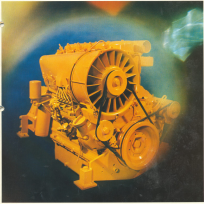


# Air-Cooled Diesel Engines

FL 912  
BF 6L 913



**DEUTZ Series PL 813  
and MP8L 913  
Air-Cooled  
Diesel Engines**

Maximum economy and reliability combined with air-cooling, are the main features of these rugged Diesel engines.

Developed from a proven earlier series, this range uses the latest technological know-how gained from basic R & D work carried out at the RND Research and Development Centre at Pilsen near Cologne - one of the most advanced of its kind in the world today.

These power units are produced in large batch numbers to meet the high precision and quality standards symbolised by the DEUTZ trademark.

A strictly modular design ensures component standardisation which solves many spare parts supply problems. Air-cooling makes for simpler maintenance by eliminating typical troubles associated with water-cooled engines, such as leakage, corrosion, the formation of scales and the use of anti-freeze

fluids. In our experience, more than twenty failures in every hundred of water-cooled engines are caused by faults developing in the cooling system.

**Special Features of DEUTZ Diesel Engines: -**

Individual cylinder and cylinder head assemblies.

A highly efficient quiet integral cooling fan, having sufficient reserve capacity to cope with extra-high ambient temperatures.

Adaptions for additional integral cooling radiator in conjunction with hydrostatic power take-off or torque converter units (by-pass cooling provided by engine cooling fan).

Direct injection as standard - for maximum performance and economy.

Two-stage combustion system (optional) to meet stringent exhaust emission control requirements.



Low noise and exhaust emission levels are two further advantages offered by this engine range which have been confirmed by numerous comparative tests.

Carried out on air-cooled as well as water-cooled engines. Noise emission can be cut even further by means of outside insulation.

Moreover, the air-cooled design offers a decisive advantage over any water-cooled unit of equivalent output, i.e. substantially lower energy consumption of a fully integral cooling system. Also, enclosures for air-cooled engines are simple constructions that require little or no installed parts.

The versatility of this engine range makes it equally suitable for a vast range of applications such as for instance, commercial vehicles, agricultural equipment, construction machinery,

compressors, conveyors and other industrial units.

In view of the growing problem of water-pollution that affects the performance of water-cooled units to an alarming extent, more and more of these engines are used to power ships.

Series FL 912 engines are available as 2, 3, 4, 5 and 6-cylinder in-line, direct injection units which are produced in large batch numbers. Their features combine high output and considerable fuel economy within an output range of 13.5 kW (17 DIN HP) to 68 kW (92 DIN HP).

Range FL 912 91 engines are fitted with a two-stage combustion system which makes them ideally suitable for any application associated with stringent emission control requirements, such as installer's underground, for instance. 6FGL 912 engines differ from

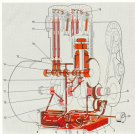
FL 912 engines mainly by virtue of their larger bore and stroke dimensions and their higher-capacity transmission units. The exhaust-turbocharged version reaches up to 80 kW (109 DIN HP) and can be fitted with a large range of optional equipment, similar to that available for FL 912 units.

### Replacement Parts Identical For All PL 912 Engines

Essential replacement parts are identical and interchangeable for all series PL 912 engines, so as to minimise the number of spare parts to be stored by the operator. The range of equipment powered by series PL 912 engines is so comprehensive - including, for instance, construction machinery, loading equipment and conveyors etc. - that large contractors can actually buy a set of machinery powered by matching engines. This will simplify operation and routine maintenance as well as inspection/repair operations after long term service.







