

# Intrinsically safe hand-held pressure calibrator

## Model CPH6510-S1 (1-channel version)

## Model CPH6510-S2 (2-channel version)

WIKA data sheet CT 14.51



### 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 CPH6510-S2 intrinsically-safe pressure calibrator**

## Description

### General information

The operator can choose between numerous different pressure measuring ranges. The model CPH6510 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 CPH6510, combined with current input, pressure switch function and a resistance thermometer, the CPH6510 enables the calibration of practically any pressure instrument. The additional ATEX approval expands the possible applications of this calibrator into hazardous areas.

### Accuracy

The CPH6510 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 CPH6510 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.

# Specifications

## Model CPH6510

### Sensor technology

<b>Measuring range</b>	<b>mbar</b>	<b>-25 ... +25 <sup>1)</sup></b>	<b>-70 ... +70 <sup>1)</sup></b>	<b>-350 ... +350 <sup>1)</sup></b>	<b>-500 ... +500 <sup>1)</sup></b>			
Overpressure limit	mbar	70	200	700	1,000			
Accuracy	% FS	0.1	0.05	0.035				
<b>Measuring range</b>	<b>bar</b>	<b>-1 ... +1 <sup>1)</sup></b>	<b>-1 ... +2 <sup>1)</sup></b>					
Overpressure limit	bar	2	4					
Accuracy	% FS	0.025						
<b>Measuring range</b>	<b>bar</b>	<b>0 ... 1 <sup>1)</sup></b>	<b>0 ... 2 <sup>1)</sup></b>	<b>0 ... 3.5 <sup>2)</sup></b>	<b>0 ... 7 <sup>2)</sup></b>	<b>0 ... 10 <sup>2)</sup></b>	<b>0 ... 20 <sup>2)</sup></b>	
Overpressure limit	bar	2	4	13	13	13	40	
Accuracy	% FS	0.025						
<b>Measuring range</b>	<b>bar</b>	<b>0 ... 35 <sup>2)</sup></b>	<b>0 ... 70</b>	<b>0 ... 100</b>	<b>0 ... 200</b>	<b>0 ... 350</b>	<b>0 ... 700</b>	
Overpressure limit	bar	70	200	200	400	700	1,000	
Accuracy	% FS	0.025				0.035		
<b>Measuring range</b>	<b>bar abs.</b>	<b>0 ... 1</b>	<b>0 ... 2</b>	<b>0 ... 7</b>	<b>0 ... 10</b>	<b>0 ... 20</b>		
Overpressure limit	bar abs.	2	4	13	13	40		
Accuracy	% FS	0.025						
<b>Measuring range</b>	<b>mbar diff.</b>	<b>0 ... 25 <sup>1) 3)</sup></b>	<b>0 ... 70 <sup>1) 3)</sup></b>	<b>0 ... 350 <sup>1) 3)</sup></b>	<b>0 ... 2,000 <sup>1) 3)</sup></b>	<b>0 ... 3,500 <sup>1) 3)</sup></b>	<b>0 ... 7,000 <sup>1) 3)</sup></b>	
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 <sup>4)</sup>							
Pressure connection	1/8 NPT female (incl. adapter 1/8 NPT male to G 1/2 B male) <sup>5)</sup>							
Pressure medium	all liquids and gases which are compatible with 316 SS stainless steel <sup>1)</sup>							
Resolution	5-digit							
<b>Current</b>								
Measuring range	0 ... 24 mA							
Resolution	1 µA							
Accuracy	0.015 % of measured value ±2 µA							
<b>Temperature</b>								
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 CPH6510)							

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 CPH6510-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 CPH6510-S1 2 inputs for CPH6510-S2
Pressure connection	1/8 NPT female thread
Pressure medium	All liquids and gases which are compatible with 316 SS stainless steel <sup>1)</sup>
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/cm <sup>2</sup> , mmH <sub>2</sub> O (4 °C), mmH <sub>2</sub> O (20 °C), cmH <sub>2</sub> O (4 °C), cmH <sub>2</sub> O (20 °C), inH <sub>2</sub> O (4 °C), inH <sub>2</sub> O (20 °C), inH <sub>2</sub> O (60 °F), mmHg (0 °C), inHg (0 °C), ft H <sub>2</sub> O (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 ( $T_a = -10 \dots +45 \text{ °C}$ )  
DEKRA 12ATEX 0146 X

