Dead Weight Testers

Pressure Ranges 10 to 600 bar and 10 to 1000 bar

Models **PD 600**
PD 1000

Dead weight testers are used for examination and calibration of pressure gauges and other pressure measuring instruments without using an external instrument. The main components are the measuring system, the valve unit, the built-in screw pump for accurate pressure adjustment and the weights.
The measuring system itself consists of a precise lapped-in pair of piston and cylinder. During the measuring process the piston is forced up by the pressure produced with the built-in screw pump and eventually with additional external pressure supply, while the regular weights and maybe further extra weights, if required for the desired test pressure, press it down.
With the built-in screw pump the test pressure can be adjusted to an equilibrium of the forces. When the forces on both sides of the piston are in balance, the piston will be floating, and the desired test pressure is reached exactly.

For simplifying the handling, the weights are already refered to each relevant determined piston area and stamped with the pressure unit (bar/MPa). When indicating the place of installation these are being corrected (3.1 certificate)
The friction between piston and cylinder is minimized by keeping piston and weights rotating while floating.

The models described in this data sheet are available for pressure ranges 0.25 to 60 bar (PD 60) resp. 0.25 to 100 bar (PD100).

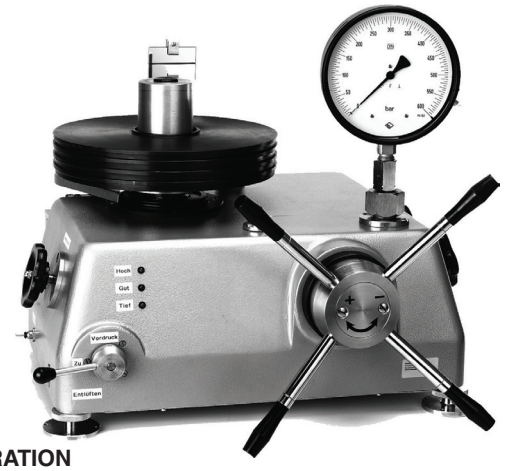
Technical data

- Pressure ranges PD 600 10 bis 600 bar
  PD 1000 10 bis 1000 bar
- Set of weights in bar / MPa
- External pressurised air supply up to max. 10 bar recommemded for a fast filling of the system
- Accuracy of the adjusted examination pressure: better 0.05 % resp. 0.03 % (with official verification) or 0.02 %-DKD[1)] referred to the effective pressure. Up to 60 bar the maximum error is constantly ± 30 mbar (at 0.05 %) resp. ± 18 mbar (at 0.03 %/0.02 %).
- Reference conditions for the granted accuracy:
  ambient temperature + 20 °C ± 2 °C
  acceleration of fall = 9.80968 m/s²
- Dimension of the crosssection of the measuring unit: 0.5 cm² ± 0.2 %
- Rotation of the weights: by electrical drive (220 VAC/50 Hz/45 mA)
- Connection for pressure gauges: one clamping sleeve G ½ and M 20x1.5 each
- Connection for external pressurised air: plug connection (Prestolock) for PA tube 4 x 1, with expansion plug for N 6 x 1
- Medium: special oil
- Case: grey-painted Al-case (self-supporting cap), 3 machine mounts for the exact horizontal positioning according to installed circular level
- Case dimensions including star handle:
  PD 600: 490 x 480 x 330 mm (L x W x H) (19.29" x 18.9" x 12.99"),
  PD 1000: 490 x 480 x 400 mm (L x W x H) (19.29" x 18.9 "x 15.48")
- Required working surface: 520 x 450 mm (20.47" x 17.72")

• Weights: (approx.)	**PD 600**	**PD 1000**
Dead weight tester	34 kg	36 kg
Sets of weights	36 kg	56 kg
Transport box	21 kg	21 kg
Transport boxes for sets of weights	4 kg	4+4 kg

PD 600: 1 box
PD 1000: 2 boxes

SPECIAL VERSIONS
- Set of weights in kp/cm², other sets of weights upon request
- Test certifictate 3.1 EN 10 204[1)]
- Official verification or DKD[1)]



OPERATION

ATTENTION !
During transport and moving please touch the dead weight tester only at the case, by no means at the measuring unit. This could lead to serious injuries.

Please do not tilt the instrument, as the oil tank (3) is filled. Should oil leak from the tank, it has to be refilled according to the instructions.

PUTTING INTO OPERATION
The dead weight tester and the sets of weights are supplied in separate wooden transport boxes. Please release the transport screws before taking the instrument out of the transport boxes and place the instrument at the work station. Adjust the instrument by the circular level. The machine mounts have orifices for mounting to the work station. Screw in the clamp handles in the helicoidal gear pump head.

