Pressure balance
Differential pressure version
Model CPB5600DP

DH·Budenberg

Applications

- Reference instrument for the calibration of differential pressure measuring instruments under static pressure
- Primary standard 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

- Measuring range (= static pressure + differential pressure) up to 400 bar pneumatic, up to 1,600 bar hydraulic
- Total measurement uncertainty to 0.008 % of differential pressure plus 0.0001 % (1 ppm) of static pressure
- Factory calibration includes traceability to national standards, as standard; with DKD/DAkkS calibration possible as an option
- High long-term stability with recommended recalibration cycle every five years
- Masses manufactured from stainless steel and aluminium, can be adjusted to local gravity

Model CPB5600DP pressure balance for differential pressure

Description

Proven primary standard

Pressure balances 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 of five years (recommended in accordance with German Calibration Service DKD/DAkkS).
The pressure balance 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 CPB5600DP 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 CPB5600DP 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 weights. As standard, these masses are manufactured to the standard gravity (9.80665 m/s^2), though they can be adjusted to a specific location and also DKD/DAkkS calibrated.

Data sheets showing similar products and accessories:
Pressure balance in compact design; model CPB3800; see data sheet CT 31.06
Pneumatic pressure balance; model CPB5000; see data sheet CT 31.01
Hydraulic pressure balance; model CPB5800; see data sheet CT 31.11
Pressure balance for high pressure; model CPB5000HP; see data sheet CT 31.51
CalibratorUnit; model CPU5000; see data sheet CT 35.01

Easy operation
The pressure setting depends on the instrument design and is either done via an integrated pump or from external pressure supply via a metering valve. For fine adjustment, a very precisely-controllable spindle pump is fitted, with a precision spindle running within it.
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 test item.

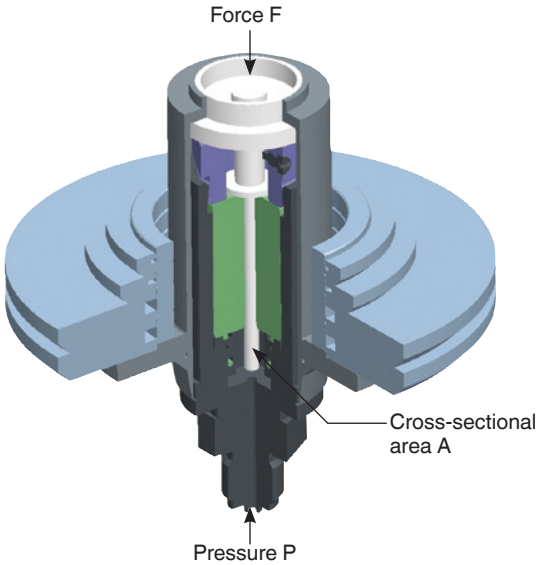
The piston-cylinder system

Both the piston and cylinder are manufactured from tungsten carbide. Compared to other materials, tungsten carbide has very small pressure and thermal expansion coefficients, which results in a very good linearity of the effective cross-sectional area of the piston and thus a high measurement 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 weights, which minimises both the side thrust on the piston-cylinder system and the friction. For relatively low starting pressures, a lighter aluminium plate can be used instead of the overhang (bell jar).

The overall design of the piston-cylinder unit and the very precise manufacturing of both the piston and the cylinder, ensure excellent operating characteristics with a long free-rotation time, low sink rates and a very high long-term stability. Therefore, the recommended recalibration interval is five years.



