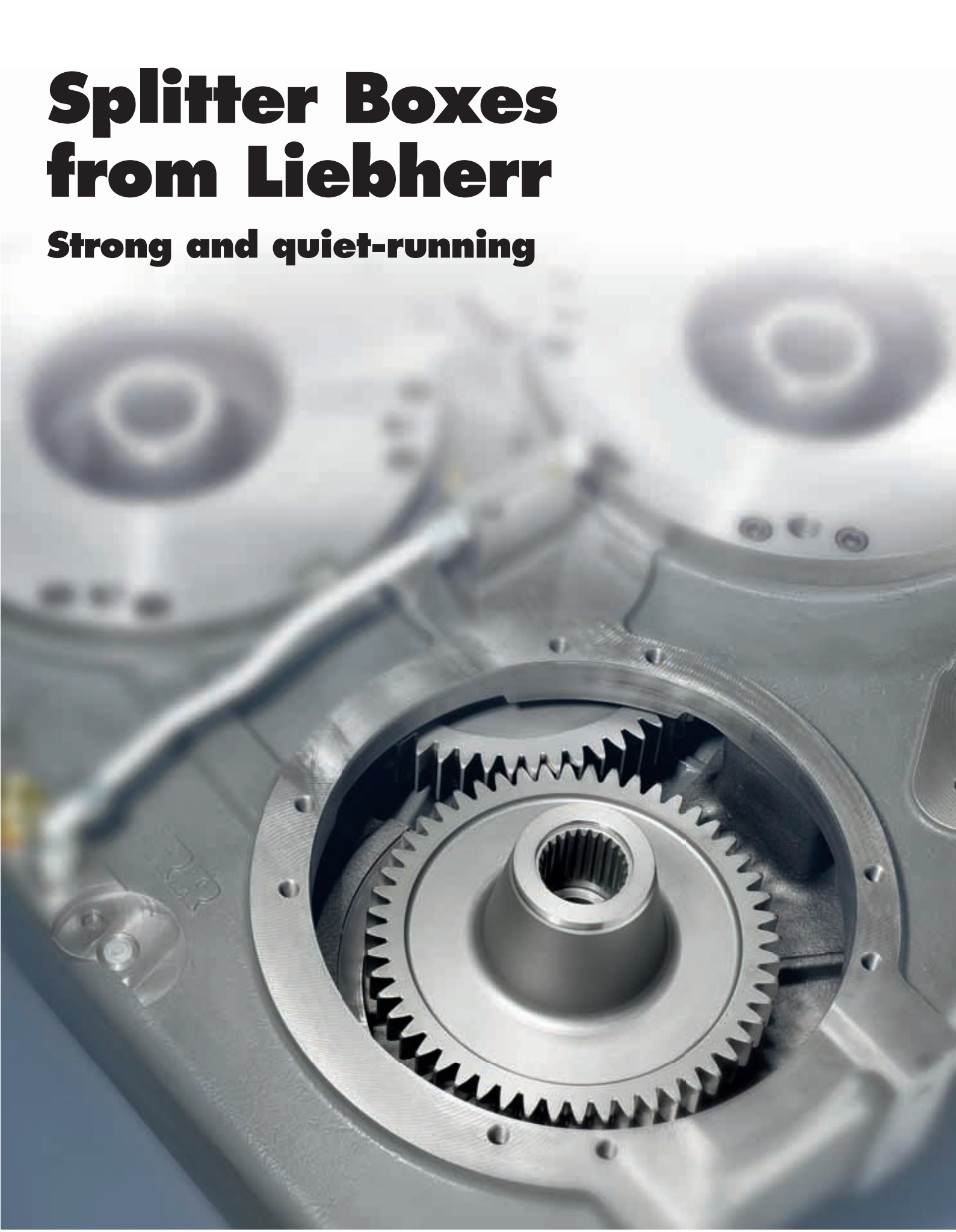
Splitter Boxes from Liebherr

Strong and quiet-running



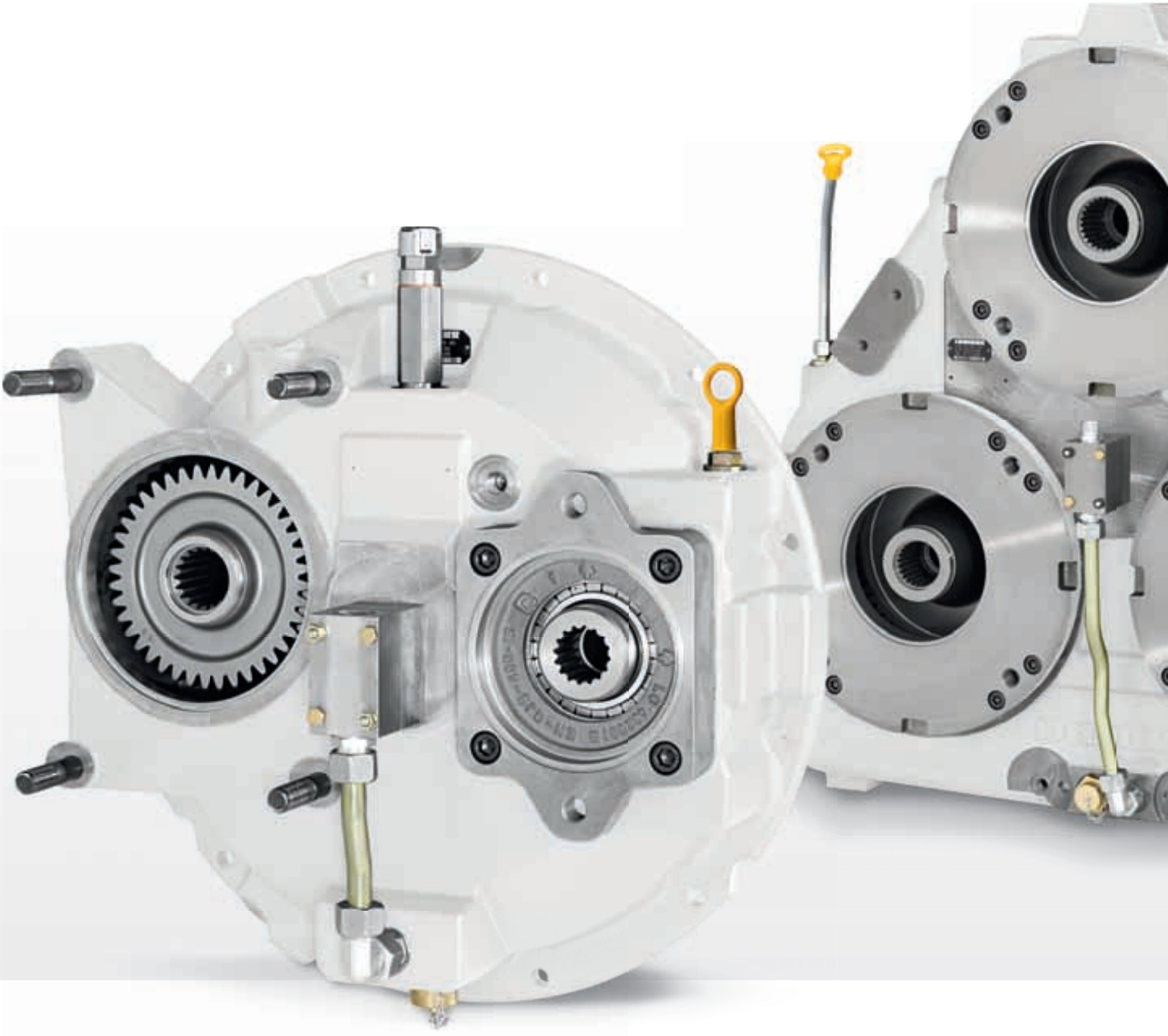
LIEBHERR

Long operating life

Liebherr multi-output pump transmissions are designed and built for tough operating conditions in construction machinery, and are notable for their long, trouble-free operating life.

Low noise

Special measures are taken at the design stage to reduce the noise emission. This contribute to compliance with the valid noise emission regulation for the machine. They include special gear tooth patterns and the use of noise-absorbing grey cast iron for the pump housings.



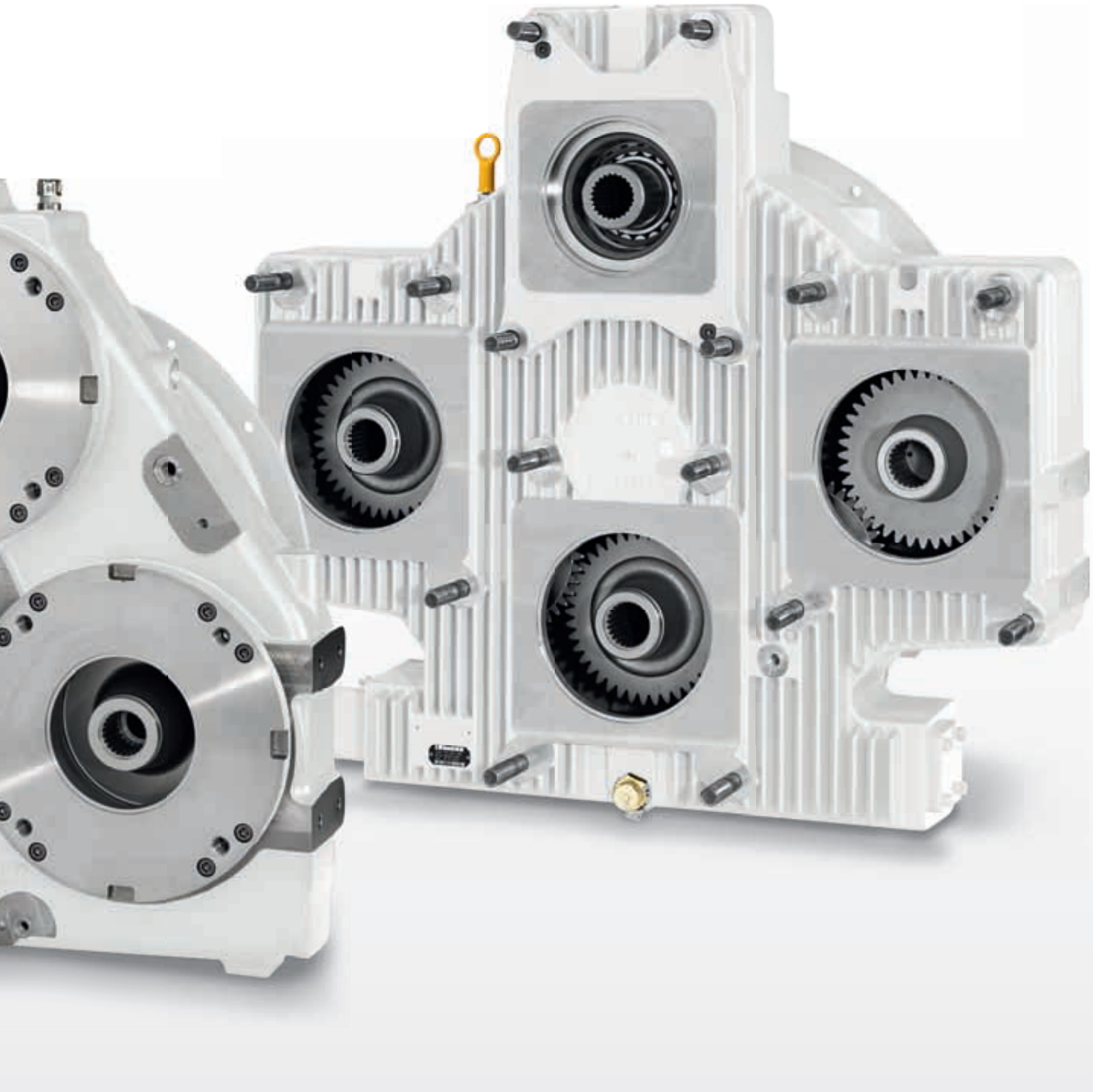
Optimised efficiency

Liebherr multi-output pump transmissions cover a performance range up to 750 kW. Reinforcement of critical components, low splash losses and close manufacturing tolerances ensure long working life and optimum efficiency levels.

System know-how

Like no other supplier to this market, Liebherr's unique system know-how permits diesel engines, pump transmissions and hydraulic motors to be matched together effectively.

Complete system solutions with precisely matched components are developed in close cooperation with the customer.



FEM computer model

Modern computing methods supply extremely precise simulation results and permit very close networking of the complex geometries in multi-output pump transmissions.

Long operating life

Liebherr multi-output pump transmissions are designed and rated for long life despite the tough operating conditions encountered, for example, in construction machinery.

