Automatic hydraulic dead weight tester V1.1

Application

- ✓ Calibration laboratories
- ✓ Avionics/Aerospace equipment manufacturers
- ✓ Precision pressure sensor manufacturers
- ✓ Calibration service companies and service industry

Features

High-accuracy piston

High-elastic modulus tempered ceramics and tungsten carbide are selected as piston materials to minimize deformation of the piston assembly under ultra-high pressure, effectively improving the accuracy.

Less weights

Adopting a combination of binary mass weights and equal-mass weights to achieve the set mass with the minimum quantity of weight combinations. Non-magnetic stainless steel is used as the weight material, featuring excellent corrosion resistance and wear resistance.

Automatic loading weights

Adopting pneumatic manipulator for automatic loading/unloading of weights, avoiding electromagnetic interference and enabling stable and rapid loading/unloading of weights with required mass.

Description

- ■ The gas piston system is processed using atomic-level material injection and nanoscale planarization processes, ensuring that the gas piston maintains rotational sensitivity for over 30 consecutive working days.
- ■ The combination of weights with the required mass can be automatically calculated and loaded, allowing for skip-type loading of any pressure point (corresponding to the weight combination) within the measurement range. The weight loading/unloading time does not exceed 3 seconds.
- ■ The pressurization, holding, and release of pressure can be automatically achieved through a single-button operation.

- The weights can be lifted with a single-button operation, facilitating the disassembly of the piston assembly and ensuring convenience and efficiency.
- Parameters such as piston position, piston temperature, and weight rotation speed can be sensed and displayed in real-time.
- System errors can be corrected and compensated for by adjusting parameters such as temperature, air buoyancy, and liquid level differences.
- All weights rotate synchronously without wear during loading and unloading, ensuring long-term accuracy of weight measurement.
- The intelligent control algorithm is employed, resulting in a short stabilization time from pressurization to piston position, and the control system exhibits high robustness.
- Check points can be either manually input or automatically generated.
- Equipped with expansion interfaces, it offers robust scalability.
- Safety protection devices are configured, including piston system anti-breakage rod protection, wrong operation protection etc.

Working Conditions

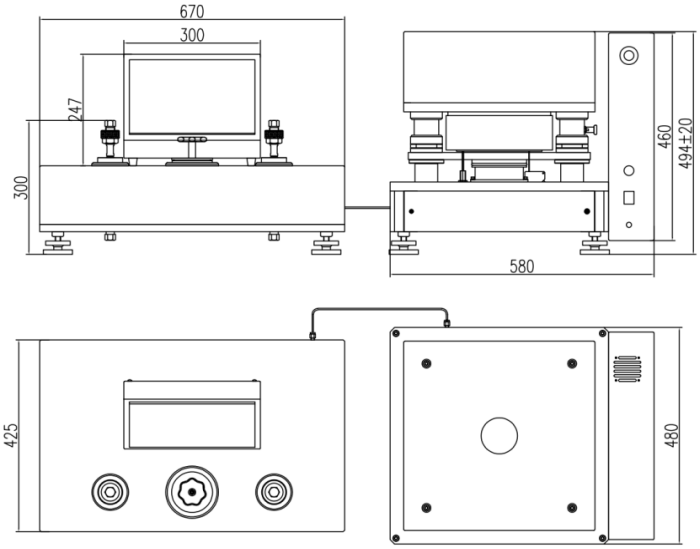
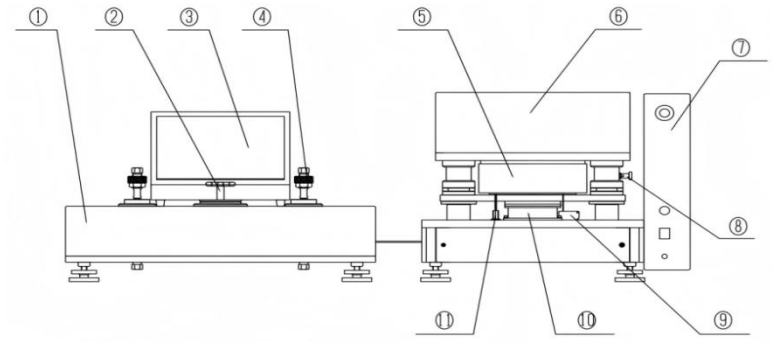
Environmental：20±1 ℃, < 80%RH
Power supply voltage：AC 220V，50.Hz

