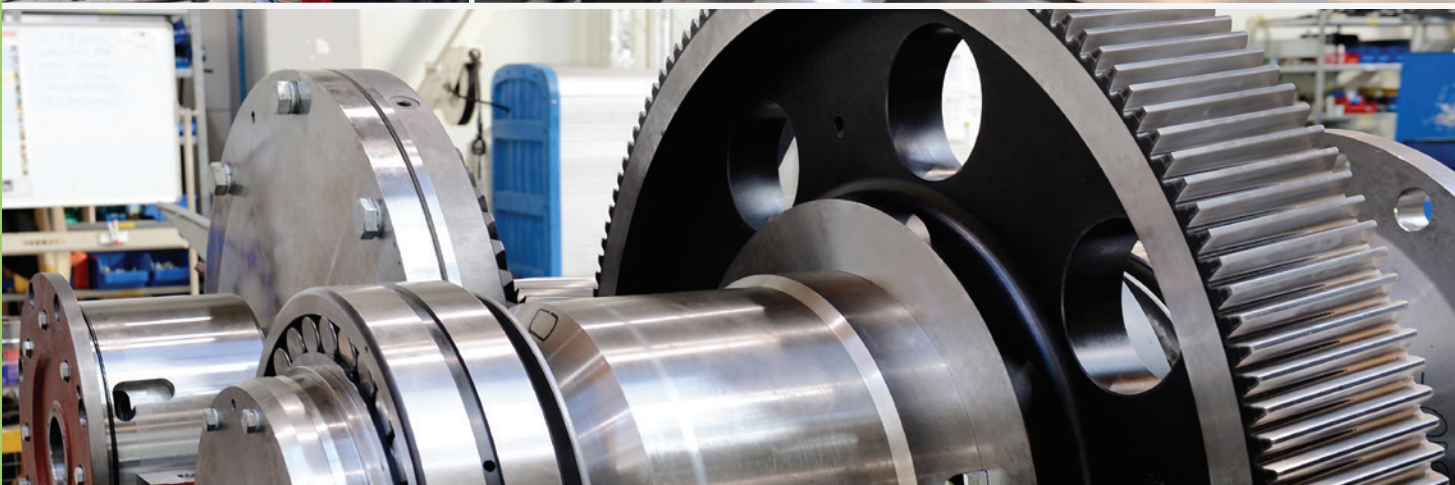


FAMUR

Industrial gearboxes



INDUSTRIAL GEARBOXES

The market driven growth of technical requirements, including expectations of increasingly higher efficiency at reduced overall size, confronts manufacturers of modern gearboxes with permanent challenges. An expectation of maximizing effectiveness of designed gears and meeting restrictive noise emission requirements, makes it necessary to constantly improve the design of the manufactured equipment considering materials, technology and production methods. This also happens in FAMUR.

For over 40 years, we have been designing and delivering industrial class gearboxes to many market segments, in particular to underground and opencast mining, cargo handling machines and gantry cranes, as well as bulk materials transportation machines. Our gearboxes successfully and reliably operate in cutting drums, scraper and belt conveyors and other industrial processes and technologies.



A modern production plant, built in Katowice in 2011, together with the heat treatment facility and the world-class test station, manufactures a wide range of industrial gearboxes in the highest precision classes, compliant with DIN 3962 and taking into consideration the fatigue resilience of used components according to ISO 6336 standards.

The Transmission Design Team consisting of experienced mechanical and structural engineers, undertakes the design and optimization tasks on the basis of their long-lasting operational experience, as well as advanced calculation and analytical methods. Equipped with the modern CAD and analytical tools, we are able to solve complex gearbox design issues using advanced numerical analyses and FEA.



Custom applications and special versions of gearboxes developed by FAMUR, help our Clients all over the world in the most challenging operating conditions. Fully-automatic gearbox diagnostic systems designed and produced by FAMUR supervise the main technical parameters and their performance in the real time.

The technical potential of FAMUR, supported with many years of experience in the field of design and manufacturing of gearboxes, derived from the companies of the Group (FUGO, PIOMA, NOWOMAG, GLINIK), allows us to design, optimize and produce the highest quality gearboxes and mechanical transmission equipment.

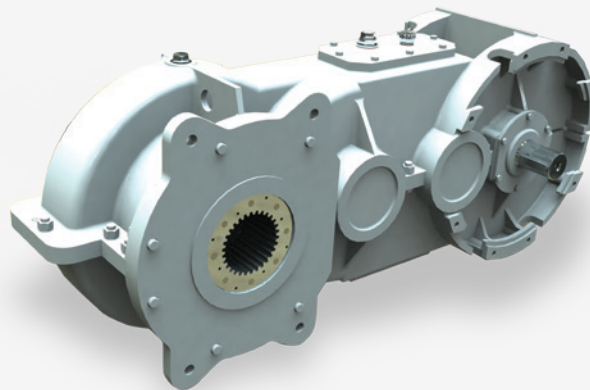


GEARBOXES TO DRIVE BELT CONVEYORS FOR UNDERGROUND MINING APPLICATIONS

W3ZEK SPUR GEARBOX

ADVANTAGES

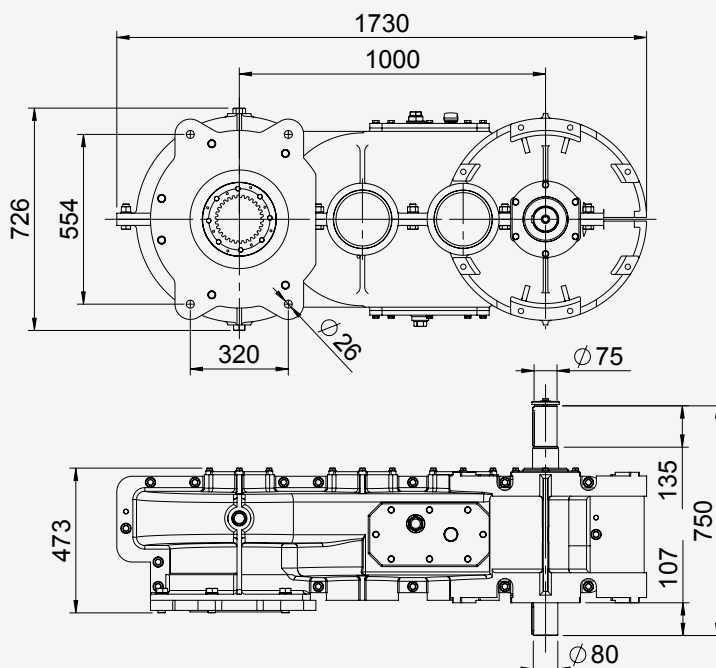
- easy to install
- adapted for a cooling system with forced circulation
- suitable for operation in dusty or explosive atmospheres



TECHNICAL PARAMETERS

Power (for KA=1.5)	160			kW
Nominal input rotation	1500			rpm
Gear ratio	12,68	15,48	19,14	
Weight	1255			kg
Cooling	natural convection			
Type of lubrication	splash lubrication			
Type of oil	mineral oil ISO VG 220			
Oil volume	25			l
Direction of rotations	CW/CCW			
Mounting	left/right side			

DIMENSIONS

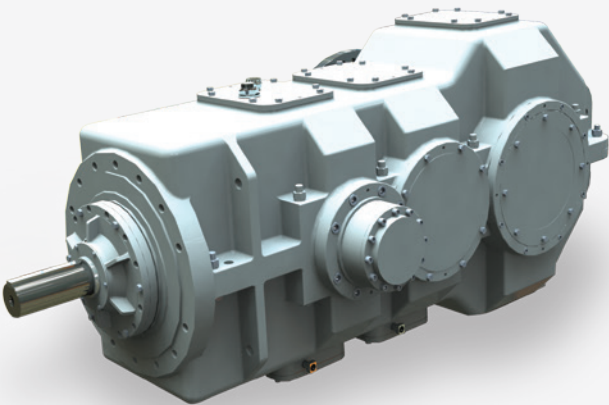


KB 315

BEVEL HELICAL GEARBOX

ADVANTAGES

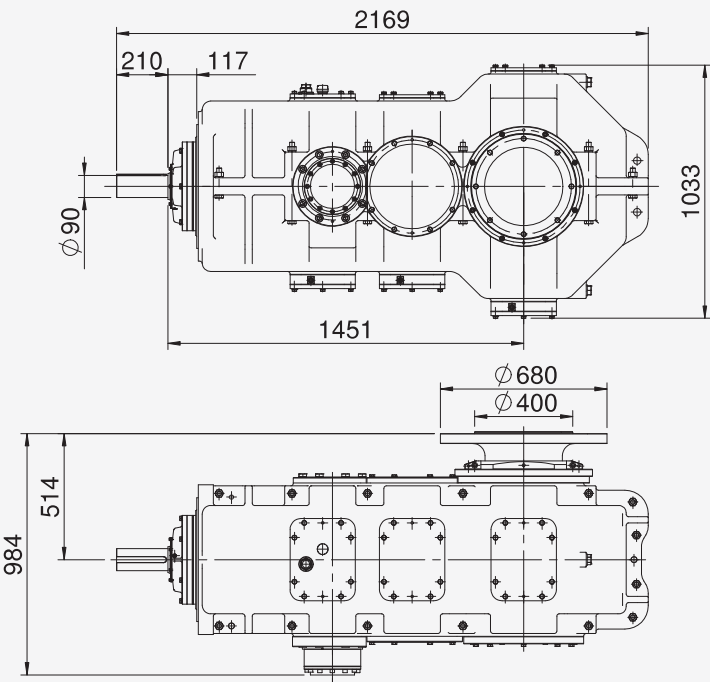
- suitable for self-supporting drive systems
(no platform between engine and gearbox)
- adapted for a cooling system with forced circulation
- gravity lubrication of bearings
- multiple mounting methods on the drum shaft
- simple reinstallation



