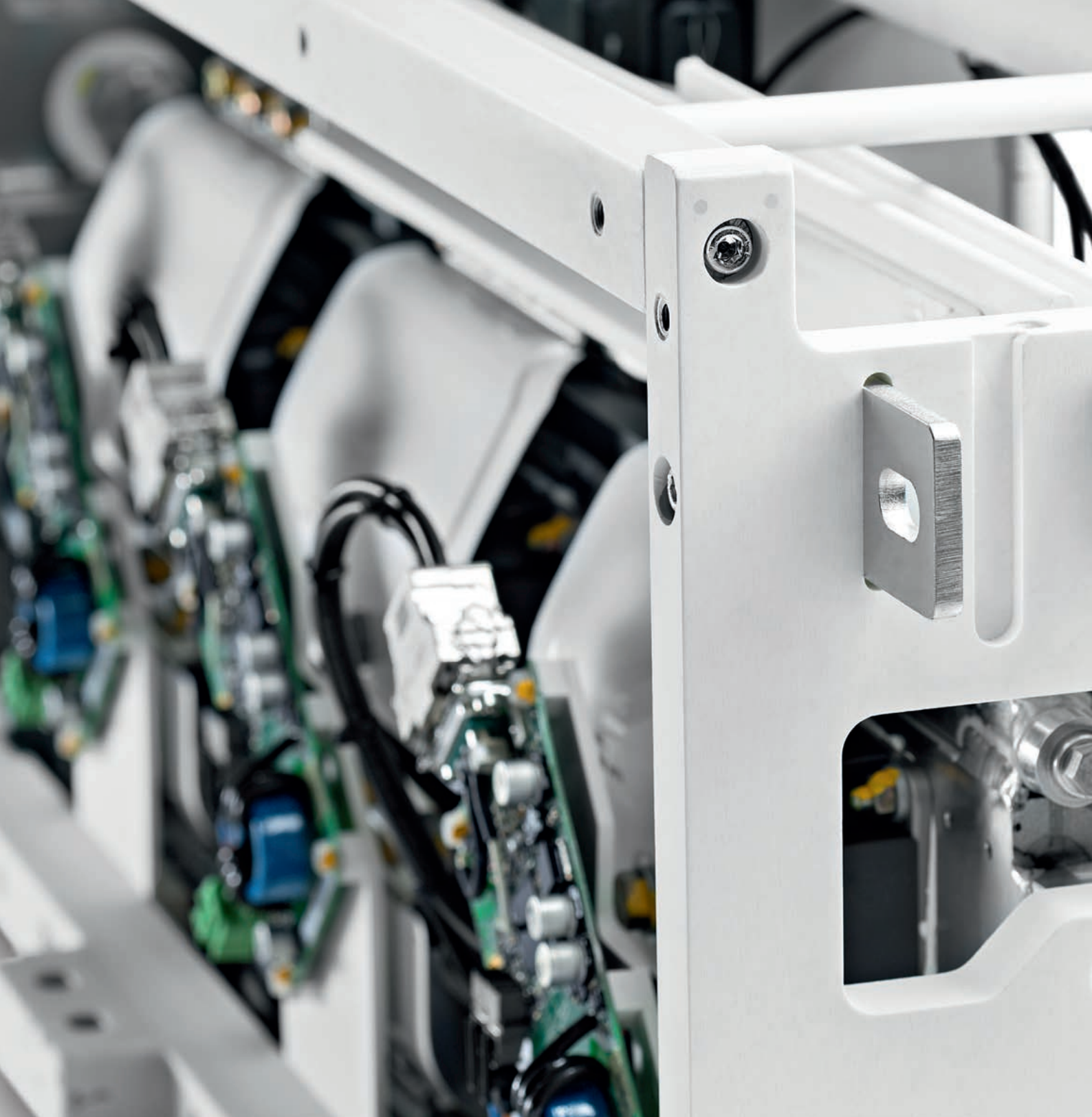


Versatile and Powerful
Power Electronics by Liebherr



LIEBHERR

Power electronics

Liebherr develops and manufactures power electronics for a wide range of applications. All of the research and development activities, as well as the entire production, take place at production facilities in Germany.



