

# Hydraulic pressure balance Model CPB5800



WIKA data sheet CT 31.11



for further approvals  
see page 8

## Applications

- Primary standard for calibrating the pressure scale in a hydraulic range up to 1,400 bar [20,000 lb/in<sup>2</sup>]
- Reference instrument for factory and calibration laboratories for the testing, adjustment and calibration of pressure measuring instruments
- Complete, stand-alone system, also suitable for on-site use

## Special features

- Total measurement uncertainty to 0.006 % of reading
- Extremely flexible instrument with a wide range of single and dual-range piston-cylinder systems
- Dual-range piston-cylinder systems with fully automated changing between ranges
- Factory calibration included as standard, traceable to national standards, with UKAS calibration possible as an option
- Fast and safe replacement of the piston-cylinder system via patented ConTect quick-release system as an option

## Description

### Proven primary standard

Pressure balances (dead-weight testers) are the most accurate instruments available on the market for the calibration of electronic or mechanical pressure measuring instruments. The direct measurement of the pressure ( $p = F/A$ ), as well as the use of high-quality materials enable a very small measurement uncertainty, in conjunction with an excellent long-term stability.

The pressure balance (dead-weight tester) has therefore been used for years in factory and calibration laboratories in industry, national institutes and research laboratories.

### Stand-alone operation

Due to its integrated pressure generation and the purely mechanical measuring principle, the model CPB5800 is ideal for on-site use for maintenance and service.



Hydraulic pressure balance, model CPB5800

### Basic principle

Pressure is defined as the quotient of force and area. The core component of the CPB5800 is therefore a very precisely manufactured piston-cylinder system, onto which a mass load is applied in order to generate the individual test points.

The mass load is proportional to the target pressure and this is achieved through optimally graduated masses. As standard, these masses are manufactured to the standard gravity (9.80665 m/s<sup>2</sup>), though they can be adjusted to a specific location and calibrated according to UKAS accreditation.

## The piston-cylinder system model CPS5800

The CPS5800 piston-cylinder systems are available in two fundamentally different designs, depending on the measuring range:

- Single-range piston-cylinder system for measuring ranges 120 bar and 300 bar [1,600 and 4,000 lb/in<sup>2</sup>]
- Dual-range piston-cylinder system for measuring ranges 700 bar, 1,200 bar and 1,400 bar [10,000, 16,000 and 20,000 lb/in<sup>2</sup>]

### High accuracy over a wide measuring range

The dual-range piston-cylinder system offers two measuring ranges in one case with automatic measuring range switching from low-pressure to high-pressure piston. This provides the user with an extremely flexible measuring instrument that can cover a wide measuring range with high accuracy, with only one piston-cylinder system and one mass set. Additionally two test points can automatically be achieved by loading just the one mass.

Both the piston and cylinder are manufactured from hardened steel or tungsten carbide, respectively. This pairing of materials has very low pressure and temperature coefficients of expansion, which results in a very good linearity for the effective area of the piston and a very high accuracy.

Piston and cylinder are very well protected, against

contact, impacts or contamination from outside, in a solid stainless-steel/hardened tool steel case. At the same time, overpressure protection is integrated, which prevents the piston from being forced out vertically and avoids damage to the piston-cylinder system in the event of masses removal under pressure.

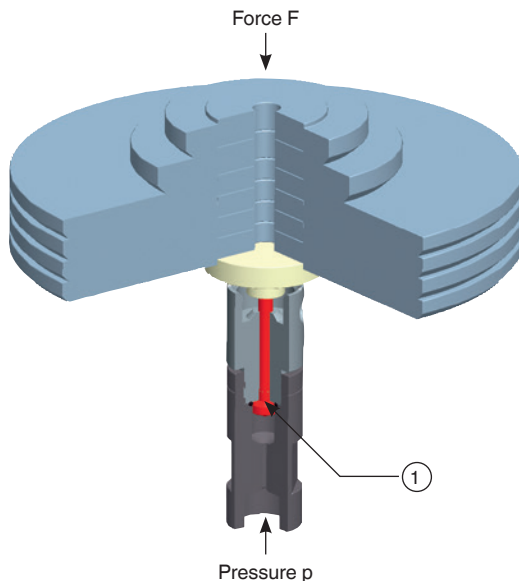
The masses are stacked directly onto the piston shaft. This makes it easier to place the masses on and thus enables a lower start value.

The overall design of the piston-cylinder system and the very precise manufacturing of both the piston and the cylinder, ensure exceptionally low friction force, which results in excellent operating characteristics with long free-rotation time and low sink rates. Thus a high long-term stability is ensured. Therefore, the recommended recalibration interval is two to five years dependent on the conditions of use.

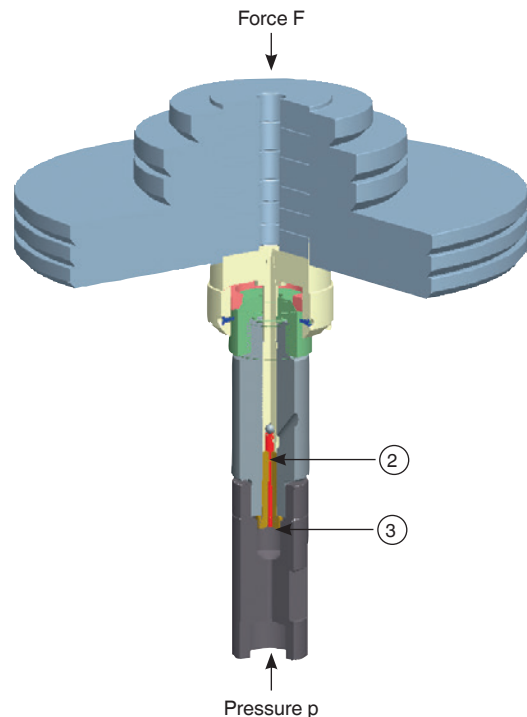
As an option the model CPS5000 hydraulic piston-cylinder systems are available.

