

Dead Weight Testers

PD 6

Models PD 10

PD 25

Dead weight testers for pressurised air or neutral gas

Pressure ranges 0.1... 6 bar, 0.1 ... 10 bar and 0.1 ... 25 bar

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 units, the built-in screw pump for accurate pressure adjustment and the set of 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 respectively with external pressure supply, while the regular weights and maybe further extra weights, if required for the designated 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 designated test pressure is reached exactly.

For simplifying the handling, the instrument-specific weights are already referred to each relevant determined piston area and stamped with the pressure unit (bar/kPa).

The influence of the friction between piston and cylinder is minimised by keeping piston and weights rotating while floating.

The models described in this data sheet are available for pressure ranges 0.1 to 6, 0.1 to 10 resp. 0.1 to 25 bar.



Technical data

- Pressure range: PD 6 0.1 to 6 bar
PD 10 0.1 to 10 bar
PD 25 0.1 to 25 bar
- Set of weights in bar / kPa
- External pressurised air supply for PD 10 and PD 25 required, indeed as high as the pressures that have to be examined¹⁾; external pressurised air supply for PD 6 recommended (compare page 2)
- Accuracy of the adjusted examination pressure: better 0.05 % resp. 0.03 % (with official verification or DKD-approval) referred to the effective pressure. Up to 0.6 bar the maximum error is constantly ± 0.3 mbar (at 0.05%) resp. ± 0.18 mbar (at 0.03%)
- Reference conditions for the granted accuracy:
ambient temperature + 20 °C ± 2 °C
acceleration of fall = 9.8102 m/s²
- Dimension of the crosssection of the measuring unit:
1.0 cm² ± 0.2 %
- Rotation of the weights: by electrical drive
(220 VAC / 50 Hz / 45 mA)
- Connection for pressure gauges:
1 clamping sleeve G 1/2 and M 20x1.5 each
- Connection for external pressurised air: plug connection (Prestolock) for PA hosxpansion plug for N 6 x 1
- Medium: pressurised air or neutral gas, e.g. nitrogen
- 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:
(L x W x H) 490 x 480 x 330 mm (19.29" x 18.9" x 12.99")
- Required working surface: 520 x 450 mm (20.47" x 17.72")
- Weights: (approx.)

	PD 6	PD 10	PD 25
Dead weight tester	28 kg	28 kg	28 kg
Set of weights	7 kg	16 kg	31 kg
Transport box dead weight tester	21 kg	21 kg	21 kg
Transport box set of weights	2 kg	5 kg	5+2 kg

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 (drilling oil and sealing liquid)
- 1 cover plate
- 1 special sealing for test item with 2 chambered o-rings
- 4 o-rings as replacement
- 2 expansion plugs for N 6x1 (admission pressure connection) for models PD 6 and PD 10
- 2 plugs for "oil drains" (21, 26 compare page 3), already plugged in when being delivered

Special versions and accessory

- Set of weights in kp/cm²; other set of weights upon request
- Test certificate 3.1. according to EN 10204 for indication accuracy
- Official verification or DKD-approval (the installation location has to be specified for this)
- Hose N 4 x 1 for Prestolock
- Fitting of the hose 4 x 1 on 1/4" NPT male

Operating instructions

(see also page 3, drawing 1...5b)

ATTENTION !

Please handle the dead weight tester only at the hanholds for transporting and repositioning, but never at the measuring system. Otherwise this could lead to serious damage.

Putting into operation

The dead weight tester and the set of weights are supplied in separate wooden transport boxes (PD 25 two boxes for set of weights).

Please release the transport screws before taking the instrument out of the transport boxes.

Place the instrument at the workplace and adjust it via the integrated circular level by screwing in the machine mounts. The machine mounts have orifices for mounting to the workplace.

Screw in the clamp handles and the helicoidal gear pump head.

Plug in the motor.

¹⁾ To reach these pressures, a gas cylinder (nitrogen) or an air pressure intensifier can be applied.



Connection of the admission pressure

The admission pressure connection happens optionally via a PA-hose N 4 x 1 or with an expansion plug for N 6 x 1 to plug connection (9) (Prestolock), for PD 25 only via hose N 4 x 1.

To protect the dead weight tester against impurities, an air control unit consisting of pressure regulator and filter (pores 10-20 µm with oil and water separator) has to be applied to the air control unit.

The pressure regulator has to be limited to the maximum final value.

Refilling of the oil reservoir (3)

The instrument is supplied in a filled condition.

Oil must be refilled immediately when the oil level is no longer visible through the window of the oil column.

For refilling the change over valve (18) has to be switched to "Entlüften" ("vent"). Remove the screw (24) from the oil tank, fill in the oil up to the upper rim and close the reservoir by screwing in the screw (24).