TECHNICAL PARAMETERS

Power (for KA=1.5)	315			400			kW
Nominal input rotation	1500						rpm
Gear ratio	25,55	32,09	40,41	16,19	25,62	32,14	
Weight	~3350			~3200			kg
Cooling	water cooling with embedded heat exchanger						
Type of lubrication	splash lubrication						
Type of oil	mineral oil ISO VG 220 mineral oil ISO VG 320						
Oil volume	120						l
Direction of rotations	CW/CCW						
Mounting	left/right side						

DIMENSIONS

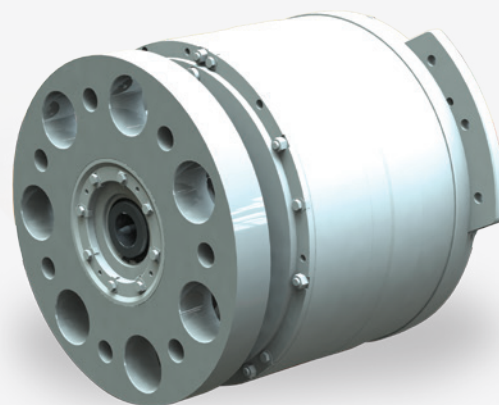


DPG 315

COMPACT PLANETARY GEARBOX

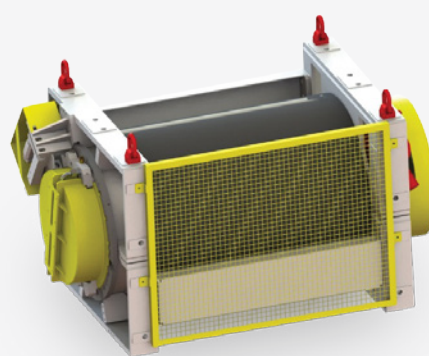
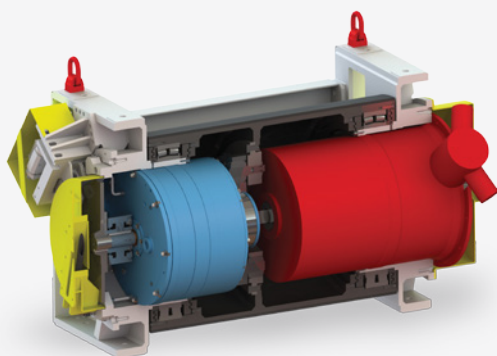
ADVANTAGES

- compact design
- optional installation of brake
- wide range of installation configurations
- compact gearbox for installation in the FCD 315 belt conveyor drive

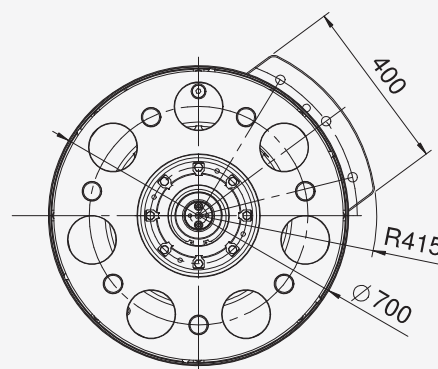
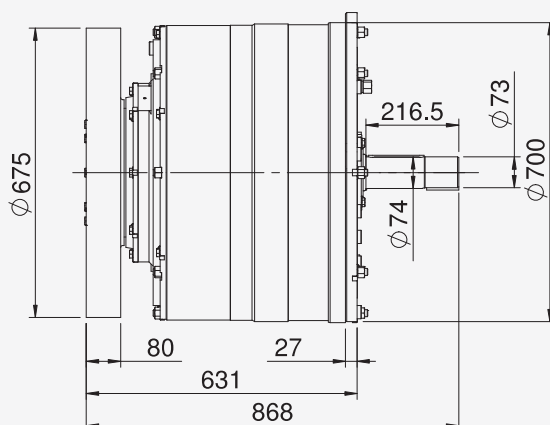


TECHNICAL PARAMETERS

Power (for KA=1.5)	315			kW
Nominal input rotation	1500			rpm
Gear ratio	18,87	25,31	31,29	
Weight	1255			kg
Cooling	water cooling			
Type of lubrication	splash lubrication			
Type of oil	mineral oil ISO VG 320			
Oil volume	18			l
Direction of rotations	CW/CCW			
Mounting	left/right side			



DIMENSIONS

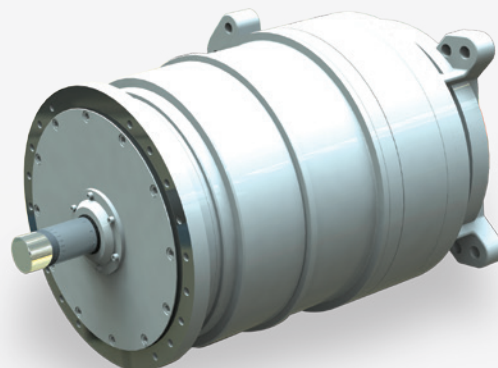


GEARBOXES TO DRIVE ARMoured CONVEYORS (AFC & BSL)

FPL 25 PLANETARY GEARBOX

ADVANTAGES

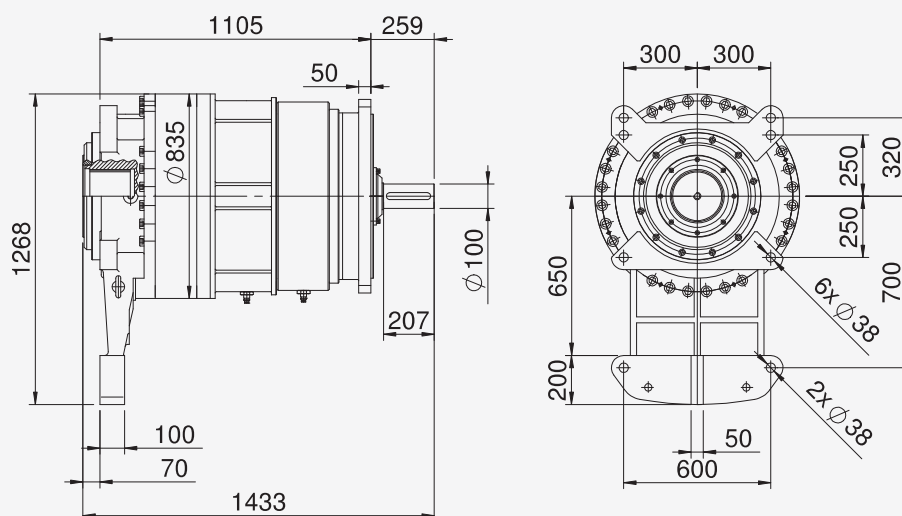
- the gearbox is designed to drive armoured conveyors (AFC & BSL)
- fitted with a water cooler
- standardized design enables installation on most types of armoured conveyors for mining application



TECHNICAL PARAMETERS

Power (for KA=1.5)	400		450	kW
Nominal input rotation	1500			rpm
Gear ratio	33	39	28	
Weight	2835			kg
Cooling	water cooling with water jacket			
Type of lubrication	splash lubrication			
Type of oil	mineral oil ISO VG 320			
Direction of rotations	CW/CCW			
Mounting	left/right side			

DIMENSIONS

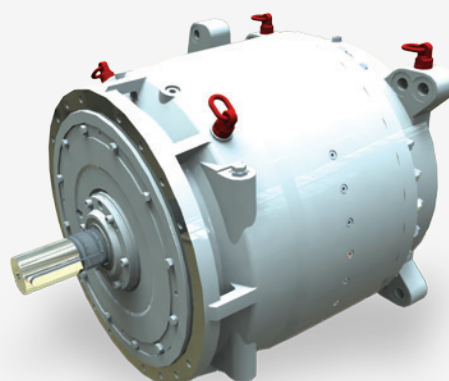


FPL 35

PLANETARY GEARBOX

ADVANTAGES

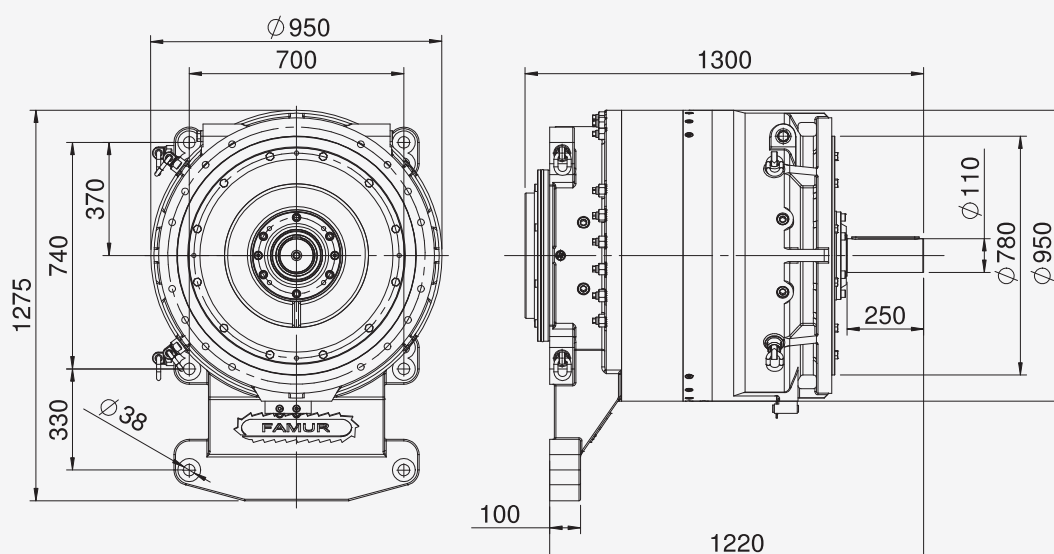
- the gearbox is designed to drive armoured conveyors (AFC & BSL)
- fitted with a water cooler
- standardized design enables installation on most types of armoured conveyors for mining application