Specifications

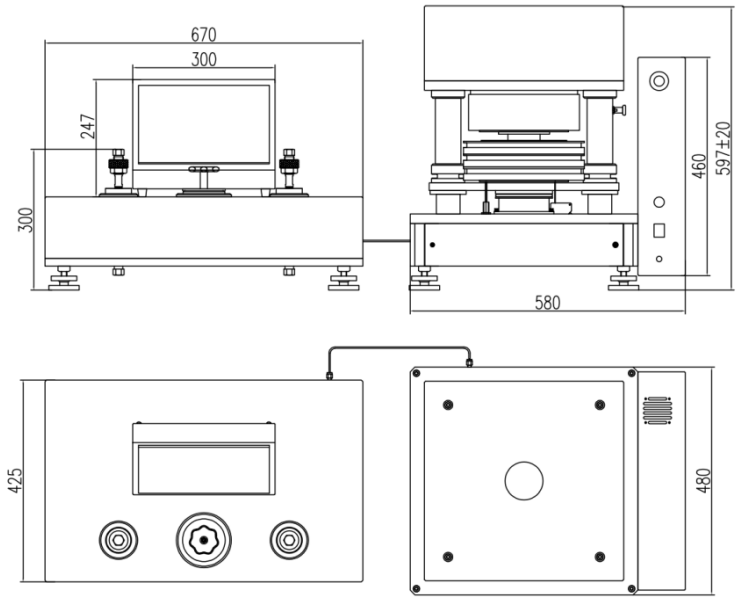
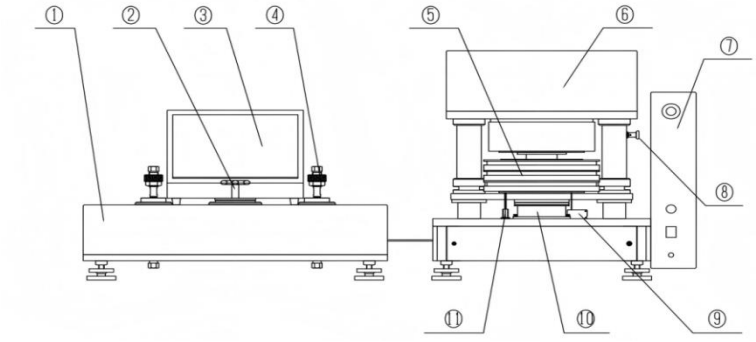
Model		PR-ZD06	PR-ZD60	PR-ZD120	PR-ZD250	PR-ZD500
Pressure range (MPa)		0.1~6	1~60	2~120	5~250	10~500
Minimum pressure interval (MPa)		0.1	1	1	1	1
Upper measurement limit (MPa)		6	60	120	250	500
Lower measurement limit (MPa)		0.1	1	2	5	10
Highest accuracy		0.005%	0.005%	0.005%	0.005%	0.005%
Nominal piston area (cm^2)		0.5	0.1	0.05	0.025	0.02
Basket & piston	Nominal mass (kg)	0.5	1	1	1.25	2
	Nominal pressure (MPa)	0.1	1	2	5	10
Total weight (kg)		130kg	140kg	150kg		170kg
Working medium	<25MPa	A blend of 25# transformer oil and aviation kerosene (ratio 4.39:1). The kinematic viscosity is 9-12 mm^2/s at 20°C, and the acid value is no more than 0.05 mg KOH/g.				
	≥25MPa	Sebacate esters, the kinematic viscosity is 20-25 mm^2/s at 20°C, and the acid value is no more than 0.05 mg KOH/g.				
Note: The equipment consists of weight addition/removal section, pressure generation section, and operation panel.						