For detailed specifications see data sheet CT 31.01.

- ① Effective area A
- ② High-pressure piston
- ③ Low-pressure piston = High-pressure cylinder



Single-range piston-cylinder system, model CPS5800



Dual-range piston-cylinder system, model CPS5800

## The instrument base model CPB5800

### Easy operation

In the stable instrument base, the integrated priming pump and the 250 ml tank enable large test volumes to be easily filled and pressurised. For further pressure increases and fine adjustment, a very precisely controllable spindle pump is fitted, which only runs within the pump body.

As soon as the measuring system reaches equilibrium, there is a balance of forces between the pressure and the masses applied. The excellent quality of the system ensures that this pressure remains stable over several minutes, so that the pressure value for comparative measurements can be read without any problems, or also so that more complex adjustments can be carried out on the test item.

### High-performance instrument range

The CPB5800 instrument bases are available in 2 variants:

- Standard hydraulic base
  - up to max. 1,200 bar [16,000 lb/in<sup>2</sup>]
  - with integrated pressure generation through priming pump and spindle pump
  - Pressure transmission medium
  - Standard: Mineral oil
  - Optional: Sebacate oil, brake fluid, Skydrol or Fomblin oil

- Hydraulic high-pressure base
  - up to max. 1,400 bar [20,000 lb/in<sup>2</sup>]
  - with integrated pressure generation through priming pump and spindle pump
  - Pressure transmission medium mineral oil or Sebacate oil

As standard, both instrument bases are fitted with a connection for the model CPS5800 piston-cylinder system with G 3/4 B male thread.

As an option a M30 x 2 female thread for optional CPS5000 piston-cylinder systems is available.

With the 1,200 bar instrument base [16,000 lb/in<sup>2</sup> instrument base], the patented ConTect quick-release mechanism is available as an option. This enables the piston-cylinder system to be changed quickly and safely without any tools. The connection of the test item is made without tools using a quick connector. Via the freely rotating knurled nut, the test item can be oriented as required. As standard, a threaded insert with a G 1/2 female thread is provided. Other threaded inserts are available to connect the most common pressure measuring instruments.

## The mass sets, model CPM5800

These mass sets are supplied in a flight cases with foam inserts. This includes the masses listed in the tables of masses below, made from non-magnetic stainless steel, and optimised for everyday use.

For finer increments and for a higher resolution, as an option, the standard mass sets can be extended by a set of fine increment masses.

If even smaller intermediate values need to be generated, using one of the class M1 or F1 set of fine increment masses from the accessories is recommended.

As an option for the CPS5000 piston-cylinder systems CPM5000 mass sets are available. For detailed specifications see data sheet CT 31.01.



Mass set model CPM5800 (Sample picture)

## Tables of masses

The following tables show the number of masses within a mass set with their nominal mass values and the resulting nominal pressures for the respective measuring ranges.

Should the instrument not be operated under reference conditions (ambient temperature 20 °C [68 °F], atmospheric pressure 1,013 mbar [14.69 lb/in<sup>2</sup>], relative humidity 40 %), the measured values must be corrected arithmetically.

For the measurement of the ambient conditions, the CPU6000 CalibratorUnit can be used, see page 11.

The masses are manufactured, as standard, to the standard gravity (9.80665 m/s<sup>2</sup>) although they can be adjusted for any local gravity.

The mass sets can be manufactured for the following different pressure units, bar/kPa, kg/cm<sup>2</sup>, MPa or lb/in<sup>2</sup> and can be used with the same piston-cylinder system.

Measuring range [bar] or [kg/cm <sup>2</sup> ]	Single-piston measuring ranges				Dual-piston measuring ranges								
	1 ... 120		2 ... 300		1 ... 700			1 ... 1,200			1 ... 1,400		
					1 ... 60	10 ... 700		1 ... 60	20 ... 1,200		1 ... 60	20 ... 1,400	
	Quantity	Nominal pressure per piece [bar] [kg/cm <sup>2</sup> ]	Quantity	Nominal pressure per piece [bar] [kg/cm <sup>2</sup> ]	Quantity	Nominal pressure per piece [bar] [kg/cm <sup>2</sup> ]	Nominal pressure per piece [bar] [kg/cm <sup>2</sup> ]	Quantity	Nominal pressure per piece [bar] [kg/cm <sup>2</sup> ]	Nominal pressure per piece [bar] [kg/cm <sup>2</sup> ]	Quantity	Nominal pressure per piece [bar] [kg/cm <sup>2</sup> ]	Nominal pressure per piece [bar] [kg/cm <sup>2</sup> ]
<b>Piston and make-up weight</b>	1	1	1	2	1	1	10	1	1	20	1	1	20
<b>Standard mass set</b>	4	20	4	50	5	10	100	4	10	200	5	10	200
	1	18	1	45	1	9	90	1	9	180	1	9	180
	1	10	1	25	1	5	50	1	5	100	1	5	100
	2	4	2	10	2	2	20	2	2	40	2	2	40
	1	2	1	5	1	1	10	1	1	20	1	1	20
	2	1	1	3	1	0.5	5	1	0.5	10	1	0.5	10
	1	0.5	1	2.5	--	--	--	--	--	--	--	--	--
<b>Set of fine increment masses (optional)</b>	1	0.4	2	1	2	0.2	2	2	0.2	4	2	0.2	4
	1	0.2	1	0.5	1	0.1	1	1	0.1	2	1	0.1	2
	1	0.1	1	0.25	1	0.05	0.5	1	0.05	1	1	0.05	1
	2	0.04	2	0.1	2	0.02	0.2	2	0.02	0.4	2	0.02	0.4
	1	0.02	1	0.05	1	0.01	0.1	1	0.01	0.2	1	0.01	0.2