TECHNICAL PARAMETERS

Power (for KA=1.5)	400	630				800		kW
Nominal input rotation	1500				rpm			
Gear ratio	50	39	33	28	25	21	16	
Weight	3413	3394	3421	3409	3426	3405	3376	kg
Cooling	water cooling with embedded heat exchanger							
Type of lubrication	splash lubrication							
Type of oil	mineral oil ISO VG 320							
Direction of rotations	CW/CCW							
Mounting	left/right side							

DIMENSIONS

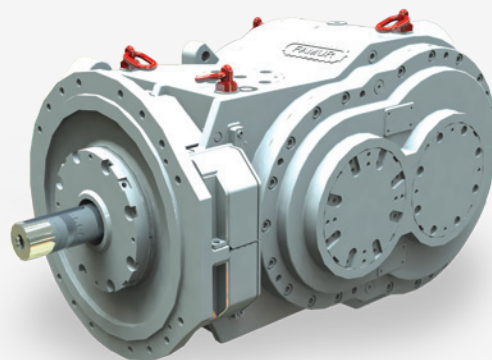


FKPL 25

PLANETARY HELICAL GEARBOX

ADVANTAGES

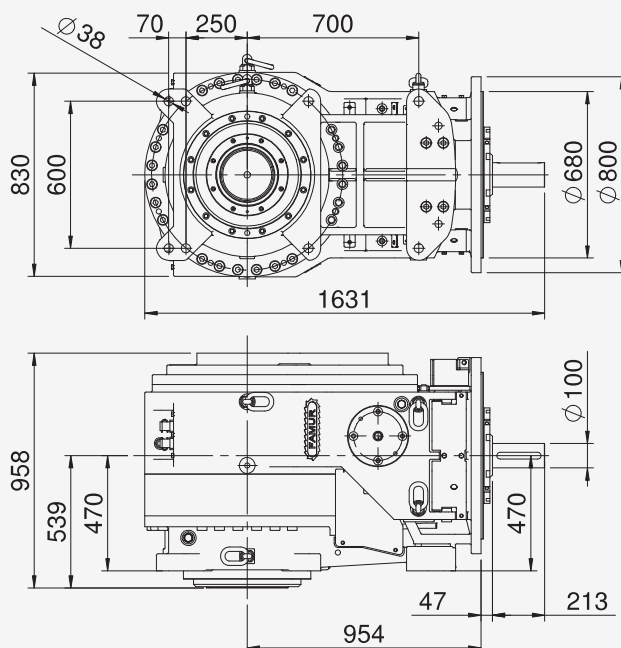
- the gearbox is designed to drive armoured conveyors (AFC & BSL)
- fitted with a water cooler
- standardized design enables installation on most types of armoured conveyors for mining application



TECHNICAL PARAMETERS

Power (for KA=1.5)	315	400	450				kW
Nominal input rotation	1500						rpm
Gear ratio	50	39	21	25	28	33	
Weight	3550						kg
Cooling	water cooling with embedded heat exchanger						
Type of lubrication	splash lubrication with lubrication circuit forced by an input shaft						
Type of oil	mineral oil ISO VG 320						
Oil volume	96						l
Direction of rotations	CW/CCW						
Mounting	left/right side						

DIMENSIONS

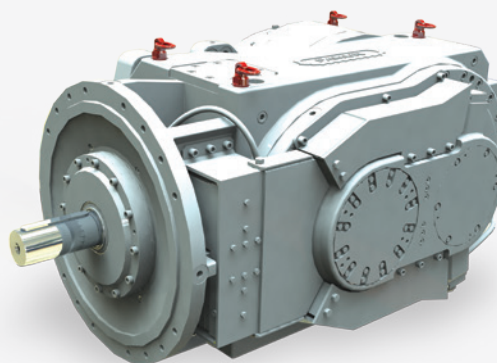


FKPL 35

PLANETARY HELICAL GEARBOX

ADVANTAGES

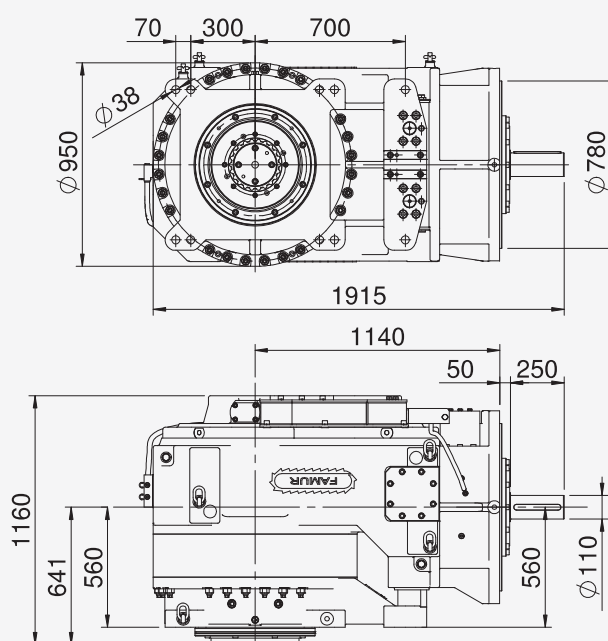
- adapted for operation under heavy-duty mining conditions
- compliant with standards applicable to installation on drives of the specific type
- efficient cooling system
- minimum scope of operations related to transfer and reinstallation
- wide ratio range in standard versions



TECHNICAL PARAMETERS

Power (for KA=1.5)	400	630				800		kW	
Nominal input rotation	1500								rpm
Gear ratio	50	25	28	33	39	16	21		
Weight	5500								kg
Cooling	water cooling with both external and embedded heat exchangers								
Type of lubrication	splash lubrication with lubrication circuit forced by an input shaft								
Type of oil	mineral oil ISO VG 320								
Oil volume	165								l
Direction of rotations	CW/CCW								
Mounting	left/right side								

DIMENSIONS



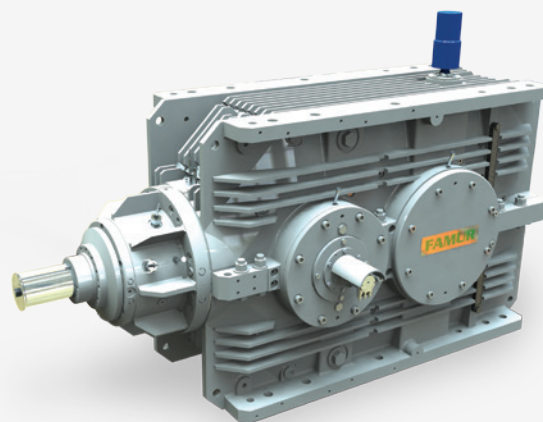
GEARBOXES TO OVERLAND BELT CONVEYORS

FG 320

BEVEL HELICAL GEARBOX

ADVANTAGES

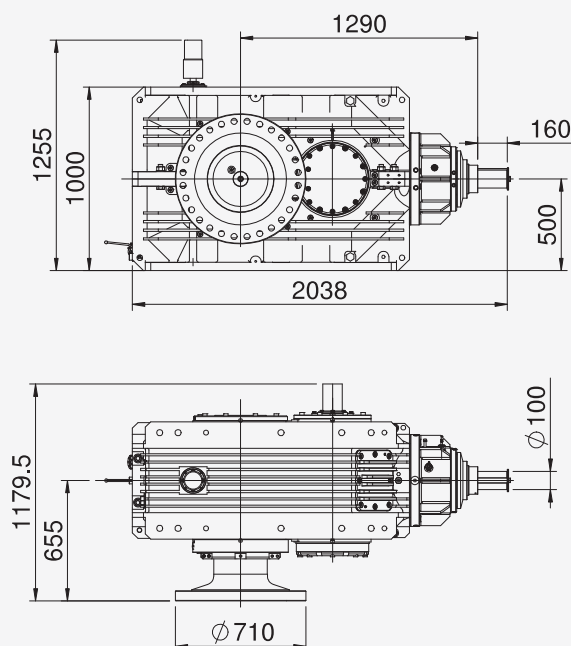
- designed for operation with belt conveyor drives, in a continuous operation mode, exposed to heavy weather conditions
- cooled with forced air circulation
- gravity lubrication of bearings
- minimum scope of operations related to conveyor reinstallation
- suitable for installation of heaters
- intended for heavy-duty high-capacity belt conveyors
- transfer from the left to the right side of conveyors with no need to rearrange interior of gearboxes



TECHNICAL PARAMETERS

Power (for KA=1.75)	320	kW
Nominal input rotation	1000	rpm
Gear ratio	16,07	
Weight	4300	kg
Lift (upwards)	500	mm
Cooling	natural /forced convection	
Type of lubrication	splash lubrication	
Type of oil	mineral oil ISO VG 320	
Oil volume	111	l
Direction of rotations	CW/CCW	
Mounting	left/right side	