### F2L 912/W Lube Oil System

- |  |   |
|--|---|
| 1 pump   | 19 push rod duct (used as cylinder head-to-crankcase oil return pipe) |
| 2 suction pipe   | 20 oil pressure gauge   |
| 3 tube oil pump  | 21 oil filter housing drain plug                                      |
| 4 pressure pipe  | 22 main dash plug   |
| 5 oil filter and filter cartridge Assy. (Full flow type)                                 |   |
| 6 no. 3 main bearing oil duct  |   |
| 7 oil cooler feed pipe   |   |
| 8 oil cooler (to suit engine version)  |   |
| 9 oil feed pipe for no. 3 main bearing, camshaft/timing gears and piston cooling (inlet) |   |
| 10 oil duct for no. 1 main bearing   |   |
| 11 main bearing  |   |
| 12 big end bearing   |   |
| 13 piston cooling spray nozzle   |   |
| 14 camshaft bearing  |   |
| 15 tappet oil duct   |   |
| 16 tappet (with timing groove to pulse-lubricate rocker arm)                             |   |
| 17 pushrod (bolts, used as rocker arm tube oil feed pipe)                                |   |
| 18 rocker arm bearing  |   |







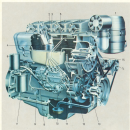
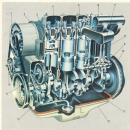
**Cutaway View of Direct Injection F4L, 815 Four Cylinder Engine**

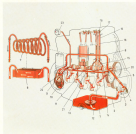
**Exhaust Side**

- 1 cooling fan
- 2 cooling fins
- 3 piston and direct injection type combustion chamber
- 4 light metal cylinder head and inlet/exhaust valve Assy.
- 5 rocker arm
- 6 induction manifold
- 7 exhaust manifold
- 8 pushrod and duct Assy.
- 9 camshaft
- 10 flywheel and ring gear Assy.
- 11 crankshaft and counterweight Assy.
- 12 sump
- 13 tube oil pump
- 14 timing gear train
- 15 cooling fan

**Service Side**

- 1 oil bath type air cleaner and preliminary filter Assy.
- 2 injector
- 3 cylinder head cover
- 4 fitted cylinder head
- 5 block-type oil cooler
- 6 fuel filter
- 7 tube oil filter
- 8 governor and speed control lever Assy.
- 9 clutch
- 10 fuel oil pump
- 11 fuel injection pump
- 12 timing gear train
- 13 tube oil pump
- 14 splanter/steerer
- 15 cooling fan



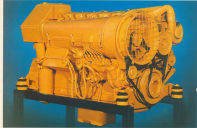


### Lubrication System

- |  |                               |
|--|-------------------------------|
| 1 sump   | 21 piston cooling nozzle      |
| 2 suction pipe   | 22 oil pressure gauge adapter |
| 3 take off pump  | 23 oil pressure gauge         |
| 4 oil pressure control valve   |                               |
| 5 pressure pipe  |                               |
| 6 by-pass pipe or alternative  |                               |
| 7 cooling coil or alternative  |                               |
| 8 stock-type oil cooler  |                               |
| 9 oil filter   |                               |
| 10 safety valve  |                               |
| 11 main oil gallery  |                               |
| 12 main bearing  |                               |
| 13 big end bearing   |                               |
| 14 mainshaft bearing   |                               |
| 15 tappet with timing groove<br>to pulse-lubricate rocker arm            |                               |
| 16 pushrod (holes, used as<br>rocker arm oil feed pipe)                  |                               |
| 17 rocker arm bearing  |                               |
| 18 metering plug (to control<br>valve lubrication)                       |                               |
| 19 pushrod duct (used as<br>cylinder-head-to-chamber<br>oil return pipe) |                               |
| 20 splash hole to lubricate<br>timing gears                              |                               |

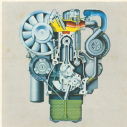






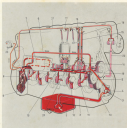
## BP6L 913

### Sectional View of BP6L 913



### BP6L 913 Lube Oil System

- 1 pump
- 2 suction pipe
- 3 oil pump
- 4 oil pressure control valve
- 5 pressure pipe
- 6 oil cooler connecting pipe (by-pass)
- 7 block-type oil cooler
- 8 oil filter
- 9 safety valve
- 10 main oil gallery
- 11 main bearing
- 12 big end bearing
- 13 camshaft bearing
- 14 tapped with lining groove to take 4.0litre rocker arm oil
- 15 drilled (bore, used as rocker arm oil feed pipe)
- 16 rocker arm bearings
- 17 metering plug for control valve lubrication
- 18 ported duct (used as cylinder head-to-crankcase oil return pipe)
- 19 splash hole for timing gear lubrication
- 20 piston cooling spray nozzle
- 21 late oil feed pipe for exhaust turbocharger
- 22 exhaust turbocharger-to-crankcase oil return pipe
- 23 oil pressure gauge



## Combustion Systems

### Direct Injection System

This system injects fuel directly into the combustion chamber. The 4-hole injectors atomize the fuel and distribute the fuel mist in a special piston crown recess where the mist is thoroughly mixed with compressed air that is swirling rapidly inside the cylinder. Spray-type inlet ports produce the gas vortex necessary for complete and "soft" combustion. Direct injection makes for high performance combined with low fuel consumption. The standard injection system is a block-type injection pump, but 2-cylinder units feature integral DEUTZ injection pumps.



