

Instruction Manual

Dead Weight Tester



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Description

1.1

Baseplate: The main components of the tester are fixed on a rigid aluminum baseplate. The baseplate is provided with 4 levelling screws. A sheet metal cover is provided for protecting the interconnecting pipes against damage.

1.2

Screw Pump: The screw pump provides the main pressure generation mechanism of the tester. It consists of a plunger operating inside a cylinder used to suck the oil into the cylinder from the oil reservoir as well as to generate the pressure.

1.3

H.P. (High Pressure) Block: This is the manifold that houses the high pressure piston. Oil from the screw pump cylinder enters this block and pressurises the high pressure piston. The high pressure block is connected to the low pressure block also.

1.4

L.P.(Low Pressure) Block: This is the manifold that houses the low pressure piston. Oil from the HP block flows into the LP block in a simple line circuit.

1.5

Main Block: This is the manifold that connects the screw pump to the tester.

1.6

Piston Cylinder Unit (PCU): This is mounted on the top face of the low/high pressure block. Oil from the block flows through the mounting column and the pressure acts below the piston. A weight carrier is fixed on the piston to provide a loading surface on which weights are stacked. A weight marked 'carrier' (if supplied) must also be loaded on the carrier each time before use.

The pistons and weights should be rotated before any readings are taken. Oil pressure generated by the screw pump acts on the bottom of the free piston, producing a force that pushes the loaded piston vertically upwards. This force is balanced by dead weights which are marked in pressure units. The piston should be vertical before use. This is ensured by using leveling screws and placing a spirit level on the weight carrier.

The tester is provided with separate LP and HP PCUs. The LP PCU is direct top loading type, whereas the HP PCU is provided with a bell for loading weights in an overhang fashion. Both pistons can take the full pressure of the tester and no separate isolation is required.

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1.7

Union Connectors: The gauge connector on the gauge block is a union connector which may be rotated in any direction even after the gauge is tightened on it. The connector has soft seating washers that allow hand tightening of the gauge on them. There is no need to use teflon tape on the union connector or the BSP adaptors. Teflon tapes are useful only when tightening gauges on NPT adaptors as the sealing in NPT threads is on the thread, while the sealing in BSP threads is on the washer and gauge bottom face. Use of teflon tape is to be avoided on the union connector as loose tape may clog the tubing in the system.

1.8

Set of Weights: The top face of each weight including carriers are marked with the pressure equivalent of the weight and the serial number of the tester for which it is calibrated. The weights have a projection on the top face and a recess on the bottom face to maintain concentric stacking of the weights on the carrier or elsewhere.