Design ratings

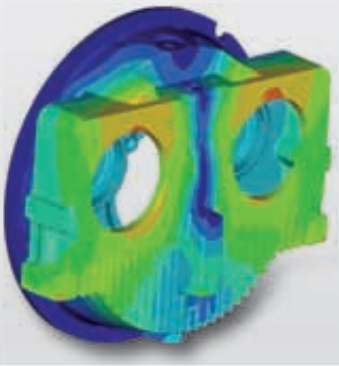
Optimal component dimension is the outcome of many years of experience and guarantees exceptional working life.

Cooling and lubrication

Liebherr multi-output pump transmissions feature a specially matched sealing concept and have a forced lubrification. For exceptionally arduous work situations, the transmission can be additionally cooled.

Rigidity

FEM analyses and systematic design revision have made the pump transmission housings extremely rigid with an absolute minimum of deformation. This has created ideal conditions for the bearings and gearwheels, and prolonged the working life of the entire transmission.



Deformation

Deformation is analysed for various load situations, and the geometry optimised.

Stress distribution under load

Multi-output pump transmissions are optimised by examining distortions and stresses.

Noise optimisation at the actual product

An acoustic camera takes measurements directly at the product.

Low noise

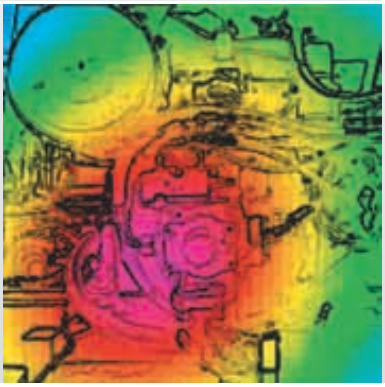
Design work in specific areas are made to reduce the noise. This contributes and ensures for the machine that valid noise emissions laws complied with. It includes the development of special gear tooth patterns and the use of noise-absorbing grey cast iron for transmission housings.

Simulations

All transmissions are analysed systematically with the very latest simulation tools.
FEM analyses, reductions in mechanical stress and greatly reduced noise emissions earn Liebherr multi-output pump transmissions their state-of-the-art status.

Noise measurement

During the development phase, noise measurements are carried out on the test rig and at the final product, so that the pump transmissions can be vibro-acoustically optimised. This has a positive effect on noise emissions from the machinery to which the pump transmission is fitted.

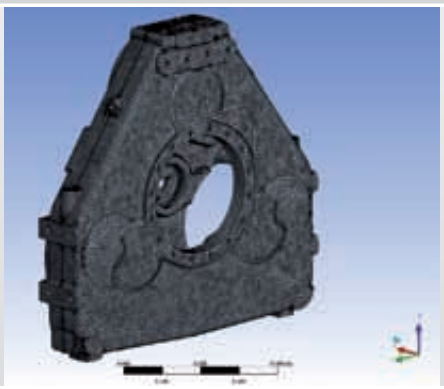


Noise image

Measured results from the acoustic camera before optimisation work.

Noise image

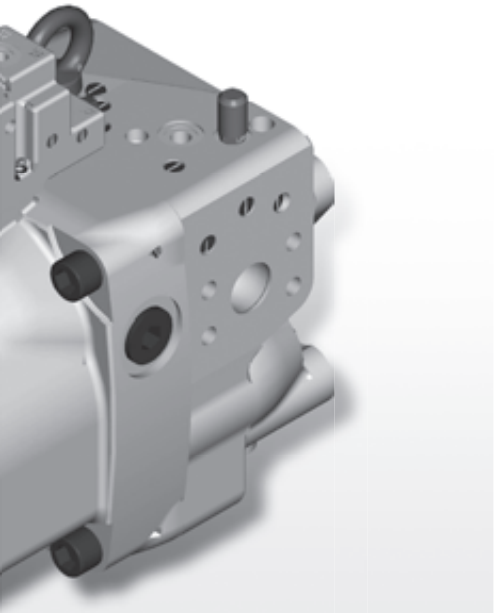
Measured results from the acoustic camera after optimisation work.



FEM dynamic analysis computing model

Modern simulation tools permit fine networking of complex geometries down to the smallest detail.

Optimised efficiency



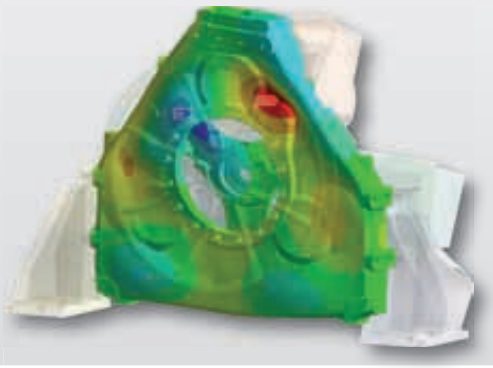
Liebherr multi-output pump transmissions cover a performance range up to 750 kW. Targeted reinforcement of critical components, low splash losses and close manufacturing tolerances ensure long working life and optimum efficiency levels.

Low friction losses

Specially computed gear tooth geometries and high rigidity minimise friction losses and ensure optimal operating conditions. High rigidity also distributes contact pressures uniformly among the gear teeth and avoids local overloading.

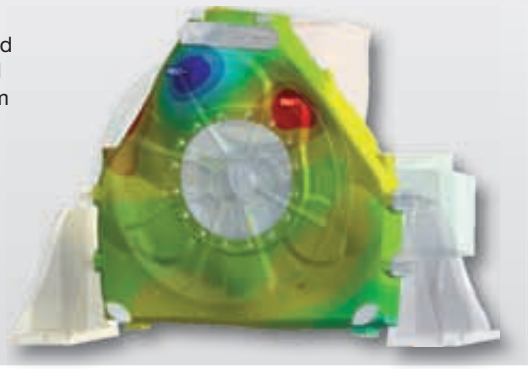
Bearing dimensions

Cumulative experience from actual operating practice is applied systematically to new designs. Every new application influences the chosen methods, the dimensions of the principal elements such as gearwheels and the choice of bearings and seals.