Measuring range [lb/in <sup>2</sup> ]	Single-piston measuring ranges				Dual-piston measuring ranges								
	10 ... 1,600		30 ... 4,000		10 ... 10,000			10 ... 16,000			10 ... 20,000		
	Quantity	Nominal pressure per piece [lb/in <sup>2</sup> ]	Quantity	Nominal pressure per piece [lb/in <sup>2</sup> ]	Quantity	Nominal pressure per piece [lb/in <sup>2</sup> ]	Nominal pressure per piece [lb/in <sup>2</sup> ]	Quantity	Nominal pressure per piece [lb/in <sup>2</sup> ]	Nominal pressure per piece [lb/in <sup>2</sup> ]	Quantity	Nominal pressure per piece [lb/in <sup>2</sup> ]	Nominal pressure per piece [lb/in <sup>2</sup> ]
10 ... 800													
<b>Piston</b>	1	10	--	--	1	10	100	1	10	200	1	10	200
<b>Piston and make-up weight</b>	--	--	1	30	--	--	--	--	--	--	--	--	--
<b>Standard mass set</b>	6	200	6	500	8	100	1,000	6	100	2,000	8	100	2,000
	1	180	1	450	1	90	900	1	90	1,800	1	90	1,800
	1	100	1	250	1	50	500	1	50	1,000	1	50	1,000
	2	40	2	100	2	20	200	2	20	400	2	20	400
	1	20	1	50	1	10	100	1	10	200	1	10	200
	2	10	1	25	1	5	50	1	5	100	1	5	100
	1	5	1	20	--	--	--	--	--	--	--	--	--
<b>Set of fine increment masses (optional)</b>	1	4	2	10	2	2	20	2	2	40	2	2	40
	1	2	1	5	1	1	10	1	1	20	1	1	20
	1	1	1	2.5	1	0.5	5	1	0.5	10	1	0.5	10
	2	0.4	2	1	2	0.2	2	2	0.2	4	2	0.2	4
	1	0.2	1	0.5	1	0.1	1	1	0.1	2	1	0.1	2

Measuring range [kPa]	Single-piston measuring ranges				Dual-piston measuring ranges								
	100 ... 12,000		200 ... 30,000		100 ... 70,000			100 ... 120,000			100 ... 140,000		
	Quantity	Nominal pressure per piece [kPa]	Quantity	Nominal pressure per piece [kPa]	Quantity	Nominal pressure per piece [kPa]	Nominal pressure per piece [kPa]	Quantity	Nominal pressure per piece [kPa]	Nominal pressure per piece [kPa]	Quantity	Nominal pressure per piece [kPa]	Nominal pressure per piece [kPa]
100 ... 6,000													
<b>Piston and make-up weight</b>	1	100	1	200	1	100	1,000	1	100	2,000	1	100	2,000
<b>Standard mass set</b>	4	2,000	4	5,000	5	1,000	10,000	4	1,000	20,000	5	1,000	20,000
	1	1,800	1	4,500	1	900	9,000	1	900	18,000	1	900	18,000
	1	1,000	1	2,500	1	500	5,000	1	500	10,000	1	500	10,000
	2	400	2	1,000	2	200	2,000	2	200	4,000	2	200	4,000
	1	200	1	500	1	100	1,000	1	100	2,000	1	100	2,000
	2	100	1	300	1	50	500	1	50	1,000	1	50	1,000
	1	50	1	250	--	--	--	--	--	--	--	--	--
<b>Set of fine increment masses (optional)</b>	1	40	2	100	2	20	200	2	20	400	2	20	400
	1	20	1	50	1	10	100	1	10	200	1	10	200
	1	10	1	25	1	5	50	1	5	100	1	5	100
	2	4	2	10	2	2	20	2	2	40	2	2	40
	1	2	1	5	1	1	10	1	1	20	1	1	20