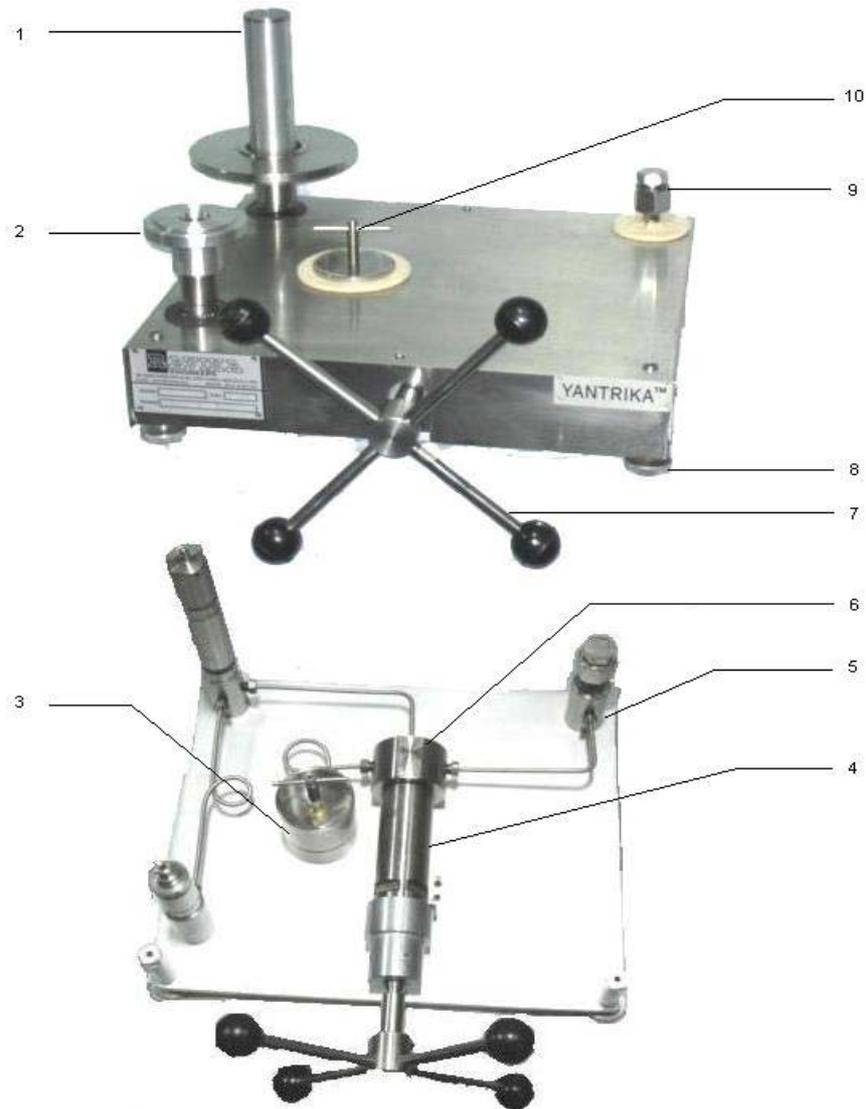
1.9

Release Valve: The release valve is the only user operable valve in the system. It should be left open during storage or dis-use of the tester. The valve should normally be closed after the screw pump handle has been withdrawn all the way back by rotating it counter-clockwise. The valve is kept closed during normal testing.

1.10

Electrical Power Rotation (if ordered): The rotation of the PCU is accomplished by the electrical system provided. The mechanism is designed to transmit only torque and no vertical or horizontal forces. The rotation is designed for approximately 30 rpm. The motors run on standard mains 220VAC single phase supply.

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Legend

1	HP Piston/ Carrier	6	Main Block
2	LP Piston/ Carrier	7	Handle Rod
3	Oil Reservoir	8	Leveling Screw
4	Screw Pump	9	Gauge Connector
5	Gauge Block	10	Release Valve

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Set Up

2.1

Place the tester on a strong and rigid table in the instrument room. Direct rays of the sun should be avoided. The instrument should not be near a furnace or any other hot area. The environment should be clean, dust and vibration free.

2.2

Clean the instrument with a soft cloth and remove protective tape wherever provided. Remove the piston protectors and store them for future transportation use in the tool-box.

2.3

Install the following as shown in the illustration on the previous page.

- a) Levelling screws
- b) Screw pump handle rods.
- c) Place the weight carrier on the LP Piston. Place the bell and carrier on HP Piston.

2.4

If Electrical Power Rotation is ordered with the tester, attach the motor assembly to the baseplate of the tester by means of the bolts provided. Tighten well. Attach the motor driving belt to the piston in use. Attach the power cable to the mains supply (220VAC).

2.5

Place a spirit level on the top of the weight carrier and adjust the levelling using the levelling screws. This needs to be done at first installation and whenever the position of the machine is changed.

Operating Procedure

3.1

a) Open release valve

b) Close the gauge connector stopper on the union connector or alternatively, remove the gauge stopper and fix the gauge on the union connector. Hand tightening is sufficient if PU washers are used and overtightening should be avoided. **Overtightening PU washers may block the oil path to the gauge.**

c) Slowly turn the screw pump handle clockwise completely.

d) Pour oil into the oil cup, filling it up almost completely.

e) **Slowly** turn the screw pump handle anticlockwise completely. This will fill the screw pump with oil. On the first use, turn the handle clockwise again and **slowly** turn it back anticlockwise. This is to remove air that might be there in the system.

f) With the handle turned fully anti clockwise, close the release valve and fix the gauge to be tested if it has not been fitted in step (b)

g) Load the necessary weights on the LP or HP weight carrier as per requirement. Please note that in some machines the **carrier weight is split into two parts**, one fixed on the piston & other to be loaded on top of the fixed piece. This has been done to reduce chances of transportation damage in an improperly packed machine. Please make sure that both carrier pieces are put on the machine before any readings are taken.

Please also note that weights may be placed on the LP or HP piston as desired. The pressure indicated would be according to which of the 2 PCUs is floating on Oil Pressure.

h) Turn the screw pump handle clockwise to generate pressure until the weights lift to approximately the middle of its range of motion. Rotate the weights and piston to reduce the effect of friction.

i) At this time, you may note the pressure in the gauge under test and make out a calibration report as per your quality system.

j) Once the machine has been primed (filled with oil), you may just reduce the pressure to zero by turning the handle anticlockwise till the gauge reads zero, then change the gauge to perform multiple calibrations. If after a few calibrations, pressure does not develop then you may need to reprime the machine by opening the release valve, turning the handle fully clockwise once, then anticlockwise, then closing the release valve again and proceeding from step (g)

k) Contaminated gauges must first be cleaned before installing on the tester so as to avoid contaminating the hydraulic fluid.

Closing Up

4.1

The tester should be left in the following condition after current calibration work is over.