Quality from Liebherr “Made in Germany”

State-of-the-art development and calculation methods

The function and reliability of the components is assured through holistic appraisal and examination of the individual components and the entire system with state-of-the-art calculation and simulation programs as well as the use of hardware-in-the-loop systems.

Extensive individual tests

After intensive quality assessments and function checks of the subassemblies, the ready-mounted components are subjected to further function tests and safety inspections, such as insulation checks and high voltage tests.

Broad product spectrum

The performance portfolio comprises rectifier units, DC/DC converters, brake choppers, high-power inverter units, as well as complete frequency converter systems for mobile applications in the off-highway and maritime sector, as well as industrial applications. Energy storage units and Active-Front-End units (AFE), offered by Liebherr up to 4.5 MW, have proven their worth in many applications in the reduction of energy consumption and overall operating costs (total cost of ownership).

Maximum serviceability

Already during the development stage attention is paid to ensure that the individual components are easily accessible in order to facilitate servicing. Moreover, integrated finely subdivided self-diagnosis functions identify faults at an early stage and, in this way, keep downtimes to a minimum.

Long service life and reliability

The power electronics from Liebherr were designed to cope with the most diverse operating conditions such as vibration, dust and extreme temperatures and are therefore distinguished by long service life and a high level of availability.

Overview of application areas

- Mining equipment
- Maritime applications
- Construction machines
- Conveying and lifting technology

Frequency converter system

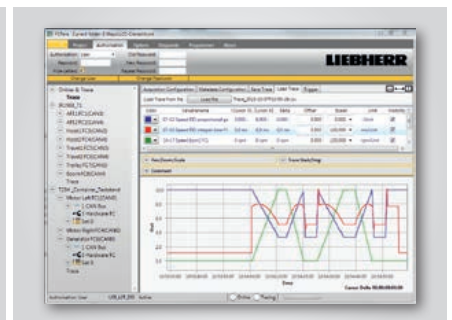
- Flexible owing to modular design
- Mobile and stationary application

Power modules

- Highest level of reliability and performance
- Easy installation

Software

- Intuitive engineering tool for management, configuration and parametrisation
- Distinctive diagnostics function



Frequency converter systems

Reliability and efficiency are just two of the characteristics which are typical of Liebherr frequency converters. Other highlights include the compact design, easy accessibility of the assemblies, as well as the comprehensive diagnostic capability of the complete system.



High performance and modularity

High flexibility

Whether it is a cabinet unit, a compact device or a special design, Liebherr frequency converter systems are based on a modular platform. Due to the high power density and compactness of the systems, they are ideally suited for installation in restricted spaces.

Developed by the user for the user

Liebherr is not just a manufacturer of frequency converter systems, Liebherr is also a user. Already during the development stage attention is paid to ensure that the integration in systems and machines is possible very easily. This includes, for example, the accessibility of the cable connections, intuitive parametrisation, as well as simple commissioning.

Modular configuration

The cabinet systems have a modular design and can be configured according to requirements. The platform of this concept is based on standard individual components, which are all developed and produced by Liebherr. This includes control units, power modules, connection units and optional functional modules. Due to that the requirements of a frequency converter system for diverse applications can be easily satisfied.

Easy servicing

All individual components are easy to access and can be replaced if needed. The downtimes are therefore reduced to a minimum.

High efficiency and economy

With the use of a common DC link, as well as a common liquid cooling circuit, the efficiency and therefore the economy are increased. Regenerative energy from a drive can be used by other drive units, or returned to the supply network.