DIMENSIONS

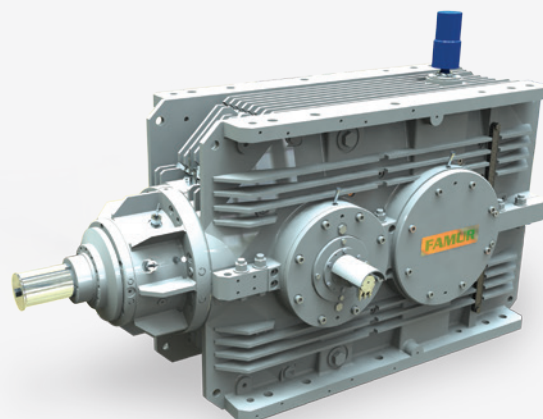


FG 500

BEVEL HELICAL GEARBOX

ADVANTAGES

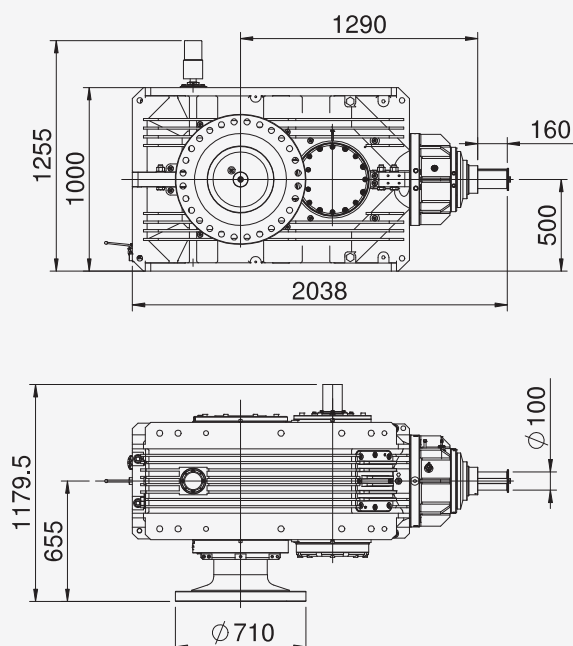
- designed for operation with belt conveyor drives, in a continuous operation mode, exposed to heavy weather conditions
- cooled with forced air circulation
- gravity lubrication of bearings
- minimum scope of operations related to conveyor reinstallation
- suitable for installation of heaters
- intended for heavy-duty high-capacity belt conveyors
- transfer from the left to the right side of conveyors with no need to rearrange interior of gearboxes



TECHNICAL PARAMETERS

Power (for KA=1.5)	500	kW
Nominal input rotation	1500	rpm
Gear ratio	20,344	
Weight	4300	kg
Lift (upwards)	500	mm
Cooling	natural /forced convection	
Type of lubrication	splash lubrication	
Type of oil	mineral oil ISO VG 320	
Oil volume	111	l
Direction of rotations	CW/CCW	
Mounting	left/right side	

DIMENSIONS

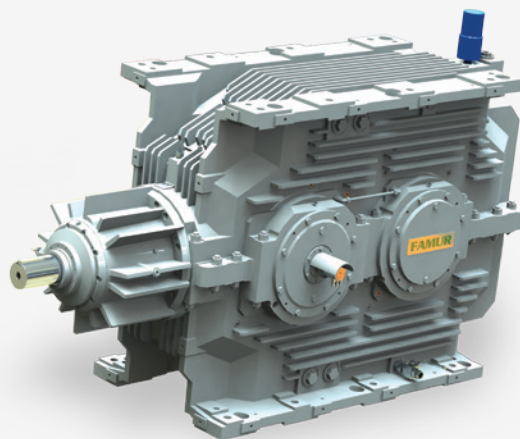


FG 630

BEVEL HELICAL GEARBOX

ADVANTAGES

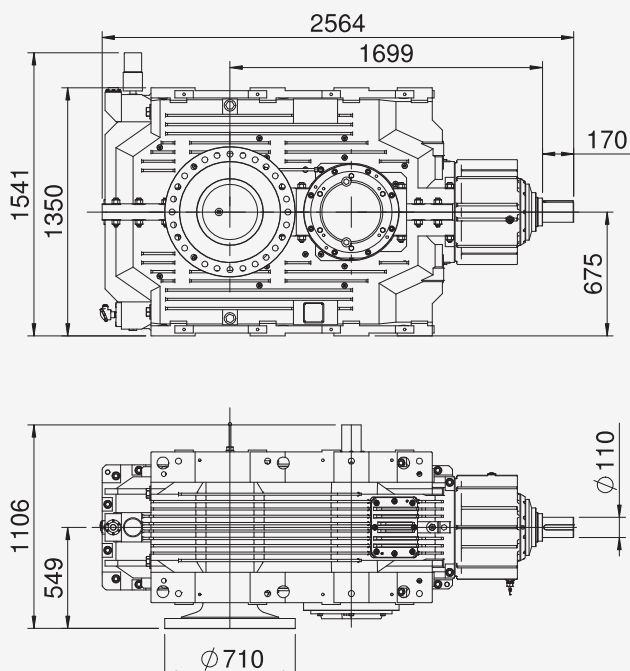
- designed for operation with belt conveyor drives, in a continuous operation mode, exposed to heavy weather conditions
- cooled with forced air circulation
- gravity lubrication of bearings
- minimum scope of operations related to conveyor reinstallation
- suitable for installation of heaters
- transfer from the left to the right side of conveyors with no need to rearrange interior of gearboxes



TECHNICAL PARAMETERS

Power (for KA=1.75)	630	kW
Nominal input rotation	1000	rpm
Gear ratio	12,71	
Weight	6800	kg
Lift (upwards)	675	mm
Cooling	natural /forced convection	
Type of lubrication	splash lubrication	
Type of oil	mineral oil ISO VG 320	
Oil volume	180	l
Direction of rotations	CW/CCW	
Mounting	left/right side	

DIMENSIONS

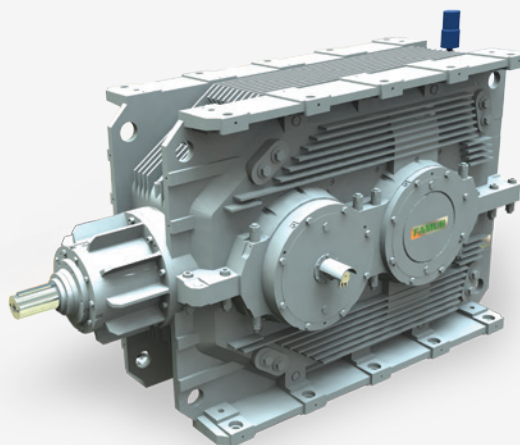


FG 1000 AC

BEVEL HELICAL GEARBOX

ADVANTAGES

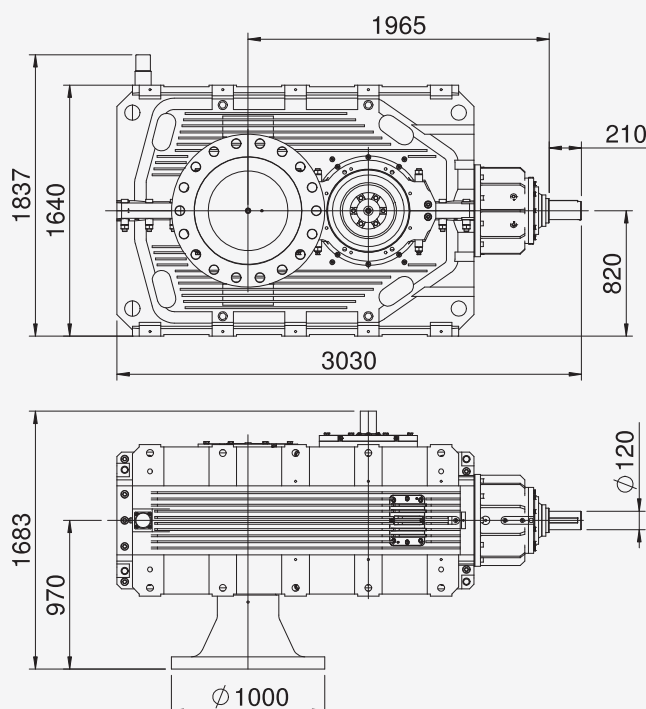
- designed for operation with belt conveyor drives, in a continuous operation mode, exposed to heavy weather conditions
- cooled with forced air circulation
- gravity lubrication of bearings
- minimum scope of operations related to conveyor reinstallation
- suitable for installation of heaters
- transfer from the left to the right side of conveyors with no need to rearrange interior of gearboxes



TECHNICAL PARAMETERS

Power (for KA=1.75)	1000	kW
Nominal input rotation	1000	rpm
Gear ratio	14,50	
Weight	12110	kg
Lift (upwards)	820	mm
Cooling	natural /forced convection	
Type of lubrication	splash lubrication	
Type of oil	mineral oil ISO VG 320	
Oil volume	400	l
Direction of rotations	CW/CCW	
Mounting	left/right side	

DIMENSIONS

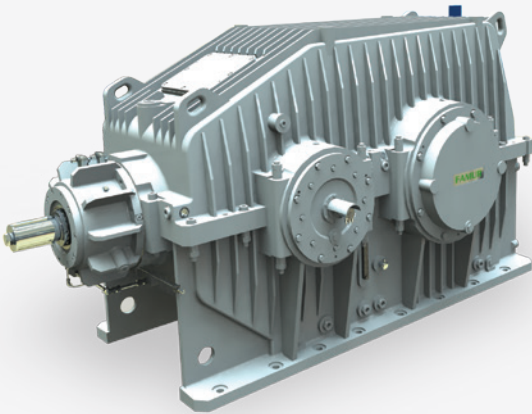


FG 1000 NC

BEVEL HELICAL GEARBOX

ADVANTAGES

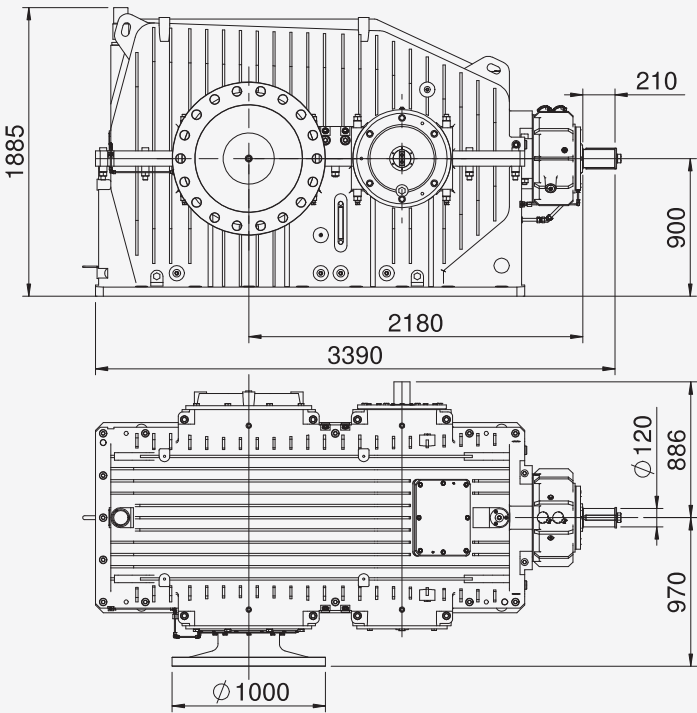
- designed for operation with belt conveyor drives, in a continuous operation mode, exposed to heavy weather conditions
- no need to apply external cooling
- gravity lubrication of bearings
- suitable for installation of heaters
- designed for heavy-duty high-capacity belt conveyors