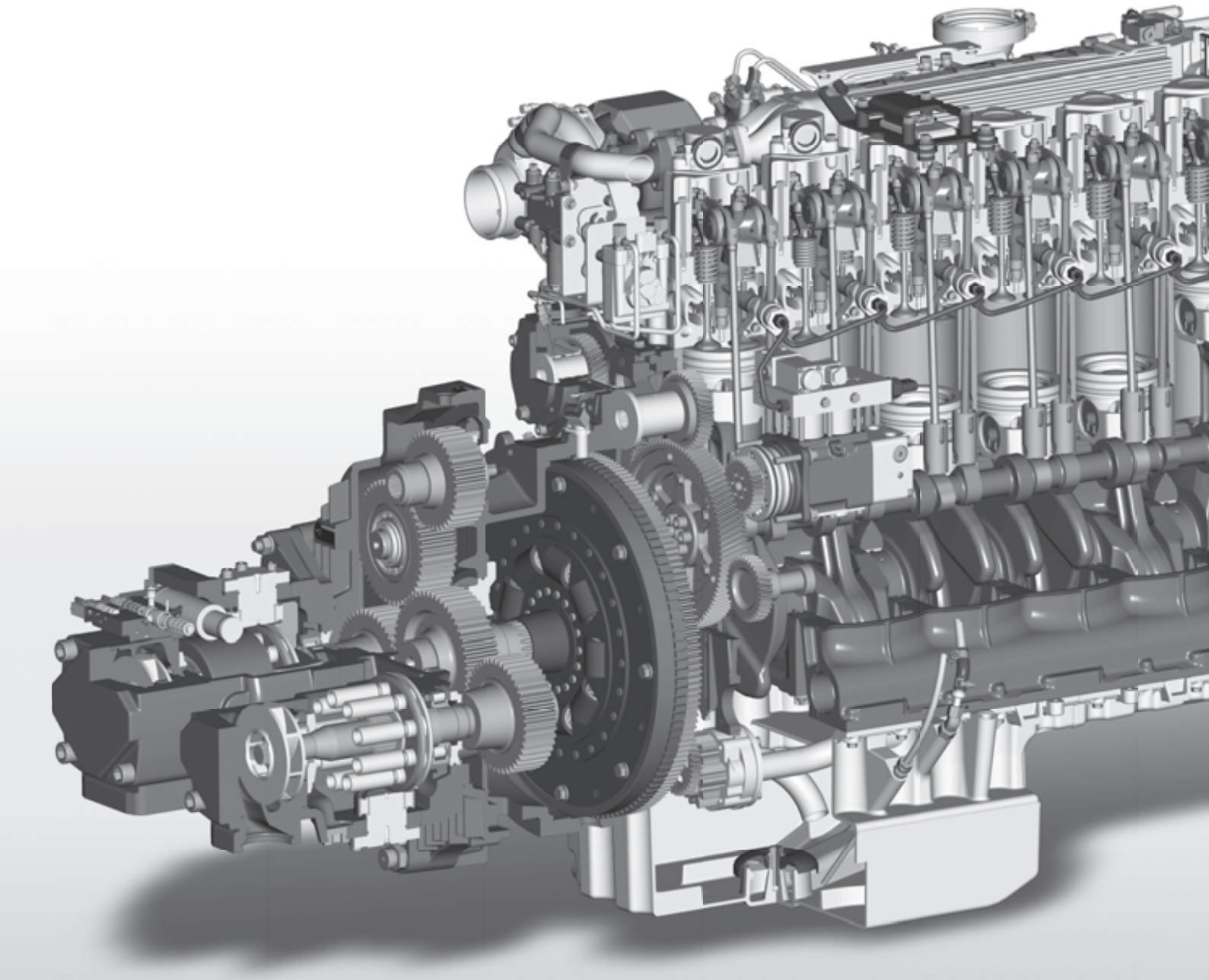
Deformation

Rigidity is optimised with the aid of FEM simulations, the aim being to keep friction and local contact pressures as low as possible.

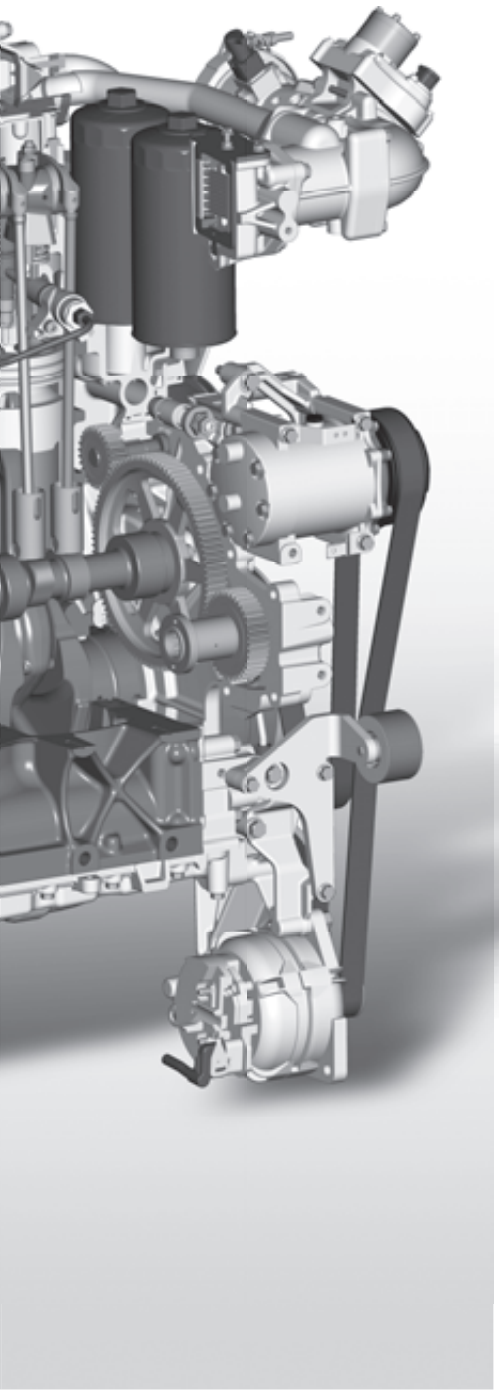


Deformation

Optimisation work takes place in various load situations, both mechanical and thermal.



System know-how



Liebherr's product range permits diesel engines, pump transmissions and hydraulic motors to be matched together in a unique way – truly extensive system know-how.
Complete system solutions using precisely matched components are developed in close cooperation with the customer.

