

## Dead-weight tester in compact design Model CPB3800



WIKA data sheet CT 31.06

### Applications

- Primary standard for calibrating the pressure scale in a hydraulic range up to 1,200 bar
- 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 0.025 % of reading
- Upgradeable using CPS5800/CPM5800 to provide increased accuracy to 0.006 %
- Direct replacement of original DH-Budenberg 580 series, see replacement matrix on page 2
- Factory calibration includes traceability to national standards, as standard; with UKAS calibration possible as an option
- Masses manufactured from stainless steel, can be adjusted to local gravity



Dead-weight tester, model CPB3800

### 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 pure mechanical measuring principle, the model CPB3800 is ideal for on-site use for maintenance and service.

#### Basic principle

Pressure is defined as the quotient of force and area. The core component of the CPB3800 is therefore a very precisely-manufactured piston-cylinder system, which is loaded with masses in order to generate the individual test points.

The masses applied are proportional to the target pressure and this is achieved through optimally graduated masses. As standard, these masses are manufactured to the standard gravity ( $9.80665 \text{ m/s}^2$ ), though they can be adjusted to a specific location and also UKAS calibrated.

### Easy operation

The integrated dual-area spindle pump enables rapid priming of the test system and smooth pressure generation up to 1,200 bar. At the same time, the precise adjustable spindle pump also enables fine pressure adjustment. A control schematic for pressure generation on the instrument base facilitates quick and easy operation.

As soon as the measuring system reaches equilibrium, there is a balance of forces between the pressure and the mass load 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 item under test.

### Compact instrument design

The CPB3800 is also particularly notable for its compact dimensions, which are not altered during operation, since the spindle runs within the pump body.

With its compact dimensions, the exceptionally robust ABS plastic housing and the low weight associated with these, the CPB3800 is also particularly suited to on-site applications.



Control schematic on the CPB3800 instrument base

### CPB3800 with dual-range piston-cylinder units

Next to the standard piston-cylinder systems the CPB3800 instrument base can also be combined with the CPS5800 single- or dual-range piston-cylinder systems.

With this combination the former 580-series dead-weight tester from DH-Budenberg is still available. This includes all 580L/580M/580DX and 580HX instruments and is identical in form, fit, function, specification and quality.

The table below shows WIKA's model code combinations to the corresponding 580-series models.



Dead-weight tester CPB3800 with CPS5800 piston unit

### DH-Budenberg 580-series replacement units

Former model designations		Replacement model code combinations			
Model	Instrument base	Piston-cylinder unit / mass set	Range <sup>1)</sup>	Accuracy	
				Standard	Premium
580L	CPB3800	CPS5800 / CPM5800	1 ... 120 bar	0.015 %	0.007 %
580M	CPB3800	CPS5800 / CPM5800	2 ... 300 bar	0.015 %	0.006 %
580DX	CPB3800	CPS5800 / CPM5800	1 ... 60 bar / 10 ... 700 bar	0.015 %	0.006 %
580HX	CPB3800	CPS5800 / CPM5800	1 ... 60 bar / 20 ... 1,200 bar	0.015 %	0.007 %

<sup>1)</sup> Also available for pressure units kg/cm<sup>2</sup>, lb/in<sup>2</sup>, psi and kPa

For detailed specifications see page 6, 8 and 9.

## The standard piston-cylinder system

The piston and cylinder are manufactured from tungsten carbide.

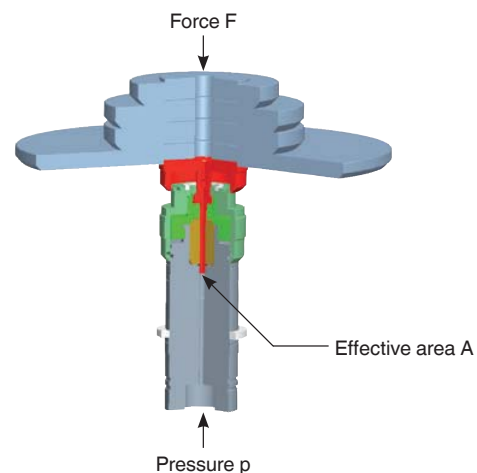
This pairing of materials, in comparison to other materials, has very low pressure and temperature coefficients of expansion, which results in a very good linearity for the cross-sectional area and a very high accuracy.

Piston and cylinder are very well protected, against contact, impacts or contamination from outside, in a solid stainless-steel housing. 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 mass removal under pressure.