TECHNICAL PARAMETERS

Power (for KA=1.75)	1000	kW
Nominal input rotation	1000	rpm
Gear ratio	13,87	
Weight	16616	kg
Lift (upwards)	900	mm
Cooling	natural /forced convection	
Type of lubrication	splash lubrication	
Type of oil	mineral oil ISO VG 220	
Oil volume	800	l
Direction of rotations	CW/CCW	
Mounting	left/right side	

DIMENSIONS

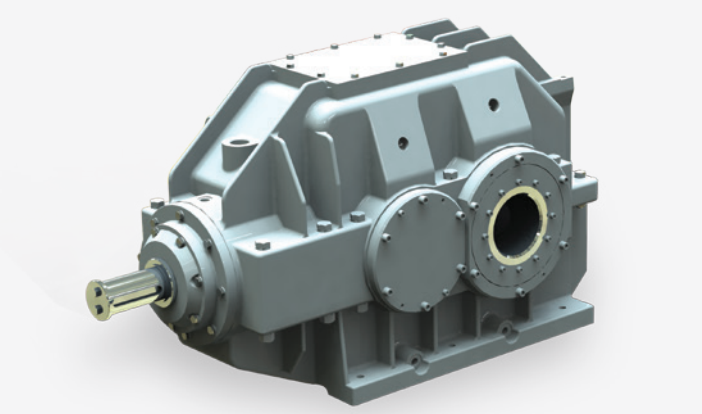


FKW 280, 315, 400

BEVEL HELICAL GEARBOX

ADVANTAGES

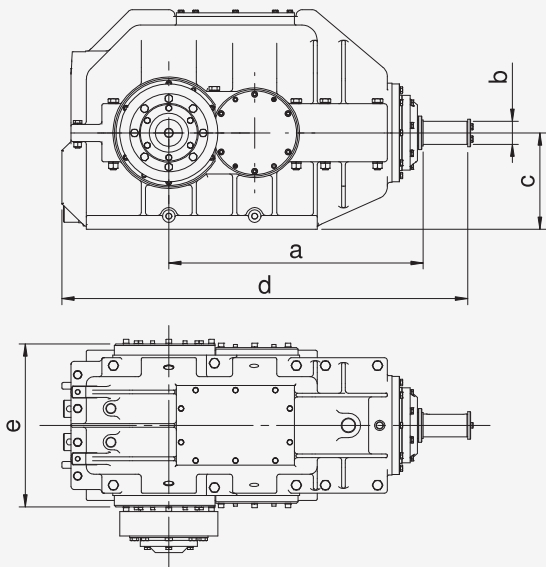
- designed for operation with belt conveyor drives, in a continuous operation mode, exposed to heavy weather conditions
- no need to apply external cooling
- gravity lubrication of bearings
- suitable for installation of heaters
- designed for heavy-duty belt conveyors with high capacities



TECHNICAL PARAMETERS

Gearbox size	280	315	400	
Power (for KA=1.5)	100	160	315	kW
Nominal input rotation	1000	1500	1000	rpm
Gear ratio	5–16			
Weight	980	1590	2800	kg
Lift (upwards)	315	355	450	mm
Cooling	natural /forced convection			
Type of lubrication	splash /forced lubrication			
Type of oil	mineral oil to ISO VG 220, synthetic oil to PAO ISO VG 220			
Direction of rotations	CW/CCW			
Mounting	left/right side			
Dimension	a	830	900	1160
	b	Ø75	Ø85	Ø100
	c	315	355	450
	d	1320	1450	1846
	e	532	620	664

DIMENSIONS

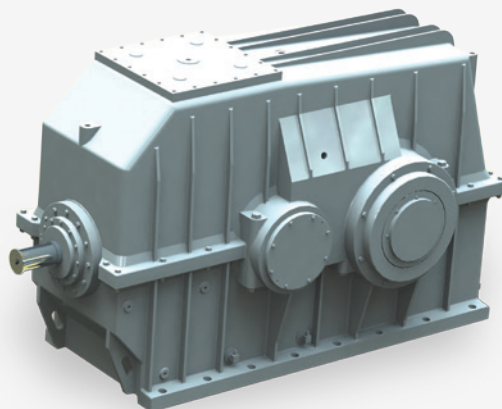


FKW 750

BEVEL HELICAL GEARBOX

ADVANTAGES

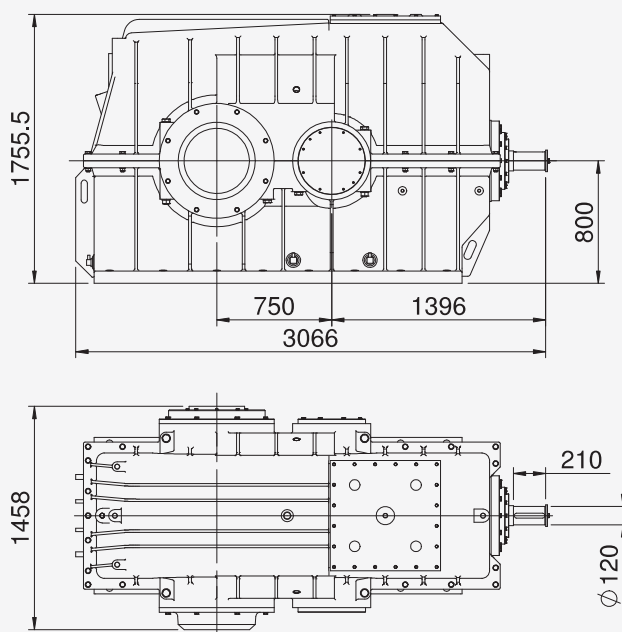
- designed for operation with belt conveyor drives, in a continuous operation mode, exposed to heavy weather conditions
- no need to apply external cooling
- gravity lubrication of bearings
- suitable for installation of heaters
- designed for heavy-duty belt conveyors with high capacities



TECHNICAL PARAMETERS

Power (for KA=1.5)	630	kW
Nominal input rotation	980	rpm
Gear ratio	14,21	
Weight	9200	kg
Lift (upwards)	800	mm
Cooling	natural /forced convection	
Type of lubrication	splash /forced lubrication	
Type of oil	mineral oil to ISO VG 220	
Direction of rotations	CW/CCW	
Mounting	left/right side	

DIMENSIONS



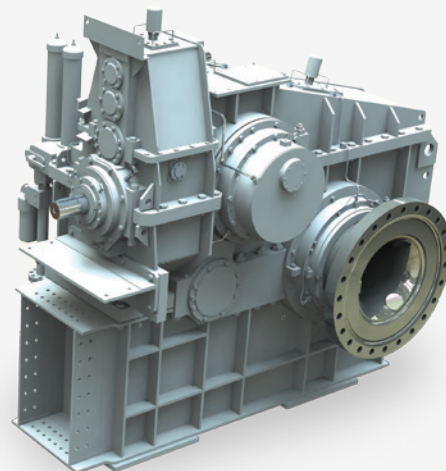
GEARBOXES TO DRIVE BUCKET WHEELS OF DREDGER EXCAVATORS FOR OPEN-PIT MINING

FBWG 500

PLANETARY BEVEL HELICAL GEARBOX

ADVANTAGES

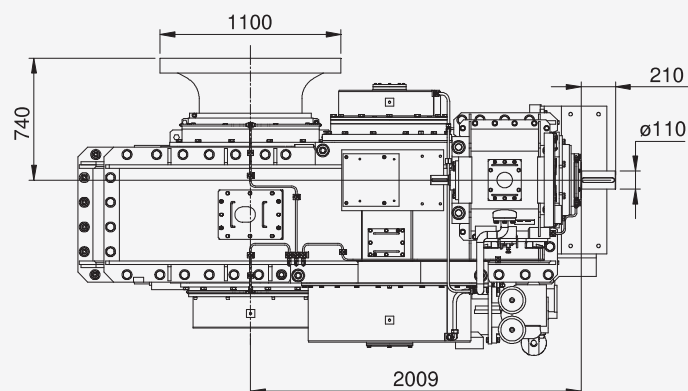
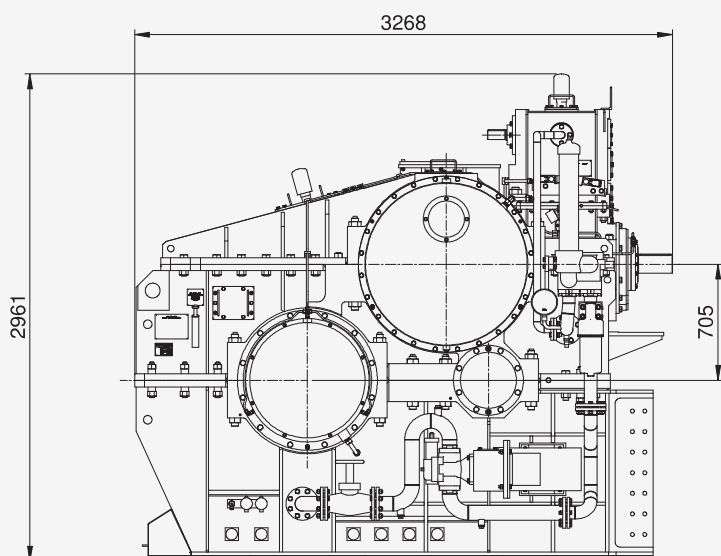
- forced lubrication circuit
- independent, attachable maintenance drive for convenient handling of a bucket wheel
- narrow contour of the gearbox to maximize the envelope angle
- embedded web of sensors to monitor status of key components