- a) Release valve: Open
- b) Screw pump: Fully withdrawn by turning it counter-clockwise.
- c) Union connectors: Plugged
- d) Weights: Removed from the carriers, properly cleaned with a soft cloth, and stacked near the machine.
- e) Dust cover: Placed over the instrument.

Re-Adjustment of Pressure Gauges

5.1

Study the test results of the pressure gauge and resolve the error at each point so as to find the zero error and the continuous increase/decrease of error. Install the pressure gauge on the tester and proceed as follows.

5.2

Zero Error (Constant error at all readings)

Install the pressure gauge on the tester and raise the pressure upto the value of the first main division of the pressure gauge. Remove the pointer by means of the pointer puller and place it at the correct position by hand. Finally fix it in position by means of the pointer punch which may be tapped by the handle of a screw driver or a very light hammer. Check readings once again.

Study the test results of the pressure gauge and resolve the error at each point so as to find the zero error and the continuous increase/decrease of error. Install the pressure gauge on the tester and proceed as follows.

Note: Zero error is not corrected at the zero point of the gauge.

5.3

Ratio Error (Error continuously increases or decreases)

There is a link which connects the free end of the bourdon tube to the arm of the segment gear. The segment gear arm has a slot in which the link is connected. Moving the position of the link in the slot towards the bearing pin of the segment gear will cause the gauge pointer to move faster with increasing pressure. Moving the link away from the bearing pin will make the pointer move slower with increasing pressure. This adjustment is a trial and error procedure, but with a little practice, it may be done quite quickly. Some high quality gauges like test gauges have another link between the segment gear and the bourdon for adjusting linearity and angularity. This may be used to adjust the reading at mid scale.

Transmitters and digital gauges should be adjusted as per the procedure given by their manufacturer.

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Maintenance

6.1

Cleanliness and Lubrication:

The instrument and weights should be kept scrupulously clean. A soft cloth without loose threads may be used for the same.

The screw of the screw pump may be lubricated every few months depending on use. A few drops of 20/40 multigrade oil or a smearing of grease may be used for the same.

6.2

Adaptors/Gauge connectors:

PU/Bonded Seals at the base of the gauge connectors&adaptors may wear out with time and usage. The washers are easily replaced from extra washers provided in the toolkit.

6.3

Screw Pump:

The 'O' rings of the screw pump may wear out with time. Spare 'O' rings are provided with the tester for maintenance. In order to change these 'O' rings, remove the bells and carriers from the tester. Unscrew both LP and HP columns if the tester has electrical power rotation. The columns need not be removed if the tester does not have electrical power rotation. Now remove the sheet metal cover of the tester. Unscrew the screw nut, which is the outermost piece in the screw pump cylinder assembly and pull the screw along with the dual area plunger out of the tester. Replace the 'O' rings with fresh ones taking care not to introduce any wrinkles or twisting while installing the same. Close the cover and screw the columns back to restart work.

6.4

Changing the Hydraulic Fluid:

Turn the screw pump handle clockwise until it reaches its innermost position. At least one gauge connector must be left open while doing this so that no pressure is generated unintentionally. Most of the oil will get collected in the oil cup and may be removed using a syringe or sponge. Castrol HySpin EP 22 grade oil supplied by us is recommended for the same.

6.5

Electrical Power Rotation:

Check power lead and plug pins. Check and replace Rubber 'O' belt if broken or worn out.

6.6

Ordering of Spare Parts :

Model number as well as serial number of the machine must both be quoted when ordering spares.

6.7

Tips and Troubleshooting

- a) Unexplained pressure drop may be due to air trapped in the system. Pressurise the machine to full range and leave for a few minutes to allow trapped air to escape.
- b) Pistons should be clean. If pistons get stuck or appear tight in rotation, clean the pistons with clean solvent like carbon tetrachloride or isopropyl alcohol, apply oil, fit back and rotate the weights at high pressure to free them.
- c) Large pressure drops will show up as leak. Open cover and check seal nearest to oil spill.

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Other Calibration Products

Pressure Comparators

Lightweight, Bench Top
Pressure Source



Multifunction Calibrator

Used for calibration of pressure transmitters/PT100 and recorder inputs along with above instruments



Digital Pressure Gauges

High Accuracy Various Ranges from Vacuum to 700 bar



Handheld Comparison Test Pump

Calibration of Pressure From -1 to 700 bar



Hand-Held Documenting Pressure Calibrator

Testing procedures of the pressure process instrument



Precision Master Gauges

Various Ranges from Vacuum to 2500 bar
Accuracy : $\pm 0.1\%$ & 0.2% of F.S.



Dry Block & Liquid Bath Temperature Calibrator

Used for calibration of Temperature Gauges, Temperature Recorder



Documenting Pressure Calibrator

High Accuracy Various Ranges from Vacuum to 700 bar



Manufacturer:

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An ISO 9001 : 2008
Certified Company

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