Intrinsically safe hand-held pressure calibrator
Model CPH65I0-S1 (1-channel version)
Model CPH65I0-S2 (2-channel version)

Applications

- Calibration service companies and service industry
- Measurement and control laboratories
- Quality assurance
- Operation directly within hazardous areas

Special features

- Measuring ranges from 0 ... 25 mbar up to 0 ... 700 bar (also vacuum, absolute and differential pressure ranges available)
- Accuracy: to 0.025 % (incl. calibration certificate)
- Intrinsically safe version Ex ia IIB T3
- Measurement 4 ... 20 mA
- Accurate temperature measurement with Pt100 resistance thermometer

Model CPH65I0-S2 intrinsically-safe pressure calibrator

Description

General information

The operator can choose between numerous different pressure measuring ranges. The model CPH65I0 can have up to two different reference pressure sensors integrated within it. These reference pressure sensors are fixed into the housing. The pressure connection is found on the bottom of the calibrator.

Various application possibilities

With up to two reference pressure sensors integrated into the CPH65I0, combined with current input, pressure switch function and a resistance thermometer, the CPH65I0 enables the calibration of practically any pressure instrument.
The additional ATEX approval expands the possible applications of this calibrator into hazardous areas.

Accuracy

The CPH65I0 offers an accuracy of up to 0.025 % of the span in 24 pressure measuring ranges. The measurements can be displayed in one of 16 standard units.

Certified accuracy

For each CPH65I0 reference pressure sensor, the accuracy is certified by a factory calibration certificate which accompanies the instrument. On request, we can provide a DKD/DAkkS calibration certificate for this instrument.

Data sheets showing similar products and accessories:
ProcessCalibrator; model CPH6000; see data sheet CT 15.01
Precision hand-held pressure indicator; model CPH6400; see data sheet CT 14.01
Precision digital pressure gauge; model CPG1000; see data sheet CT 10.01

Specifications
Model CPH65I0

Sensor technology

Measuring range	**mbar**	**-25 ... +25** [1]	**-70 … +70** [1]	**-350 ... +350** [1]	**-500 … +500** [1]		
Overpressure limit	mbar	70	200	700	1,000		
Accuracy	% FS	0.1	0.05	0.035			
Measuring range	**bar**	**-1 ... +1** [1]	**-1 ... +2** [1]				
Overpressure limit	bar	2	4				
Accuracy	% FS	0.025					
Measuring range	**bar**	**0 … 1** [1]	**0 ... 2** [1]	**0 ... 3.5** [2]	**0 ... 7** [2]	**0 ... 10** [2]	**0 ... 20** [2]
Overpressure limit	bar	2	4	13	13	13	40
Accuracy	% FS	0.025					
Measuring range	**bar**	**0 ... 35** [2]	**0 ... 70**	**0 ... 100**	**0 ... 200**	**0 ... 350**	**0 ... 700**
Overpressure limit	bar	70	200	200	400	700	1,000
Accuracy	% FS	0.025				0.035	
Measuring range	**bar abs.**	**0 ... 1**	**0 ... 2**	**0 ... 7**	**0 ... 10**	**0 ... 20**	
Overpressure limit	bar abs.	2	4	13	13	40	
Accuracy	% FS	0.025					
Measuring range	**mbar diff.**	**0 ... 25** [1] [3]	**0 ... 70** [1] [3]	**0 ... 350** [1] [3]	**0 ... 2,000** [1] [3]	**0 ... 3,500** [1] [3]	**0 ... 7,000** [1] [3]
Overpressure limit	mbar diff.	70	200	700	4,000	7,000	10,000
Accuracy	% FS	0.1	0.05	0.035	0.025		
Type of pressure	Relative pressure, absolute pressure, vacuum and differential pressure [4]						
Pressure connection	⅛ NPT female (incl. adapter 1/8 NPT male to G ½ B male) [5]						
Pressure medium	all liquids and gases which are compatible with 316 SS stainless steel [1]						
Resolution	5-digit						
Current							
Measuring range	0 … 24 mA						
Resolution	1 µA						
Accuracy	0.015 % of measured value ±2 µA						
Temperature							
Measuring range	-40 … +150 °C						
Resolution	0.01 °C						
Accuracy	0.015 % of measured value ±20 mΩ, or 0.2 °C for complete measuring chain (Pt100 resistance thermometer and CPH65I0)						

1) **Non isolated:** Only use the pressure measuring ranges marked in this way with clean and non-corrosive gases.
2) Pressure measurement possible in vacuum range to -1 bar.
3) For differential pressure sensors with a measuring range of 25 mbar, the maximum static pressure is limited to 70 mbar.
For the measuring ranges 70, 350, 2,000, 3,500 and 7,000 mbar the static pressure is limited to a maximum of 10 bar.
4) The differential pressure sensor is only possible with the CPH65I0-S1 (1-channel version). Both pressure connections for the differential pressure measurement are found on the bottom of the calibrator.
5) Adapter not included in delivery for North America.