TECHNICAL PARAMETERS

Power (for KA=1.5)	500	kW
Nominal input rotation	1000	rpm
Gear ratio	147,14	
Weight	20000	kg
Cooling	natural convection	
Type of lubrication	forced lubrication	
Type of oil	mineral oil to ISO VG 320	
Direction of rotations	CW	
Mounting	right side	

DIMENSIONS



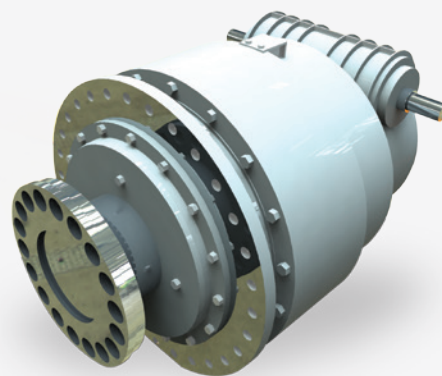
GEARBOXES FOR TRAVEL MECHANISM AND BOOM ROTATION OF EXCAVATORS IN OPEN-PIT MINING INDUSTRY

FSP 950

PLANETARY-WORM GEARBOX

ADVANTAGES

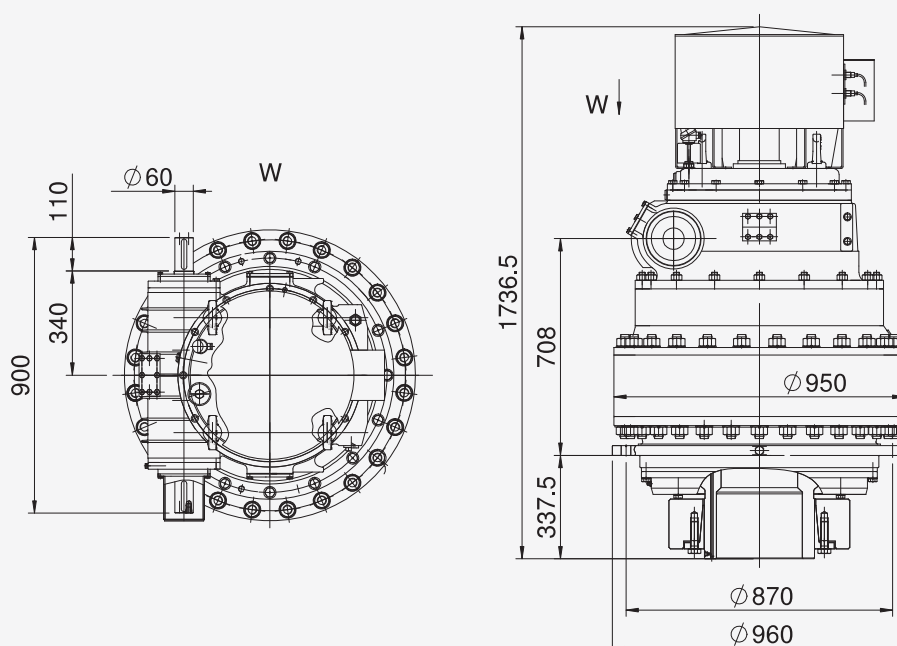
- good gear ratio and transferred loads in relation to the overall size and weight
- possibility of modular extension within the type series to achieve the required gear ratios
- silent-running
- high durability and reliability
- suitable for operation in dust environment
- suitable for operation in reverse mode



TECHNICAL PARAMETERS

Power (for KA=1.25)	40	60	60	kW
Nominal input rotation	1000			rpm
Gear ratio	521,70			
Weight	3335	2950	3100	kg
Cooling	natural convection			
Type of lubrication	splash lubrication			
Type of oil	mineral oil ISO VG 220/320			
Oil volume	85			l
Direction of rotations	CW/CCW			
Mounting	left/right side			

DIMENSIONS

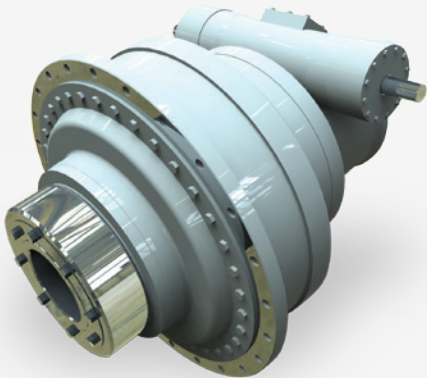


FSP 860

PLANETARY-WORM GEARBOX

ADVANTAGES

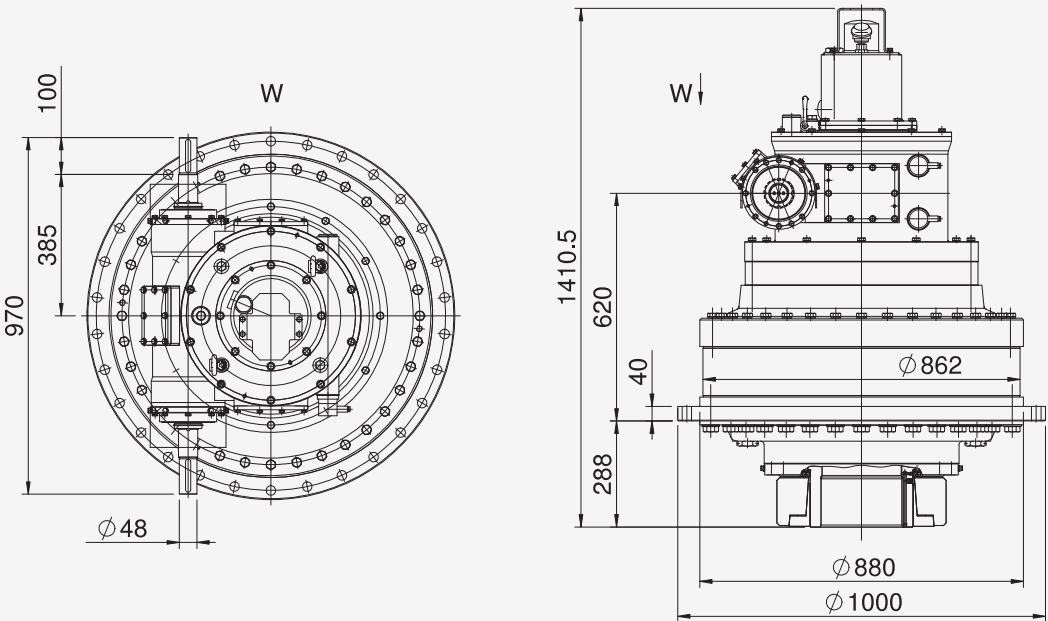
- good gear ratio and transferred loads in relation to the overall size and weight
- possibility of modular extension within the type series to achieve the required gear ratios
- silent-running
- high durability and reliability
- suitable for operation in dust environment
- suitable for operation in reverse mode



TECHNICAL PARAMETERS

Power (for KA=1.25)	11	22	kW
Nominal input rotation	725	1500	rpm
Gear ratio	846,50	401,56	
Weight	1775		kg
Cooling	natural convection		
Type of lubrication	splash lubrication		
Type of oil	mineral or synthetic oil ISO VG 220		
Oil volume	120		l
Direction of rotations	CW/CCW		
Mounting	left/right side		

DIMENSIONS

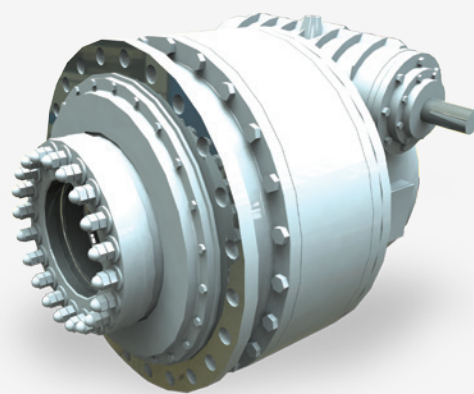


FSP 1200

PLANETARY-WORM GEARBOX

ADVANTAGES

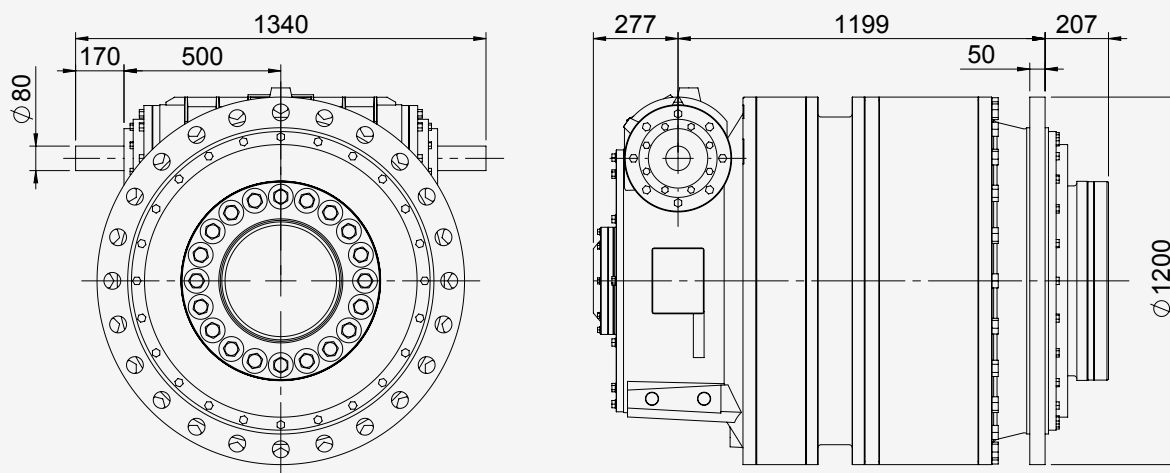
- good gear ratio and transferred loads in relation to the overall size and weight
- possibility of modular extension within the type series to achieve the required gear ratios
- silent-running
- high durability and reliability
- suitable for operation in dust environment
- suitable for operation in reverse mode