Before putting the oil tank (28) into operation, it has to be filled with the supplied oil up to the rim of the bleeder.
For this please remove the seal (24) and the base plate (14).

Insert the supplied plug into the connection (21).
Plug in the motor.

CONNECTION OF THE ADMISSION PRESSURE
The admission pressure connection happens optionally via PA-tube M 4 x 1 or with expansion plug for N 6 x 1 to plug connection (7) (Prestolock). To protect the dead weight tester against impurities an air control unit consisting of pressure regulator and filter (pores Ø 10-20 µm, with oil and water separator) has to be placed into the connecting tube between admission pressure and the dead weight tester for contamination protection of the dead weight tester (The filter is not part of standard supply!).
The pressure regulator has to be limited to 10 bar (150 psi).

REFILLING OF THE OIL RESERVOIR (3)
The instrument is being supplied in a filled condition. Oil must be refilled immediately when the red float stick is no longer visible through the window of the oil column. Use only the special oil included to shipment respectively re-ordered oil, which will be delievered upon request! For refilling the change-over valve (18) has to be switched to "Entlüften" (vent). Close the admission pressure valve "Vordruck" (9). Close the change-over valve (18) by turning the lever to the tag "Zu". Remove the union nut and the acrylic cap from the reservoir and fill in the oil up to the rim while pressing down the float. Close the reservoir. Open the admission pressure valve "Vordruck" (9) und switch the change-over valve (18) to "Entlüften" (vent).

ADVICE
After approximately 40 operating hours pull the plug out of the drain port (21) and let the oil overflow run out. (Use an appropriate vessel to collect the oil!)

[1)] Because of the high accuracy of the dead weight tester the influence of the acceleration of gravity may not be disregarded. As precondition for a official verification the dead weight tester has to be calibrated with the acceleration of gravity at the place of installation. For this the value has to be specified when ordering. A calibration for the place of installation is also recommended without official verification (3.1 certificate). Without an indication of the acceleration of gravity the dead weight tester is being calibrated with the value (g_{Hst} = 9.80968 m/s²) at the place of manufacture. Then the measured values have to be converted for the compliance with the accuracy classes at the place of installation.

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EXAMINATION OF PRESSURE GAUGES AT CONNECTED ADMISSION PRESSURE

With external admission pressure (up to max. 10 bar resp. 150 psi) the system can be filled faster.

All valves are closed

Open valve "Prüfanschluss" (11) before connecting the pressure gauge. Fill in oil with the screw pump up to the sealing face of the connection (13). Screw the pressure gauge tight into the connection.

Open the valves "Vordruck" (9) and "Messsystem" (10).

Put the weights corresponding to the desired pressure to the base plate (14). Therefore consider the advice regarding the set of weights.

For filling the system, please switch the change-over valve (18) to "Vordruck" (admission pressure).

Afterwards the valve "Vordruck" (9) has to be closed.
Use the screw pump (2) to raise the pressure until the piston starts floating.

ATTENTION !
During measuring operation the piston has to float. It may not touch the upper or the lower stopper!

The motor has to be switched off and the measuring system has to be stopped before putting on the 100 bar weights!
Please also stop the motor before pressure relief!

Switch on the electrical drive (22).

Adjust the pressure by turning the star handle until the upper edge of the base plate (14) is exactly covering the lower marking line on the mirror (Fig. 3) respectively until the marking on the ring weight base plate (14a) is on the same level like the upper marking line of the mirror.

For pressure relief open valve "Vordruck" (9).

For pressure relief down to "0 bar" the admission pressure has to be reliefed, too. Therefore switch the change-over valve (18) to "Entlüften" (vent).

When using the change-over valve (18), please regard on a explicit engaging

SET OF WEIGHTS

ATTENTION !
Treat the set of weights carefully!
Avoid all kinds of damage!

The set of weights is being delivered in wooden boxes.
(PD 600 1 box, PD 1000 2 boxes)

The weights (disc weight plates and ring weight plates) (14) and the base plate (14) are marked with their pressure in bar and MPa, with the serial number and the final value (600 resp. 1000 bar). The weights without weight plates (basic load) produce a pressure of 10 bar.

The additional ring weight plate (90 bar) is marked with number 1, the other ring weight plates (100 bar) are marked with number 2 to 6 (PD 600) resp. 2 to 10 (PD 1000). Please use them only in this order, i.e. start with no. 1, let no. 2 follow, then add no. 3 etc.