Piston-cylinder system

High-performance instrument range
The CPB5600DP instrument bases are available in the following four designs:

- Pneumatic base
  - up to a max. 100 bar / 1,500 psi
  - with integrated pressure generation through priming pump and spindle pump
  - connection for external pressure supply
- Pneumatic base with integrated gas to oil separator
  - up to a max. 400 bar / 5,000 psi
  - connection for external pressure supply
  - for use with hydraulic piston-cylinder systems with M30 x 2 connection
  - test items can be easily, dryly and cleanly calibrated with air
- Hydraulic base
  - up to a max. 1,000 bar / 14,500 psi
  - with integrated pressure generation through priming pump and spindle pump
  - special designs available to 1,200 bar / 17,400 psi
- Hydraulic high-pressure base
  - up to a max. 1,600 bar / 23,200 psi
  - with integrated pressure generation through priming pump and spindle pump
  - for use with high-pressure hydraulic piston-cylinder systems with M30 x 2 connection with sealing cone

The instruments include the components of two pressure balances in one housing. For the calibration of differential pressure gauges under a static pressure, the two systems are separated by a by-pass valve.

One of the systems is used to generate the static pressure with the second system generating the differential pressure (incl. static pressure). It is recommended that one of the sets of trim-masses is used for this (see accessories).

The instrument bases, pneumatic to 100 bar and hydraulic, are fitted with the patented ConTect quick-release mechanism. This enables a quick and safe replacement of the piston-cylinder systems without any tools. The pneumatic instrument design with separator is fitted with a connection for the piston-cylinder system with M30 x 2 female thread and the hydraulic high-pressure base version is fitted with a M30 x 2 female thread with sealing cone.

The instrument bases are also available as individual instruments.

Tables of weights

The following tables show the number of masses within a set of masses with their nominal mass values and the resulting nominal pressures for the respective measuring ranges. Should you not operate the device under reference conditions (ambient temperature 20 °C, air pressure 1,013 mbar, relative humidity 40 %), relevant corrections must be made.

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

Measuring range [bar]	Pneumatic models							
	0.03 ... 2		0.2 ... 10		0.4 ... 50		0.4 ... 100	
	Quantity	Nominal pressure per piece	Quantity	Nominal pressure per piece	Quantity	Nominal pressure per piece	Quantity	Nominal pressure per piece
		bar		bar		bar		bar
Piston	1	0.03	1	0.2	1	0.4	1	0.4
Overhang (bell jar)	1	0.16	1	0.8	1	4	1	4
Piston plate	1	0.01	1	0.05	1	0.25	1	0.25
Masses 2 kg	-	-	-	-	-	-	5	10
Masses 1 kg	9	0.2	9	1	9	5	9	5
Masses 0.5 kg	1	0.1	1	0.5	1	2.5	1	2.5
Masses 0.2 kg	1	0.04	1	0.2	1	1	1	1
Masses 0.12 kg	1	0.024	1	0.12	1	0.6	1	0.6
Masses 0.1 kg	1	0.02	1	0.1	1	0.5	1	0.5
Masses 0.07 kg	1	0.014	1	0.07	1	0.35	1	0.35
Masses 0.05 kg	1	0.01	1	0.05	1	0.25	1	0.25

Measuring range [psi]	Pneumatic models									
	0.435... 30		2.9 ... 150		5.8 ... 500		5.8 ... 1,000		5.8 ... 1,500	
	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
		psi		psi		psi		psi		psi
Piston	1	0.435	1	2.9	1	5.8	1	5.8	1	5.8
Overhang (bell jar)	1	2.22	1	11.1	1	55.5	1	55.5	1	55.5
Piston plate	1	0.22	1	1.1	1	5.5	1	5.5	1	5.5
Masses 1.4 kg	5	4	5	20	-	-	5	100	8	100
Masses 1 kg	2	3	2	15	2	75	2	75	2	75
Masses 0.7 kg	4	2	4	10	4	50	4	50	9	50
Masses 0.35 kg	3	1	3	5	3	25	3	25	3	25
Masses 0.19 kg	1	0.548	1	2.74	1	13.7	1	13.7	1	13.7
Masses 0.14 kg	1	0.4	1	2	1	10	1	10	1	10
Masses 0.12 kg	1	0.345	1	1.725	1	8.625	1	8.625	1	8.625
Masses 0.07 kg	1	0.2	1	1	1	5	1	5	1	5