TECHNICAL PARAMETERS

Power (for KA=1.25)	90	kW
Nominal input rotation	735	rpm
Gear ratio	639,45	
Weight	7100	kg
Cooling	natural convection	
Type of lubrication	splash lubrication	
Type of oil	mineral oil ISO VG 220	
Oil volume	120	1
Direction of rotations	CW/CCW	
Mounting	left/right side	

DIMENSIONS

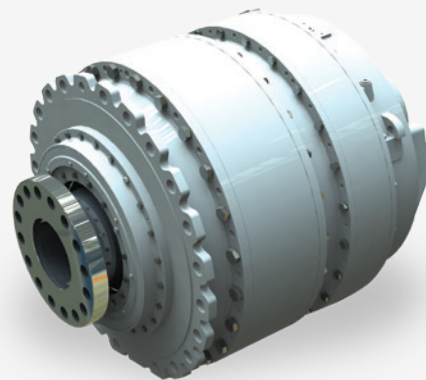


PG 340

CYLINDRICAL AND PLANETARY GEARBOX

ADVANTAGES

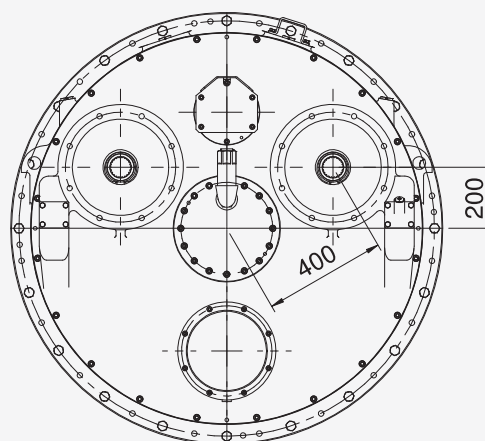
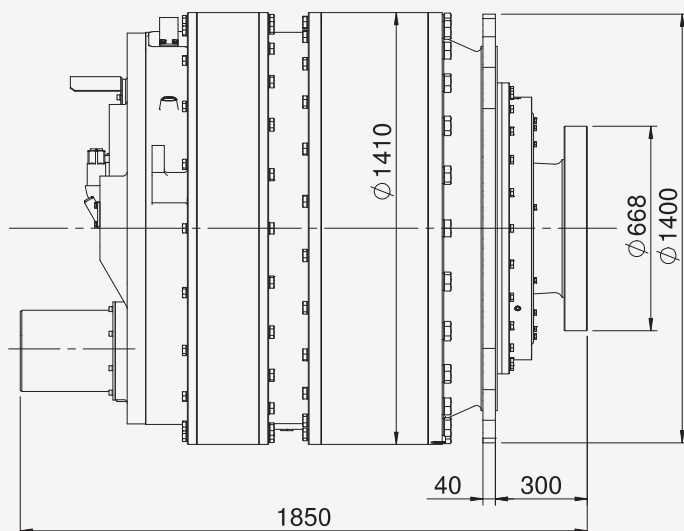
- good gear ratio and transferred loads in relation to the overall size and weight
- possibility of modular extension within the type series to achieve the required gear ratios
- silent-running
- high durability and reliability
- suitable for operation in dust environment
- air convection cooling – no need to apply any forced-cooling system



TECHNICAL PARAMETERS

Rated output torque	2000	kNm
Nominal input rotation	138–1850	rpm
Gear ratio	340,2	
Weight	8250	kg
Cooling	natural convection	
Type of lubrication	splash lubrication	
Type of oil	mineral oil ISO VG 320/460	
Direction of rotations	CW/CCW	
Mounting	left/right side	

DIMENSIONS



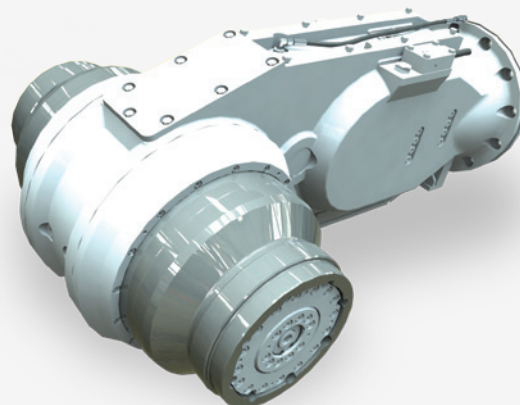
GEARBOXES FOR CUTTING HEADS OF ROADHEADERS

FRG 160/250

PLANETARY HELICAL GEARBOX

ADVANTAGES

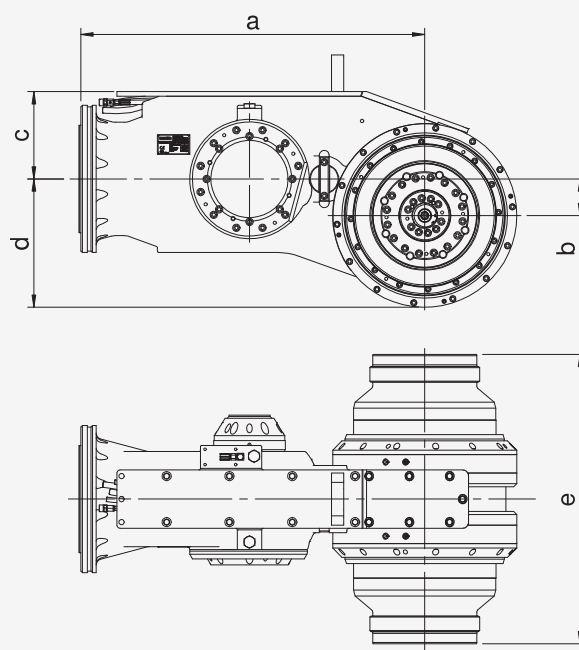
- transverse cutting head gearbox
- suitable for operation in dusty or explosive atmospheres
- highly durable
- adapted to external sector spraying system



TECHNICAL PARAMETERS

Power (for KA=1.75)	160	250	kW
Nominal input rotation	1500		rpm
Gear ratio	20,27	26,68	
Weight	1788	3357	kg
Cooling	forced water cooling		
Type of lubrication	splash lubrication		
Type of oil	synthetic oil ISO VG 320		
Dimensions	a	1122	1296
	b	120	0
	c	285	395
	d	419	390
	e	944	1203

DIMENSIONS



MANUFACTURING CAPACITY

Our Gearbox Manufacturing Plant in Katowice - built in 2011 - manufactures industrial gearboxes of total weight up to 25 tons, with gears up to 1600 mm in diameter.

Machining of gearbox housings is made on large-size Juaristi numerical boring machines with hydrostatic benches and MP-RAM type spindles. Gears are made on numerically controlled precise hobbing machines and profile grinding machines by Gleason-Pfauter, which allows for achieving the 4th class of precision according to DIN in the gear specification.

Our machining park includes also a 4-axis vertical milling centre by AXA, on which we finish the spur gears and involute gears with the InvoMilling method, of outer diameter up to 620 mm. MORI-SEIKI numerical lathers and CNC turning and boring lathe by Fermat are used to manufacture axial-symmetry elements (shafts, sleeves, covers).

Depending on the customer needs, the toothed elements may undergo a shot peening process, which significantly increases their fatigue strength resilience.



MANUFACTURING CAPACITY

All the toothed elements are measured with coordinate measuring machines by Carl-Zeiss and they are certified with a measurement protocol by qualified employees of Quality Control.

Steel and iron cast housings for our gearboxes are produced in the Group's manufacturing plants in Piotrków Trybunalski and Śrem, while semi-manufactured forged products (gear wheels, yokes, pinions, shafts) in our forging shop in Glinik. All welded housings are made in one of three production plants located in Katowice, Gorlice or Konin.

FAMUR machining plant is equipped with heat treatment processing facility with number of pit furnaces to perform thermal and thermalchemical processing including: standardization, improvement, tempering, carburizing and hardening. We also have machines for medium- and high-frequency induction hardening, which allows for surface hardening of details at the depth of 1 to 5 mm. A material testing laboratory confirms correctness of the processes (grade, micro and macro structure, hardness, carburization depth).