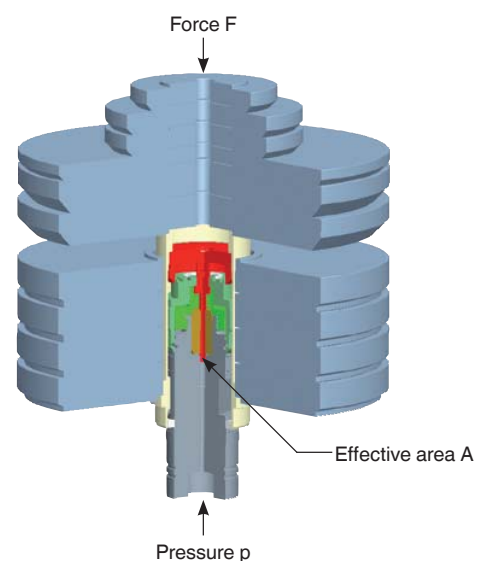
The masses are stacked on an overhang (bell jar), which sits on the piston shaft. The construction of the overhang (bell jar) provides a very low centre of gravity for the stacked masses, which minimises both the side thrust on the piston-cylinder system and the friction. For smaller starting pressures, the masses can also be stacked directly onto the piston shaft, without using the overhang (bell jar).

The overall design of the piston-cylinder unit and the very precise manufacturing of both the piston and the cylinder, ensures excellent operating characteristics with long free-rotation time and low rate of fall.

Thus a high long-term stability is ensured. Therefore the recommended recalibration interval is two to five years dependant on the conditions of usage.



**Piston-cylinder system with masses, without overhang (bell jar)**



**Piston-cylinder system with masses, with overhang (bell jar)**

## The optional piston-cylinder system model CPS5800

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

- Single-range piston-cylinder system (for measuring ranges 120 bar and 300 bar)
- Dual-range piston-cylinder system (for measuring ranges 700 bar and 1,200 bar)

### High accuracy over a wide measuring range

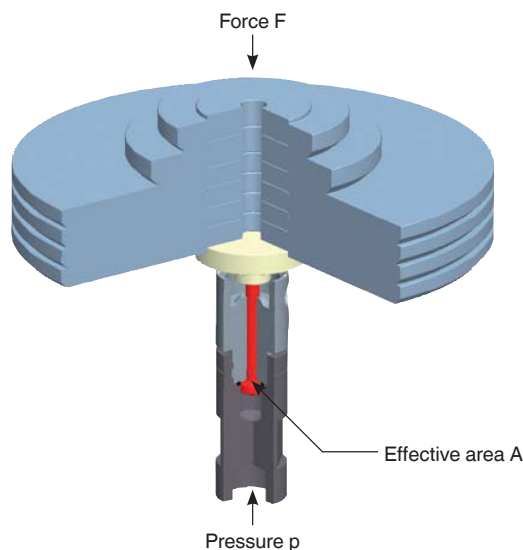
The dual-range piston-cylinder system offers two measuring ranges in one housing with automatic measuring range switching from low-pressure to high-pressure pistons. This provides the user with an extremely flexible measuring instrument that can cover a wide measuring range with high accuracy, with only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

The piston and cylinder are manufactured from hardened steel and 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 cross-sectional area and a very high accuracy.

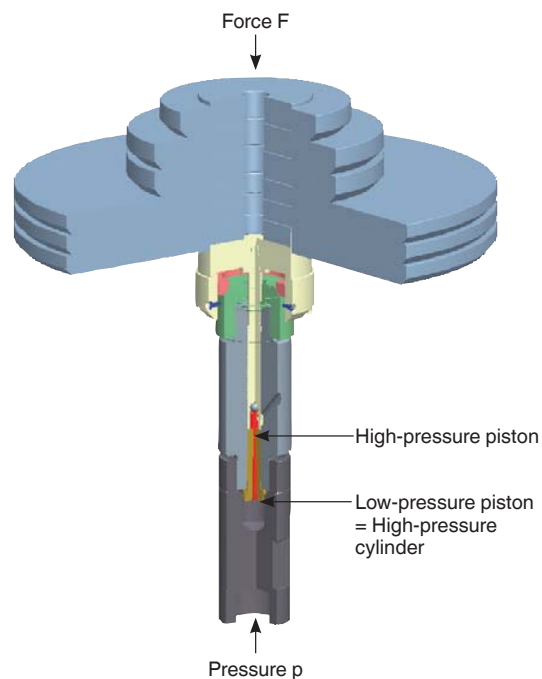
Piston and cylinder are very well protected, against contact, impacts or contamination from outside, in a solid stainless-steel/hardened tool steel housing. At the same time, overpressure protection is integrated, which prevents the piston from being forced out vertically and avoids damage to the piston-cylinder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

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

The overall design of the piston-cylinder unit 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 depending on the conditions of usage.