Measuring range [bar]	Hydraulic models													
	0.2 ... 60		0.2 ... 100		1 ... 250		1 ... 400		2 … 600		2 … 1,000		25 … 1,600	
	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
Piston	1	0.2	1	0.2	1	1	1	1	1	2	1	2	1	25
Overhang (bell jar)	1	1.6	1	1.6	1	8	1	8	1	16	1	16	-	-
Piston plate	1	0.1	1	0.1	1	0.5	1	0.5	1	1	1	1	-	-
Masses 4 kg	6	8	11	8	5	40	11	40	6	80	11	80	4	200
Masses 2 kg	2	4	2	4	2	20	2	20	2	40	2	40	8	100
Masses 1 kg	1	2	1	2	1	10	1	10	1	20	1	20	1	50
Masses 0.5 kg	1	1	1	1	1	5	1	5	1	10	1	10	2	25
Masses 0.2 kg	1	0.4	1	0.4	1	2	1	2	1	4	1	4	1	10
Masses 0.1 kg	1	0.2	1	0.2	1	1	1	1	1	2	1	2	1	5
Masses 0.05 kg	1	0.1	1	0.1	1	0.5	1	0.5	1	1	1	1	1	2.5

Measuring range [psi]	Hydraulic models									
	2.9 ... 1,000		14.5 ... 5,000		29 ... 10,000		29 ... 14,500		350 ... 23,200	
	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
		psi		psi		psi		psi		psi
Piston	1	2.9	1	14.5	1	29	1	29	1	350
Overhang (bell jar)	1	23.1	1	115.5	1	231	1	231	-	-
Piston plate	1	1.1	1	5.5	1	11	1	11	-	-
Masses 7 kg	-	-	-	-	-	-	-	-	2	5,000
Masses 3.5 kg	9	100	9	500	9	1,000	14	1,000	3	2,500
Masses 1.4 kg	1	40	1	200	1	400	1	400	6	1,000
Masses 1 kg	1	30	1	150	1	300	1	300	1	750
Masses 0.7 kg	2	20	2	100	2	200	2	200	2	500
Masses 0.35 kg	1	10	1	50	1	100	1	100	1	250
Masses 0.175 kg	1	5	1	25	1	50	1	50	-	-
Masses 0.14 kg	1	4	1	20	1	40	1	40	1	100
Masses 0.07 kg	1	2	1	10	1	20	1	20	1	50

Specifications
Model CPB5600DP

Piston-cylinder system

Version		pneumatic				
Measuring range [1) 6)]	bar [2)]	0.03 … 2	0.2 … 10	0.4 … 50	0.4 … 100	
Required masses	kg	10	10	10	20	
Smallest step	bar [3)]	0.01	0.05	0.25	0.25	
Sensitivity [4)]	mbar	0.002	0.01	0.05	0.05	
Nominal cross-sectional area of the piston	cm^2	5	1	0.2	0.2	
Version		pneumatic				
Measuring range [1) 6)]	psi [2)]	0.435 … 30	2.9 … 150	5.8 … 500	5.8 … 1,000	5.8 … 1,500
Required masses	kg	10	10	7	13	20
Smallest step	psi [3)]	0.2	1	5	5	5
Sensitivity [4)]	psi	0.00003	0.00015	0.00075	0.00075	0.00075
Nominal cross-sectional area of the piston	cm^2	5	1	0.2	0.2	0.2
Version		hydraulic				
Measuring range [1) 6)]	bar [2)]	0.2 … 60	0.2 … 100	1 … 250	1 … 400	2 … 600
Required masses	kg	30	50	25	40	30
Smallest step	bar [3)]	0.1	0.1	0.5	0.5	1
Sensitivity [4)]	mbar	0.04	0.04	0.2	0.2	0.4
Nominal cross-sectional area of the piston	cm^2	0.5	0.5	0.1	0.1	0.05
Version		hydraulic	hydraulic high-pressure			
Measuring range [1) 6)]	bar [2)]	2 … 1,000	25 … 1,600			
Required masses	kg	50	32			
Smallest step	bar [3)]	1	2.5			
Sensitivity [4)]	mbar	0.4	5			
Nominal cross-sectional area of the piston	cm^2	0.05	0.02			
Version		hydraulic				hydraulic high-pressure
Measuring range [1) 6)]	psi [2)]	2.9 … 1,000	14.5 … 5,000	29 … 10,000	29 … 14,500	350 … 23,200
Required masses	kg	34	34	34	50	33
Smallest step	psi [3)]	2	10	20	20	50
Sensitivity [4)]	psi	0.006	0.003	0.006	0.006	5
Nominal cross-sectional area of the piston	cm^2	0.5	0.1	0.05	0.05	0.02
Accuracies						
Proportion of static pressure	% of reading	0.0001				
Proportion of differential pressure, standard [5) 7)]	% of reading	0.015 0.025 at hydraulic high-pressure				
Proportion of differential pressure, premium [5) 7)]	% of reading	0.008 0.02 at hydraulic high-pressure				
Lower limiting value of the measurement uncertainty		depending on the measuring range; corresponds to the sensitivity of the piston				