Base instrument

Measuring inputs	1 input for CPH65I0-S1 2 inputs for CPH65I0-S2
Pressure connection	⅛ NPT female thread
Pressure medium	All liquids and gases which are compatible with 316 SS stainless steel [1]
Temperature compensation	15 … 35 °C
Temperature coefficient	0.002 % of the span/°C outside of the 15 ... 35 °C temperature range
Pressure units	psi, bar, mbar, kPa, MPa, kg/cm², mmH_2O (4 °C), mmH_2O (20 °C), cmH_2O (4 °C), cmH_2O (20 °C), inH_2O (4 °C), inH_2O (20 °C), inH_2O (60 °F), mmHg (0 °C), inHg (0 °C), ft H_2O (60 °F)

1) **Non isolated:** Only use the pressure measuring ranges marked in this way with clean and non-corrosive gases. (See sensor table)

Base instrument

Display	
Display	5-digit display; large backlit screen for the display of up to three measurement parameters
Voltage supply	
Power supply	DC 6 V, 4 x 1.5 V AA alkaline batteries
Battery life	> 35 hours
Permissible ambient conditions	
Operating temperature	-10 ... +45 °C
Storage temperature	-20 ... +60 °C
Relative humidity	5 ... 95 % r.H. (non-condensing)
Case	
Material	Stainless steel and plastic
Dimensions	see technical drawing
Weight	approx. 570 g

Ignition protection type

ATEX directive	94/9/EC, category 2G, ignition protection type Ex ia IIB T3 Gb II 2 G Ex ia IIB T3 Gb (T_a = -10 ... +45 °C) DEKRA 12ATEX 0146 X
IECEx	Ex ia IIB T3 Gb (T_a = -10 ... +45 °C) IECEx CSA 11.0019X
Connection values	
max. voltage	U_o = DC 7.14 V
Max. current	I_o = 1.12 mA
Max. power	P_o = 2 mW
Max. effective internal capacitance	C_o = 240 µF
Max. effective internal inductance	L_o = 1 H
Power supply circuit	
max. voltage	U_i = DC 30 V
Max. current	I_i = 80 mA
Max. power	P_i = 750 mW
Max. effective internal capacitance	C_i = 0 nF
Max. effective internal inductance	L_i = 0 mH
LEMO plug-connector	Only for use with LTP100A RTD sensor

Approvals and certificates

CE conformity	
EMC directive	2004/108/EC, EN 61326 emission (group 1, class B) and interference immunity (portable measurement equipment)
ATEX directive	94/9/EC, category 2G, ignition protection type Ex ia IIB T3 Gb
Certificate	
Calibration	3.1 calibration certificate per DIN EN 10204 Option: DKD/DAkkS calibration certificate

Further approvals and certificates can be found on the internet.

