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Press release

New cylinder pressure sensors from Kistler for monitoring and combustion optimization of large engines

The new piezoelectric cylinder pressure sensors (Type 6636A2 and 7636A2) from Kistler are designed for use in closed-loop combustion control (CLCC) for monitoring and combustion control of slow-running large engines.

Winterthur, May 2025

Closed-loop combustion control (CLCC) guarantees optimal operation of large engines, in particular slow-running engines like those used in the shipping industry. Kistler is introducing a new generation of piezoelectric cylinder pressure sensors for continuous combustion control that feature an extremely robust design, a high degree of temperature stability and pressure resistance, and highly precise measurement results. The sensors have an extremely long service life and provide the electronic control system with the data base for continuous optimization of combustion processes. This, in turn, reduces fuel consumption and therefore the emission of harmful substances and particles. The new cylinder pressure sensors are designed for operation with both conventional fuels and future fuels such as hydrogen, ammonia and methanol.

Cylinder pressure sensors for use in large engines must meet special requirements. With the new pressure sensors (6636A2 and 7636A2), Kistler is raising the bar in this sector. Compared to their tried-and-tested predecessor models (6613CG2/7614CG2), these sensors have maintained a high degree of resistance to temperatures of 350°C while also dynamically expanding the overload range to 450 bar. This new generation of piezoelectric cylinder pressure sensors for slow-running large engines is therefore ideally prepared for new engine generations and the use of future fuels. The new sensors are also equipped with high-quality Kistler PiezoStar crystal technology, which is up to five times more sensitive than quartz. PiezoStar crystals offer excellent measurement stability at nearly any temperature. Continuous operation of the sensors for combustion monitoring in large engines requires an extremely robust design. Conventional plug connections for signal transmission have been replaced by welded connections, making the sensors far less sensitive to vibrations and guaranteeing significantly more stable transmission of measured values. Moreover, the unique anti-strain design of the new cylinder pressure sensors offers superior stress resistance.

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Cylinder pressure sensors extend the service life of large engines

The use of cylinder pressure sensors can significantly extend the service life of slow-running large engines like the ones installed in container ships, thus playing a key role in sustainable operation. The cylinder pressure sensors monitor parameters such as cylinder pressure, time of combustion and knocking. The measurement results are fed into the closed-loop control circuit (CLCC) for combustion analysis. The electronic engine control intervenes in real time, adjusting the engine to balance the combustion processes in all cylinders. This decreases the mechanical strain on the engine, improves fuel efficiency and reduces emissions.

Combustion optimization in large marine engines to achieve (IMO) climate goals

In the medium term, large engines will have to continue to rely on combustion technology. At the moment, the majority of all large marine engines are still operated with heavy fuel oil; however, alternative fuels (future fuels) like LNG, ammonia and methanol are increasingly being used – either exclusively or in hybrid operation. Moreover, tests in which hydrogen is used to fuel slow-running large engines are currently underway. The 175 member states of the International Maritime Organization (IMO), a specialized agency of the United Nations, have made it their goal for international shipping to achieve net climate neutrality by around 2050. For that reason, it is essential to use advanced technology to reach both intermediate targets and the end goal. With the help of measurement technology – like cylinder pressure sensors from Kistler – the fuel consumption of marine engines can be reduced by around 1.8%. Carbon emissions are reduced proportionally. For example, a large marine engine would emit an average of 2,000 (metric) tonnes less CO_2 in one year. Roughly 10,000 ships around the world are equipped with cylinder pressure sensors from Kistler, which help these ships to cut around 20 million tonnes of carbon emissions annually.

High-precision cylinder pressure monitoring for different engine types

The new generation of cylinder pressure sensors (6636A2 and 7636A2) for high-precision measurements on slow-running large engines are replacing the previous sensor generation (6613CG2 and 7614CG2). The sensors 6636A2 and 7636A2 are identical in terms of technical parameters; the only difference is the respective dimension of the sensor body and the installation thread. In addition to these sensor types, which are designed for installation in two-stroke large engines, Kistler also offers a sensor (6635A1) that is designed for use in four-stroke large engines.

You can find all further information on the cylinder pressure sensors 6636A2 and 7636A2 here:

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Image material (please name the Kistler Group as picture source)

The cylinder pressure sensor 6636A2 for cylinder pressure monitoring in slow-running two-stroke large engines is designed for a temperature range of up to 350°C. Compared to its predecessor models, the new sensor's overload range has been expanded to 450 bar. Thanks to welded connections and anti-strain design, it is extremely robust and resistant to vibrations.

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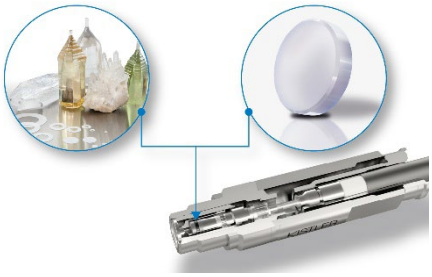
Combustion optimization can be carried out on different kinds of large engines. The cylinder pressure sensor 6636A2 has a smaller sensor body and an M10 installation thread; the sensor Type 7636A2 is fitted with an M14 thread. The sensor (6635A1) for use in four-stroke large engines is pictured on the right.

Closed-loop combustion control (CLCC) guarantees greater combustion efficiency during operation of large engines. Continuous monitoring of cylinder pressure using pressure sensors from Kistler is the key element in the optimization of combustion efficiency. It extends the service life of the engine, reduces fuel consumption and lowers emissions.



PiezoStar crystal technology from Kistler replaces the quartz crystals conventionally used in piezoelectric cylinder pressure sensors. PiezoStar crystals are up to five times more sensitive than quartz, offer excellent measurement stability and are virtually temperature independent. This technology is raising the bar in terms of measurement accuracy.

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About the Kistler Group

Kistler is the global market leader for dynamic pressure, force, torque and acceleration measurement technology. Cutting-edge technologies provide the basis for Kistler's modular solutions. Customers in industry and scientific research benefit from Kistler's experience as a development partner, enabling them to optimize their products and processes so as to secure sustainable competitive edge. Unique sensor technology from this Swiss corporation helps to shape future innovations not only in automotive development and industrial automation but also in many newly emerging sectors. Drawing on our extensive application expertise, and always with an absolute commitment to quality, Kistler plays a key part in the ongoing development of the latest megatrends. The focus is on issues such as electrified drive technology, autonomous driving, emission reduction and Industry 4.0. Some 2,000 employees at more than 60 facilities across the globe are dedicated to the development of new solutions, and they offer application-specific services at the local level. Ever since it was founded in 1959, the Kistler Group has grown hand-in-hand with its customers and in 2024, it posted sales of mCHF 448. About 9 percent of this figure is reinvested in research and technology – with the aim of delivering innovative solutions for every customer.

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