1) Measuring range = static pressure + differential pressure
2) Theroretical starting value; corresponds to the pressure value generated by the piston (by its own weight). To optimise the operating characteristics more weights should be loaded.
3) The smallest pressure change value that can be achieved based on the standard weight set. To reduce this, a set of trim-masses is also available.
4) The sensitivity is the threshold of the measuring system. It is the pressure value of the smallest mass-addition, which brings the piston-cylinder system clearly and reproducibly out of balance.
5) 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.
6) Others on request
7) The accuracy of the differential pressure is determined in accordance with the following calculation basis (see page 8).

Piston-cylinder system

Material		
Piston		tungsten carbide hardened steel at hydraulic high-pressure
Cylinder		tungsten carbide
Mass set		stainless steel 1.4305 and aluminium, non-magnetic
Weight		
Piston-cylinder system, pneumatic or hydraulic	kg	1.5 / 5.7 (incl. overhang (bell jar) and aluminium plate in optional storage case); 2 systems required
Piston-cylinder system, hydraulic high-pressure	kg	2.7 / 5.0 (in optional storage case); 2 systems required
BAR basic mass set, pneumatic	kg	32.4 (incl. 2 carrying case)
BAR extension mass set, pneumatic	kg	28.0 (incl. 2 carrying case)
BAR basic mass set, hydraulic	kg	72.0 (incl. 2 carrying case)
BAR extension mass set, hydraulic	kg	48.0 (incl. 2 carrying case)
BAR basic mass set, hydraulic high-pressure	kg	48.0 (incl. 2 carrying case)
BAR extension mass set, hydraulic high-pressure	kg	39.0 (incl. 2 carrying case)
PSI basic mass set, pneumatic	kg	25.0 (incl. 2 carrying case)
PSI extension mass set 1, pneumatic	kg	22.0 (incl. 2 carrying case)
PSI extension mass set 2, pneumatic (only for 1,500 psi)	kg	37.0 (incl. 2 carrying case)
PSI basic mass set, hydraulic	kg	84.0 (incl. 2 carrying case)
PSI extension mass set, hydraulic	kg	43.0 (incl. 2 carrying case)
PSI basic mass set, hydraulic high-pressure	kg	96.5 (incl. 2 carrying case)
PSI extension mass set, hydraulic high-pressure	kg	16.0 (incl. 2 carrying case)
Dimensions		
Carrying case for basic mass set		400 x 310 x 310 mm (W x D x H)
Carrying case for extension mass set		215 x 310 x 310 mm (W x D x H)
Storage case for piston-cylinder system (optional)		300 x 265 x 205 mm (W x D x H)

Base

Base version	
Pneumatic	up to a max. 100 bar / 1,500 psi; with priming pump, spindle pump and connection for external supply
Pneumatic, with separator	up to a max. 400 bar / 5,000 psi; for external supply with integrated gas to oil separator for use with hydraulic pistons with M30 x 2 connection
Hydraulic	up to a max. 1,000 bar / 14,500 psi; with internal pressure generation up to a max. 1,200 bar / 17,400 psi on request
Hydraulic high-pressure	up to a max. 1,600 bar / 23,200 psi; with internal pressure generation
Pressure transmission medium	
Pneumatic	Clean, dry, non corrosive gases (e.g. air or nitrogen)
Hydraulic	Operating fluid (1 litre is included in delivery), other media on request
Reservoir	250 cm^3

