



Force Machine of 100 kN and 1 MN.



Force Machine of 5 kN.

The Laboratory for Force is responsible for the National Standards of Force providing the following additional services:

- Dissemination of the unit of force;
- Calibrations;
- Participation and coordination of international laboratory comparisons;
- Technical support for legal metrology.

Derived unit of the International System (SI) of the quantity Force (F):

newton (N) defined as:

The amount of force required to give a one kilogram mass an acceleration of one meter per square second.

Force Quantity

The traceability to the SI Unit of the Laboratory for Force is assured by the calibration of the standards. The Laboratory for Force gets its traceability from PTB (Germany).

The Laboratory for Force of IPQ has the force National Standards.

The practical realisation of the unit of force makes use of known masses, which subjected to the effect of local gravitational force exert a known force on an earth located support.



The mechanical structure to handle and control such masses is known as a **deadweight machine**.

Force is therefore a *derived* quantity, with dimensions of length (L), mass (M), and time (T).

This can be illustrated from the fundamental equation:

force = mass \times acceleration

Calibration

MEASURAND	MEASURING INTERVAL	EXPANDED UNCERTAINTY ($k=2$)	CMC (CIPM-MRA)
force	50 N to 5 kN	$2 \cdot 10^{-5}$	
	5 kN to 100 kN	$2 \cdot 10^{-5}$	
	100 kN to 1 MN	$1 \cdot 10^{-4}$	-----

Metrological Control

EQUIPMENT	TESTS	LAWS
Load Cell	Pattern Approval	Not applicable

INSTITUTO PORTUGUÊS DA QUALIDADE (Portuguese Institute for Quality)

Rua António Gião, 2; PT-2829-513 Caparica

FORCE LABORATORY

Head: Eng.^a Isabel Spohr

Tel +351 212 948 173 E-mail: ispohr@ipq.pt