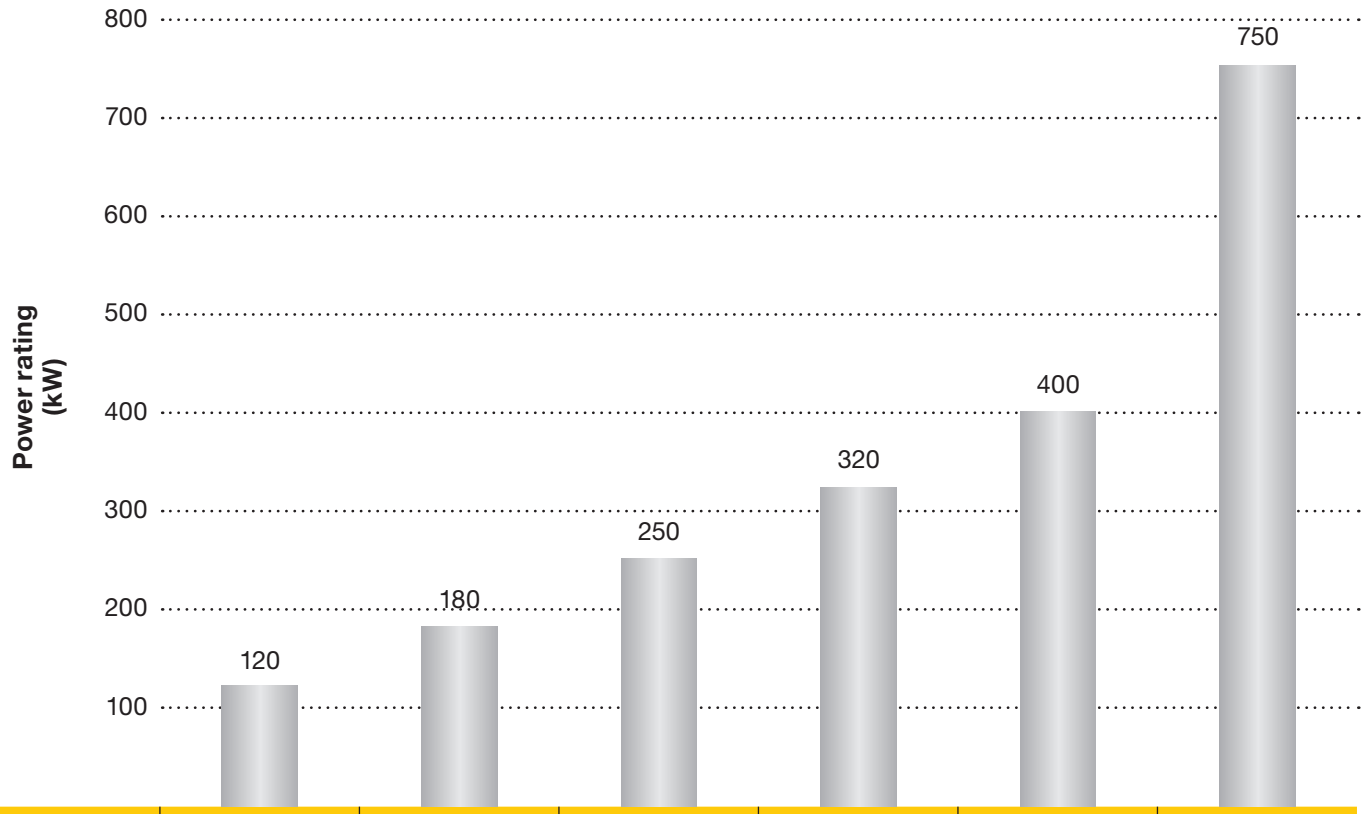
Many years of experience

Liebherr's unsurpassed awareness of actual operating conditions is the result of many years of practical experience and systematic research.

System integration

Liebherr multi-output pump transmissions are not only ideally matched to the size categories in which Liebherr's diesel engines are built, but also to Liebherr's hydraulic pumps. Thanks to the use of a modular principle, all components can be individually combined. Exact matching of installation dimensions and output ranges makes multi-circuit transmission and pump systems much more economical. A cast-on SAE flange allows the transmission to be attached directly to the diesel engine.

Overview of nominal module sizes



	m = 2	m = 2,5	m = 3	m = 3,5	m = 4	m = 4,5
2 outputs	•	•	•	•	•	–
3 outputs	•	•	•	•	•	•
4 outputs	–	–	•	•	•	•

• included
– not provided for

Gear ratios

$i = \frac{n0}{n1}$

n0 = input speed [min^{-1}] (diesel engine or electric motor)
n1 = output speed [min^{-1}] (pumps)

Technical data – pump transmissions

Installed position:
Oil drain plug at bottom.
Permissible angle during operation: 45°.

Start-up:
The housing must be horizontal for start-up and filled with oil up to the centre of the mark on the dipstick.

Pressure fluids:
For the choice of pressure fluids and operating conditions, please refer to the Liebherr “Lubricants and process materials” data sheets.

Operating viscosity range:
For optimal efficiency and operating life, we recommend choosing an operating viscosity range at regular operating temperature of: V_{opt} = optimal operating viscosity 30...60 mm^2/s, referred to circuit temperature.

Viscosity limits
In extreme conditions, comply with the following values:
V_{min} = 12 mm^2/s
(for short periods at a max. permitted temperature of t_{max}= 115°C.

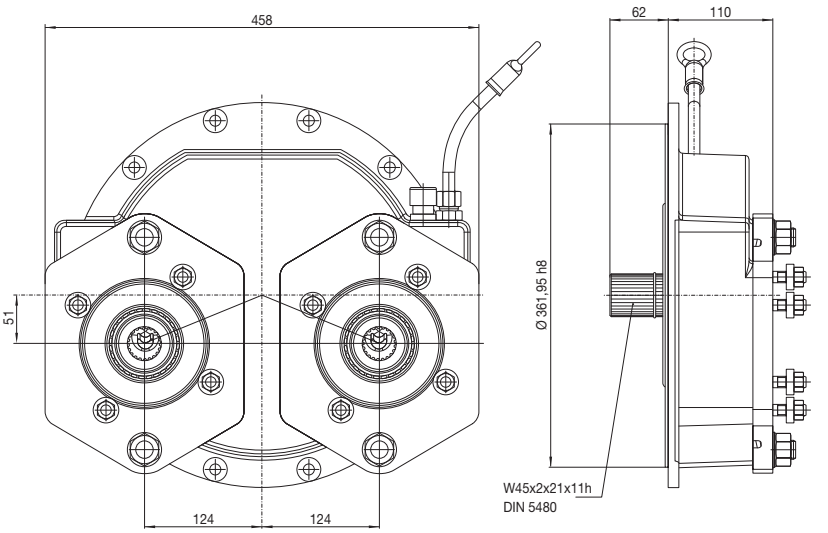
Make sure that the max. pressure fluid temperature of 85°C is not exceeded, even locally (e.g. at bearings).