Overview of features

- Compact and modular design
- High power density
- Single or multi-axis system
- Drive or recovery unit
- Highest level of reliability and performance
- Simple assembly and commissioning

Special medium-voltage converter

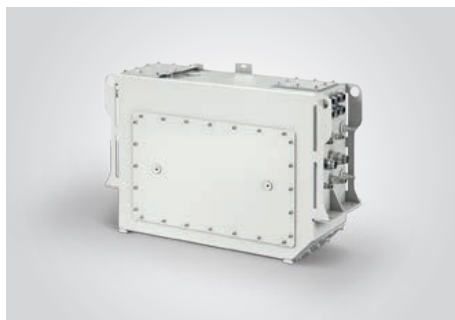
- Extreme overload use
- Application-specific housing

Mobile frequency converter system

- For the toughest of environmental conditions
- Easy serviceability

Cabinet converter system

- Highest level of reliability and performance
- Simple assembly



Frequency converter system

Modular concept

Control unit

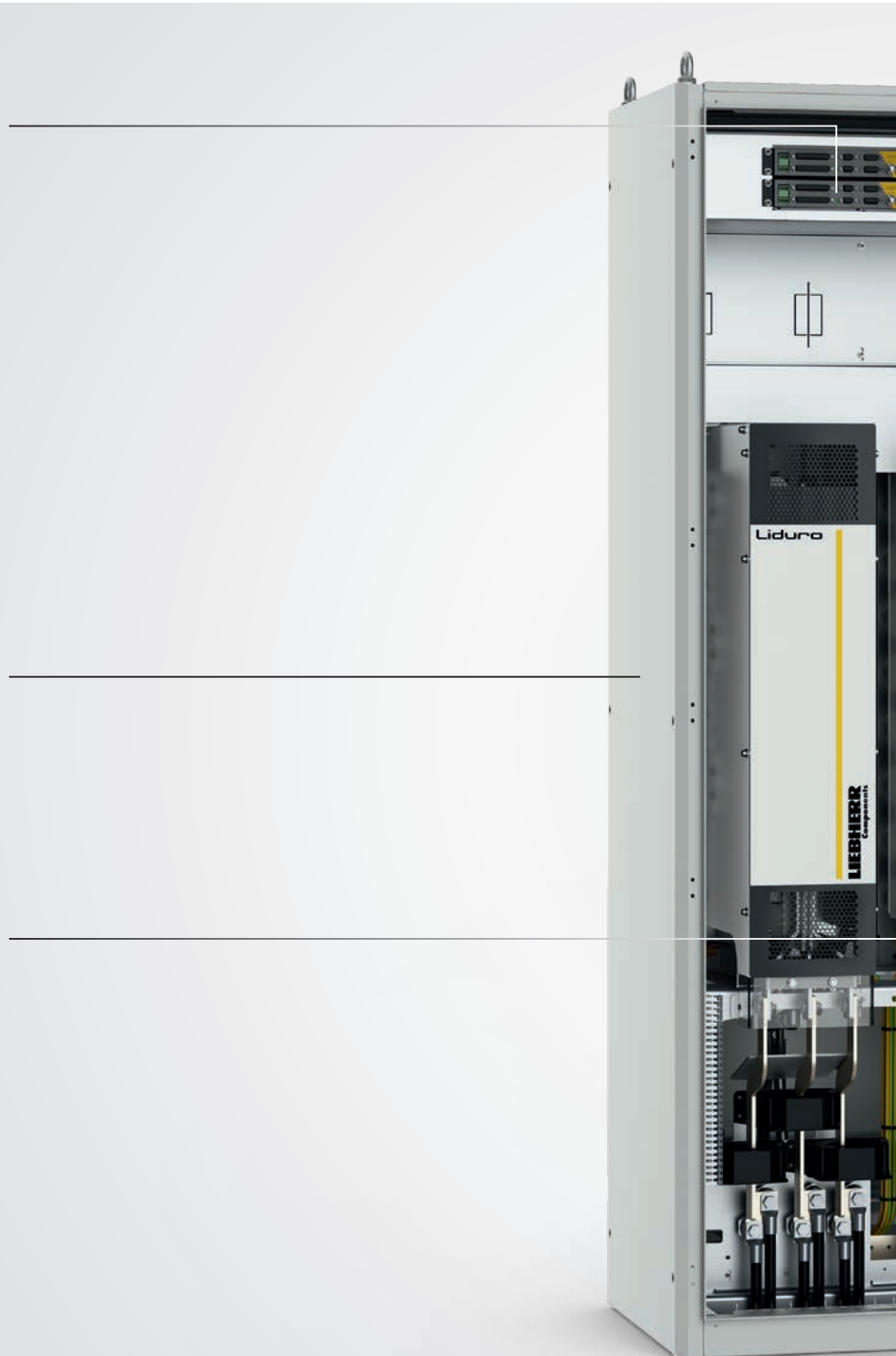
- Single/Multi-axis operation
- Motor/Active front-end control
- Communication: CANopen; Profinet; Ethercat
- Optional programming interface IEC61131-3
- E/A interfaces
- Firmware and parameter update possible by using a USB stick
- Fast Trace with Pre-Trigger function and trigger up to controller frequency