Structure and Dimensions

■ PR-ZD06

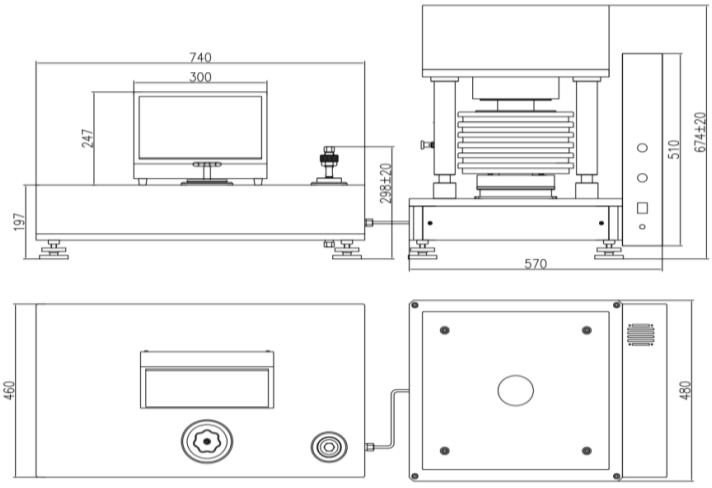
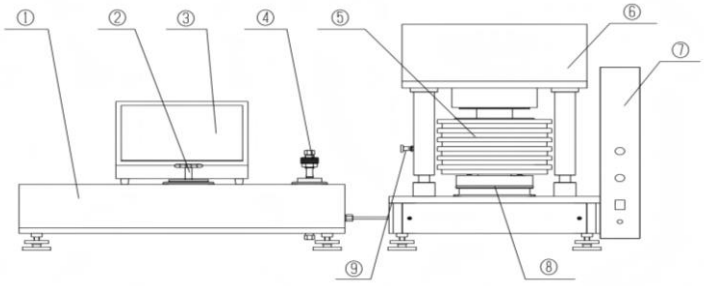
Items	Specifications	
Pressure range	0.1MPa ~ 6 MPa	
Uncertainty	≤0.005%	
Working Medium	A blend of 25# transformer oil and aviation kerosene (ratio 4.39:1)	
Piston material	Tungsten carbide	
Weights	Material	Non-magnetic stainless steel
	Nominal pressure (MPa)	0.1;0.2;0.4;0.8;1.6;2.8
	Nominal mass (kg)	0.1;0.2;0.4;0.8;1.6;2.8
	Quantity of weights	6
Pressure port	3/4-16UNF (customizable)	
Dimensions		
Schematic diagram	 ① Pressure system ② Manual safety valve ③ Movable operation panel ④ Gauge connecting platform ⑤ Weight system ⑥ Weighing loading system ⑦ Control box ⑧ Safety pin ⑨ Piston height detection ⑩ Weight rotation drive system ⑪ Weight rotation speed detection	

■ PR-ZD60

Items	Specifications	
Pressure range	1MPa ~ 60MPa	
Uncertainty	≤0.005%	
Working Medium	Diisooctyl sebacate	
Piston material	Tungsten carbide	
Weights	Material	Non-magnetic stainless steel
	Nominal pressure (MPa)	1;2;4;8;16;28
	Nominal mass (kg)	1;2;4;8;16;28
	Quantity of weights	6
Pressure port	3/4-16UNF (customizable)	
Dimensions		
Schematic diagram		

① Pressure system ② Manual safety valve ③ Movable operation panel ④ Gauge connecting platform
⑤ Weight system ⑥ Weighing loading system ⑦ Control box ⑧ Safety pin
⑨ Piston height detection ⑩ Weight rotation drive system ⑪ Weight rotation speed detection