# Specifications

## Model CPB5800





Piston-cylinder systems model CPS5800					
Version	Single-piston measuring ranges		Dual-piston measuring ranges		
<b>Measuring ranges in bar or kg/cm<sup>2</sup> 1)</b>	1 ... 120	2 ... 300	1 ... 60 / 10 ... 700	1 ... 60 / 20 ... 1,200	1 ... 60 / 20 ... 1,400
Required masses	49.7 kg	49.6 kg	57.4 kg	49.2 kg	57.4 kg
Smallest step 2) (Standard mass set)	0.5 bar	2.5 bar	0.5 bar / 5.0 bar	0.5 bar / 10 bar	
Smallest step 3) (Set of fine increment masses)	0.02 bar	0.05 bar	0.01 bar / 0.1 bar	0.01 bar / 0.2 bar	
Nominal effective area of the piston	0.4032 cm <sup>2</sup>	0.1613 cm <sup>2</sup>	0.8065 cm <sup>2</sup> / 0.0807 cm <sup>2</sup>	0.8065 cm <sup>2</sup> / 0.0403 cm <sup>2</sup>	
<b>Measuring ranges in lb/in<sup>2</sup> 1)</b>	10 ... 1,600	30 ... 4,000	10 ... 800 / 100 ... 10,000	10 ... 800 / 200 ... 16,000	10 ... 800 / 200 ... 20,000
Required masses	45.5 kg	45.3 kg	56.4 kg	45 kg	56.4 kg
Smallest step 2) (Standard mass set)	5 lb/in <sup>2</sup>	20 lb/in <sup>2</sup>	5 lb/in <sup>2</sup> / 50 lb/in <sup>2</sup>	5 lb/in <sup>2</sup> / 100 lb/in <sup>2</sup>	
Smallest step 3) (Set of fine increment masses)	0.2 lb/in <sup>2</sup>	0.5 lb/in <sup>2</sup>	0.1 lb/in <sup>2</sup> / 1 lb/in <sup>2</sup>	0.1 lb/in <sup>2</sup> / 2 lb/in <sup>2</sup>	
Nominal effective area of the piston	0.4032 cm <sup>2</sup>	0.1613 cm <sup>2</sup>	0.8065 cm <sup>2</sup> / 0.0807 cm <sup>2</sup>	0.8065 cm <sup>2</sup> / 0.0403 cm <sup>2</sup>	
<b>Measuring ranges in kPa 1)</b>	100 ... 12,000	200 ... 30,000	100 ... 6,000 / 1,000 ... 70,000	100 ... 6,000 / 2,000 ... 120,000	100 ... 6,000 / 2,000 ... 140,000
Required masses	49.7 kg	49.6 kg	57.4 kg	49.2 kg	57.4 kg
Smallest step 2) (Standard mass set)	50 kPa	250 kPa	50 kPa / 500 kPa	50 kPa / 1,000 kPa	
Smallest step 3) (Set of fine increment masses)	2 kPa	5 kPa	1 kPa / 10 kPa	1 kPa / 20 kPa	
Nominal effective area of the piston	0.4032 cm <sup>2</sup>	0.1613 cm <sup>2</sup>	0.8065 cm <sup>2</sup> / 0.0807 cm <sup>2</sup>	0.8065 cm <sup>2</sup> / 0.0403 cm <sup>2</sup>	
<b>Accuracies</b>					
Standard 4) 5) 6)	0.015 % of reading				0.025 % of reading
Premium 4) 5) 7)	0.007 % of reading	0.006 % of reading		0.007 % of reading	0.008 % of reading
<b>Pressure transmission medium</b>					
Standard	Hydraulic fluid based on VG22 mineral oil				
Optional	Sebacate oil Brake fluid Skydrol Fomblin oil				Sebacate oil
<b>Material</b>					
Piston	Steel		Tungsten carbide / steel		
Cylinder	Bronze	Steel	Steel / tungsten carbide		
Mass set	Stainless steel, non-magnetic				

- 1) Theoretical starting value; corresponds to the pressure value generated by the piston or the piston and its make-up weight (by their own weight). To optimise the operating characteristics more masses should be loaded.
- 2) The smallest pressure change value that can be achieved based on the standard mass set. To reduce this, a set of fine increment masses is also available.
- 3) The smallest pressure change value that can be achieved based on the optional set of fine increment masses. For further reductions, an accessory of class M1 or F1 set of fine increment masses is available to compensate for actual area of piston unit.
- 4) The accuracy from 10 % of the measuring range is based on the measured value. The standard accuracy of 0.02 % of reading or 10 % of measuring range is maintained without any correction of actual area of the piston unit. In the lower range, the accuracy is 0.03 % of reading for the single-range piston-cylinder systems and 0.025 % of reading for dual-range piston-cylinder systems.
- 5) Measurement uncertainty assuming reference conditions (ambient temperature 20 °C [68 °F], atmospheric pressure 1,013 mbar [14.69 lb/in<sup>2</sup>], relative humidity 40 %). For operation without a CalibratorUnit, corrections must be made if required.
- 6) Not available with UKAS area and mass calibration.
- 7) Requires UKAS area and mass calibration.

Piston-cylinder systems model CPS5800					
Version	Single-piston measuring ranges		Dual-piston measuring ranges		
<b>Weight</b>					
Piston-cylinder system	1 kg [2.2 lbs]	0.8 kg [1.8 lbs]	2 kg [4.4 lbs]	2 kg [4.4 lbs]	2 kg [4.4 lbs]
Storage case for the piston-cylinder system	3.1 kg [6.8 lbs]				
bar standard mass sets (in 2 wooden cases)	61.3 kg [135.2 lbs]	61.2 kg [134.9 lbs]	69 kg [152.1 lbs]	60.8 kg [134.1 lbs]	69 kg [152.1 lbs]
lb/in <sup>2</sup> standard mass sets (in 2 wooden cases)	57.1 kg [125.9 lbs]	56.9 kg [125.5 lbs]	68 kg [149.9 lbs]	56.6 kg [124.8 lbs]	68 kg [149.9 lbs]
bar set of fine increment masses	0.33 kg [0.73 lbs]	0.5 kg [1.10 lbs]	0.5 kg [1.10 lbs]	0.5 kg [1.10 lbs]	0.5 kg [1.10 lbs]
lb/in <sup>2</sup> set of fine increment masses	0.23 kg [0.51 lbs]	0.34 kg [0.75 lbs]	0.34 kg [0.75 lbs]	0.34 kg [0.75 lbs]	0.34 kg [0.75 lbs]
<b>Dimensions (W x D x H)</b>					
Carrying case for standard mass sets	400 x 310 x 310 mm [15.7 x 12.2 x 12.2 in]				
Storage case for the piston-cylinder system (optional)	300 x 265 x 205 mm [11.8 x 10.4 x 8.1 in]				