Base

Connections	
Connection to the piston-cylinder system	ConTect quick connector on pneumatic and hydraulic base versions M30 x 2 female thread on pneumatic base version with separator M30 x 2 female thread with sealing cone on hydraulic high-pressure base version
Test item connection	2 pieces quick connector G ½ B female thread as standard, freely rotating, changeable; for further threaded inserts, see accessories
External pressure connection	6 mm SWAGELOK® tube fitting; max. 110 % of the assigned measuring range; only with pneumatic base versions and pneumatic with separator.
Material	
Piping in instrument base	pneumatic: stainless steel 1.4571, 3 x 1 mm hydraulic: stainless steel 1.4404, 6 x 2 mm
Weight	
Pneumatic base	34.0 kg
Pneumatic base with separator	32.0 kg
Hydraulic base	38.5 kg
Hydraulic high-pressure base	37.0 kg
Permissible ambient conditions	
Operating temperature	18 ... 28 °C
Dimensions	
Base	800 x 375 x 265 mm (W x D x H), for details, see technical drawings

Approvals and certificates

CE conformity	
Pressure equipment directive	97/23/EC (Module A) only for 1,200 bar / 17,400 psi design and hydraulic high-pressure
Certificate	
Calibration	Standard: factory calibration certificate Option: DKD/DAkkS calibration certificate

Approvals and certificates, see website

Scope of delivery

- Base
- Priming pump
- Spindle pump for pressure generation/fine adjustment
- Piston adapter with ConTect quick-release connector (on pneumatic and hydraulic base)
- Piston adapter with M30 x 2 female thread (on pneumatic base with separator and hydraulic high-pressure)
- 2 quick connectors for test items
- 2 piston-cylinder systems with overhangs (bell jars)
- 2 basic mass sets in carrying case
- 2 extension mass sets in carrying cases (depending on the measuring range)
- Mass sets manufactured to standard gravity (9.80665 m/s^2)
- Operating fluid 1.0 litre (only for hydraulic version) or 0.25 litre (for separator version)
- Operating instructions in German and English language
- Factory calibration certificate

Options

- Systems with increased accuracy to 0.008 % (depending on measuring range)
- Storage case for piston-cylinder systems
- Mass set manufactured to local gravity
- DKD/DAkkS calibration certificate

Transport dimensions for complete instrument

The complete instrument, in its standard version and standard scope of delivery, consists of 2 packaging units.

- 1 wooden case with instrument base, dimensions 980 x 580 x 560 mm (L x W x H)
- 1 pallet with piston and mass sets, dimensions 1,200 x 800 x 500 mm (L x W x H)

The overall weight is dependant on the instrument version and the measuring range.

Wooden case	Weight in kg net	gross
Pneumatic base	34.0	43.5
Pneumatic base with separator	32.0	41.5
Hydraulic base	38.5	48.0
Hydraulic high-pressure base	37.0	46.5

Pallet Version in bar	Weight in kg net	gross
Pneumatic		
2 bar / 10 bar / 50 bar	35.5	50.5
100 bar	63.5	78.5
Hydraulic		
60 bar / 250 bar / 600 bar	75.0	90.0
100 bar / 400 bar / 1,000 bar	123.0	138.0
1,600 bar	92.5	107.5

Pallet Version in psi	Weight in kg net	gross
Pneumatic		
30 psi / 150 psi / 1,000 psi	50.0	65.0
500 psi	28.0	43.0
1,500 psi	87.0	102.0
Hydraulic		
1,000 psi / 5,000 psi / 10,000 psi	87.0	102.0
14,500 psi	130.0	145.0
23,200 psi	118.0	133.0

Calculation of the measurement uncertainty

The accuracy of the differential pressure is the quadratic sum of the percentage of static pressure $u_{stat.}$ (normally distributed) and the percentage of the differential pressure value $u_{diff.}$ (normally distributed). In this way, the minimum values of each of the individual components are taken into account. What is calculated is the expanded uncertainty U (k = 2), in which the measurand lies with a probability of 95 %.