Use only the oil included in shipment respectively reordered oil, which will be delivered upon request.

Advice

After approximately 40 operating hours the overflow oil of the system (via outlet 21) and the overflow oil of the measuring cylinder (via outlet 26) should be emptied in depressurised condition.

Examination of pressure gauges at connected admission pressure

All valves are closed.

Only for PD 6: Switch the change-over valve 7 permanently to "Pumpe ein" ("pump on"). (This setting should only be changed in case of operation without external pressure, compare below.)

The test item has to be screwed in densely into the clamping sleeve at the test connection (13).

Afterwards please open the pressure gauge valve "Prüfanschluss" (11) ("test connection").

Place the spindle and pump approximately in the middle between front and back arrester, so that the pressure can be both, increased and decreased via the star handle of the spindle.

Put the weights according to the designated pressure on the base plate (14).

Switch the change-over valve (18) to "Vordruck" ("admission pressure").

Open the dosing valve "Vordruck" (8) (admission pressure) slowly and reclose it.

Switch on the electric drive via the switch (22).

The pressure has to be adjusted via the star handle of the spindle so that the piston is placed in the measuring position (drawing 5a or 5b).

ATTENTION!

During measuring operation the piston may neither touch the lower nor the upper arrester.

Except of the 5 bar weight the weights can be laid down during ongoing operation.

The motor and the measuring system have to be stopped respectively switched off before laying down the 5 bar weights.

Please also stop the motor before pressure relief.

For pressure relief down to "0 bar" the admission pressure also has to be relieved by switching over the change-over valve (18) to "Entlüften" (ventilation) and opening the dosing valve "Vordruck" (admission pressure).

At operation of the change-over valves (7 + 18) please pay attention to a clear locking of the lever position above the nameplates.

Examination of pressure gauges without external admission pressure – only model PD 6 –

If for PD 6 no admission pressure is available, the designated pressure can be produced with the helicoidal gear pump and change-over valve (7) as follows:

Close dosing valve "Vordruck" (8) ("admission pressure").

Switch over the change-over valve "Spindelpumpe" (7) ("helicoidal gear pump") to "Pumpe aus" ("pump off").

Move the piston of the helicoidal gear pump (2) by left-turning of the star handle all the way to the stop.

Switch over the change-over valve (7) to "Pumpe ein" ("pump on").

Move the piston of the helicoidal gear pump by right-hand turning all the way up to the stop.

Switch over the change-over valve (7) to "Pumpe aus" ("pump off").

Turn the piston of the pump back all the way to the stop.

Switch over to "Pumpe ein" (7) ("pump on").

Please repeat this process as long as the designated pressure (max. 6 bar) is reached.

Set of weights

ATTENTION !

Treat the set of weights carefully and avoid all kinds of damage! The set of weights are delivered in one wooden box for models PD 6 and PD 10 and in two wooden boxes for model PD 25.

The weights and the base plate [14 (basic load)] are marked with bar and kPa for the pressure, which is produced on the dead weight tester, as well as the instrument identification number and the final value. The base plate [14 (basic load)] without weights produces a pressure of 0.1 bar.

We recommend to work with additional weights to simplify the applying of further weights.

An additional weight is a weight as addition to the basic load 0.1 bar, to produce a pressure of 1 bar, respectively 5 bar.

First you apply an additional weight (0.9 or 4.9 bar) and then the next weights, according to the designated pressure.

In the lower range additional weight 0.9 bar is used and for above 5 bar (for PD 10 and PD 25) the additional weight 4.9 bar is used.

The set of weights is composed as follows.

PD 6

5 weights	1	bar
1 weight	0.9	bar (additional weight)
1 weight	0.5	bar
4 weights	0.1	bar
1 weight	0.05	bar
4 weights	0.01	bar

PD 10

1 weight	5	bar
1 weight	4.9	bar (additional weight)
4 weights	1	bar
1 weight	0.9	bar (additional weight)
1 weight	0.5	bar
4 weights	0.1	bar
1 weight	0.05	bar
4 weights	0.01	bar

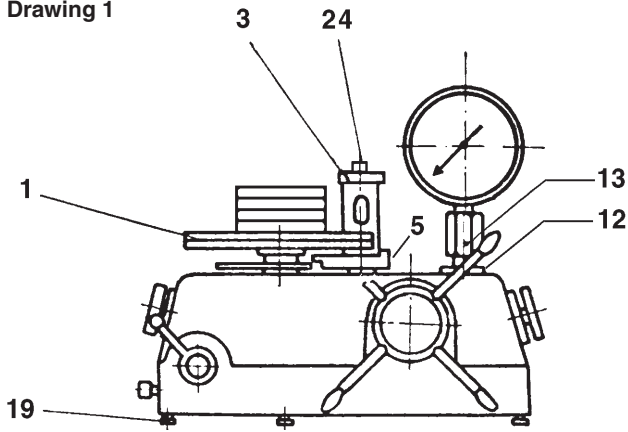
PD 25

4 weights	5	bar
1 weight	4.9	bar (additional weight)
4 weights	1	bar
1 weight	0.9	bar (additional weight)
1 weight	0.5	bar
4 weights	0.1	bar
1 weight	0.05	bar
4 weights	0.01	bar

The smallest graduation of the supplied set of weights is 0.01 bar.

