

KISTLER

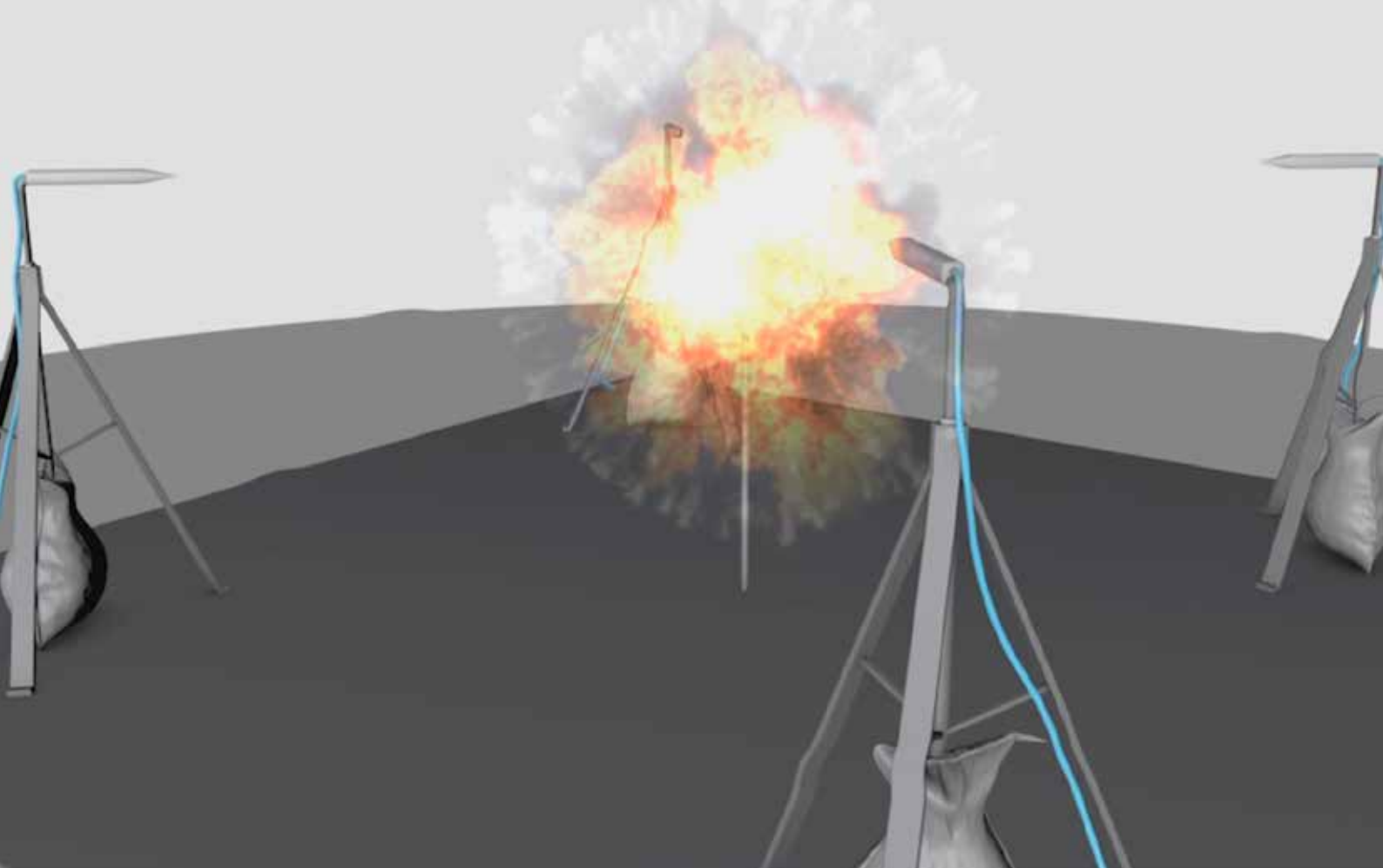
measure. analyze. innovate.



**Reliable Air Blast
Testing Solutions
for Extreme
Environments**

Blast Pressure Measurement

Sensors and Accessories for Accurate Detection
of Blast Pressure Profiles



Schematic of free-field blast testing setup with pencil probes on tripod fixations

Meeting the Highest Requirements – Air Blast Testing with Pencil Probes from Kistler

Measurements of pressure waves in explosions provide knowledge that is crucial in the fields of energetics research, safety engineering and testing of protective vehicles and structures.

Free-field Blast Testing

Both energetic materials chemists and shockwave physicists perform free-field blast tests to study explosions. Based on the measurement of blast pressure profiles, they can analyze the chemical reaction and the propagation of the resulting shockwave. Such data are also required for the validation of computational models of explosive processes. Pencil probes from Kistler deliver highly reliable data in every environment.