Model CPS5800 single-range piston-cylinder system



Model CPS5800 dual-range piston-cylinder system

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## Tables of masses

The following tables show, for the respective measuring range, the number of masses within a set of masses, with their resulting nominal pressures.

The masses are manufactured, as standard, to the standard gravity ( $9.80665 \text{ m/s}^2$ ) although they can be adjusted for any particular location.

Should the instrument not be operated under reference conditions (ambient temperature  $20^\circ\text{C}$ , air pressure 1,013 mbar, relative humidity 40 %), the relevant corrections must be made for example with the CPU6000 CalibratorUnit, see page 13.

### Standard mass sets

Measuring range [bar]	1 ... 120		2.5 ... 300		5 ... 700		10 ... 1,200	
	Quantity	Nominal pressure per piece [bar]	Quantity	Nominal pressure per piece [bar]	Quantity	Nominal pressure per piece [bar]	Quantity	Nominal pressure per piece [bar]
Piston and make-up weight	1	1	1	2.5	1	5	1	10
Piston, overhang (bell jar) and overhang make-up weight	1	20	1	50	1	100	1	200
Masses (stackable on overhang (bell jar))	3	20	3	50	4	100	3	200
Masses (stackable on piston)	1	20	1	50	1	100	1	200
	1	10	1	25	1	50	1	100
	2	4	2	10	2	20	2	40
	1	2	1	5	1	10	1	20
	1	1	1	2.5	1	5	1	10

Measuring range [lb/in <sup>2</sup> ]	10 ... 1,600		25 ... 4,000		50 ... 10,000		100 ... 16,000	
	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> ]	Quantity	Nominal pressure per piece [lb/in <sup>2</sup> ]
Piston	1	10	1	25	1	50	1	100
Overhang (bell jar) and overhang make-up weight	1	190	1	475	1	950	1	1,900
Masses (stackable on overhang (bell jar))	5	200	5	500	7	1,000	5	2,000
Masses (stackable on piston)	1	200	1	500	1	1,000	1	2,000
	1	100	1	250	1	500	1	1,000
	2	40	2	100	2	200	2	400
	1	20	1	50	1	100	1	200
	1	10	1	25	1	50	1	100

## The mass sets, model CPM5800 (option)

These mass sets are supplied in wooden cases with foam inserts. This includes the masses listed in the table 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 set of class M1 or F1 trim masses from the accessories is recommended.



Mass set model CPM5800

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	Quantity	Nominal pressure per piece	Quantity	Nominal pressure per piece	Quantity	Nominal pressure per piece	Quantity	Nominal pressure per piece	Quantity	Nominal pressure per piece	Quantity	Nominal pressure per piece	Quantity	Nominal pressure per piece	
	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	
	[kg/cm <sup>2</sup> ]	[kg/cm <sup>2</sup> ]		[kg/cm <sup>2</sup> ]	[kg/cm <sup>2</sup> ]	[kg/cm <sup>2</sup> ]		[kg/cm <sup>2</sup> ]	[kg/cm <sup>2</sup> ]		[kg/cm <sup>2</sup> ]	[kg/cm <sup>2</sup> ]		[kg/cm <sup>2</sup> ]	[kg/cm <sup>2</sup> ]		[kg/cm <sup>2</sup> ]
Piston and make-up weight	1	1	1	2	1	1	10		1	1	20		1	1	20		
Standard mass set	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													
Set of fine increment masses (optional)	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		