### Two Stage Combustion System

This system injects fuel into a hot wall chamber containing only about half of the hot air volume available for combustion. The air deficiency condition existing at the beginning of the pre-combustion phase limits the formation of oxides of nitrogen, thus producing an extremely small quantity of these hazardous emission substances. The pressure increase associated

with pre-combustion will push the partially burnt combustion product into the double wall combustion chamber received in the piston crown where the after-burning process takes place under excess air, but relatively low temperature and high turbulence, conditions, which also limit the formation of oxides of nitrogen, again minimizing the production of these

hazardous emission substances. The division of the combustion process into two stages, in conjunction with a thorough release of fuel and air, does not only tend to reduce carbon deposits, but also tends to minimize hydrocarbon emission substantially, so that the typical Diesel soot associated with direct Diesel injection is eliminated.



### Sectional View of Cylinder and Cylinder Head Assy. showing 2-stage combustion system

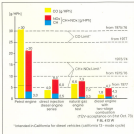
The two-stage combustion module – simply comprising an alternative set of pistons and cylinder heads – makes DUTZ engines extremely pre-environmental by controlling exhaust emission at the source. This type of engine even meets the extreme requirements of the 1977 California Exhaust Emission Control Legislation, as shown by exhaust emission tests carried out by the Airward TLM testing authority. The increasing demand for DUTZ engines featuring two-stage combustion, for applications underground, in enclosed spaces and ultra-industrial centres, clearly shows how successfully the engine design combines economy and environmental protection features.



**Air-Cooled  
DEUTZ Diesel Engines  
- To Clean Up Exhaust  
Emission**

The pollutant levels shown for DEUTZ Diesel engines featuring two-stage combustion - particularly the hydrocarbon and nitric oxide levels - are far below those measured on petrol and even on direct injection Diesel engines - a noticeable improvement in terms of a more agreeable environment. The diagram shows specific pollutant levels measured on various DEUTZ Diesel engines and a typical petrol engine, relative to the limits prescribed by the California 13-mode cycle test.

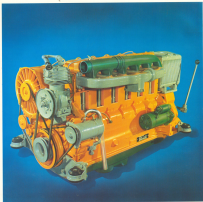
The assets of Diesel engines over petrol engines are clearly shown, and are obviously enhanced by the two-stage combustion system.





### Optional Equipment Range

F5L 570 engine fitted with the following optional equipment: downswirl exhaust pipe, forward induction pipe, glow-plug type starting aid, electric starter, dynamic hydraulic fluid pump, compressor, crankcase ventilation system, hydraulic fluid cooler, clutch, central well type sump, flexible engine mounting.

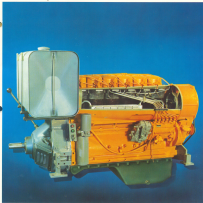


## Versatility

FL 912 engine fitted with the following optional equipment: lateral well type pump; SAE flywheel housing, clutch and instrument panel; fuel tank, oil and fuel filters, governor; rigid engine mountings, open cooling, viewed towards oil cooler.

A standard range of optional equipment is available for series FL 912 engines, as there is for the whole range of air-cooled DEUTZ Diesel engines, which - together with the option of various power take-off facilities make FL 912 engines highly versatile so as to meet the requirements of almost any application in the best possible way, thus causing for the present

trend towards hydraulic steering control systems, converters and hydrostatic drive units as well as hydraulic fluid coolers in a particularly economical way. (optional parts are identified by contrasting colour).



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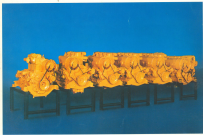
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