Blast Impact Testing

Blast-protected vehicles and buildings are designed to ensure the safety of their occupants in case of explosions. During blast impact tests, protective structures are subjected to detonations. Dummies equipped with piezoelectric acceleration and force sensors are used to estimate the resulting injuries due to the effects of blast waves. Additionally, blast pressure sensors are used to measure the blast pressure magnitudes outside as well as inside

the protective structure. Such combined data provide a thorough understanding of the protective performance and the requirements for improvement.

Explosive Ordnance Disposal

The disposal of explosive devices, such as land mines, bombs and explosive munitions is frequently done by a controlled detonation. Such disarmament operations must be conducted without putting the involved personnel and the surroundings at risk. Pencil probes are used to monitor the blast pressure levels.

Testing of Industrial Safety Technology

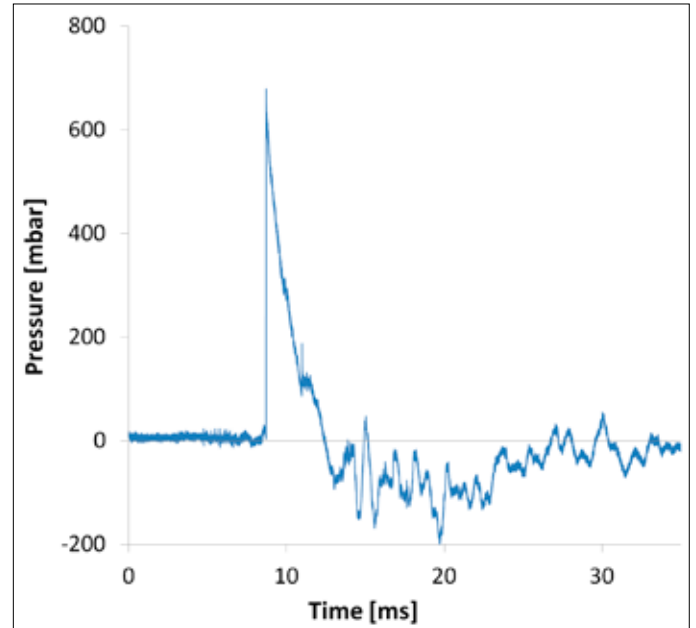
Numerous industrial processes result in potential hazards due to explosive liquids, gases or powders. Safety systems such as relief valves are designed to mitigate the destructive effects of a detonation. The development and testing of such components often requires highly dynamic and reliable blast pressure measurements.

Benefits

- Signals with high pressure and time resolution
- Transmission of voltage signals enables long cable lengths
- Practical accessories ensure user-friendly operation



Pencil probe Type 6233A... measures side-on blast pressure



Typical pressure profile resulting from free-field blast test

Pencil Probe

Pencil type blast sensors are most effectively used in testing scenarios where the direction of shock wave propagation is clearly defined. The characteristic pencil shape minimizes the influence of the sensor geometry on the blast wave propagation and the measured pressure signal. Type 6233A... is pointed radially towards the center of the explosion and effectively measures the side-on pressure of the propagating blast wave. It is available with measuring ranges from 0 ... 25 psi, 50 psi, 250 psi, 500 psi and 1 000 psi. With its rugged design, acceleration compensation and minimal bending sensitivity, it is tailored to provide very accurate pressure signals even in very hostile environments.

Fixations

In order to obtain reliable blast pressure measurements, a suitable fixation needs to provide accurate alignment and support of the pencil probe, as well as damping against ground shocks. A mobile

tripod fixation may be used for small detonations or at larger distances when measuring big detonations. Tripod adapter Type 6550A10 features a standard ¼-inch UNC thread which is compatible with most commercial tripods. For large detonations or in close proximity to the charge, a fixed pipe installation is recommended. The pencil probe may be fixed to an extension pipe using pipe adapter Type 6550A20 featuring an M22x1 thread.

Thermal Protection Foil

In close range of an explosion, the pressure sensor membrane is subjected to considerable infrared irradiation. The resulting deformation of the membrane leads to a distortion of the pressure signal. Thermal protection foil type 1911AAA10 is designed to reduce this thermal shock by a factor of 10. This leads to a minimal and reproducible increase of the sensor sensitivity by only 2%.

Triggering and Detonation Time

Knowing the exact detonation time is important for calculation of the blast wave propagation velocity as well as for triggering the measurement. Trigger box Type 2525A04 is connected to a trigger wire which is wound around the explosive charge. As soon as the charge detonates, the trigger wire breaks and the trigger box produces a voltage step of 1 V.

Refer to the data sheet and manual of pencil probe Type 6233A... for further information regarding all the accessories.

Key Features

- Integrated sensors with a high resonance frequency and segmented ranges
- High sensor sensitivity up to 200 mV/psi
- Integrated impedance converter electronics (IEPE)
- Complementary accessories portfolio for pencil probe fixation, thermal protection and triggering

Kistler Group

Eulachstrasse 22
8408 Winterthur
Switzerland
Tel. +41 52 224 11 11

Kistler Group includes the Kistler Holding AG and
all its subsidiaries in Europe, Asia, Americas and Australia.

Find your local contact on
www.kistler.com

KISTLER
measure. analyze. innovate.