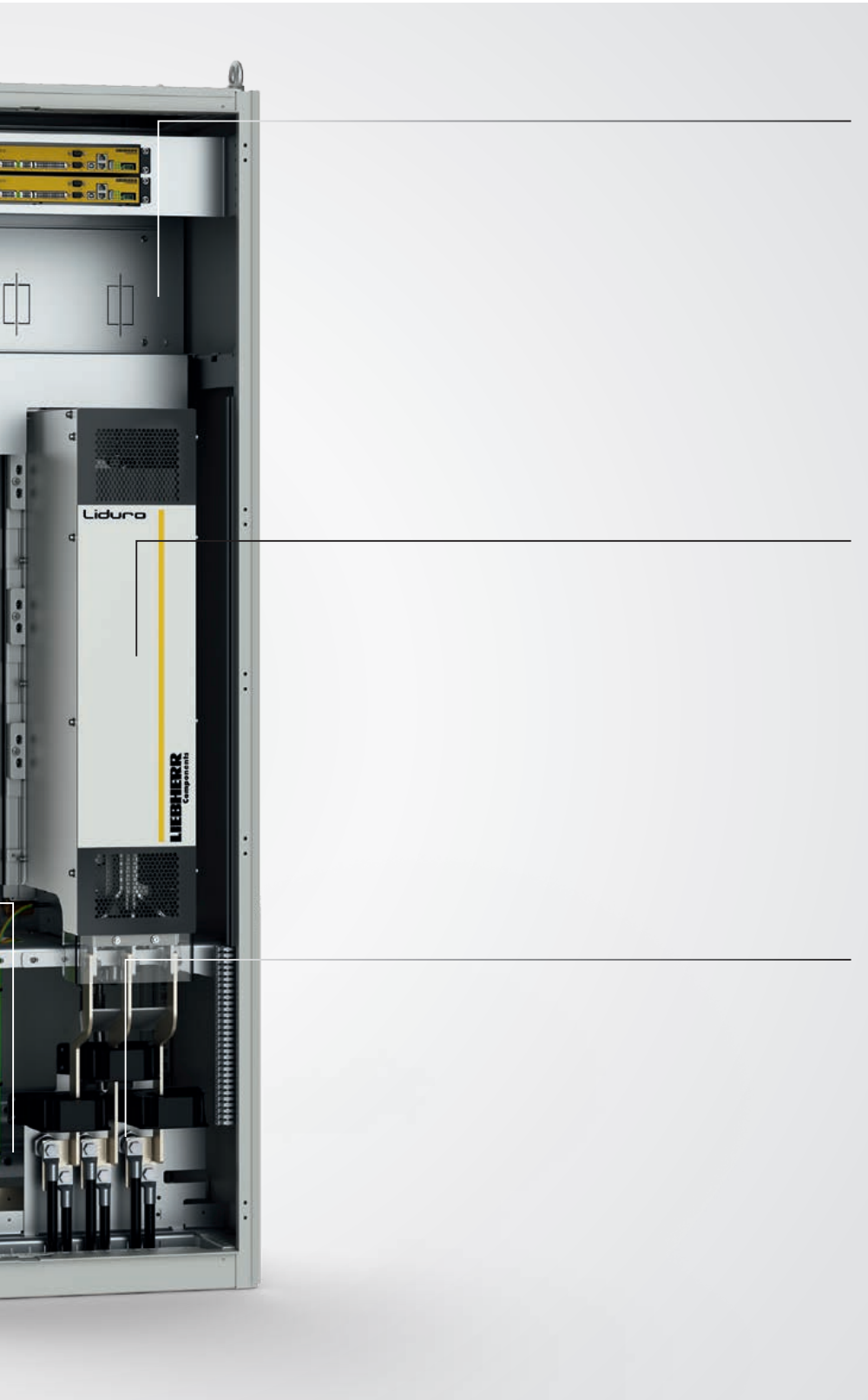
Housing

- Standard dimensions

Cooling system

- Continuous liquid cooling
- Direct connection of all power modules
- Monitoring of flow and temperature





Protection

- Device protection with DC bus fuses for the power modules
- Cabinet protection class IP54

Power modules

- From 110 kW to 1,000 kW
- High power density
- Compact design
- Inverter, chopper, rectifier units
- Performance increase due to parallel connection

Connection unit

- Easy accessibility to cable connections
- Sensor technology

Power modules

Liduro stands for durable and robust power electronics from Liebherr, designed for use in the toughest conditions.



Durable and robust

Power modules from Liebherr are distinguished by their compact design and are easy to maintain. The modules have a high flexibility and are suitable for use under the harshest environment and application conditions due to their high overload capacity. An installation can be effected in cabinets, and in application-specific housings.

**Compact inverter unit
Low voltage**



**Inverter unit
Low voltage**



**Inverter unit
Medium voltage**



Voltage class	V	380 – 500, 500 – 690	380 – 500, 500 – 690	1,550
Power range	kW	110/160/200/250/315	500/710/1,000	1,650
Output frequency	Hz	0 – 150	0 – 150	0 – 150
Cooling		Liquid	Liquid	Liquid
Temperature range	°C	-20 up to +50	-20 up to +50	-40 up to +60
Weight	kg	35	50	50
Dimensions (H x W x D)	mm	765 x 150 x 410	950 x 260 x 370	990 x 260 x 390
Protection class		IP21	IP21	IP21
Installation		Cabinet and wall mounting	Cabinet mounting	Cabinet mounting

Software tool - OPAL

The Liebherr commissioning and diagnosis software is intuitive applicable, thus relieving the strain on the user in his day-to-day work with our power electronics. It stands for Observation, Parametrization, Analysis by Liebherr - in short OPAL.



Diverse and intuitive

All-In-One

OPAL offers an all-in-one software solution for the commissioning and diagnosis of power electronics from Liebherr. This includes all functions and features, which are required for a simple and quick configuration and monitoring and to help to reduce project engineering times and downtimes.

Project management and planning

The software supports the user in the creation of his project. Various functional units such as a frequency converter or active front-end units can be compiled and managed within a project. Each unit can be individually parametrised. There are predefined selections available for this purpose. Parameters can be edited offline and online. Entire parameter sets can be easily copied using Copy & Paste. A comparison function can verify selected parameter sets and assume individual parameters if desired.

Monitoring and diagnosis

All process data can be logged using a trace function and stored as an image or a file. Not only the data which is currently visible on the window is stored, but also all the data from the beginning of the recording. Longer processes can therefore be checked in detail. There is also an automatic data logger function. As soon as OPAL is started, the logging of selected process data starts. This data is stored in a separate file.

