

Dead Weight Tester

PD 2500

Hydraulic version

Pressure range 25 – 2500 bar (high pressure version)

Application

- High-precision primary standard (comparison standard)
- Reference device for calibration services, gauging offices and laboratories
- Suitable for testing, adjusting and calibrating pressure measuring instruments without using an external reference device

Construction

The main components are measuring system, hand pump, valve units, spindle unit for fine adjustment of the pressure and set of weights.

The measuring system consists of a fine lapped piston / cylinder pair. The weight-loaded piston is pressed down by the local gravitation of the weights. From below the test pressure, which is generated and adjusted by the spindle pump or hand pump, acts towards the piston surface area. This test pressure is increased until the hydraulic force of the medium on the piston surface area (acting from below) compensates the weight force of the piston / weight system and the equilibrium of forces is reached. During this state of equilibrium, the piston floats freely in the cylinder.

In order to simplify the handling, the weights are already standardised to the specific determined piston surface area and the local gravitation at the installation site. The set of weights is available discretely graduated in different pressure units (bar, Pa, psi).

Piston and weights are kept rotating with a motor while floating in order to minimise the influence of static friction of piston and cylinder and therefore to guarantee a sensitive discrimination threshold.

The dead weight tester described herein operates in a range from 25 to 2500 bar.

Specialties

Due to the high accuracy of the dead weight tester, the influence of the gravitational acceleration is not negligible. A requirement for an official verification is the calibration of the dead weight tester with the gravitational acceleration at the installation site. Thus, this value needs to be specified when placing the order. A calibration for the installation site is recommended without official verification as well.

Without specification of the gravitational acceleration, the dead weight tester is calibrated with the value at the manufacturing site ($g_{Hst} = 9.80968 \text{ m/s}^2$). Then, the measuring values need to be converted at the installation site for the compliance with the accuracy class.

Standard Versions

Set of Weights

In bar / MPa

Pressure Range

Basic load	25 bar
Main measuring range	250 – 2500 bar
Required admission pressure air	6 bar
Admission pressure attainable with hand pump	1600 bar



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Reference Condition for the Guaranteed Accuracy

Ambient temperature $+20 \text{ °C} \pm 2 \text{ °C}$ ($+68 \text{ °F} \pm 3.6 \text{ °F}$)

Accuracy (factory calibration)

Standard $\pm 0.05 \%$ of the measured value¹⁾
Enhanced $\pm 0.02 \%$ of the measured value¹⁾

Medium

Special oil

Nominal Piston Cross-section

0.02 cm²

Rotation of the Weights

By electric drive (230 – 240 V AC / 50 Hz / 3 W)

Connection

High-pressure connection $\frac{3}{8}$ " HPF-M20x1.5 with 2 adapters for G $\frac{1}{2}$ " and M20x1.5 (union nut)

Connection for External Compressed Air

Plug connection (Prestolock) for PA hose N4x1, with adapter for N6x1

Case

Aluminum case, grey enamelled (self-supporting cover), 3 adjustable feet for precise horizontal alignment according to integrated circular level

Case Dimensions incl. Star Handle / Hand Pump (L x W x H)

600 x 500 x 450 mm (23.62 x 19.69 x 17.72")

Approx. Weight

Dead weight tester	48 kg (105.82 lb)
Set of weights	56 kg (123.46 lb)
Device packaging	41 kg (90.39 lb)
Transport case set of weights	9.2 kg (20.28 lb)

¹⁾ in the main measuring range, the accuracy refers to the measured value; in the secondary measuring range, it refers to 250 bar