## Specifications

### Model CPB3800

#### Piston-cylinder systems (standard)

Measuring range <sup>1)</sup>	bar	1 ... 120	2.5 ... 300	5 ... 700	10 ... 1,200
Required masses	kg	41	50	58	50
Smallest step <sup>2)</sup> (Standard mass set)	bar	1	2.5	5	10
Nominal cross-sectional area of the piston	in <sup>2</sup>	1/16	1/40	1/80	1/160
Measuring range <sup>1)</sup>	lb/in <sup>2</sup>	10 ... 1,600	25 ... 4,000	50 ... 10,000	100 ... 16,000
Required masses	kg	47	47	58	47
Smallest step <sup>2)</sup> (Standard mass set)	lb/in <sup>2</sup>	10	25	50	100
Nominal cross-sectional area of the piston	in <sup>2</sup>	1/16	1/40	1/80	1/160
Accuracies					
Standard <sup>3) 4)</sup>		0.05 % of reading			
Option <sup>3) 4)</sup>		0.025 % of reading			
Pressure transmission medium	Hydraulic fluid based on VG22 mineral oil (0.5 l included in scope of delivery)				
Material					
Piston		Tungsten carbide			
Cylinder		Tungsten carbide			
Mass set		Stainless steel, non-magnetic			
Weight					
Piston-cylinder system	kg	2.4			
BAR mass set incl. overhang (bell jar)	kg	41.5	50.5	58.5	50.5
lb/in <sup>2</sup> mass set incl. overhang (bell jar)	kg	47.5	47.5	58.5	47.5
Storage case for mass set (optional, 2 pieces required)	kg	5.8			
Dimensions					
Storage case for mass set (optional)		400 x 310 x 310 mm (W x H x D) and 215 x 310 x 310 mm (W x H x D)			

- 1) Theoretical starting value; corresponds to the pressure value generated by the piston or the piston and its make-up weights (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 masses set. To reduce this, a set of trim masses is also available.
- 3) The accuracy from 10 % of the measuring range is based on the measured value. In the lower range, a fixed error based on 10 % of the range applies.
- 4) Measurement uncertainty assuming reference conditions (ambient temperature 20 °C, air pressure 1,013 mbar, relative humidity 40 %). For operation without a CalibratorUnit, corrections must be made if required.



## Piston-cylinder systems, model CPS5800 (option)

Version		Single-piston measuring ranges		Dual-piston measuring ranges	
<b>Measuring range <sup>1)</sup></b>	bar, kg/cm <sup>2</sup>	1 ... 120	2 ... 300	1 ... 60 / 10 ... 700	1 ... 60 / 20 ... 1,200
Required masses	kg	49.7	49.6	57.4	49.2
Smallest step <sup>2)</sup> (Standard mass sets)	bar, kg/cm <sup>2</sup>	0.5	2.5	0.5 / 5.0	0.5 / 10
Smallest step <sup>3)</sup> (set of fine increment masses)	bar, kg/cm <sup>2</sup>	0.02	0.05	0.01 / 0.1	0.01 / 0.2
Nominal cross-sectional area of the piston	cm <sup>2</sup>	0.4032	0.1613	0.8065 / 0.0807	0.8065 / 0.0403
<b>Measuring range <sup>1)</sup></b>	psi, lb/in <sup>2</sup>	10 ... 1,600	30 ... 4,000	10 ... 800 / 100 ... 10,000	10 ... 800 / 200 ... 16,000
Required masses	kg	45.5	45.3	56.4	45
Smallest step <sup>2)</sup> (Standard mass sets)	psi, lb/in <sup>2</sup>	5	20	5 / 50	5 / 100
Smallest step <sup>3)</sup> (set of fine increment masses)	psi, lb/in <sup>2</sup>	0.2	0.5	0.1 / 1	0.1 / 2
Nominal cross-sectional area of the piston	cm <sup>2</sup>	0.4032	0.1613	0.8065 / 0.0807	0.8065 / 0.0403
<b>Measuring range <sup>1)</sup></b>	kPa	100 ... 12,000	200 ... 30,000	100 ... 6,000 / 1,000 ... 70,000	100 ... 6,000 / 2,000 ... 120,000
Required masses	kg	49.7	49.6	57.4	49.2
Smallest step <sup>2)</sup> (Standard mass sets)	kPa	50	250	50 / 500	50 / 1,000
Smallest step <sup>3)</sup> (set of fine increment masses)	kPa	2	5	1 / 10	1 / 20
Nominal cross-sectional area of the piston	cm <sup>2</sup>	0.4032	0.1613	0.8065 / 0.0807	0.8065 / 0.0403
<b>Accuracies</b>					
Standard <sup>4) 5)</sup>	% of reading	0.015	0.015	0.015	0.015
Premium <sup>4) 5)</sup>	% of reading	0.007	0.006	0.006	0.007

### Pressure transmission medium

Standard	Hydraulic fluid based on VG22 mineral oil <sup>6)</sup>
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### Material

