



Schematic diagram of the frame used to divert the load transmission device from tensile forces to compression forces and vice versa

### Advantages

- **Measurement of tensile and compressive forces in one set-up**
- **No adaption required**
- **Measurement scenarios with zero crossing**
- **Requires only one air-conditioned testing chamber**

## Force measuring machine for tensile and compressive forces

Force measuring machines measure either tensile or compressive forces; they have to be modified when switching between these two operating modes. PTB's new diversion device makes these adaption times redundant. This enables novel and faster calibrations also over the full range of tensile and of compressive forces with zero crossing. Another advantage, e.g., in the case of high-precision measurements, is that only one air-conditioned testing chamber is required which is used both for tensile and for compressive measurements. The diversion principle can be used for force measuring devices with direct deadweight effect, with lever or hydraulic transmission, with reference transducers and other principles, but also for material testing machines.

The diversion device is equipped with three crossheads which can be displaced, so that the force measuring machine can measure loads induced by tensile forces and by compressive forces within one and the same set-up. Another design also allows force diversion to be realized via a bearing. First, the compressive force is generated in the force generation clearance by means of the deadweights. Then, a tensile force is generated by diversion via an appropriate inversion principle.

### Economic Significance

Based on the new diversion device, innovative force measuring machines can be designed, also for applications with zero crossing; they will provide calibration laboratories in research and industry as well as other NMIs with new, application-oriented calibration capabilities.

### Development Status

PTB is currently developing this invention into a prototype. A patent application has been filed. Licenses for the utilization of this new method are available.

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