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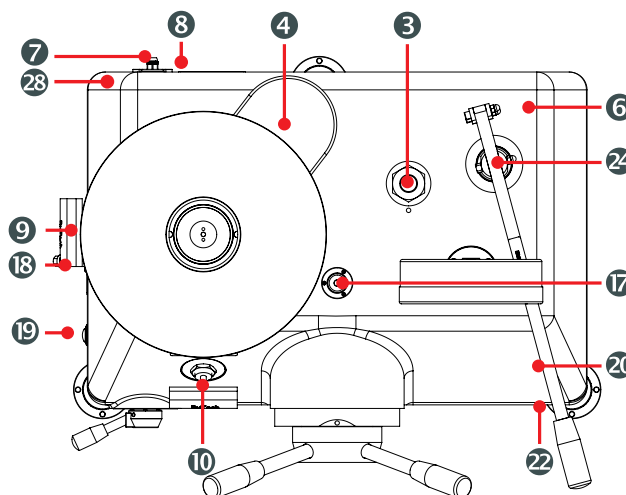
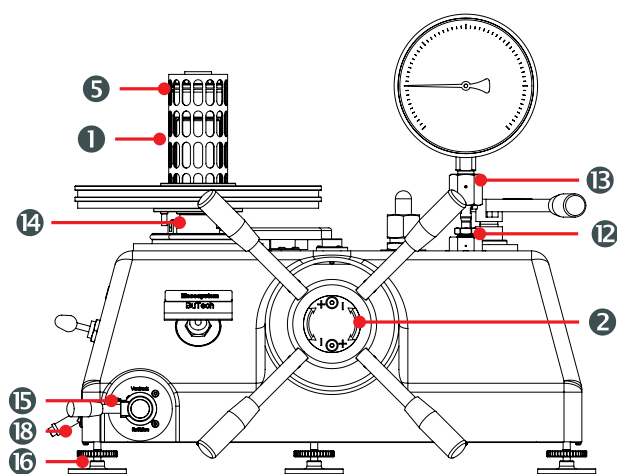
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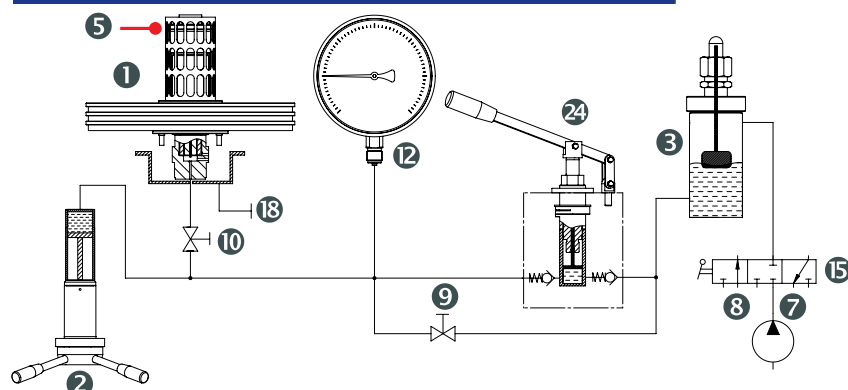
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Technical Drawings



Schematic Drawing



- | | | | | | |
|---|--|----|--|----|---|
| 1 | Measuring system | 9 | Valve "Pressure compensation / Druckausgleich" | 16 | Adjustable feet |
| 2 | Spindle pump with star handle | 10 | Stop valve "Measuring system / Messsystem" | 17 | Circular level |
| 3 | Oil reservoir (medium) | 12 | Test connection | 18 | "Oil drain / Ölablass" (overflow of the system) |
| 4 | Electric drive | 13 | Union nut (AF 32) | 19 | Switch electric drive |
| 5 | Reading device (mirror) | 14 | Base plate (basic type) | 20 | Calibration plate (for accredited calibration) |
| 6 | Case | 15 | Change-over valve for external admission pressure ("Admission pressure / Vordruck", "Closed / Zu", "Vent / Entlüften") | 22 | Nameplate |
| 7 | "Connection admission pressure / Anschluss Vordruck" | | | 24 | Hand pump |
| 8 | "Ventilation admission pressure / Entlüftung Vordruck" | | | 28 | C14 inlet |

Options

- Inspection certificate 3.1 according to DIN EN 10204 on the accuracy
- Accredited calibration or DKD approval¹⁾
- Compressed air driven liquid pump up to 1000 bar instead of hand pump
- Hose N 4x1 for Prestolock
- Connection 1/2" NPT (union nut)

Special Versions Upon Request

- Set of weights in kp/cm², psi; other weights
- Adapters for other connection threads
- Higher accuracy 0.015 %

Scope of Delivery

The delivery includes – in addition to the dead weight tester and the set of weights in a transport case:

- 1 operating instruction
- 1 l special oil (medium)
- 1 protective cover
- 1 connection for G 1/2 (union nut)
- 1 connection for M20x1.5 (union nut)
- 4 O-rings as spare parts
- 2 adapters for N6x1 (admission pressure connection)
- 1 plug for oil drain (mounted)
- 1 mains cable

Ordering Information

Please specify in your order:

Basic model PD 2500
Options see options

Example PD 2500
 accuracy 0.02 %
 connection 1/2" NPT
 gravity acceleration at the installation site
 test report 2.2

¹⁾ see section Specialties