Base, model CPB5800	
<b>Base version</b>	
Hydraulic standard	up to max. 1,200 bar [16,000 lb/in <sup>2</sup> ]; with internal pressure generation
Hydraulic high pressure	up to max. 1,400 bar [20,000 lb/in <sup>2</sup> ]; with internal pressure generation
<b>Connections</b>	
Connection for piston-cylinder system	G ¾ B male / optional: ConTect quick-release connector (not for 1,400 bar version [20,000 lb/in <sup>2</sup> version])
Test connection	G ½ female threaded quick-connectors, freely rotating, exchangeable for other threaded inserts, see Accessories
<b>Material</b>	
Piping in base	1.4404 stainless steel, 6 x 1.5 mm
<b>Pressure transmission medium</b>	
Standard	Hydraulic fluid based on VG22 mineral oil
Optional	Sebacate oil, brake fluid, Skydrol or Fomblin oil (dependent on measuring range)
Reservoir	250 cm <sup>3</sup>
<b>Weight</b>	
Standard hydraulic base	18.0 kg / 19.0 kg [39.7 lbs / 41.9 lbs] (incl. optional ConTect quick-release connector)
Hydraulic high-pressure base	18.0 kg [39.7 lbs]
Storage case for the base	8.5 kg [18.7 lbs]
<b>Permissible ambient conditions</b>	
Operating temperature	18 ... 28 °C [64 ... 82 °F]
<b>Dimensions (W x D x H)</b>	
Base	401 x 375 x 265 mm [15.7 x 14.8 x 10.4 in], for details, see technical drawings

## Approvals

Logo	Description	Country
	<b>EU declaration of conformity</b> Pressure equipment directive; PS > 1,000 bar, module A, pressure accessories	European Union
	<b>EAC (option)</b> <ul style="list-style-type: none"> <li>■ EMC directive</li> <li>■ Pressure equipment directive</li> <li>■ Low voltage directive</li> <li>■ Machinery directive</li> </ul>	Eurasian Economic Community
	<b>GOST (option)</b> Metrology, measurement technology	Russia
	<b>UkrSEPRO (option)</b> Metrology, measurement technology	Ukraine
-	<b>MTSCHS (option)</b> Permission for commissioning	Kazakhstan

## Certificates

Certificate	
Calibration	
CPB5800	Standard: Calibration certificate Option: UKAS calibration certificate (pressure calibration with a mass set)
CPS5800	Standard: Calibration certificate Option 1: UKAS calibration certificate (pressure calibration with a mass set) Option 2: UKAS calibration certificate (area calibration)
CPM5800	Standard: without Option 1: Calibration certificate Option 2: UKAS calibration certificate (mass calibration) Option 3: UKAS calibration certificate (pressure calibration with a piston-cylinder system)
<b>Recommended recalibration interval</b>	2 to 5 years (dependent on conditions of use)

Approvals and certificates, see website



## Transport dimensions for complete instrument

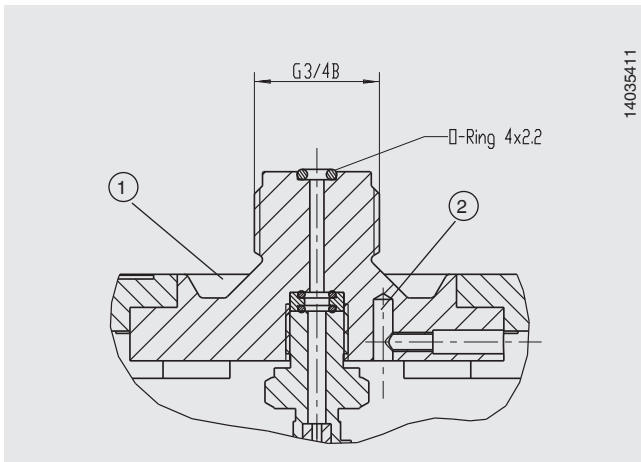
The complete instrument, in its standard version and standard scope of delivery, consists of three packages on a single pallet. The dimensions are 960 x 710 x 560 mm [37.8 x 28 x 22 in]. The overall weight is dependent on the measuring range.

Version	Weight	
	net	gross
<b>Single-piston measuring ranges</b>		
1 ... 120 bar	81.5 kg [179.7 lbs]	100 kg [220.5 lbs]
2 ... 300 bar	81.5 kg [179.7 lbs]	100 kg [220.5 lbs]
<b>Dual-piston measuring ranges</b>		
1 ... 60 bar / 10 ... 700 bar	90 kg [195.5 lbs]	108.5 kg [239.2 lbs]
1 ... 60 bar / 20 ... 1,200 bar	82 kg [180.8 lbs]	100.5 kg [221.6 lbs]
1 ... 60 bar / 20 ... 1,400 bar	90 kg [195.5 lbs]	108.5 kg [239.2 lbs]