Available measuring ranges and resolutions

Measuring ranges and factors

	Measuring range in bar	0 ... 0.025	0 ... 0.07	0 ... 0.35	0 ... 0.5	0 ... 1 [1]	0 ... 2 [2]	0 ... 3.5	0 ... 7 [3]
Unit	Conversion factor								
psi	1	0.4000	1.0000	5.0000	7.2000	15.000	30.000	50.000	100.00
bar	0.06894757	0.0276	0.0689	0.3447	0.4964	1.0342	2.0684	3.4474	6.8948
mbar	68.94757	27.579	68.948	344.74	496.42	1,034.2	2,068.4	3,447.4	6,894.8
kPa	6.894757	2.7579	6.8948	34.474	49.642	103.42	206.84	344.74	689.48
MPa	0.00689476	0.0028	0.0069	0.0345	0.0496	0.1034	0.2068	0.3447	0.6895
kg/cm^2	0.07030697	0.0281	0.0703	0.3515	0.5062	1.0546	2.1092	3.5153	7.0307
mmHg (0 °C)	51.71507	20.686	51.715	258.58	372.35	775.73	1,551.5	2,585.8	5,171.5
inHg (0 °C)	2.03603	0.8144	2.0360	10.180	14.659	30.540	61.081	101.80	203.60
cmH_2O (4 °C)	70.3089	28.124	70.309	351.54	506.22	1,054.6	2,109.3	3,515.4	7,030.9
cmH_2O (20 °C)	70.4336	28.173	70.434	352.17	507.12	1,056.5	2,113.0	3,521.7	7,043.4
mmH_2O (4 °C)	703.089	281.24	703.09	3,515.4	5,062.2	10,546	21,093	35,154	70,309
mmH_2O (20 °C)	704.336	281.73	704.34	3,521.7	5,071.2	10,565	21,130	35,217	70,434
inH_2O (4 °C)	27.68067	11.072	27.681	138.40	199.30	415.21	830.42	1,384.0	2,768.1
inH_2O (20 °C)	27.72977	11.092	27.730	138.65	199.65	415.95	831.89	1,386.5	2,773.0
inH_2O (60 °F)	27.70759	11.083	27.708	138.54	199.49	415.61	831.23	1,385.4	2,770.8
ftH_2O (60 °F)	2.308966	0.9236	2.3090	11.545	16.625	34.634	69.269	115.45	230.90

Measuring ranges and factors

	Measuring range in bar	0 ... 10 [3]	0 ... 20 [3]	0 ... 35	0 ... 70	0 ... 100	0 ... 200	0 ... 350	0 ... 700
Unit	Conversion factor								
psi	1	150.00	300.00	500.00	1,000.0	1,500.0	3,000.0	5,000.0	10,000
bar	0.06894757	10.342	20.684	34.474	68.948	103.42	206.84	344.74	689.48
mbar	68.94757	10,342	20,684	34,474	68,948	-- [4]	-- [4]	-- [4]	-- [4]
kPa	6.894757	1,034.2	2,068.4	3,447.4	6,894.8	10,342	20,684	34,474	68,948
MPa	0.00689476	1.0342	2.0684	3.4474	6.8948	10.342	20.684	34.474	68.948
kg/cm^2	0.07030697	10.546	21.092	35.153	70.307	105.46	210.92	351.53	703.07
mmHg (0 °C)	51.71507	7,757.3	15,515	25,858	51,715	77,573	-- [4]	-- [4]	-- [4]
inHg (0 °C)	2.03603	305.40	610.81	1,018.0	2,036.0	3,054.0	6,108.1	10,180	20,360
cmH_2O (4 °C)	70.3089	10,546	21,093	35,154	70,309	-- [4]	-- [4]	-- [4]	-- [4]
cmH_2O (20 °C)	70.4336	10,565	21,130	35,217	70,434	-- [4]	-- [4]	-- [4]	-- [4]
mmH_2O (4 °C)	703.089	-- [4]	-- [4]	-- [4]	-- [4]	-- [4]	-- [4]	-- [4]	-- [4]
mmH_2O (20 °C)	704.336	-- [4]	-- [4]	-- [4]	-- [4]	-- [4]	-- [4]	-- [4]	-- [4]
inH_2O (4 °C)	27.68067	4,152.1	8,304.2	13,840	27,681	41,521	83,042	-- [4]	-- [4]
inH_2O (20 °C)	27.72977	4,159.5	8,318.9	13,865	27,730	41,595	83,189	-- [4]	-- [4]
inH_2O (60 °F)	27.70759	4,156.1	8,312.3	13,854	27,708	41,561	83,123	-- [4]	-- [4]
ftH_2O (60 °F)	2.308966	346.34	692.69	1,154.5	2,309.0	3,463.4	6,926.9	11,545	23,090

1) This data is also valid for the measuring ranges -1 ... +1 bar and 0 ... 1 bar abs.
2) This data is also valid for the measuring ranges -1 ... +2 bar and 0 ... 2 bar abs.
3) This data is also valid for the measuring ranges 0 ... 7 bar abs., 0 ... 10 bar abs. and 0 ... 20 bar abs.
4) Due to the limited screen resolution, no values can be displayed here. The resolution is limited to 5 digits.

Features

Temperature and current measurement
A Pt100 resistance thermometer (RTD) is available as an option for measuring temperatures, with an accuracy of ±0.2 °C. In addition, the CPH65I0 can measure 4 ... 20 mA current signals from transmitters.