Piston	Steel	Steel	Tungsten carbide / steel	Tungsten carbide / steel
Cylinder	Bronze	Steel	Steel / tungsten carbide	Steel / tungsten carbide
Mass set	Stainless steel, non-magnetic			

### Weight

Piston-cylinder system	kg	1	0.8	2	2
Storage case for piston-cylinder system	kg	3.1			
BAR standard mass sets (in 2 wooden cases)	kg	61.3	61.2	69	60.8
PSI standard mass sets (in 2 wooden cases)	kg	57.1	56.9	68	56.6
BAR set of fine increment masses	kg	0.33	0.5	0.5	0.5
PSI set of fine increment masses	kg	0.23	0.34	0.34	0.34

- 1) Theoretical starting value; corresponds to the pressure value generated by the piston or the piston and its make-up weights (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 set of class M1 or F1 trim masses is available.
- 4) The accuracy from 10 % of the measuring range is based on the measured value. 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, air pressure 1013 mbar, relative humidity 40 %). For operation without a CalibratorUnit, corrections must be made if required.
- 6) Other pressure transmission media on request.



## Piston-cylinder systems, model CPS5800 (option)

### Dimensions

Carrying case for standard mass sets	mm	400 x 310 x 310 (W x H x D)
Storage case for piston-cylinder systems (optional)	mm	300 x 265 x 205 (W x H x D)

## Base

### Connections

Connection for piston-cylinder system	G ¾ B (male)
Test item connection	G ½ female thread, loose union connection

### Material

Wetted parts	Austenitic stainless steel, high tensile brass, nitrile rubber
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<b>Pressure transmission medium</b>	Hydraulic fluid based on VG22 mineral oil (0.5 l included in scope of delivery) <sup>6)</sup>
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Reservoir	170 cm <sup>3</sup>
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### Weight

Base	13.5 kg
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Storage case for the base (optional)	8.5 kg
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### Permissible ambient conditions

Operating temperature	18 ... 28 °C
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### Dimensions

Base	401 x 397 x 155 mm (W x D x H), for details, see technical drawings
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6) Other pressure transmission media on request.

## CE conformity and certificates

### CE conformity

Pressure equipment directive	97/23/EC (Module A)
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### Certificate

Calibration	Calibration certificate Option: UKAS calibration certificate (pressure calibration with a mass set) for CPB3800 standard models Option: UKAS calibration certificate (area and mass calibration) for CPS/CPM5800 only
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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 1,200 x 800 x 500 mm.  
The overall weight is dependant on the measuring range.

### Standard CPB3800 units

Version in bar	Weight in kg		Version in lb/in <sup>2</sup>	Weight in kg	
	net	gross		net	gross
1 ... 120 bar	71	89	10 ... 1,600 lb/in <sup>2</sup>	68	86
2.5 ... 300 bar	71	89	25 ... 4,000 lb/in <sup>2</sup>	68	86
5 ... 700 bar	71	89	50 ... 10,000 lb/in <sup>2</sup>	68	86
10 ... 1,200 bar	71	89	100 ... 16,000 lb/in <sup>2</sup>	68	86

### Optional CPS/CPM5800 units with CPB3800 base

Version in bar	Weight in kg		Version in psi	Weight in kg	
	net	gross		net	gross
Single-piston measuring ranges			Single-piston measuring ranges		
1 ... 120 bar	77	95.5	10 ... 1.600 psi	73	91.5
2 ... 300 bar	77	95.5	30 ... 4.000 psi	72.5	91
Dual-piston measuring ranges			Dual-piston measuring ranges		
1 ... 60 bar / 10 ... 700 bar	85.5	104	10 ... 800 psi / 100 ... 10.000 psi	84.5	103
1 ... 60 bar / 20 ... 1.200 bar	77.5	96	10 ... 800 psi / 200 ... 16.000 psi	73	91.5
1 ... 60 bar / 20 ... 1.400 bar	85.5	104	10 ... 800 psi / 200 ... 20.000 psi	84.5	103