The measurement uncertainty is calculated as per the following equation:

$$U = k * \sqrt{(u_{stat.} / 2)^2 + (u_{diff.} / 2)^2} \qquad (k = 2 \text{ for } 95\ \%)$$

Example 1:

Measuring range of the piston-cylinder system: 10 bar
Accuracy of the piston-cylinder system: 0.015 %
Static pressure: 5 bar
Differential pressure measured value: 100 mbar

	Measurement uncertainty	Lower limiting value of the measurement uncertainty
Proportion of static pressure	0.0001 % of 5 bar = 0.005 mbar	**0.01 mbar**
Proportion of differential pressure	0.015 % of 100 mbar = **0.015 mbar**	0.01 mbar
Overall accuracy	$\pm 2 * \sqrt{(0.01 \text{ mbar}/2)^2 + (0.015 \text{ mbar}/2)^2}$ = 0.018 mbar which corresponds to **±0.018 %** of reading	

Example 2:

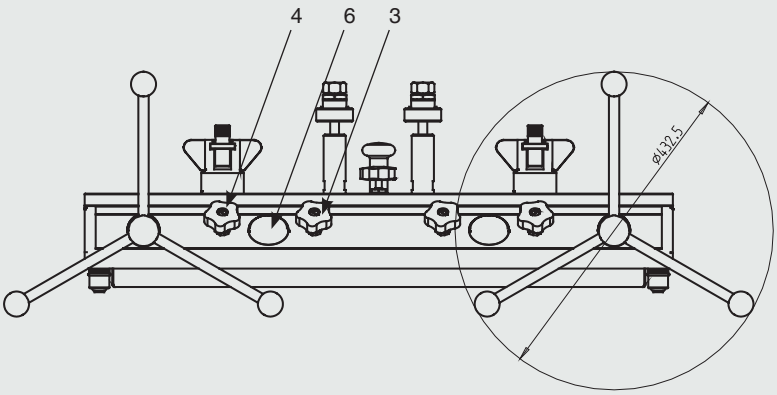
Measuring range of the piston-cylinder system: 250 bar
Accuracy of the piston-cylinder system: 0.008 %
Static pressure: 200 bar
Differential pressure measured value: 2 bar

	Measurement uncertainty	Lower limiting value of the measurement uncertainty
Proportion of static pressure	0.0001 % of 200 bar = **0.2 mbar**	0.2 mbar
Proportion of differential pressure	0.008 % of 2 bar = 0.16 mbar	**0.2 mbar**
Overall accuracy	$\pm 2 * \sqrt{(0.2 \text{ mbar}/2)^2 + (0.2 \text{ mbar}/2)^2}$ = 0.283 mbar which corresponds to **±0.014 %** of reading	

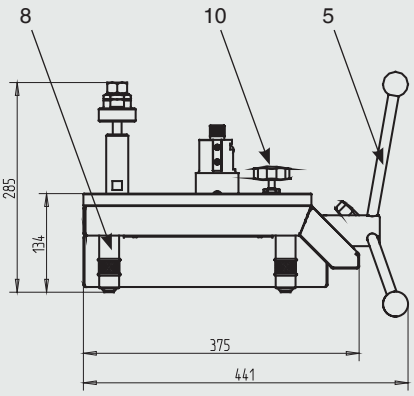
Dimensions in mm

The drawing shows a pneumatic CPB5600DP base. The hydraulic version and hydraulic high-pressure version do not differ from it dimensionally, only in the arrangement of the control elements.