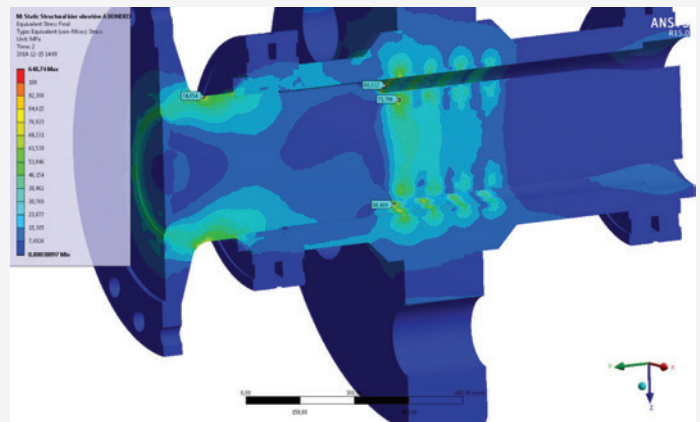


DESIGN AND RESEARCH SERVICES

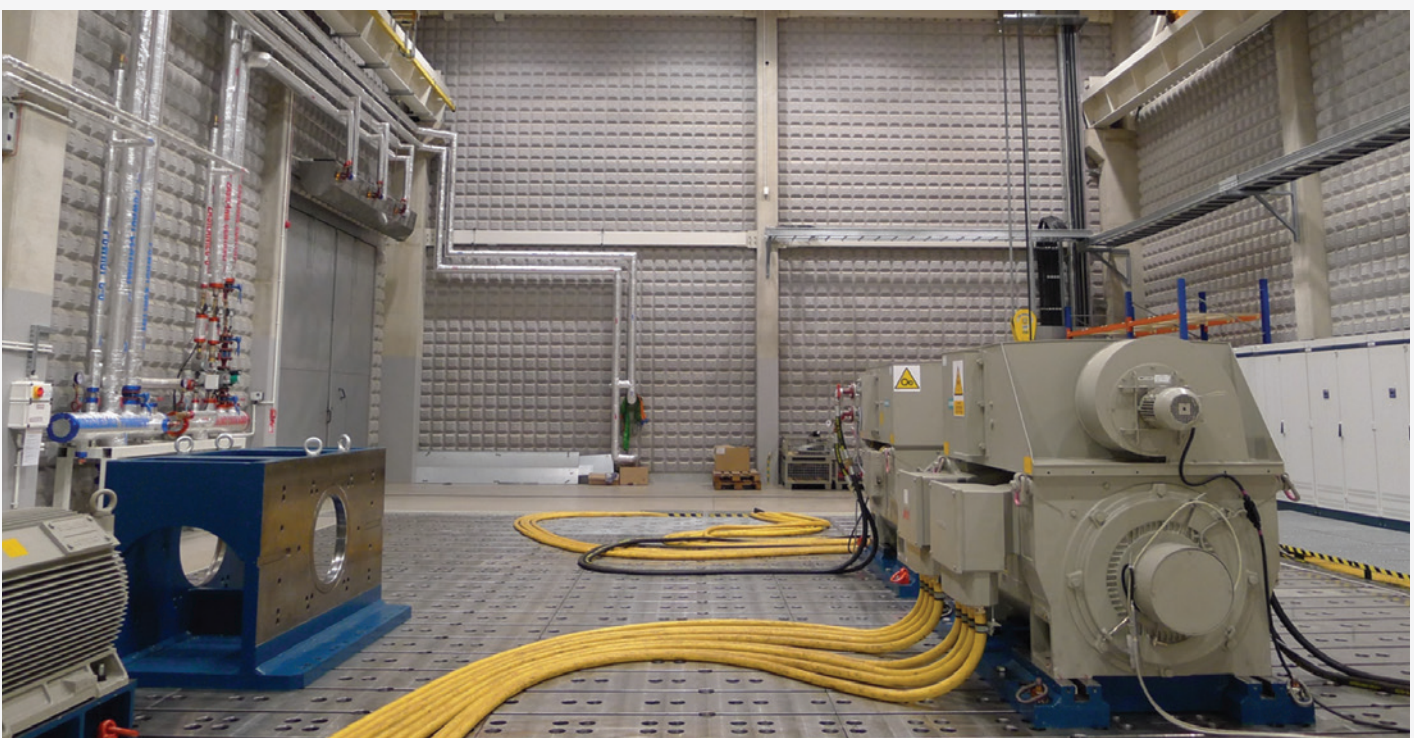
Designs and concepts of the products we offer are developed in the CAD 3D environment (SolidWorks, Inventor, Catia). The knowledge and experience we gain are supported by the latest calculation software. Our constructions are being designed in an environment which allows for complete preview of selected resilience, forces, torque and other parameters, as a key for the effective gearbox elements designs. This enables engineering of components to increase the overall gearbox life span.

Bearing nodes are analysed in two independent calculation environments, currently recognised as the world's top among the gear designing companies. We also use an advanced FEA software, which supports verification of technical solutions as early as at the design stage.

FAMUR has one of the most modern dynamic test facilities in Europe, used for testing gearboxes and drive units under the load. The drives may be tested with up to 2 MW input power engines. A unique control system makes it possible to set any load and velocity courses in order to simulate real dynamic conditions of a gearbox operation. Configuration possibilities of the test station allow for testing a wide range of gears, brakes and clutches.



Thanks to the acoustic adaptation of the test station interior, we are able to measure noise emission of our gearboxes. Our measurement methodologies comply with ISO 9614-2 and ISO 3744 standards.



MONITORING AND CONTROL SYSTEMS

FAMAC VIB IS is an advanced and scalable monitoring and vibration diagnostic system of gearboxes, approved for use in surface configurations and in underground mines. The system monitors vibrations, temperatures, process parameters of gearboxes, as well as enables integration with superior monitoring systems. System may be installed in a stand-alone configuration allowing simple diagnostics with local visualization, as well as in distributed configuration allowing precise remote diagnostic of multiple gearboxes.

The main advantages of the FAMAC VIB IS system:

- reduction of downtimes caused by sudden failures of bearings and gears, reduction of preventative maintenance inspections
- reduction of repairs costs
- increased performance, productivity and operational safety



SYSTEM PARAMETERS - BASIC CONFIGURATION

Number of vibration sensors	6 × IEPE (ICP®)
Number of rotation makers	2 × NAMUR lub 2 × Encoder TTL
Sampling resolution	24-bit
Sampling frequency	synchronous 25 kHz
Number of temperature sensors	12 × One Wire
Communication protocols	TCP/IP, OPTO
Memory capacity	64 GB (possible extension)
Auxiliary inputs protocols	RS-485, Modbus TCP, Modbus RTU
Power supply	12V DC
EMC characteristics	I M1 ia Ma

ABOUT US

The FAMUR Group stands for over a hundred years of experience and advanced engineering know-how which contribute to increasing the efficiency and safety of our customers' solutions. We develop high-performance and reliable machines and equipment, primarily for the mining industry, but also for the transport, handling and power industry, because the satisfaction of our customers is our top priority.

FAMUR brand products are based on well-proven and intuitive solutions, which allows us to complete the most complex jobs worldwide. Our specialised plants in Poland develop longwall systems, roadheading systems, underground and surface transport systems, open-pit mining machines as well as equipment for mass transport and material handling.

OFFER



**MACHINERY & EQUIPMENT
FOR UNDERGROUND
MINING**



**MACHINERY & EQUIPMENT
FOR OPEN-PIT MINING**



**CONTINUOUS
TRANSPORT SYSTEMS**



**INDUSTRIAL
SYSTEMS**



**TECHNOLOGIES
AND SERVICES
FOR MINING**

FAMUR GROUP



+100

YEARS OF EXPERIENCE



+2500

EMPLOYEES



7

PRODUCTION PLANTS



+7 500

LONGWALL SHEARERS



+212 000

POWERED ROOF SUPPORTS



+220

ARMOURED CONVEYORS



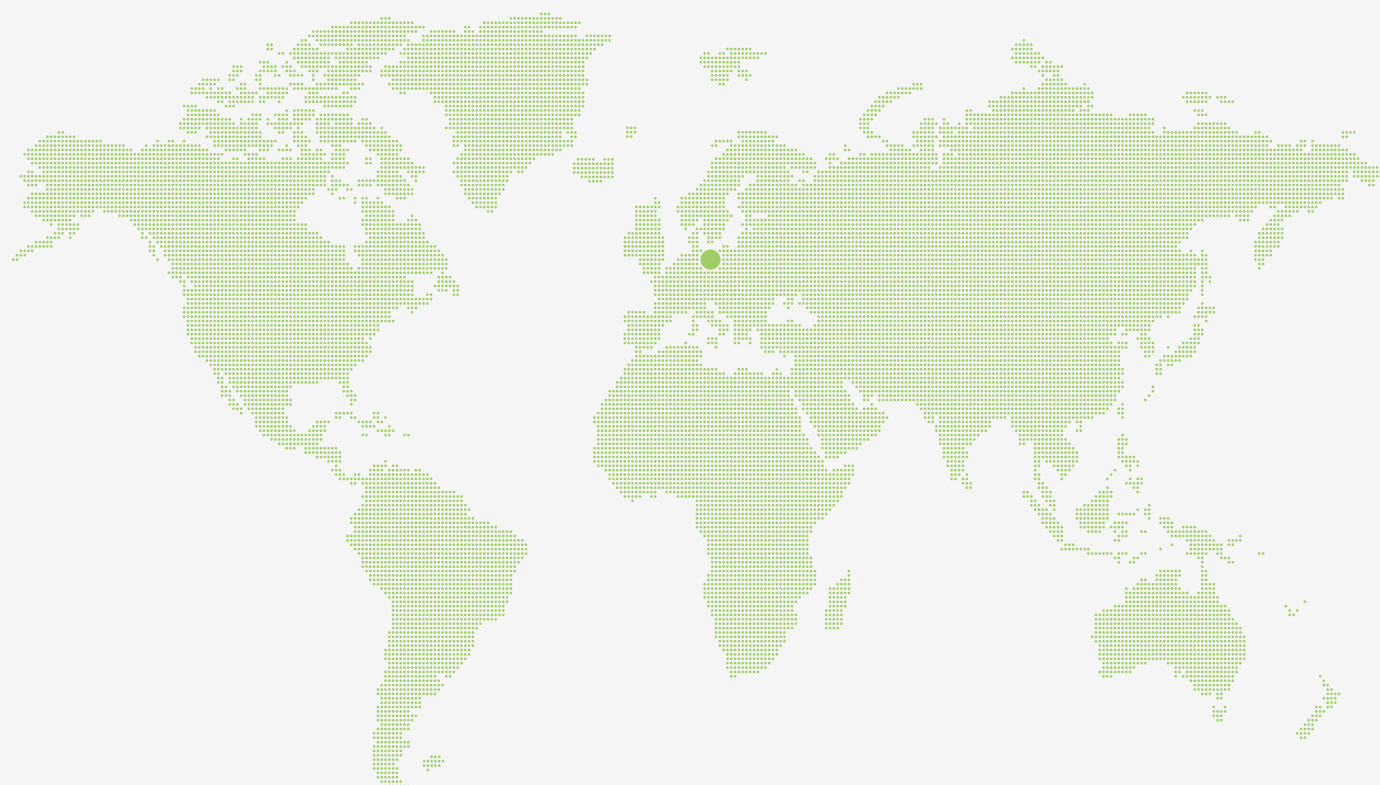
+4 400

ROADHEADERS



+4 400 km

BELT CONVEYORS



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