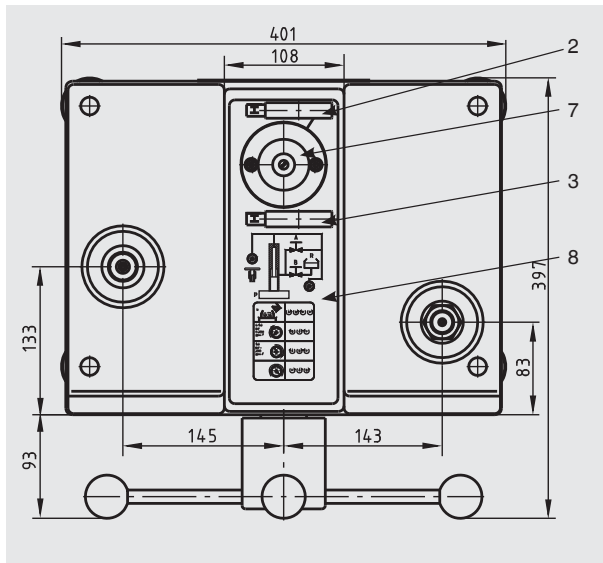
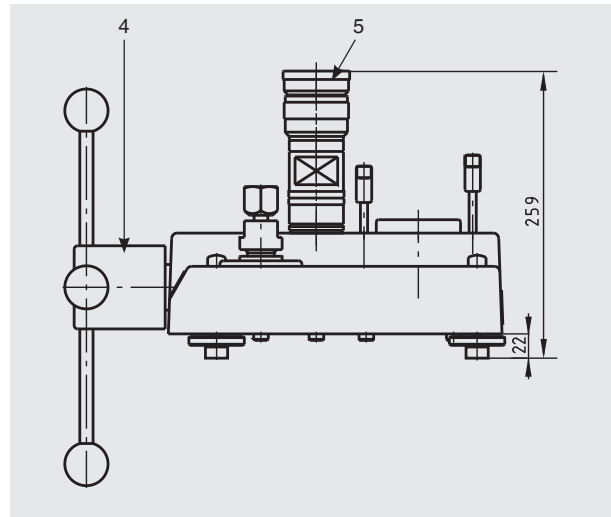
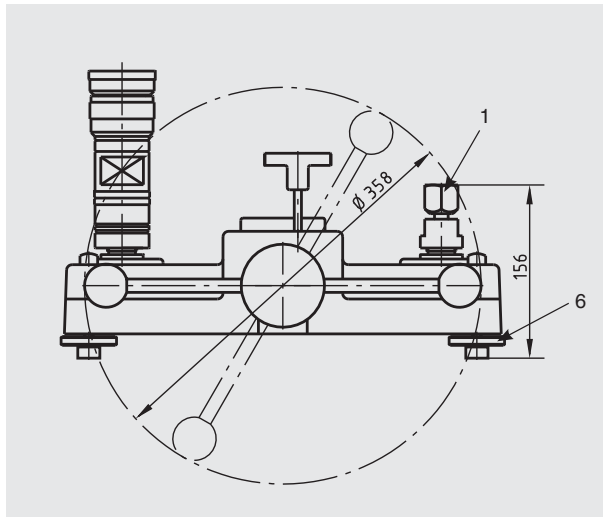


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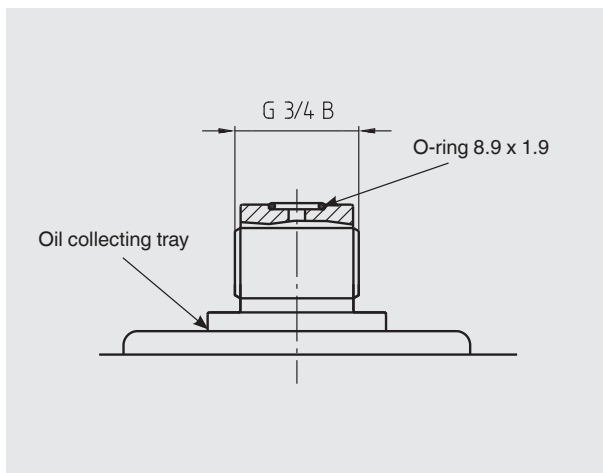
## Dimensions in mm

(without masses)

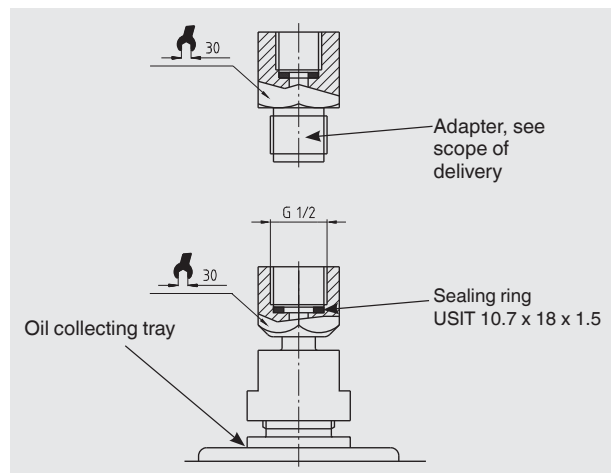


- (1) Test item connection
- (2) High-pressure shut-off valve
- (3) Low-pressure shut-off valve
- (4) Dual-area pump with star handle
- (5) Piston-cylinder system
- (6) Rotatable feet
- (7) Reservoir with screwed sealing plug
- (8) Pressure generation control schematic