Version	Weight	
	net	gross
<b>Single-piston measuring ranges</b>		
10 ... 1,600 lb/in <sup>2</sup>	77.5 kg [170.9 lbs]	96 kg [211.7 lbs]
30 ... 4,000 lb/in <sup>2</sup>	77 kg [169.8 lbs]	95.5 kg [210.6 lbs]
<b>Dual-piston measuring ranges</b>		
10 ... 800 lb/in <sup>2</sup> / 100 ... 10,000 lb/in <sup>2</sup>	89 kg [196.2 lbs]	107.5 kg [237.0 lbs]
10 ... 800 lb/in <sup>2</sup> / 200 ... 16,000 lb/in <sup>2</sup>	77.5 kg [170.9 lbs]	96 kg [211.7 lbs]
10 ... 800 lb/in <sup>2</sup> / 200 ... 20,000 lb/in <sup>2</sup>	89 kg [196.2 lbs]	107.5 kg [237.0 lbs]

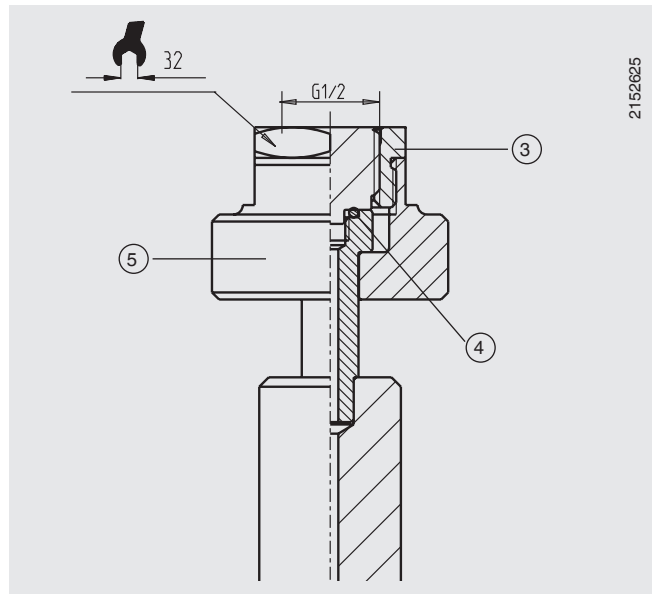
## Dimensions in mm [in]

### Standard connection piston-cylinder system



- ① Oil collecting tray
- ② Temperature sensor, optional
- ③ Threaded insert, changeable
- ④ O-ring 8 x 2
- ⑤ Quick connector with knurled nut

### Test item connection

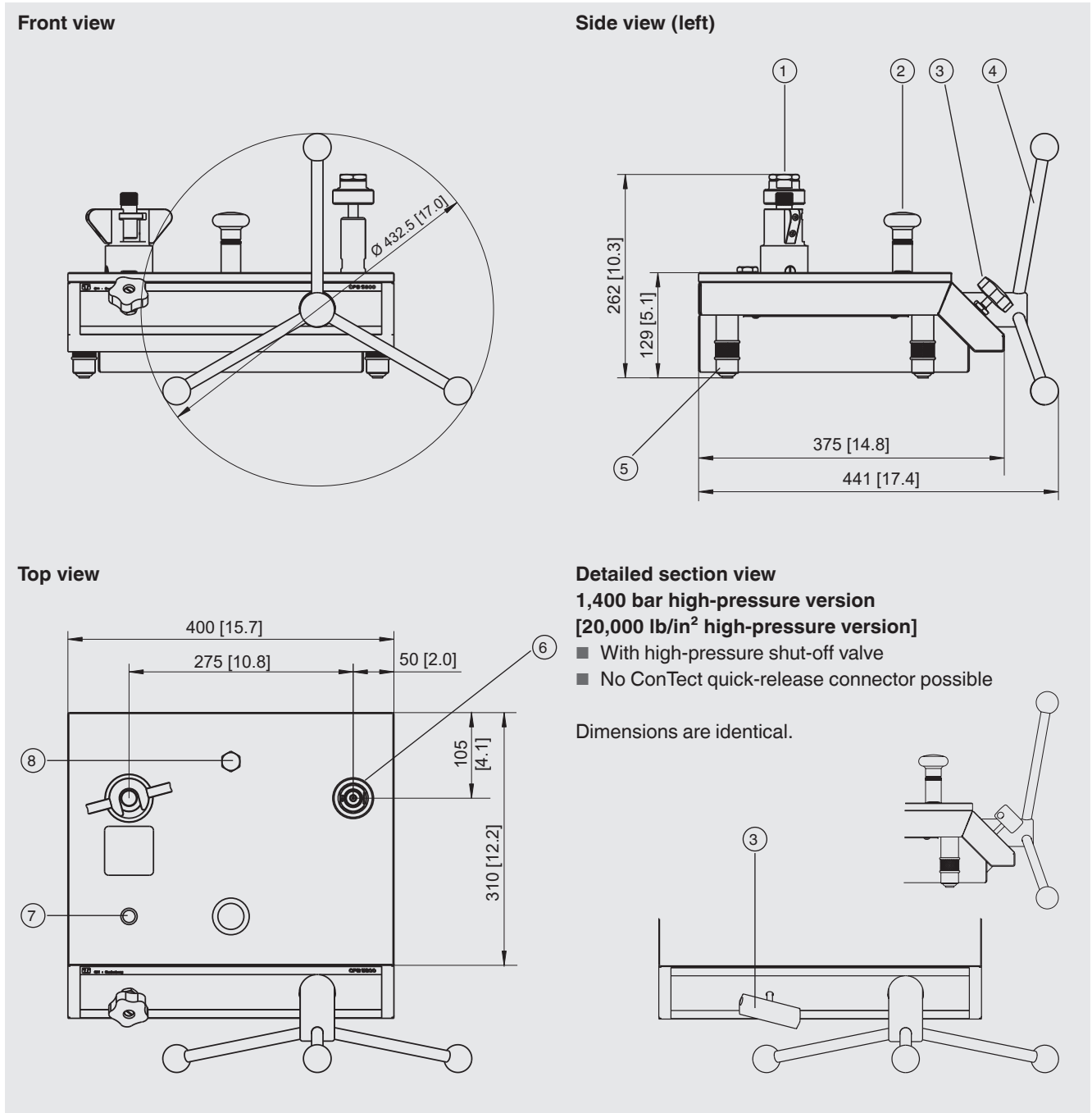


## Dimensions in mm [in]

(without masses)