At temperatures from –25°C to –40°C special measures have to be taken; please consult the manufacturer.

Pump transmissions with 2 outputs

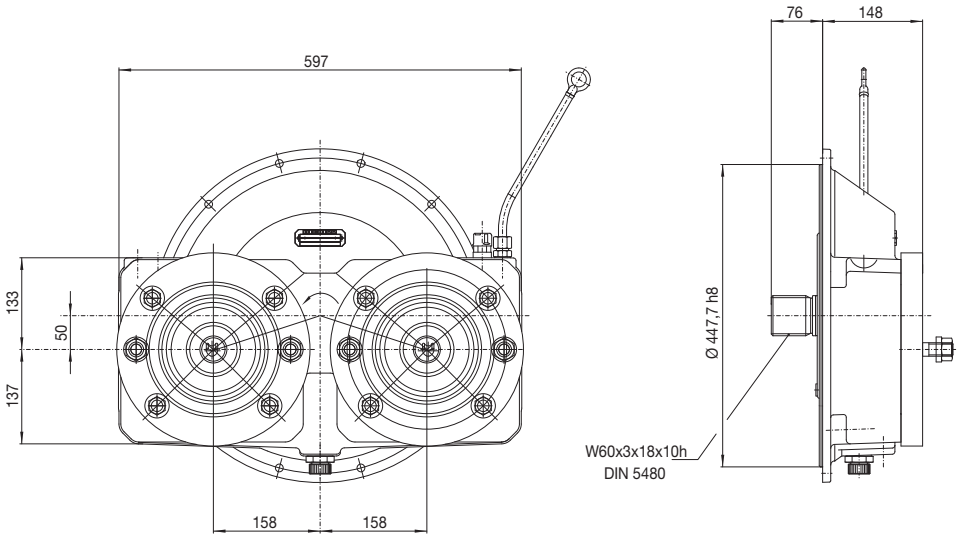
PVG 250 B

Module	2.5
Max. power rating	90 kW
Max input speed	2350 min^{-1}
Cooling	–
Weight	60 kg
Connecting flange	SAE 4
Gear ratio range	0,85 – 1,2



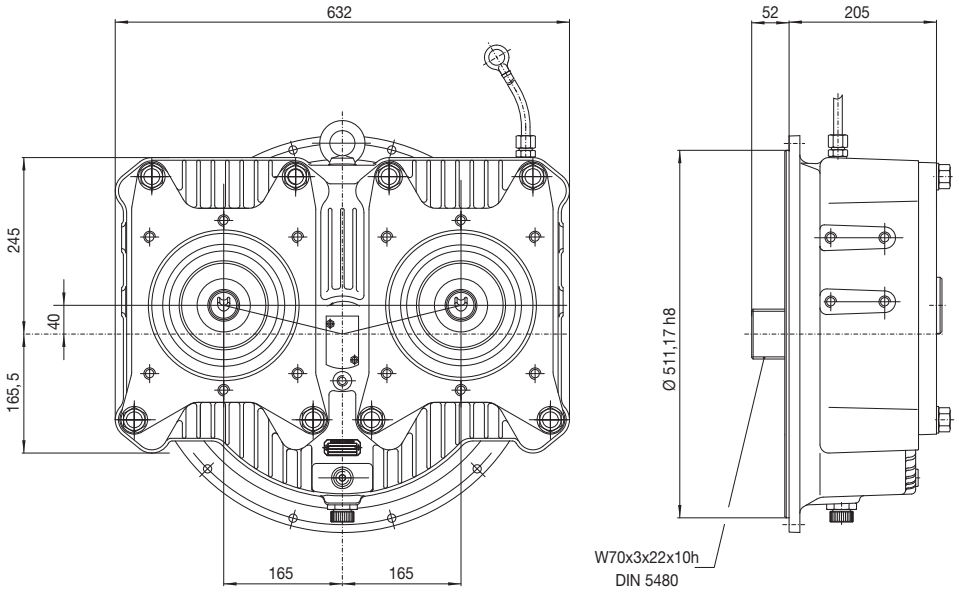
PVG 300 B

Module	3.0
Max. power rating	200 kW
Max input speed	2000 min^{-1}
Cooling	–
Weight	110 kg
Connecting flange	SAE 2
Gear ratio range	0,750 – 0,865



PVG 350 B

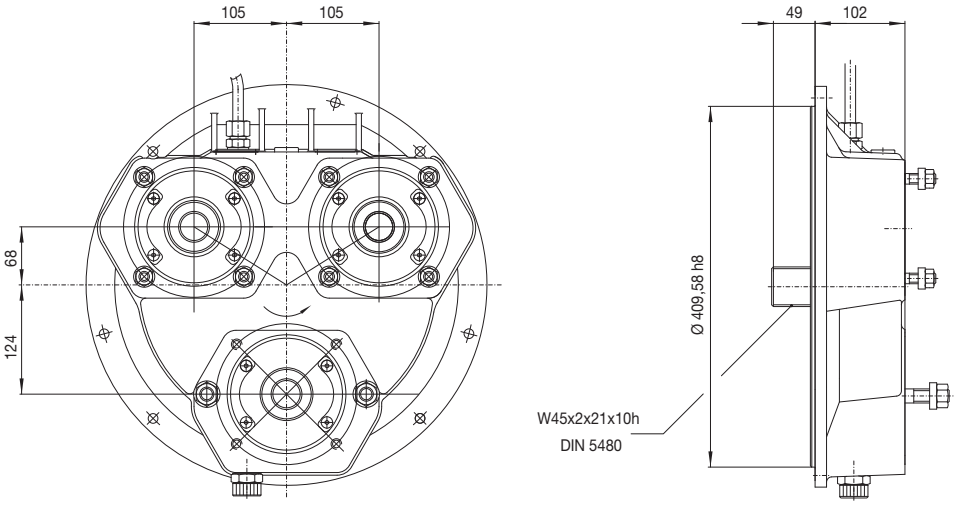
Module	3.5
Max. power rating	385 kW
Max input speed	2000 min^{-1}
Cooling	möglich
Weight	160 kg
Connecting flange	SAE 1
Gear ratio range	0,83 – 1,10



