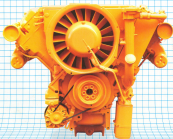


FL413 F



KHD
DEUTZ



The engines of the successful PL 402 P series have been built for some years now. They have proved extremely well in all kinds of applications, recording many millions of operating hours. The experience thereby gained was the basis for the subsequent improvement and further devel-

opment of the series. This resulted in the high degree of utility and quality for which these engines are famous.

They are produced in large batches on modern transfer assembly lines.

These robust prime movers have shown their vitality in climates throughout the world, proving their optimum-economy at reliable

power ranges across a complete spectrum from 77 kW (105 HP) up to 287 kW (390 HP) at rated speeds between 1500 and 2000 RPM.



The 433F series includes 6-, 8-, 10- and 12-cylinder engines. All are rotatively-aspirated, with the exception of a 12-cylinder version featuring the pro-environmental Deutz Two-Stage Combustion System[®]. A turbocharged intercooled version of the 12-cylinder is also available, thereby extending the upper power range for specific applications.

All of these engines are built in accordance with the well-proven Deutz modular construction principle. This means that a high percentage of components are identical for all engines of the series. A large variety of accessories for special equipment specifications to suit your application are available.

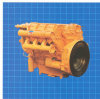
There are two different combustion systems to choose from. One is the Deutz Direct Injection System. When fulfilling all present legislative demands, this combustion system gives the best possible performance from every liter of fuel.

Then we have the Deutz Two-Stage Combustion System[®]. With this system economical operation is possible even while meeting the most stringent exhaust emission control requirements for I. C. engines (e.g. underground mining applications), without extra costs being incurred for items such as catalytic converters or exhaust gas scrubbers.

Other Design Features:

- Individual-cylinder and cylinder head assemblies. Total point rapid and simple repair work. Inventory of service parts is reduced to a minimum.
- Compact design and a good power-to-weight ratio are special advantages associated with our engines, resulting in light weight and easy access to components.
- Integral cooling system, virtually maintenance-free, incorporating low-noise, aeroflow cooling at blower.
- Engine-load dependent control of the cooling air blower means low power requirements for engine cooling and problem-free operation in all climates.
- Possibility of integrated arrangement of various types of coolers for hydraulic and transmission oil within the engine cooling system.

- Excellent cold-starting
- Favorable exhaust emissions.
- The 12-cylinder version with Two-Stage Combustion System[®] can also be optionally equipped with exhaust-driven turbocharger and charge air cooling system (BP 12.1.433F4).
- The engines of the FL 433F series are very quiet. This has been proved by comparison tests organized by independent institutes.
- Further noise-reducing improvements are inexpensive to make on equipment (integral cooling system and lower loading air requirements as compared with water-cooled engines).
- Long maintenance intervals, reduced downtime and associated costs.
- Above-average reliability and endurance, plus exemplary low fuel consumption and a guarantee of excellent overall economy.



F12L420P



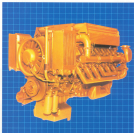
F12L420P



BF12L 413 F90

Version with:

- Deutz Two-Stage-Combustion[®]
- Exhaust-driven turbocharger
- Charge air-cooling system



FL 630P Design specifications

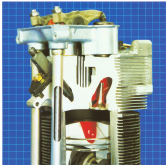


- Air-cooled 4-stroke diesel engine with Deutz Direct Injection System or, alternatively, with the low-emission Deutz Two-Stage Combustion-System[®].
- Naturally aspirated engine (with the exception of the turbo-charged 90 FL 630P[®] equipped with the Deutz Two-Stage Combustion-System[®]).
- V-form arrangement of cylinders at 90° angle.
- Individual cylinder heads of aluminium alloy with overhead inlet and exhaust valves.
- Individually removable lined cylinders of grey cast iron.
- Valve drive via tappets and pushrods, by central camshaft.
- Camshaft drive via helical spur gears from flywheel-end of crankshaft.
- Crankcase of high-quality grey cast iron with deep-side rails and additional lateral casting of bearing caps.
- Crankshaft with steel-metal main bearings, assembling with caps, including one floating bearing.
- Big-end bearings: three-metal friction type.
- Pistons with ring carrier, two compression rings and one oil control ring.
- Oil-splash piston cooling. Engines with two-stage combustion have pistons with cooling channel.
- Direct oil cooling by water-cooled, mechanically driven axial-type cooler, with load-dependent hydraulic control.
- Force-feed lubrication by gear-type pump.
- Oil filtering by full-flow paper cartridge filter; high-performance centrifugal type by pilot filter in cooling power hub.
- In-line injection pump with mechanical centrifugal governor.
- Reciprocating-type fuel feed pump.

The Combustion Systems of the PL 413 F Engines

Deutz Direct Injection

Fuel is injected by the well-proven Deutz direct injection system. The combustion chamber has a swirl-type air inlet port, which produces a high-turbulence condition during the intake stroke. The swirling motion of the combustion air is accelerated during the compression stroke due to the deep, inclined cavity in the piston crown. A smooth, quiet and efficient combustion process is thus attained, resulting in high engine performance and economical fuel consumption.



Deutz Two-Stage Combustion[®]

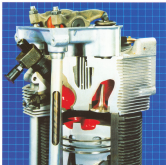
1. Pre-combustion (1st stage):

This takes place inside the swirl chamber under high turbulence, high temperature and rich fuel/air conditions. The hot chamber walls prevent the formation of odorous substances, the rich fuel/air mix hinders the formation of nitric oxide.



2. After-combustion (2nd stage):

The second stage takes place under low pressure and relatively low temperature in the double swirl cavity of the piston crown. Low temperature and pressure drop due to the expansion of the burning gases prevent the further formation of nitric oxide. Excess air and high turbulence ensure complete combustion of carbon monoxide, hydrocarbons and particulates.



Accessory

FL 413 F
FL 413 F
FL 413 F
FL 413 F

Application-Matching Versatility

A range of standardized auxiliary equipment – as available for the whole line of air-cooled Deutz diesel engines – has also been developed for the FL413F/W series. This range of accessories combined with various power take-off points, permits numerous combinations able to meet the requirements of practically any drive application.

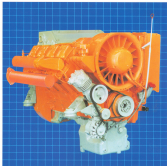
Oil pumps for engine inclinations up to 45°.

Starting aids for temperatures down to -40°C.

Integrated coolers for hydraulic and transmission oil.

Various

- Intake and exhaust manifolds
- SAE housings
- Flywheels and clutches
- Auxiliary drives
- Alternators and starters
- Air compressors
- Engine mounts
- Filters for lube oil, fuel and combustion air



FL 413 F with optional accessories

A Sound Reason for Standardizing on Deutz



The main components for all engines of the FL413F series are identical and thus interchangeable. Spare parts inventories are thereby reduced to a minimum. Contractors and other equipment users can enjoy the benefits of standardizing on one engine type available in a wide selection of construction machinery, vehicles, cranes and conveyors, etc.

This brings not only the advantages of easier parts handling, engine maintenance and training of service personnel – scheduled tasks such as inspections and overhauls after long periods of operation are also simplified considerably.



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