

VTT

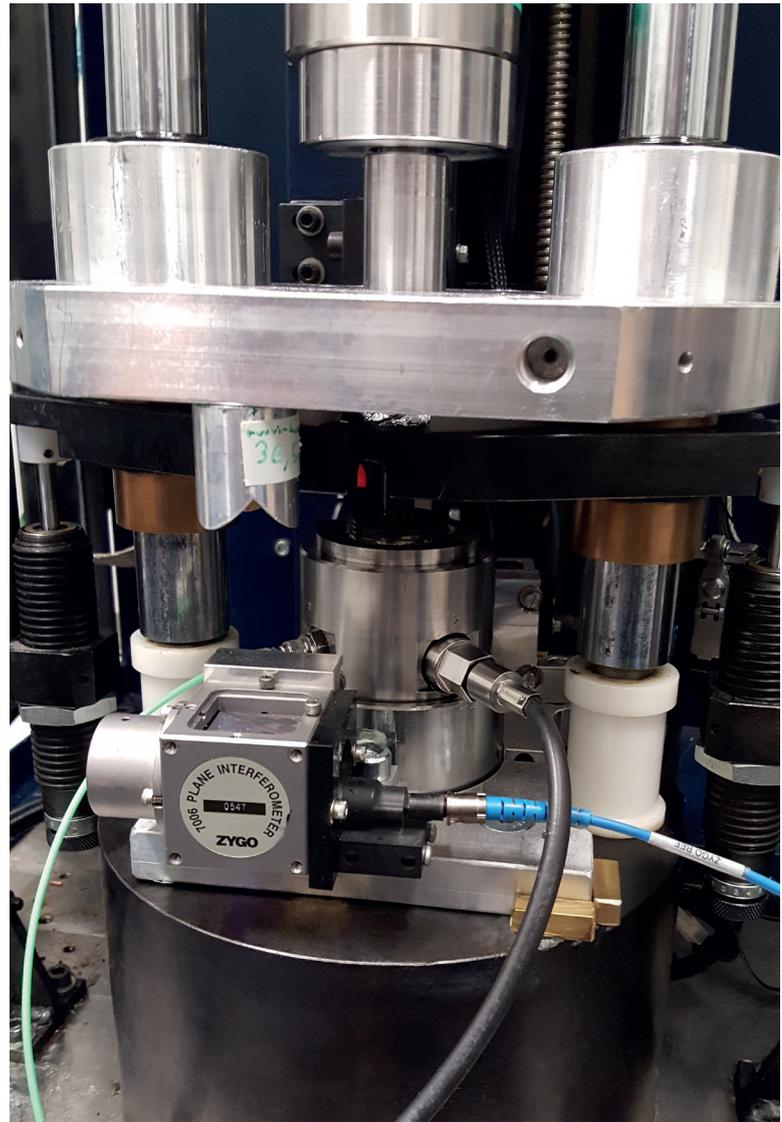
State-of-the-art dynamic pressure calibration solutions

beyond the obvious

The bottom half of the page features an abstract geometric design. It consists of several overlapping shapes: a large orange trapezoid on the left, a dark blue trapezoid on the right, and a light grey shape at the top center that tapers downwards. At the bottom, a light grey semi-circular shape is partially visible, overlapping the other shapes.



Dynamic pressure calibrator



Primary dynamic pressure standard

Introduction

Dynamic pressure measurement is a key requirement for modern process control in several demanding applications, such as automotive, marine and engine power plants, manufacturing, ammunition, explosives, and mechanical safety testing. However, the current practice to calibrate dynamic pressure sensors only in static conditions significantly limits the achievable measurement accuracy — errors up to 10% might occur!

VTT MIKES has developed technologies for calibrating pressure sensors at dynamic conditions to improve accuracy of measurements. Now, VTT is offering this technology to customers in the form of a dynamic pressure calibrator for day-to-day use in industry and a primary standard for National Metrology Institutes (NMI) and high-end calibration laboratories where the best achievable accuracy is required.