Intuitive and secure

The user interface has a clear and structured design, whereby an intuitive and project-oriented operation is guaranteed. The projects can be protected against unauthorised access by different access rights. Three user levels are available.

Universal communication

The communication is effected via USB, Ethernet or via Ethercat, Profinet field bus tunnel.

Project management

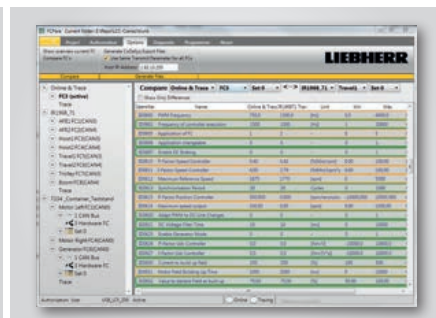
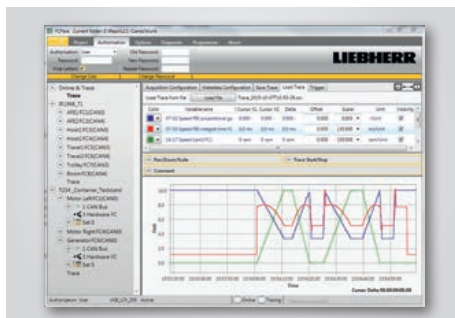
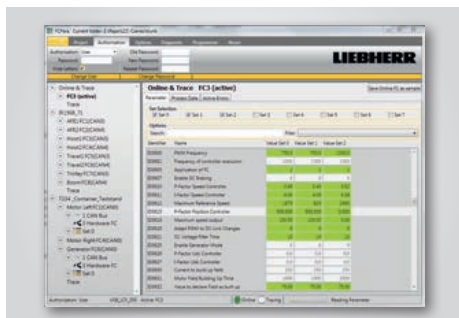
- Management of several functional units in one project
- Access online and offline

Diagnosis

- Multi-FC trace functions
- Simultaneous logging of process data from various functional units

Configuration

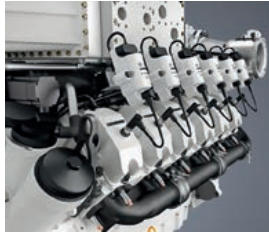
- Clear configuration and parametrisation
- Up to 8 parameter sets per unit
- All process parameters can be changed online



Liebherr Components



Diesel engines



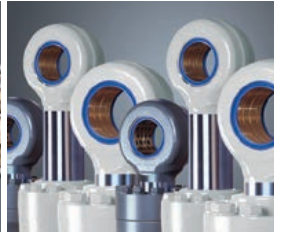
Gas engines



Fuel injection systems



Axial piston hydraulics



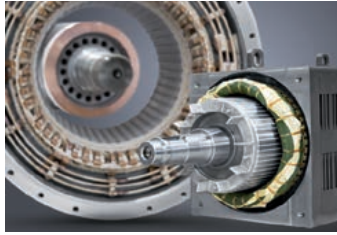
Hydraulic cylinders



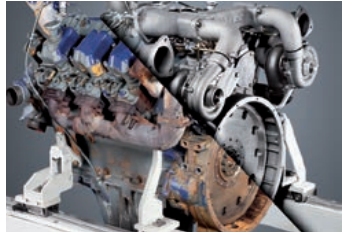
Large diameter bearings



Gearboxes and winches



Electric machines



Remanufacturing



Display and operation units



Control and regulation electronics



Power electronics



Switchgear



Software

From A to Z, the components division of the Liebherr Group offers a broad spectrum of solutions in the area of mechanical, hydraulic, electric and electronic drive system and control technology. The efficient components and systems are produced at a total of nine production sites around the world to the highest standards of quality. Central contact persons for all product lines are available

to customers outside the Liebherr Group at Liebherr-Components AG and the regional sales and distribution branches.

Liebherr is your partner for joint success: from the product idea to development, manufacture and commissioning right through to series production and remanufacturing.

www.liebherr.com