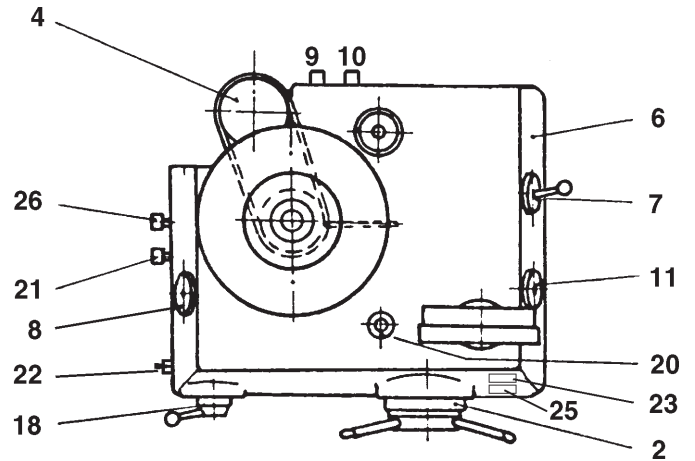
Correction weights for smaller graduations and for corrections of ambient parameter deviations of the standard conditions are available upon request.

Drawing 1

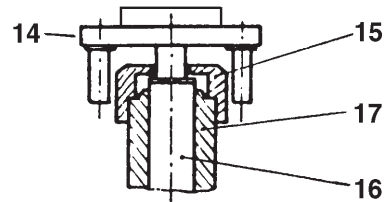


- 1 = Measuring system
- 2 = Helicoidal gear pump with star handle
- 3 = Oil reservoir
- 4 = Electrical motor
- 5 = Reading device (stationary pointer)
- 6 = Case
- 7 = for PD 6: change-over valve helicoidal gear pump ("Pumpe ein", "Pumpe aus", "Entlüften") (pump on, pump off, vent)
- 8 = Dosing valve "Vordruck" (admission pressure)
- 9 = "Eingang Vordruck" (inlet admission pressure)
- 10 = "Entlüftung Vordruck" (ventilation admission pressure)
- 11 = Pressure gauge valve "Prüfanschluss" (test connection)
- 12 = Test connection
- 13 = Clamping sleeve (SW 27)
- 14 = Base plate (basic load)
- 15 = Union nut
- 16 = Measuring piston
- 17 = Measuring cylinder
- 18 = Change-over valve for external admission pressure ("Vordruck", "Zu", "Entlüften") (admission pressure, closed, vent)
- 19 = Machine mounts
- 20 = Circular level
- 21 = "Ölablass" (oil drain port) (overflow of the system)
- 22 = Switch of the electrical motor
- 23 = Calibration plate (for official verification)
- 24 = Screw oil reservoir
- 25 = Nameplate
- 26 = "Ölablass Messzylinder" (oil drain port measuring cylinder)

Drawing 2

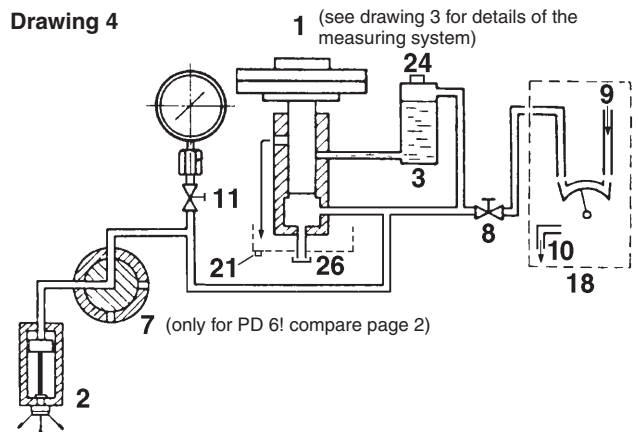


Drawing 3

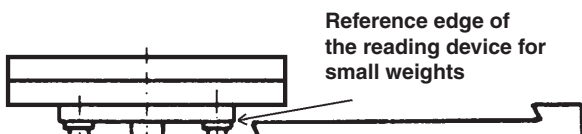


Schematic diagram

Drawing 4



Drawing 5 a



Drawing 5 b