### Standard connection piston-cylinder system



### Test item connection



## Accessories

### Set of trim-masses M1 and F1

The masses included in the standard mass set are ideally suited for everyday use.

If smaller intermediate values need to be generated, we recommend using a set of class M1 or F1 trim masses, with the following masses:

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 trim masses

### Test connections

With the existing standard test item connection, test items with radial connection points can be mounted. For units with rear connection points, a 90° angle connector is available. With a G ¾ female to G ½ female, loose union connection, which can be mounted in place of the piston-cylinder system on the piston connector, the CPB3800 instrument base can be used as a comparison test pump.



Fig. left: Gauge adapter, G ¾ female to G ½ female  
Fig. right: Angle connector 90°

### Separators

The separators (with diaphragm) 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 against contamination of the pressure balance (dead-weight tester) from the test items.

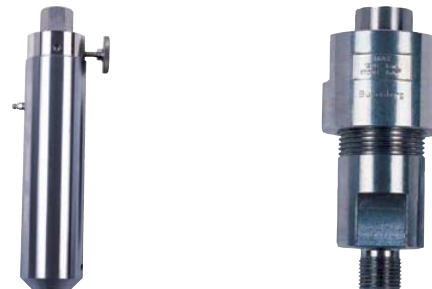


Fig. left: Separator (with diaphragm) 700 bar  
Fig. right: Separator (with diaphragm) 1,200 bar

Designation/Variant	Order no.
Set of trim masses (1 mg up to 50 g), class F1	7093874
Set of trim masses (1 mg up to 50 g), class M1	14025325
Set of 2 carrying cases for bar mass set	14031236
Set of 2 carrying cases for psi mass set	14068416
Carrying case for CPB3800 instrument base	14031237
Set of adapters "BSP" for test item connection G ½ B male on G ⅛, G ¼, G ⅜ and G ½ female	14031238
Set of adapters "NPT" for test item connection G ½ B male on ⅛ NPT, ¼ NPT, ⅜ NPT and ½ NPT female	14031239
Set of adapters "metric" for test item connection G ½ B male on M12 x 1.5 and M20 x 1.5 female	14031242
Test item connection, G ¾ female to G ½ female, rotating	14031251
90° angle connection, for test items with back mounting connection	1564838
Separator (to separate two liquid media by a diaphragm), max. 700 bar	14031253
Separator (to separate two liquid media by a diaphragm), max. 1,200 bar	14031254
Sealing set for CPB3800 instrument base	14031255
Operating fluid for CPB series up to a max. 4,000 bar, 0.5 litre	2099954
Tool set consisting of open-ended spanner, BSP adapter, replacement seals, pointer remover and pointer punch	14031263

## 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 CPB-CAL (iPad® app) and/or 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 air 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 fulfills the function of a digital multimeter and power supply unit when electronic pressure transmitters must be calibrated.

### Typical application

#### CPB-CAL iPad® app

The iPad® application calculates the mass loads for pressure balances (dead-weight testers) or the reference pressure while taking the measured parameters from the CPU6000 into account. The conversion can be carried out in all common pressure units. As an additional parameter, the local gravity can be specified for location-independent measurements.

#### WIKI-CAL PC software - Weight calculator

With the demo version of the WIKI-CAL software and a CPB series pressure balance (dead-weight tester), the mass discs 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 online available XML file. All ambient parameters and piston temperature can be entered manually into WIKI-CAL or can be measured automatically with the CPU6000 series, so that the highest accuracy can be achieved. WIKI-CAL demo version can be downloaded free of charge from the WIKI website.