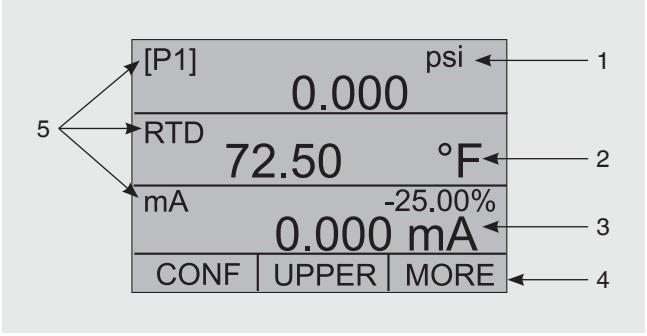
Display
The CPH65I0 displays up to three measured values simultaneously. That means the pressure value from both pressure sensors, the temperature measured with an external temperature sensor or current signal (mA) can be indicated simultaneously on the display. The CPH65I0 has a large graphical LCD display with backlighting.

Pressure ranges
The CPH65I0 can be supplied in 24 different measuring ranges from 0 ... 25 mbar up to 0 ... 700 bar. Relative, vacuum, absolute and differential pressure are all available.

Functions
The CPH65I0 has a complete range of useful functions. Switch tests can be performed via both internal pressure inputs. The deviation of the test item is calculated by the CPH65I0 with the calibration of a transmitter. A damping function is available. Up to five frequently-used instrument settings can be stored and retrieved with the touch of a button.

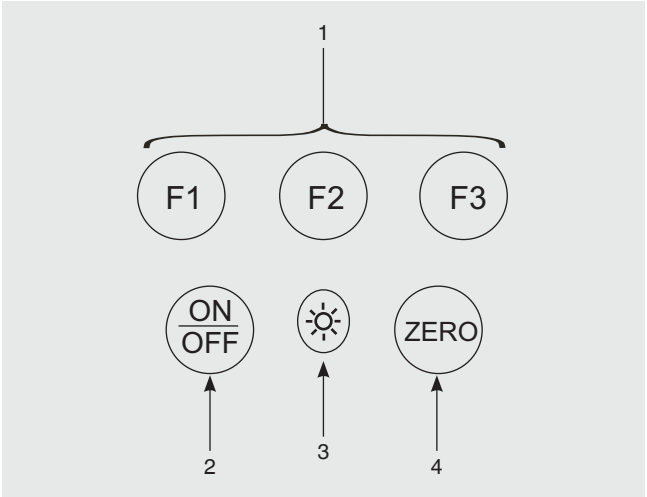
Compact and robust
The CPH65I0, with its compact and robust design, is powered by four standard AA alkaline batteries. With the energy-saving function in the CPH65I0, the battery life is more than 35 hours.

Display layout



1) **Pressure units**
   Indication of the pressure unit (selectable from 16 pressure units)
2) **Units**
   Indication of the measuring unit
3) **Display of the span**
   Display of 4 ... 20 mA span (only with mA measurement)
4) **Menu list**
5) **Primary parameters**
   Indication of the current measured parameters