Dynamic pressure calibrator

VTT dynamic pressure calibrator enables cost-effective calibration and testing of dynamic pressure sensors. The calibrator generates pressure pulses in the millisecond range up to 350 bar and includes a heating option to enable calibrations at temperatures up to 200 °C — a unique feature not available in commercial calibrators. This makes the calibrator an ideal solution for calibrating dynamic pressure sensors used in harsh conditions, e.g. inside combustion engines. SI traceability of the calibration results is established through a reference sensor calibrated against VTT MIKES dynamic pressure standard.

Primary dynamic pressure standard

VTT has developed unique technology to establish a primary method for realizing SI traceability for dynamic pressure measurements. The method is based on laser interferometric measurement of the acceleration of an impact mass as it hits the piston of a piston-cylinder assembly, giving rise to a pressure pulse inside the liquid filled measurement chamber. This technology provides the most accurate dynamic pressure calibrations currently available, and thus it is an ideal solution for NMIs, high-end calibration laboratories and applications where the best accuracy is required.

Dynamic pressure calibrator performance

Pressure range	0–350 bar
Pressure pulse duration (half sine)	1–2 ms
Calibration temperature	20–200°C
Measurement traceability	Reference sensor ¹
Measurement uncertainty (k=2)	2%

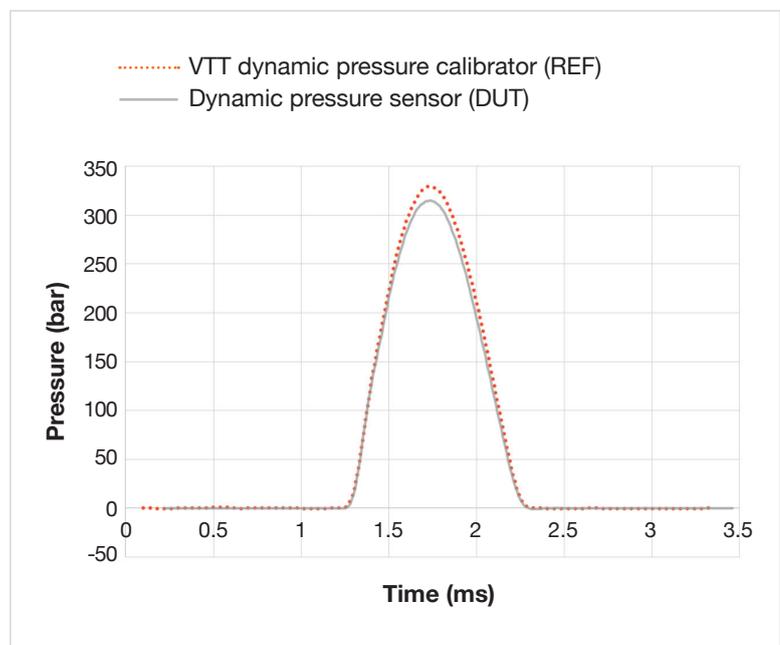
¹ SI traceable calibration using VTT MIKES dynamic pressure standard

Primary dynamic pressure standard

Pressure range	0–1000/6000 bar ¹
Pressure pulse duration (half sine)	1–2 ms
Measurement traceability	Laser interferometry ²
Measurement uncertainty (k=2)	1.5%

¹ Pressure range is customized according to customer needs

² SI traceability through primary measurement of impact mass acceleration



Example of measured pressure signals

VTT is a visionary research, development and innovation partner for companies and the society. We bring together people, business, science and technology to solve the biggest challenges of our time. This is how we create sustainable growth, jobs and wellbeing and bring exponential hope.

We promise to always think beyond the obvious.

Get in touch with us:

Richard Högström
Research Team Leader
+358 50 303 9341
richard.hogstrom@vtt.fi

Kaj Nummila
Solution Sales Lead
+358 40 758 7461
kaj.nummila@vtt.fi