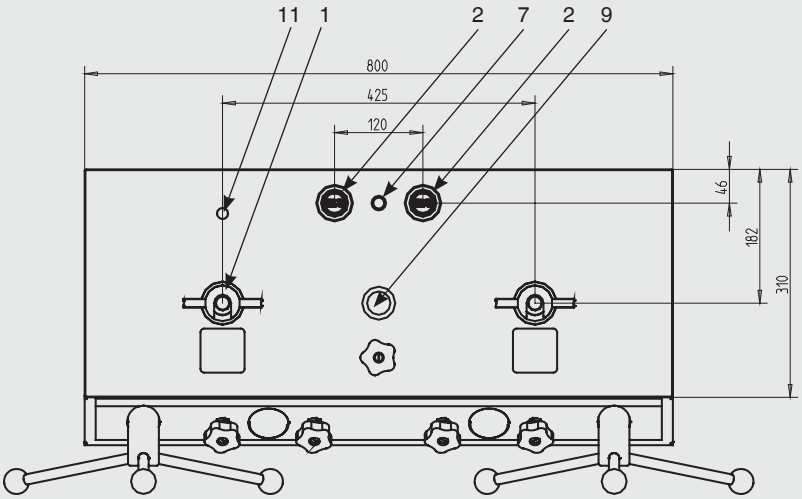
Front view



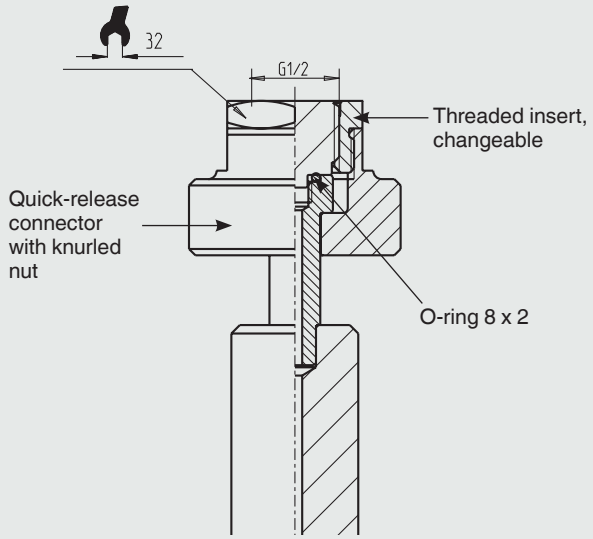
Side view



Top view



Test item connector



(1) Connector for piston-cylinder system
(2) Test item connection
(3) Inlet valve (only on pneumatic versions)
(4) Outlet valve
(5) Spindle pump with star handle, removable
(6) Test pressure gauge
(only to a max. 1,000 bar/14,500 psi)
(7) Level
(8) Rotatable feet
(9) Priming pump
(10) Bypass valve
(11) Threaded drain plug for oil reservoir (only on hydraulic versions)

Accessories

Set of trim-masses
The weights included in the standard scope of delivery are ideally suited for everyday use. If you would like to generate intermediate values, however, we recommend using a set of Class F1 trim-masses, with the following weights:

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

Sets of adapters for quick-release connector
As a standard, the pressure balance is equipped with a quick-release connector for connecting the test item. For this purpose, various threaded adapters, which can be easily changed, are available:

- Set of adapters: G ¼, G ⅜, ½ NPT, ¼ NPT and M20 x 1.5
- Set of NPT adapters: ⅛ NPT, ¼ NPT, ⅜ NPT and ½ NPT

Additionally, the sets of adapters 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.

Set of adapters

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 adapters for quick-release connector 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	2036941
Set of "NPT" adapters for quick-release connector in case with ⅛ NPT, ¼ NPT, ⅜ NPT and ½ NPT threaded inserts for insertion in the knurled nut on the test item connector	12563626
90° angle connection, for test item with back mounting connection	1564838
Separator, max. 1,000 bar	1565389
Dirt trap, -1 ... +1,000 bar, volume 0.2 litres	2015820
Dirt trap, -1 ... +1,000 bar, volume 0.03 litres	2015714
O-Ring set consisting of 5 pcs. 8 x 2 and 5 pcs. 4 x 2.2	12328562
Operating fluid for CPB5000 up to a max. 4,000 bar, 1 litre	2099882
Cleaning set for ConTect systems, pneumatic	12485943
Cleaning set for ConTect systems, hydraulic	12481425