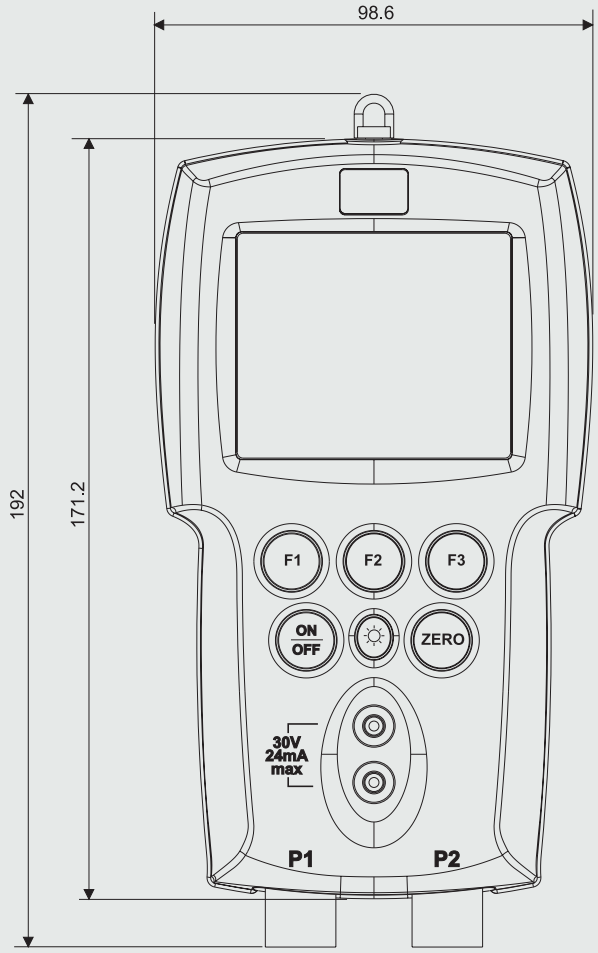
Keypad



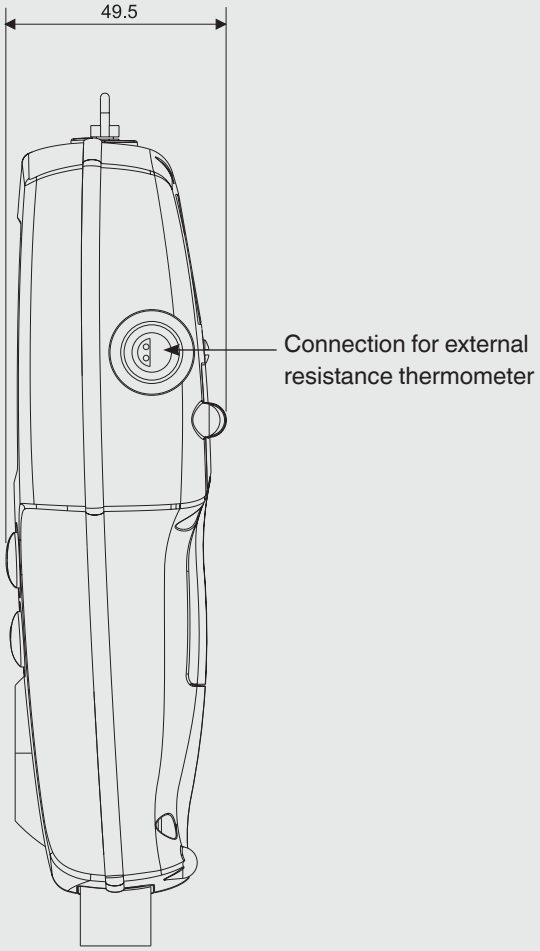
1) **Function keys**
   Configuration of the calibrator via these soft keys
2) **ON/OFF key**
   Turning the calibrator on and off
3) **Backlighting**
   Turning the backlighting on and off
4) **ZERO key**
   Zeroing of the pressure measurement

