short section occupancy

Safety human-to-machine interface

Hydraulic half-barrier

KLC3 – KONČAR Level Crossing 3rd generation

Electric traction

- Electric traction substations
- Sectioning stations
- Rectifier stations
- Reactive power compensation plants
- Local and remote control
- Coach pre-heating devices

Contact network equipment

Dalekovod specializes in providing comprehensive solutions for the design, construction, manufacturing, and installation of contact network equipment, supporting:

- **Electrification of new railway lines**
- **Replacement equipment during maintenance of existing contact networks**

Our contact network equipment is meticulously engineered to meet the rigorous standards and recommendations set by leading European countries, ensuring top-tier compliance and performance.

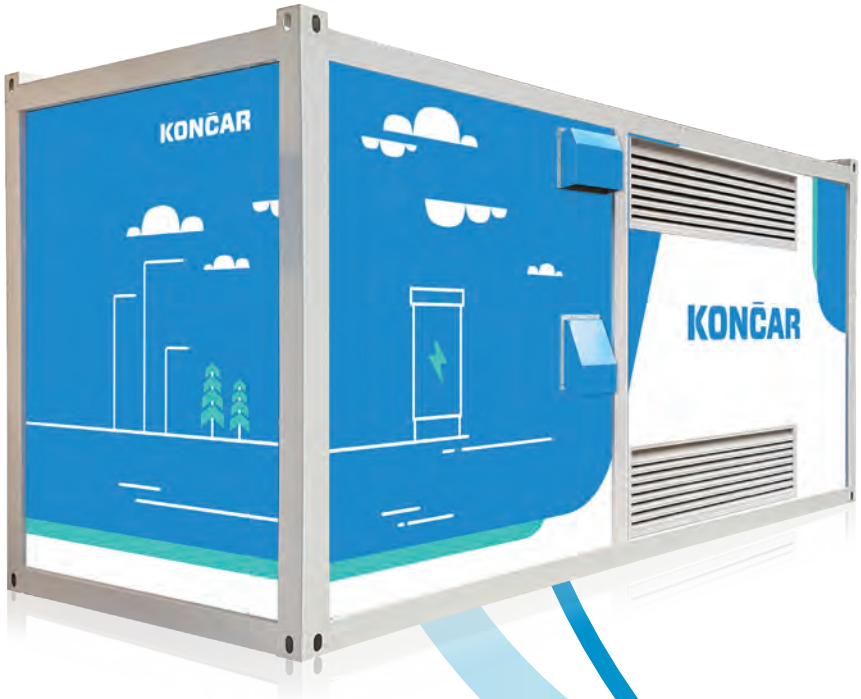
Dalekovod has also developed specialized contact network equipment specifically for the electrification of railway lines operating on single-phase 25 kV 50 Hz systems, addressing the unique demands of modern rail infrastructure.

DALEKOVOD
KONČAR GROUP MEMBER

Railway infrastructure construction

- Overhead catenary system
- Load bearing steel structures
- Railroad and railway station lighting
- Noise protection barriers
- Cable laying and relocation

Battery charger for batteries onboard rail vehicles



The *KonCharge 1000* battery charger is a power converter specifically designed for charging batteries onboard rail vehicles, including both full battery and hybrid powertrain systems. It operates with an input voltage of 10(20) kV and is capable of parallel charging two batteries, each with a power rating of up to 500 kW.

The system consists of two distinct elements: a container housing the equipment required for energy conversion and a connection cabinet (Satellite) featuring a user interface, necessary safety features and connection cables for linking to the rail vehicle battery system. The location is outside of the rail corridor, while the connection cabinet is positioned within it.

Battery Multiple Unit
(BMU)

Designed for passenger transport on non-electrified railway lines, using onboard propulsion batteries charged exclusively through stable energy connections.