Further pressure balances within our calibration technology programme

Model CPB3800 pressure balance

Measuring ranges:

- Hydraulic: 1 ... 120 to 10 ... 1,200 bar or 10 ... 1,600 to 100 ... 16,000 psi, respectively

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

For specifications see data sheet CT 31.06

Model CPB3800 pressure balance

Model CPB5000 pressure balance

Measuring ranges:

- Pneumatic: -0.03 ... -1 to +0.4 ... +100 bar or -0.435 … -14 to +5.8 … +1,500 psi, respectively

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

For specifications see data sheet CT 31.01

Model CPB5000 pressure balance

Model CPB5800 pressure balance

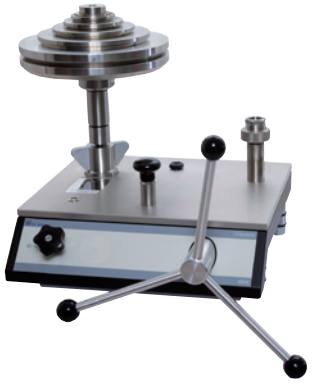
Measuring ranges:

- Hydraulic: Single-piston measuring ranges:
  1 ... 120 to 2 ... 300 bar or
  10 ... 1,600 to 30 ... 4,000 psi, respectively

  Dual-piston measuring ranges:
  1 ... 60 / 10 ... 700 bar to
  1 ... 60 / 20 ... 1,400 bar or
  10 ... 800 / 100 ... 10,000 psi to
  10 ... 800 / 200 ... 20,000 psi, respectively

Accuracy: 0.015 % of reading
up to 0.006 % of reading (optional)

For specifications see data sheet CT 31.11



Model CPB5800 pressure balance

Model CPB5000HP pressure balance for high pressure

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 reading
0.02 % of reading (optional)

For specifications see data sheet CT 31.51

Model CPB5000HP pressure balance for high pressure

Model CPU5000 CalibratorUnit

The model CPU5000 CalibratorUnit is a compact computer for use with a pressure balance. When highly-accurate measuring values with measurement uncertainties of less than 0.025 % are required, complicated mathematical calculations and corrections are necessary, in particular. With the CPU5000, all critical ambient parameters can be registered and automatically corrected.

CPU5000 basic package
The basic CalibratorUnit package converts masses into the corresponding pressure value, or vice versa, it calculates the masses required for a specific pressure value with consideration to the local gravity, for location-independent measurements. The conversion can be carried out in all common pressure units. The input of all parameters takes place manually.

Sensor package
The "sensor package" extension includes sensors to automatically register all critical parameters such as room temperature, air pressure, relative humidity and piston temperature and to update calculations continually.

Multimeter package
Furthermore, with the multimeter package, a calibrator function for pressure transmitters can be integrated. With this, the sensor to be tested, without additional power can be supplied with a DC 24 V voltage and the output signal (V, mA) can be measured. Besides the signal, the automatically converted pressure value is also shown on the display.

Piston position display
With the extension for "piston position indication", the piston position can be measured (contact free) and shown on the CalibratorUnit with high resolution (not available for dual-range piston-cylinder systems).

Further specifications on the CPU5000 CalibratorUnit see data sheet CT 35.01.

Model CPB5800 pressure balance with model CPU5000 CalibratorUnit

Order variants

CPU5000 base packet (processor only)
- Calculation of the mass loads
- Manual input of all parameters

Sensor package for measuring of:
- Ambient temperature
- Air pressure
- Air humidity
- Piston temperature

Multimeter package
- Voltage supply, DC 24 V
- Measurement of output signal (V, mA) incl. conversion into pressure values

Piston position display
- Contact-free measuring of piston position

Ordering information
Model / Instrument version / Measuring range / Accuracy / Gravity value g / Carrying case for piston-cylinder system / Calibration for pressure balance / Additional order information

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