Dimensions in mm

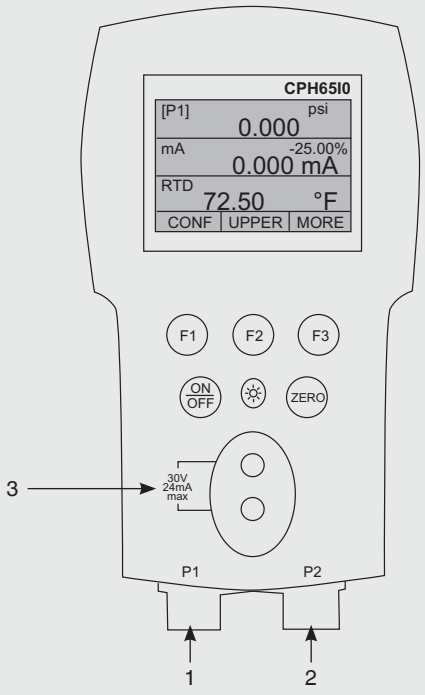
Front view



Side view, right



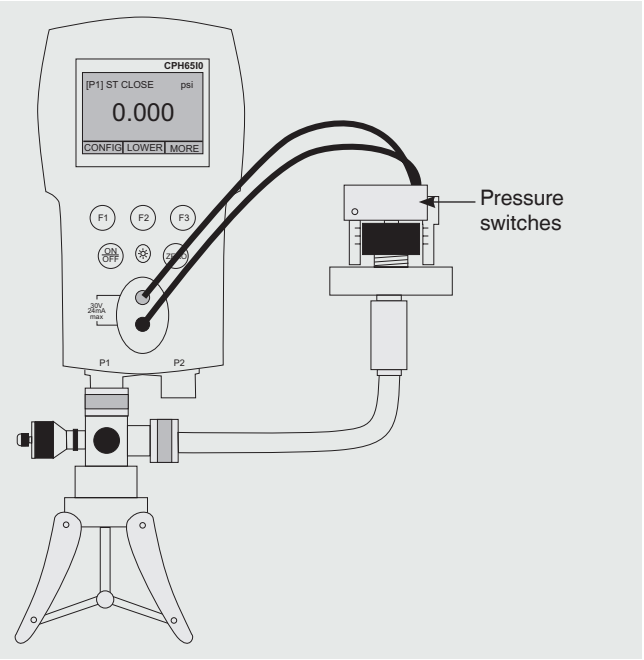
Connections



1) **P1 pressure connection**
   Connection for internal sensor, P1
2) **P2 pressure connection**
   Connection for internal sensor, P2
3) **Input connection**
   Electrical connections for current and switch test

Special operating modes

Operating mode: Pressure switch test

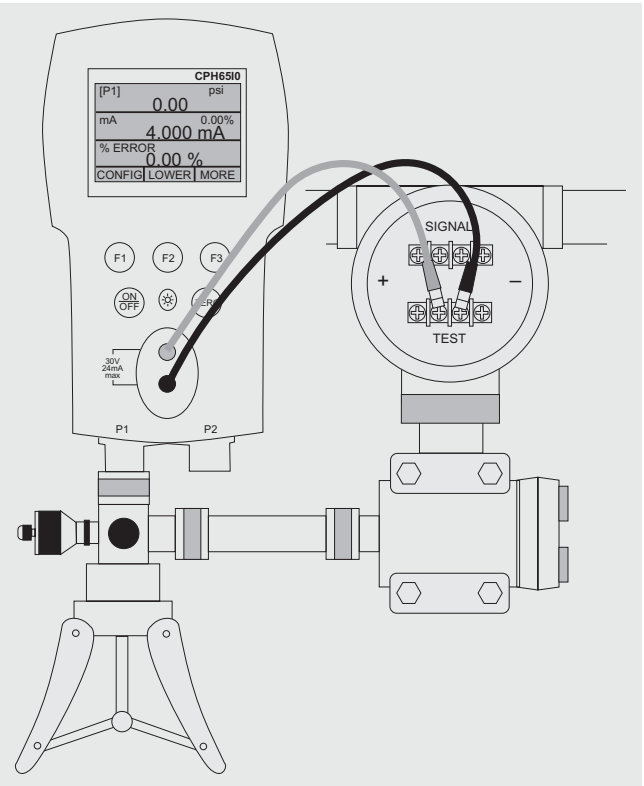


Pressure switch test
With the pressure switch function, the CPH65I0 can indicate the pressures at which the switch closes or opens. In addition, the hysteresis can be calculated.

In the switch test mode the display update rate is increased to capture changing pressure inputs quickly.

If required, the ambient or medium temperature can be measured with an external Pt100 resistance thermometer at the same time.

Operating mode: Calibrating transmitters and %-error function



Calibrating transmitters
With the mA measuring function, the 4 ... 20 mA output of the instrument which is currently being calibrated can be read. This is achieved passively, meaning the instrument to be calibrated generates the 4 ... 20 mA directly. This mA signal is read by the calibrator.

The calibrator features a special function which can calculate the error in the pressure value from the mA value as a percentage of the 4 ... 20 mA span. The %-error mode uses all three screens and has a special menu structure. It displays pressure, mA and %-error simultaneously.

Example:
A transmitter to be tested has a measuring range of 2 bar and outputs a corresponding 4 ... 20 mA signal. The user can program in a 0 ... 2 bar pressure span into the calibrator and the calibrator will then calculate and display the deviation or error in a percentage value of the 4 ... 20 mA output. This is produced without the need for any manual calculation, which is also an advantage if it is difficult to set an accurate pressure using an external pump.

Scope of delivery

- Model CPH65I0-S1 intrinsically-safe pressure calibrator
- Operating instructions
- Test cable
- Four AA alkaline batteries
- 1 x adapter 1/8 NPT male to G 1/2 B male per pressure connection [1)]
- 3.1 calibration certificate per DIN EN 10204

1) Adapter not included in delivery for North America.

Option

- Model CPH65I0-S2 intrinsically-safe pressure calibrator (version with two built-in reference pressure sensors)
- DKD/DAkkS certified accuracy

Accessories

Connection adapters

- Various pressure adapters

Temperature measurement

- Pt100 resistance thermometer

Model CPH65I0-S2 intrinsically-safe pressure calibrator with Pt100 resistance thermometer