PR-ZD120

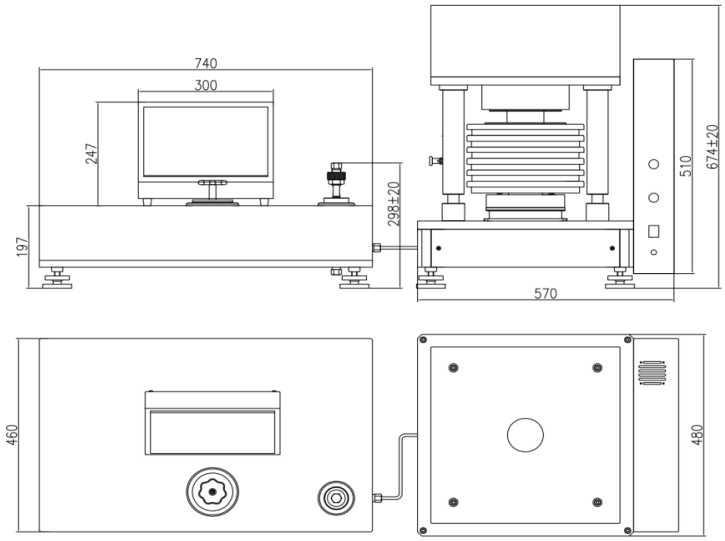
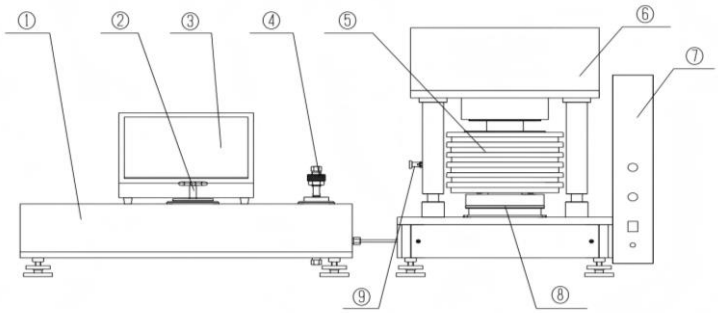
Items	Specifications	
Pressure range	2MPa ~ 20MPa	
Uncertainty	≤0.005%	
Working Medium	Diisooctyl sebacate	
Piston material	Tungsten carbide	
Weights	Material	Non-magnetic stainless steel
	Nominal pressure (MPa)	0.25;0.5;1;2;4;8;16
	Nominal mass (kg)	0.5;1;2;4;8;16;32
	Quantity of weights	9
Pressure output interface	3/4-16UNF (customizable)	
Dimensions		
Schematic diagram		

① Pressure system ② Manual safety valve ③ Movable operation panel

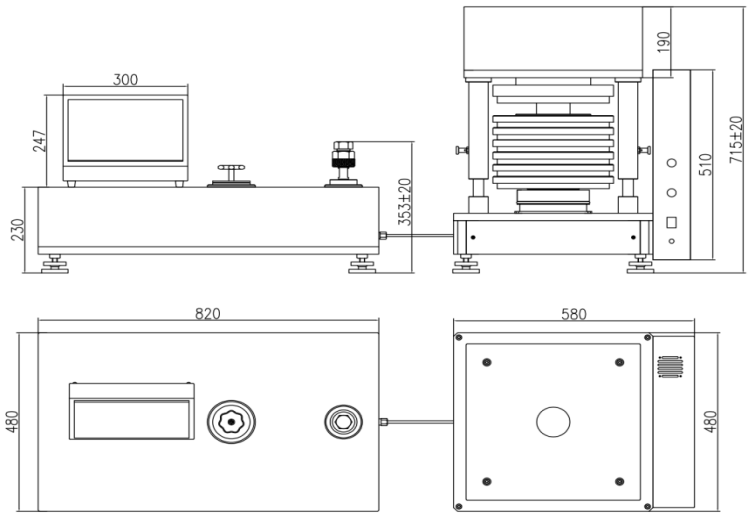
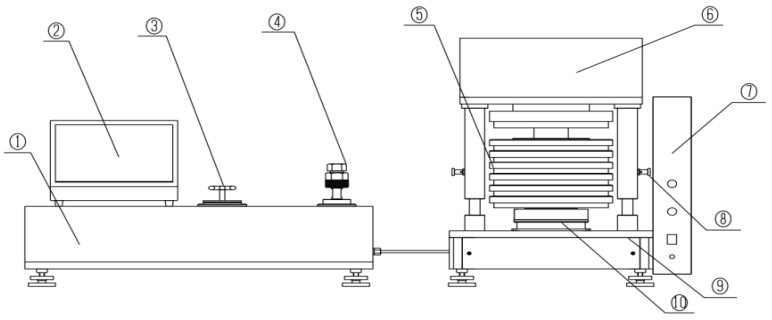
④ Gauge connecting platform ⑤ Weight system ⑥ Weighing loading system