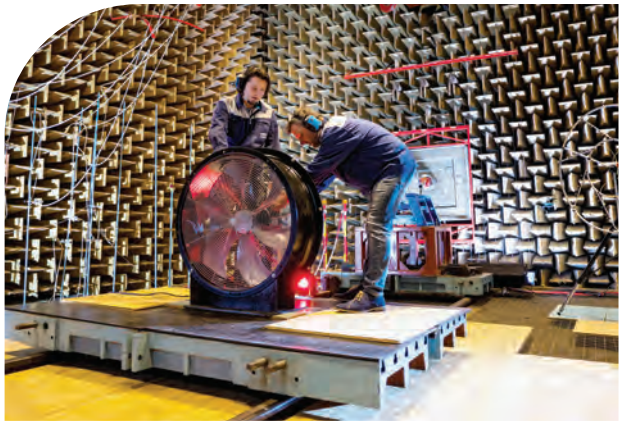
These environmentally friendly trains are quieter and more efficient, suitable for diverse routes, with autonomy based on battery capacity and speed.

Alongside their environmental benefits, our battery trains can lower maintenance and operational costs. With cutting-edge technology and efficiency, these trains embody the future of sustainable rail transport.

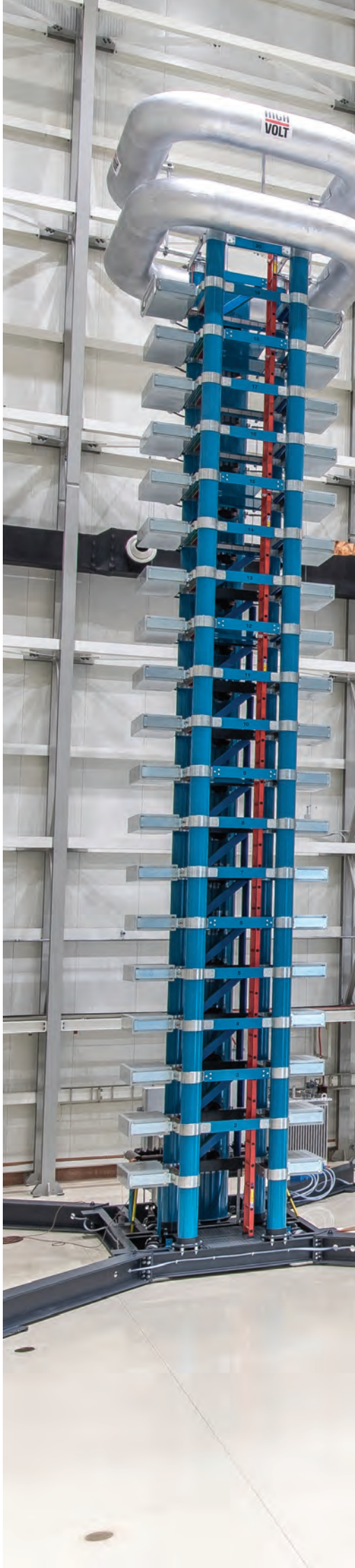
Laboratory Center

The Laboratory Center consists of eight laboratories equipped and trained to carry out over 750 testing and calibration methods in accordance with requirements of international standards and technical specifications.

- Accredited in accordance with requirements of standard EN ISO/IEC 17025
- Established to help tackle global market demands
- Its operation is based on 60 years of experience, expertise, quality and efficiency
- Modern testing and metering equipment



Noise and vibration laboratory



Laboratory offers services in the following areas:

- High, medium and low-voltage power equipment
- Material properties (physical, chemical, electrical, magnetic)
- Environmental impact
- Electromagnetic compatibility
- Electrical safety
- Radio equipment
- Electromagnetic field sources
- Low-voltage electrical installations and lightning protection systems
- Acoustics (noise)
- Calibration of measuring and test equipment

Laboratory for Power Systems and Drives

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WORLD ENGINEERING DAY FOR SUSTAINABLE DEVELOPMENT

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