Additional ring weights are the weights as addition to the basic load 10 bar to produce a pressure of 100 bar.

The set of weights is being composed as following:

5/9	weights	100 bar	PD 600 5 pieces PD 1000 9 pieces
1	weight	90 bar	(additional weight)
4	weights	20 bar	
1	weights	10 bar	
2	weights	4 bar	
1	weights	2 bar	

The smallest graduation of the supplies set of weights is 2 bar.

Special weights for smaller pressure graduations are available upon request. They may be required for example to compensate operation conditions deviating from our standard reference conditions.

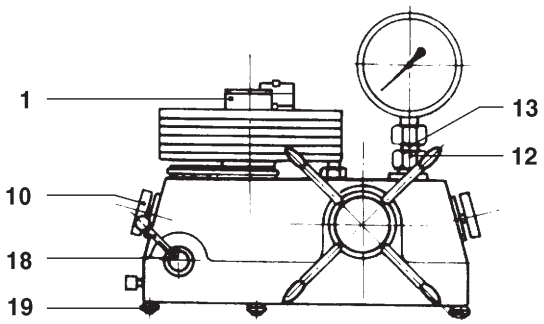
SCOPE OF DELIVERY
Beside the dead weight tester and the set of weights, the scope of delivery comprises the following:

1 operating instruction
1 canister with 1 litre special oil
1 cover cap
1 clamping sleeve M 20 x 1.5 (clamping sleeve G ½ is installed)
1 special sealing for test items with 2 chambered o-rings
4 o-rings as replacement
2 expansion plug for N 6 x 1 (admission pressure connection)
1 plug for connection (21)

Upon request:

- Hose 4 x 1 for Prestolock

Fig. 1



1 = Measuring system
2 = Screw pump with star handle
3 = Oil reservoir
4 = Electrical motor
5 = Reading device (mirror)
6 = Case
7 = Connection for external admission pressure ("Vordruck")
8 = Vent for admission pressure ("Vordruck")
10 = Shut-off valve for measuring system ("Messsystem")
11 = Shut-off valve for pressure gauge connection "Prüfanschluss"
12 = Pressure gauge connection "Prüfanschluss"
13 = Union nut (SW 27)
14 = Base plate (giving the basic weight)
15 = Union nut
16 = Piston
17 = Cylinder
18 = Change-over valve external admission pressure ("Vordruck"= admission pressure, "Zu" = closed, "Entlüften" = vent)
19 = Machine mounts
20 = Circular level
21 = Oil drain port "Ölablass" (to drain off the overflow of the system after approx. 40 hours of operation)
22 = Switch for electrical motor drive
23 = ID-plate (for official varification - sticker)
24 = plug

Fig. 2

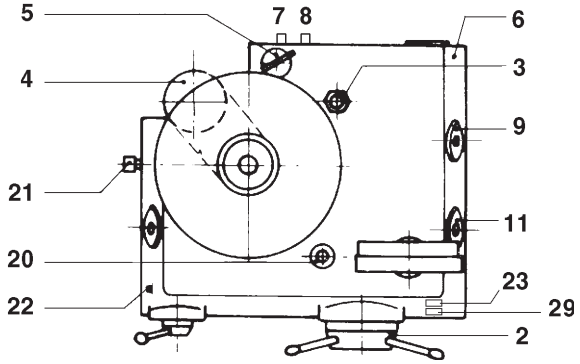
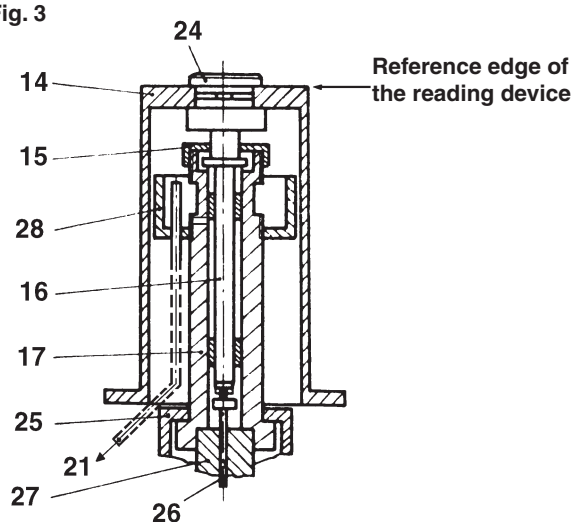


Fig. 3



25 = Union nut
26 = Piston
27 = Cylinder
28 = Tank
29 = Nameplate

Schematic diagram

Fig. 4