⑦ Control box ⑧ Weight rotation drive system ⑨ Safety pin

PR-ZD250

Items	Specifications	
Pressure range	5MPa ~ 50MPa	
Uncertainty	≤0.005%	
Working Medium	Diisooctyl sebacate	
Piston material	Tungsten carbide	
Weights	Material	Non-magnetic stainless steel
	Nominal pressure (MPa)	0.25;0.5;1;2;4;8;16
	Nominal mass (kg)	1;2;4;8;16;32;64
	Quantity of weights	9
Pressure port	3/4-16UNF (customizable)	
Dimensions		
Schematic diagram	 ① Pressure system ② Manual safety valve ③ Movable operation panel ④ Gauge connecting platform ⑤ Weight system ⑥ Weighing loading system ⑦ Control box ⑧ Weight rotation drive system ⑨ Safety pin	

■ PR-ZD500

Items	Specifications	
Pressure range	10MPa ~ 500MPa	
Uncertainty	≤0.005%	
Working Medium	Diisooctyl sebacate	
Piston material	Tungsten carbide	
Weights	Material	Non-magnetic stainless steel
	Nominal pressure (MPa)	0.2;0.4;0.8;1.6;3.2;6.4;12.8;25.6
	Nominal mass (kg)	1;2;4;8;16;32;64;128
	Quantity of weights	10
Connection thread	1-1/4-12UNF (customizable)	
Dimensions		
Schematic diagram		

① Pressure system ② Movable operation panel ③ Manual safety valve ④ Gauge connecting platform

⑤ Weight system ⑥ Weighing loading system⑦ Control box ⑧ Safety pin

⑨ Weight rotation drive system ⑩ Piston height detection

Main Accessories

Name	Quantity and model
Weight loading system	1 set
Pressure generation system	1 set
Weights	1 set (see calibration certificate or factory calibration record for details)
Piston system	1 set (in small aluminum alloy case)
Piston disassembly tool	1 set (3 pieces)
Devices under test calibration base	1 piece
Power cord	1 piece
Air compressor (air pump)	1 set
Hex wrench	1 set
Diisooctyl sebacate	1 bottle
Adjustable wrench	1 piece (12 inches, 34mm opening)
User manual	1
Certificate of approval	1
Calibration certificate	1

Vulnerable Parts

Name	Specifications	Quantity
Air pipe	Φ6mm	10.meters
Pulley belt	Φ5 (annular)	1 piece
Gauge connecting seal ring	Φ12 (OD) × 2.5 (special for 60 and 250MPa)	20.pieces
Piston bottom seal ring	Φ16 (OD) × 2.5 (special for 60MPa)	20.pieces
	Φ8.6 (OD) × 1.8 (special for 250 and 500MPa)	20.pieces

Standard Compliance

JJG1086-2022 Liquid dead weight tester

Transport Dimensions

(length × width × height mm)

Product	Pressure generator (wood box)	Weight loader (wood box)	Weight case (aviation case)	Total weight (kg)
PR-ZD06	580×900×610	700×700×930	690×450×340	180
PR-ZD60				220
PR-ZD120	580×900×610	700×700×930	800×460×390	230
PR-ZD250				230
PR-ZD500	600×970×630	700×700×1060	850×540×390	290

Note: Excluding vacuum pump and small compressor.