Pump transmissions with 3 outputs

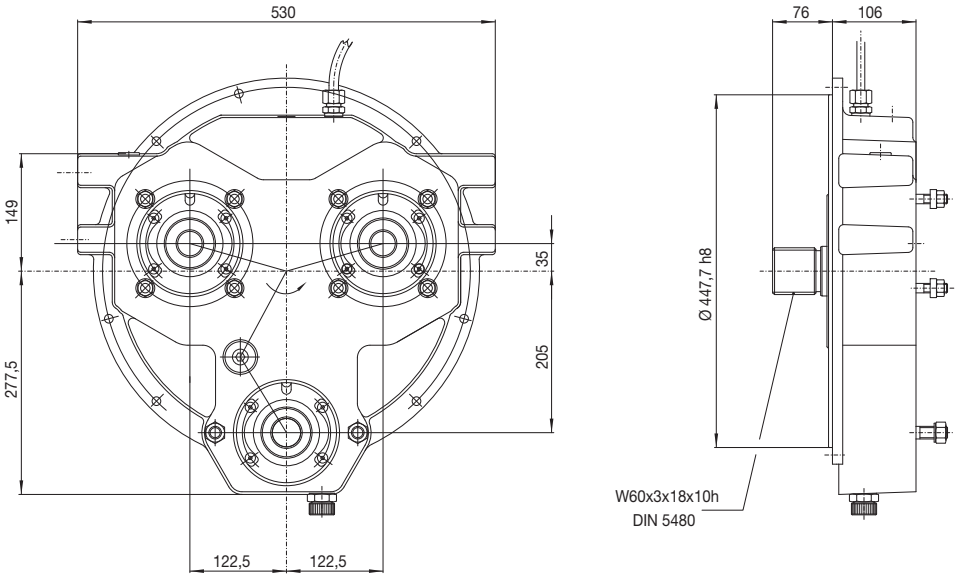
PVG 200 C

Module	2
Max. power rating	100 kW
Max input speed	2200 min^{-1}
Cooling	–
Weight	70 kg
Connecting flange	SAE 3
Gear ratio range	0,65 – 0,84



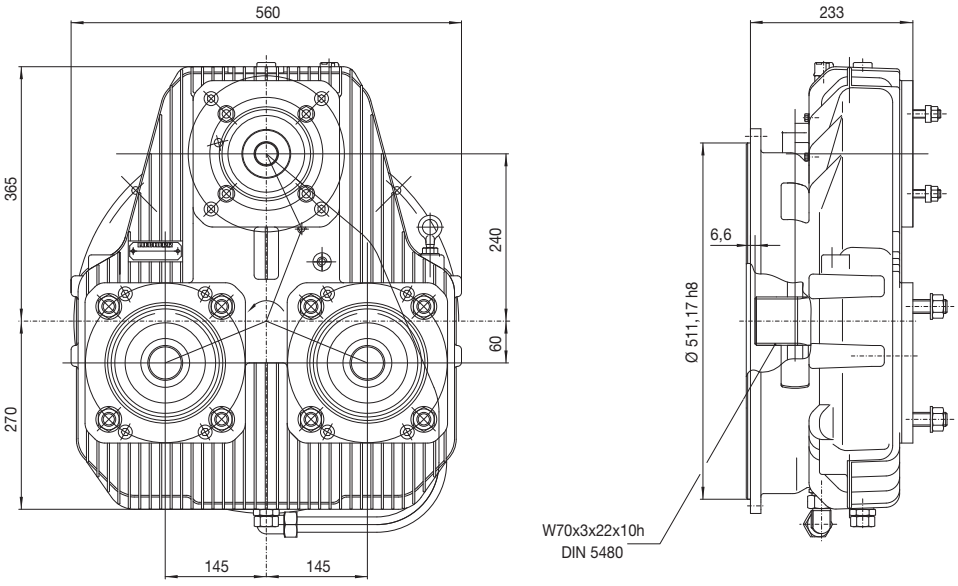
PVG 250 C

Module	2.5
Max. power rating	200 kW
Max input speed	2200 min^{-1}
Cooling	–
Weight	80 kg
Connecting flange	SAE 2
Gear ratio range	0,6 – 1,0



PVG 300 C

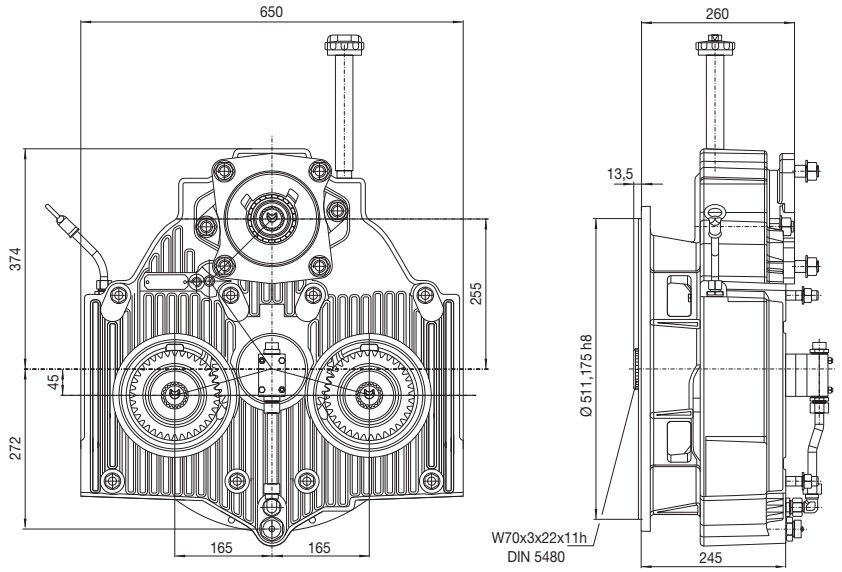
Module	3
Max. power rating	300 kW
Max input speed	1800 min^{-1}
Cooling	Ja
Weight	140 kg
Connecting flange	SAE 1
Gear ratio range	0,603 – 0,943