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

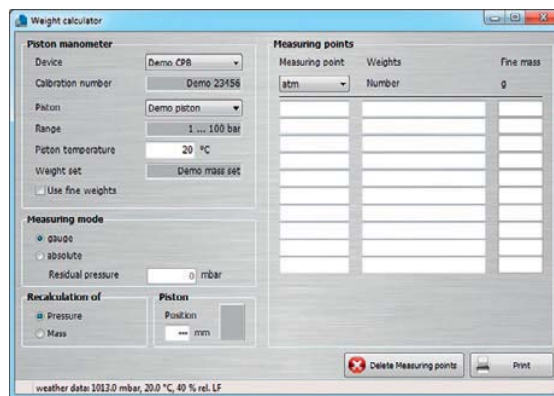
For details of the WIKI-CAL calibration software see data sheet CT 95.10.



CPU6000 series and iPad® app CPB-CAL



Model CPU6000-W, CPU6000-S, CPB5800 and PC with WIKI-CAL software



WIKI-CAL PC software - Weight calculator

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

### Pressure balance, model CPB5800

#### Measuring ranges:

- Hydraulic      Single-piston measuring ranges:  
1 ... 120 up to 2 ... 300 bar or  
10 ... 1,600 up to 30 ... 4,000 psi,  
respectively  
  
Dual-piston measuring ranges:  
1 ... 60 / 10 ... 700 bar up to  
1 ... 60 / 20 ... 1,400 bar or  
10 ... 800 / 100 ... 10,000 psi up to  
10 ... 800 / 200 ... 20,000 psi, respectively
- Accuracy:**      0.015 % of measured value  
up to 0.006 % of measured value (optional)

For specifications see data sheet CT 31.11



Pressure balance, model CPB5800

### Pressure balance, model CPB5000

#### Measuring ranges:

- Pneumatic      -0.03 ... -1 up to +0.4 ... +100 bar or  
-0.435 ... -14 up to +5.8 ... +1,500 psi,  
respectively
- Accuracy:**      0.015 % of measured value  
0.008 % of measured value (optional)

For specifications see data sheet CT 31.01



Pressure balance, model CPB5000

### Pressure balance for high pressure, model CPB5000HP

#### Measuring ranges:

- Hydraulic      25 ... 2,500, 25 ... 4,000 or 25 ... 5,000 bar, or  
350 ... 40,000, 350 ... 60,000 or  
350 ... 70,000 psi, respectively  
  
50 / 2,600 bar dual piston or  
600 / 40,000 psi dual piston, respectively
- Accuracy:**      0.025 % of measured value  
0.02 % of measured value (optional)

For specifications see data sheet CT 31.51



Pressure balance for high pressure, model CPB5000HP

### Pressure balance for differential pressure, model CPB5600DP

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

- Pneumatic      0.03 ... 2 up to 0.4 ... 100 bar or  
0.435 ... 30 up to 5.8 ... 1,500 psi,  
respectively
  - Hydraulic      0.2 ... 60 up to 25 ... 1,600 bar or  
2.9 ... 1,000 up to 350 ... 23,200 psi,  
respectively
- Accuracy:**      0.015 % of measured value  
0.008 % of measured value (optional)

For specifications see data sheet CT 31.56



Pressure balance for differential pressure, model CPB5600DP

## Scope of delivery

- Base
- Dual-area spindle pump for filling, pressure generation and fine pressure adjustment
- Piston connection with G 3/4 B male thread
- Test item connection with G 1/2 female thread, loose union connection
- Adapter set for test item selectable from 3 different sets:
  - Set of adapters "BSP" G 1/2 male on G 1/8, G 1/4, G 3/8 and G 1/2 female
  - Set of adapters "NPT" G 1/2 male on 1/8 NPT, 1/4 NPT, 3/8 NPT and 1/2 NPT female
  - Set of adapters "metric" G 1/2 male on M12 x 1.5 and M20 x 1.5 female
- Piston-cylinder system
- Mass set manufactured to standard gravity (9.80665 m/s<sup>2</sup>)
- VG22 mineral oil (0.5 litre)
- Tool and maintenance set
- Operating instructions in German and English language
- Factory calibration certificate

## Options

- System with increased accuracy to 0.006 %
- Other pressure transmission media
- Other pressure units
- Set of fine increment masses (CPS/CPM5800 option only)
- Mass set manufactured to local gravity
- Storage case for the base, mass set (included as standard for CPS5800/CPM5800 options) and the piston-cylinder system
- UKAS calibration certificate

## Ordering information

### Instrument base

CPB3800 / Instrument version / Accuracy / Gravity value g / Standard set of adapters / Storage case / Calibration for pressure balance / Additional order information

### Piston-cylinder system

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

### Mass set

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

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