The picture shows a 1,200 bar version [16,000 lb/in<sup>2</sup> version] of the CPB5800 instrument base with the ConTect quick-release connector option.

The 1,400 bar high-pressure version [20,000 lb/in<sup>2</sup> high-pressure version] does not differ from it dimensionally, only in the arrangement of the control elements.



- ① Connector for piston-cylinder system
- ② Priming pump
- ③ Outlet valve
- ④ Spindle pump with star handle, removable
- ⑤ Rotatable feet

- ⑥ Test connection
- ⑦ Level
- ⑧ Oil reservoir plug screw

## CalibratorUnit model CPU6000

The models of the CPU6000 series are compact tools for use with a pressure balance (dead-weight tester). In particular when highly accurate measuring values, with measurement uncertainties of less than 0.025 %, are required, complicated mathematical calculations and corrections are necessary. With the CPU6000 in combination with the WIKA-Cal (PC software) all critical ambient parameters can be registered and automatically corrected.

### The CPU6000 series is made up of three instruments

#### Weather station, model CPU6000-W

The CPU6000-W provides measured values such as atmospheric pressure, relative humidity and the ambient temperature of the laboratory environment.

#### Pressure balance sensor box, model CPU6000-S

The CPU6000-S measures the piston temperature and displays the floating position of the masses.

#### Digital multimeter, model CPU6000-M

The CPU6000-M fulfils the function of a digital multimeter and power supply unit when electronic pressure transmitters must be calibrated.

### Typical application

#### WIKA-Cal PC software - Weight calculator

With the demo version of the WIKA-Cal software and a CPB series pressure balance (dead-weight tester), the masses to be applied and the corresponding reference pressure can be determined. The pressure balance data (dead-weight tester data) can be entered into the database manually or imported automatically via an XML file available online.

All ambient parameters and piston temperature can be entered manually into WIKA-Cal or can be measured automatically with the CPU6000 series, so that the highest accuracy can be achieved. WIKA-Cal demo version can be downloaded free of charge from the WIKA website.

Further specifications on the CPU6000 series can be found in data sheet CT 35.02.

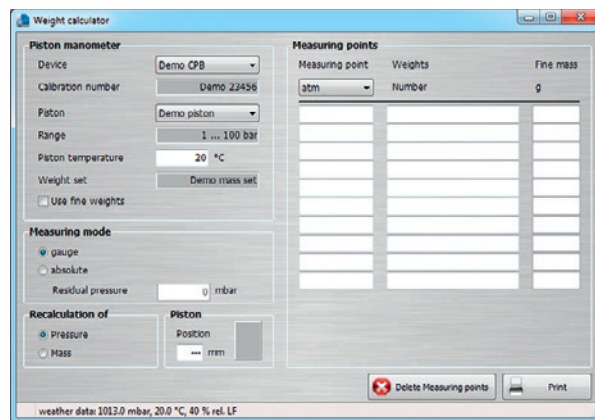
For details of the WIKA-Cal calibration software see data sheet CT 95.10.



CPU6000 series



Model CPU6000-W, CPU6000-S, CPB5800 and PC with WIKA-Cal software



WIKA-Cal PC software - Weight calculator

## Further pressure balances (dead-weight testers) within our calibration technology programme

### Dead-weight tester in compact design, model CPB3800

#### Measuring ranges:

Hydraulic 1 ... 120 to 10 ... 1,200 bar  
[10 ... 1,600 to 100 ... 16,000 lb/in<sup>2</sup>]

**Accuracy:** 0.05 % of reading  
0.025 % of reading (optional)

For specifications see data sheet CT 31.06



Dead-weight tester in compact design, model CPB3800

### Pneumatic pressure balance, model CPB5000

#### Measuring ranges:

Hydraulic -0.03 ... -1 to +0.4 ... +100 bar  
[-0.435 ... -14 to +5.8 ... +1,500 lb/in<sup>2</sup>]

**Accuracy:** 0.015 % of reading  
0.008 % of reading (optional)

For specifications see data sheet CT 31.01



Pneumatic pressure balance, model CPB5000

### Pressure balance for high pressure, model CPB5000HP

#### Measuring ranges:

Hydraulic 25 ... 2,500, 25 ... 4,000 or 40 ... 6,000 bar  
[350 ... 40,000, 350 ... 60,000 or  
400 ... 90,000 lb/in<sup>2</sup>]

**Accuracy:** 0.025 % of reading  
0.02 % of reading (optional)

For specifications see data sheet CT 31.51



Pressure balance for high pressure, model CPB5000HP

### Pressure balance for differential pressure, model CPB5600DP

#### Measuring ranges (= static pressure + differential pressure):

Pneumatic 0.03 ... 2 to 0.4 ... 100 bar  
[0.435 ... 30 to 5.8 ... 1,500 lb/in<sup>2</sup>]  
Hydraulic 0.2 ... 60 to 25 ... 1,600 bar  
[2.9 ... 1,000 to 350 ... 23,200 lb/in<sup>2</sup>]

