

## **New generation of common rail systems from Liebherr with additional installation version**

- New installation version for common rail system 11.2 with pressure feed from above (top feed system)
- The system complies not only with offroad emissions standards Stage IV and Tier 4 final but also onroad standards EURO V and EURO VI
- Start of series production is scheduled for mid-2016

**Bulle (Switzerland) October 2015 – At the trade fair for agricultural machinery and equipment Agritechnica from 8 to 14 November 2015, Liebherr is presenting a new installation version of its pioneering common rail injection system 11.2 as well as a new inhouse developed and manufactured engine control unit, which is planned for series production in mid-2016. The whole system is designed to meet the common offroad emissions standards as well as onroad guidelines EURO V and EURO VI.**

### **New top feed installation version**

At the Agritechnica, Liebherr presents the second generation of the common rail system 11.2 as a new installation version with top feed. Previously, Liebherr had only offered the 11.2 system as a side feed solution through which pressure is introduced on the side of the injector via connectors. With the top feed version, the connections for the pressure lines are located at the top of the injectors, which makes other rail and pressure line positioning options possible. At the same time, an enlarged nozzle variant has been developed with a maximum nozzle flow rate of 2,200 ml/ 30 seconds. The nozzle diameter is 9 mm instead of 7 mm.

With this additional version of the 11.2 system, Liebherr thereby offers its customers more flexibility with regard to system integration and solutions that can be adapted more specifically to the requirements. Depending on the engine geometry and available installation space, the side feed or top feed version can be selected. The development is expected to be ready for series production by mid-2016. It is currently undergoing initial trials in the field.

As with the first generation of the common rail system 11.2, the new generation also covers a performance range of 120 to about 800 kW, in exceptional cases even up to 1,000 kW. The 2-cylinder inline pump with oil-lubricated crankcase delivers up to 300 litres of fuel per hour at 2,200 bar. The injectors supply a maximum full load injection volume of 300 mg with steady multi-point injection. The nozzles can be adapted to the required engine performance from a broad flow rate range. The flow rate range in this case is between 600 and 2,200 ml/ 30 seconds. This broad spectrum makes it suitable for high performance engines as well.

### **Advantages of further-developed Liebherr system**

For generation 2 of the 11.2 common rail system, the advantages of the first generation were kept and further strengthened. The Liebherr injector is therefore still free of permanent leakage. As a result, the amount of fuel returned to the tank and the thermal energy associated with it are reduced considerably and the need for or scope of an additional cooling system is minimised. The remaining switch leakage is less than 40 ml/min under full load. The 3-way control valve enables adaptation of the needle opening speed to each individual engine and, at the same time, realises an extremely fast closing process of the injector needle. In the configuration, therefore, a good balance between the best possible combustion and lowest possible consumption can be realised.

To avoid flow losses, the injector does not have a throttle point between the high pressure connection and the injector needle seat. With an additional, relatively large fuel reservoir volume (mini-rail) in the injector, the pressure loss is minimised from the inlet to the injector seat during injection. By combining these constructive measures, it was possible to reduce the mean drive performance requirement of the high pressure pump considerably.

The revised high pressure pump is still lubricated with oil as opposed to fuel. This makes the service life of the pump independent of the fuel quality. Thanks to the optimum lubrication, the mounting is very sturdy and allows relatively high system pressures to be achieved even at low speeds. The design of the pressurisation pump allows for an inner rotor (G-rotor). It is distinguished by high suction, particularly in the start-up phase. The

main delivery pump with eccentric drive contributes towards the excellent smooth running properties.

### **New ECU3 control unit**

The engine control unit ECU3 has been completely revised for the new generation of 11.2 common rail systems. As an all-in-one system, it comprises all control functions, not only for the engine but also for exhaust gas after-treatment. As such, it ensures compliance with the common offroad emissions guideline Stage IV and Tier 4 final as well as the onroad regulations Euro V and ISO Euro VI. Besides the ECE R10 regulation, the Liebherr control unit fulfils the specifications of many other relevant standards, among them ISO 26262 and ISO 13849 for functional safety.

The ECU3 control unit features freely programmable I/O customer interfaces and supports internationally common communication protocols like J1939, XCP and UDS. Thanks to the optimised cooling concept, air cooling is adequate for most applications. For higher temperatures, fuel cooling is possible for the housing. The ECU3 system is suitable for the toughest of environmental conditions and has a long service life.

### **Development of common rail injection systems at Liebherr**

At the start of 2013, Liebherr presented the first version of its inhouse developed common rail injection system, which at that time had already proven its worth for a year in its own engines of emissions stages IIIB and Tier 4i in series production. Since then the range of products in the area of injection systems has been further developed and enhanced to meet the requirements of emissions guidelines Stage IV and Tier 4f. By mid 2014, a further step was taken in the market with the launch of the common rail injection system 11.5 for engines with up to 5 litre displacement per cylinder and an output of 220 kW per cylinder. While the 11.2 system is also used in its own engines, the 11.5 system was designed mainly for customers outside the Liebherr Group. Liebherr also plans to replace the first generation of the 11.2 system by mid 2016 with a further-developed version featuring a continual rail for inline engines and a new pump design.

## **Captions**

liebherr-common-rail-system-top-feed-300dpi.jpg

The new generation of Liebherr common rail system is available not only as a side feed but also as a top feed version.

liebherr-common-rail-system-injector-300dpi.jpg

The injectors of the new generation of common rail systems from Liebherr are also suitable for high performance engines owing to their large flow rate range between 600 and 2,200 ml/30s.

liebherr-engine-control-unit-ecu3-300dpi.jpg

As an all-in-one solution, the new Liebherr ECU3 engine control unit comprises all control functions for the engine and also for exhaust gas after-treatment.

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