Pump transmissions with 2 and 3 outputs

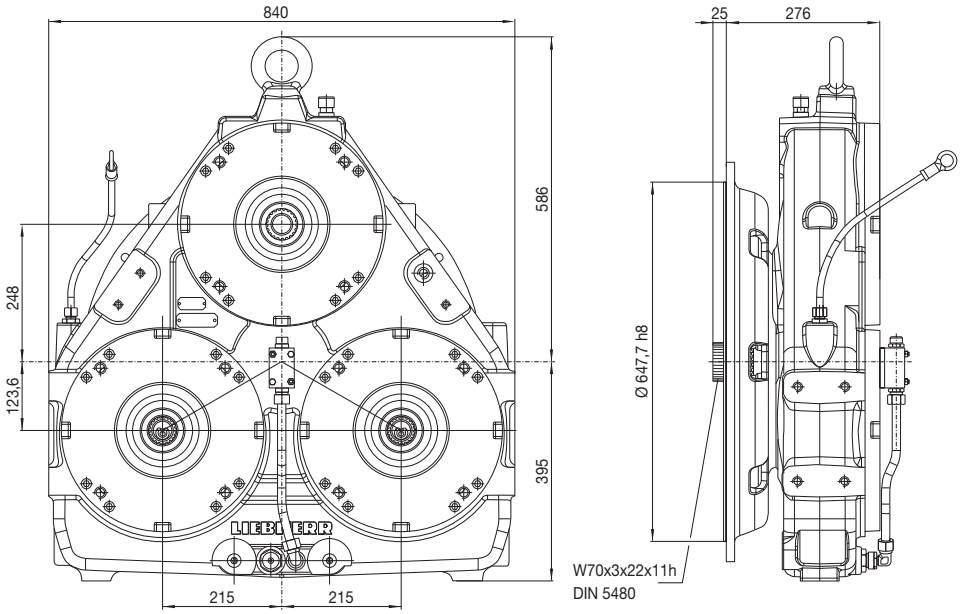
PVG 400 C

Module	4
Max. power rating	450 kW
Max input speed	1900 min^{-1}
Cooling	Ja
Weight	250 kg
Connecting flange	SAE 1
Gear ratio range	0,6 -> 1,1



PVG 450 C

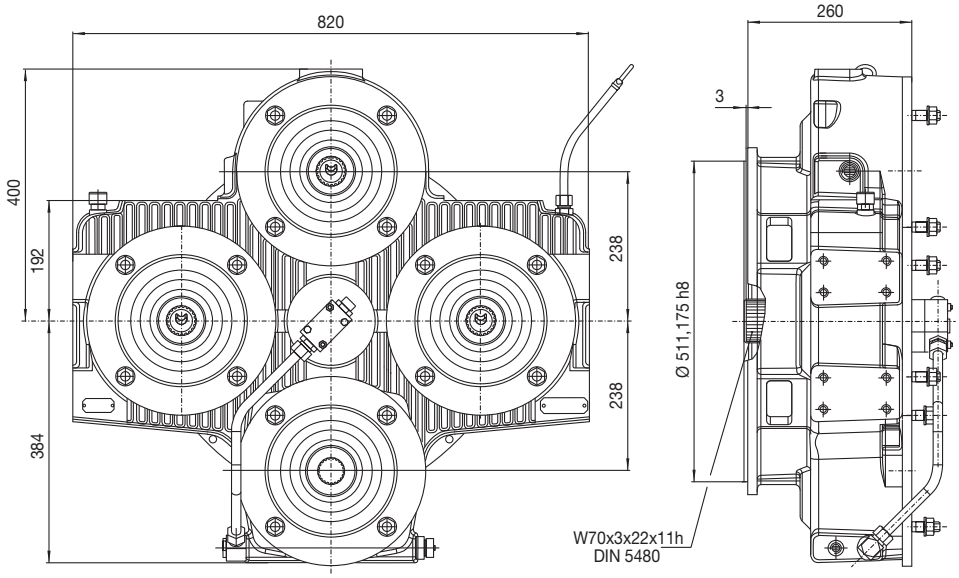
Module	4,5
Max. power rating	750 kW
Max input speed	1800 min^{-1}
Cooling	Ja
Weight	450 kg
Connecting flange	SAE 0
Gear ratio range	0,75 – 1,20



PVG 450 D

Module	4,5
Max. power rating	500 kW
Max input speed	2200 min^{-1}
Cooling	Ja
Weight	288 kg
Connecting flange	SAE 1
Gear ratio range	0,810

Other gear ratios and performance ratings are available on request.



Multi-circuit unit

MKA 450 D
Power rating 504 kW
3 axial pumps
250 cc/rev
1 axial pump
75 cc/rev

Hydraulic pumps and motors

The extensive programme of products for open and closed circuits covers a very large range of delivery volumes.

Drive assembly

AG936

270 kW (1500 - 1800 U/min)

1 multi-output pump transmission
2 open-circuit pumps
1 closed-circuit pump
1 low-pressure pump
1 gear-type pump

Pilot control units

Hand- and foot-operated hydraulic pilot control units



LIEBHERR
634

DHL

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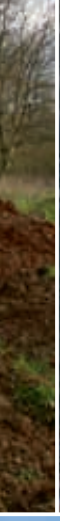




LIEBHERR TA 230



Liebherr-Component Technologies

Liebherr-Component Technologies AG, with headquarter in Bulle, Switzerland, is responsible for all activities involving the components sector within the Liebherr Group. The companies and corporate units belonging to this sector are specialized in the development, design, manufacture and reconditioning of high performance components in the field of mechanical, hydraulic, and electrical drive as well as control technology.

Long Years of Experience

Liebherr has decades of experience in the field of top quality components, for use in cranes, construction machinery, in the mining industry, maritime applications, wind turbines, automotive engineering, the aerospace sector, and in transport technology. Synergy effects from the other product sectors of the Liebherr Group of Companies are put to rational use in driving ahead with constant technological further development.

The Right Solution for Every Need

Thanks to the in-depth manufacturing techniques and the use of the most modern and flexible production resources, Liebherr can provide customers with tailor-made solutions. Every component is developed to meet individual wishes and requirements. Liebherr is your partner for achieving success together, from the product idea to development, manufacture, and taking into service, and right on up to series manufacture. For the mechanical and hydraulic drive train components Liebherr offers reconditioning in different stages from a specialised works.

System Solutions from One Source

Components from Liebherr are perfectly matched to one another in their functional performance, and in combination they achieve maximum total levels of effect and efficiency. Depending on the requirement, individual components from the broad product selection can be extended up to the complete drive train. This creates system solutions with real conviction, which can be integrated into a whole range of applications.

Quality and Cutting Edge Technologies

All components meet the highest demands for functional reliability and long service life, even under the toughest conditions. A refined quality management and extensive inspection and testing procedures are applied throughout the entire development and manufacturing process. So they ensure the reliability and long life of the components. Highly qualified staff with a real sense of responsibility plays their part in achieving the fine Liebherr quality standard.

www.liebherr.com

Biberach: large diameter bearings, gearboxes, control technology

Lindau: electronics

Kirchdorf: hydraulic cylinders

Bulle: diesel engines, splitter boxes, hydraulics

Ettlingen: exchange components

Monterrey: large diameter bearings

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