**Accuracy:** 0.015 % of reading  
0.008 % of reading (optional)

For specifications see data sheet CT 31.56



Pressure balance for differential pressure, model CPB5600DP

## Accessories

### Set of fine increment masses M1 and F1

The masses included in the standard mass set are ideally suited for everyday use. If even smaller intermediate values need to be generated, using one of the class M1 or F1 set of fine increment masses with the following masses is recommended:

1 x 50 g, 2 x 20 g, 1 x 10 g, 1 x 5 g, 2 x 2 g, 1 x 1 g,  
1 x 500 mg, 2 x 200 mg, 1 x 100 mg, 1 x 50 mg, 2 x 20 mg,  
1 x 10 mg, 1 x 5 mg, 2 x 2 mg, 1 x 1 mg



Set of fine increment masses

### Adapter sets for quick connector

As a standard, the pressure balance (dead-weight tester) is equipped with a quick connector for connecting the test item. For this purpose, the following threaded inserts, which can be easily changed, are available:

- Adapter set: G 1/4, G 3/8, 1/2 NPT, 3/4 NPT and M20 x 1.5
- Adapter set NPT: 1/8 NPT, 1/4 NPT, 3/8 NPT and 1/2 NPT

Additionally, the adapter sets include spare O-rings as well as a spanner with SW32 flats and SW14 flats, for changing the adapters.

Other threaded inserts are available on request.



Adapter set


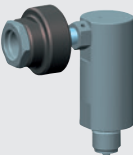


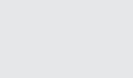
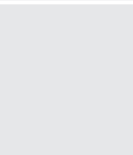
### Separators

The separators have been specifically designed for measuring instruments, which should not come into contact with the medium of the pressure balance (dead-weight tester) or to protect the pressure balance (dead-weight tester) against contamination from the test items.



Separator (without diaphragm)

## Accessories

Special features		Order code
		CPB-A-EE-
	<b>Set of fine increment masses</b> 1 mg up to 50 g, class F1	-A-
	1 mg up to 50 g, class M1	-C-
	<b>Storage case</b> for instrument base and the piston-cylinder system	-B-
	<b>90° angle connection</b> for test items with back mounting connection Threaded insert G ½ (½" BSP)	-D-
	<b>Separator</b> without diaphragm, max. 1,000 bar [14,500 lb/in <sup>2</sup> ]	-E-
	<b>O-ring set</b> consisting of 5 pcs. 8 x 2 and 5 pcs. 4 x 2.2	-F-
	<b>Operating fluid</b> for CPB series up to max. 4,000 bar [60,000 lb/in <sup>2</sup> ], 1 litre	-G-
	<b>Test item connection</b> G ¾ female to G ½ female, rotating, operation as a comparison test pump is possible	-H-
	<b>Electrical piston drive unit</b> AC 110 V/50 Hz for industrial power plug, 3 pole only for measuring ranges 700 bar and 1,200 bar [10,000 lb/in <sup>2</sup> and 16,000 lb/in <sup>2</sup> ]	-I-
	<b>Electrical piston drive unit</b> AC 230 V/50 Hz for industrial power plug, 3 pole only for measuring ranges 700 bar and 1,200 bar [10,000 lb/in <sup>2</sup> and 16,000 lb/in <sup>2</sup> ]	-J-
	<b>Adapter set for quick connector</b> in case with G ¼, G ⅜, ½ NPT, ¼ NPT and M20 x 1.5 threaded inserts for insertion in the knurled nut on the test item connector	-K-
	"NPT" in case with ⅙ NPT, ¼ NPT, ⅜ NPT and ½ NPT threaded inserts for insertion in the knurled nut on the test item connector	-L-
<b>Ordering information for your request</b>		
<b>1. Order code: CPB-A-EE-</b> <b>2. Option:</b>		↓ [   ]

## Scope of delivery

- Pressure balance CPB5800
- Priming pump
- Spindle pump for filling, pressure generation and fine adjustment
- Piston connection with G 3/4 B male thread
- Quick connector for test items with G 1/2 female threaded insert, changeable
- Piston-cylinder system
- Standard mass sets in carrying case
- Masses, manufactured to local gravity (standard value: 9.80665 m/s<sup>2</sup>)
- VG22 mineral oil (1.0 litre)
- Operating instructions in German and English language
- Factory calibration certificate

## Options

- Other pressure transmission media
- Piston connection with ConTect quick-release connector or M30 x 2 female thread
- Systems with increased accuracy to 0.006 %
- Other pressure units
- Mass set manufactured to local gravity
- UKAS calibration certificate
- Combination with CPS/CPM5000 series units possible (please contact the WIKA sales team for further information)

## Ordering information

### Instrument base

CPB5800 / Pressure transmission medium / Instrument version / Connection of piston-cylinder system / Mass set / Piston-cylinder system / Installation of CPU6000-S CalibratorUnit sensor technology / Storage case / Additional ordering information

### Piston-cylinder system

CPS5800 / Accuracy / Gravity value g / Measuring range / Connection of piston-cylinder system / Storage case for piston-cylinder system / Calibration for piston-cylinder system / Additional ordering information

### Mass set

CPM5800 / Pressure unit / Gravity value g / Standard mass set / Set of fine increment masses / Calibration for standard mass set / Calibration for set of fine increment masses / Additional ordering information

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