

Press release

Low-noise and flexible laboratory measurements

Kistler presents its first differential charge amplifier with flexible signal processing for high-temperature sensors

Winterthur, December 2024

Kistler presents the first differential charge amplifier for piezoelectric pressure sensors and accelerometers that combines the advantages of differential measurements with maximum flexibility for signal processing. The new charge amplifier is especially suitable for dynamic measurements at high ambient temperatures – for example in the design of more efficient aircraft turbines, the advancement of gas turbines for the use of hydrogen, or for identifying combustion instabilities in rocket engines.

Flexibility is king when it comes to measurement equipment, particularly in laboratory environments. For piezoelectric pressure and acceleration measurements at very high temperatures, differential measurement technology is indispensable. It reliably eliminates noise interference, caused, for instance, by vibrations of nearby machines (ground loops) or long cables. Suitable sensors and charge amplifiers have been in use for some time. However, the latter were limited in their flexibility by fixed filter settings. Especially when testing new developments with unknown frequencies, differential measurement equipment often came with the additional effort of repeatedly adapting the test setup.

Differential charge amplifier with flexible signal processing for various measuring ranges

The LabAmp 5166A charge amplifier from Kistler features adjustable digital filters to overcome this challenge. The differential amplifier covers an exceptionally wide charge and frequency bandwidth of 10 to 54,000 pC and 0.5 to 50,000 Hz, so users only need a single charge amplifier. A very high sampling rate (up to 200 kSps at 24-bit data acquisition) ensures detailed results, even for highly dynamic measurements. Its high-pass, low-pass, and notch filters can be individually adjusted. All settings for signal processing can be easily changed via a user-friendly web interface (web UI).

LabAmp 5166A provides four channels for connecting differential piezoelectric sensors. The processed measurement data is available either via flexibly scalable analog outputs or as a digital signal that enables direct evaluation in appropriate analysis software such as jBEAM from Kistler. For larger measurement setups, multiple LabAmps can be combined and synchronized with Precision Time Protocol (PTP). In this case, users can adjust settings for all charge amplifiers via the Kistler

KiStudio Lab software. A REST API is also available, allowing the differential charge amplifier to be integrated into user-specific software.

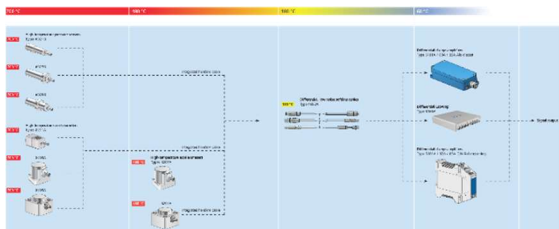
Reliable results with differential measurement technology

In differential measurement technology, signal transmission occurs not through a single signal consisting of an absolute value, but through two signals. The measured value is the difference between these two potentials. This approach is much less susceptible to interference. However, all components must be specifically designed for differential technology. Differential measurements are used particularly in demanding areas where reliability and high resolution are crucial, as well as in environments with high electromagnetic interference.

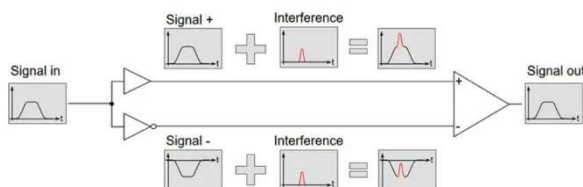
Image material (please name the Kistler Group as picture source)



The differential charge amplifier LabAmp 5166A from Kistler offers maximum signal processing flexibility for differential piezoelectric measurements.



Fully differential measuring chains are highly resistant to electromagnetic interference. Combined with high sensitivity and low-noise electronics, they enable precise detection of very small measurement signals, even in high-temperature environments and under challenging EMC (electromagnetic compatibility) conditions.



Signal transmission in differential measurement technology using a measuring chain: The difference between the two signals that are distorted by interference corresponds to the transmitted signal (Signal Out). This signal is unaffected by disturbance values, ensuring precision and distortion-free performance.

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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 owner-managed 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 2,200 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 2023, it posted sales of CHF 465 million. About 9% of this figure is reinvested in research and technology – with the aim of delivering better results for every customer.