IECEX Ex ia IIB T3 Gb ( $T_a = -10 \dots +45 \text{ °C}$ )  
IECEX CSA 11.0019X

### Connection values

max. voltage  $U_O = \text{DC } 7.14 \text{ V}$

Max. current  $I_O = 1.12 \text{ mA}$

Max. power  $P_O = 2 \text{ mW}$

Max. effective internal capacitance  $C_O = 240 \text{ }\mu\text{F}$

Max. effective internal inductance  $L_O = 1 \text{ H}$

### Power supply circuit

max. voltage  $U_i = \text{DC } 30 \text{ V}$

Max. current  $I_i = 80 \text{ mA}$

Max. power  $P_i = 750 \text{ mW}$

Max. effective internal capacitance  $C_i = 0 \text{ nF}$

Max. effective internal inductance  $L_i = 0 \text{ mH}$

**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 <sup>1)</sup>	0 ... 2 <sup>2)</sup>	0 ... 3.5	0 ... 7 <sup>3)</sup>
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 <sup>2</sup>	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 <sub>2</sub> O (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 <sub>2</sub> O (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 <sub>2</sub> O (4 °C)	703.089	281.24	703.09	3,515.4	5,062.2	10,546	21,093	35,154	70,309
mmH <sub>2</sub> O (20 °C)	704.336	281.73	704.34	3,521.7	5,071.2	10,565	21,130	35,217	70,434
inH <sub>2</sub> O (4 °C)	27.68067	11.072	27.681	138.40	199.30	415.21	830.42	1,384.0	2,768.1
inH <sub>2</sub> O (20 °C)	27.72977	11.092	27.730	138.65	199.65	415.95	831.89	1,386.5	2,773.0
inH <sub>2</sub> O (60 °F)	27.70759	11.083	27.708	138.54	199.49	415.61	831.23	1,385.4	2,770.8
ftH <sub>2</sub> O (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 <sup>3)</sup>	0 ... 20 <sup>3)</sup>	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 <sup>2</sup>	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 <sub>2</sub> O (4 °C)	70.3089	10,546	21,093	35,154	70,309	-- 4)	-- 4)	-- 4)	-- 4)
cmH <sub>2</sub> O (20 °C)	70.4336	10,565	21,130	35,217	70,434	-- 4)	-- 4)	-- 4)	-- 4)
mmH <sub>2</sub> O (4 °C)	703.089	-- 4)	-- 4)	-- 4)	-- 4)	-- 4)	-- 4)	-- 4)	-- 4)
mmH <sub>2</sub> O (20 °C)	704.336	-- 4)	-- 4)	-- 4)	-- 4)	-- 4)	-- 4)	-- 4)	-- 4)
inH <sub>2</sub> O (4 °C)	27.68067	4,152.1	8,304.2	13,840	27,681	41,521	83,042	-- 4)	-- 4)
inH <sub>2</sub> O (20 °C)	27.72977	4,159.5	8,318.9	13,865	27,730	41,595	83,189	-- 4)	-- 4)
inH <sub>2</sub> O (60 °F)	27.70759	4,156.1	8,312.3	13,854	27,708	41,561	83,123	-- 4)	-- 4)
ftH <sub>2</sub> O (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  $\pm 0.2$  °C. In addition, the CPH6510 can measure 4 ... 20 mA current signals from transmitters.

### Display

The CPH6510 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 CPH6510 has a large graphical LCD display with backlighting.

### Pressure ranges

The CPH6510 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.

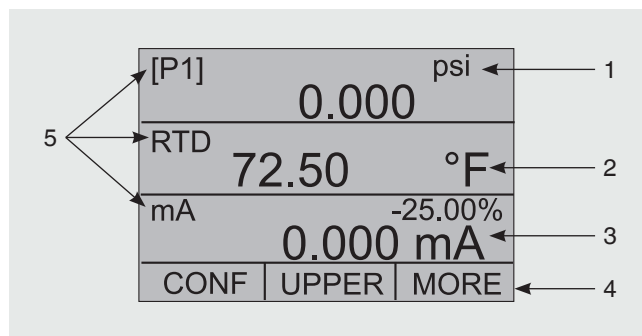
### Functions

The CPH6510 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 CPH6510 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

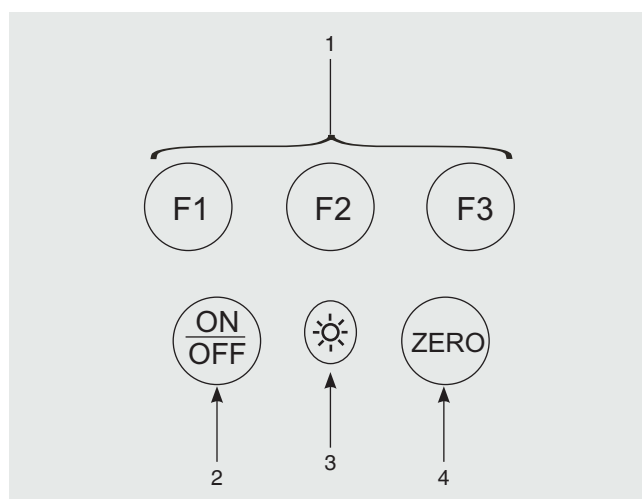
The CPH6510, with its compact and robust design, is powered by four standard AA alkaline batteries. With the energy-saving function in the CPH6510, the battery life is more than 35 hours.

## Display layout



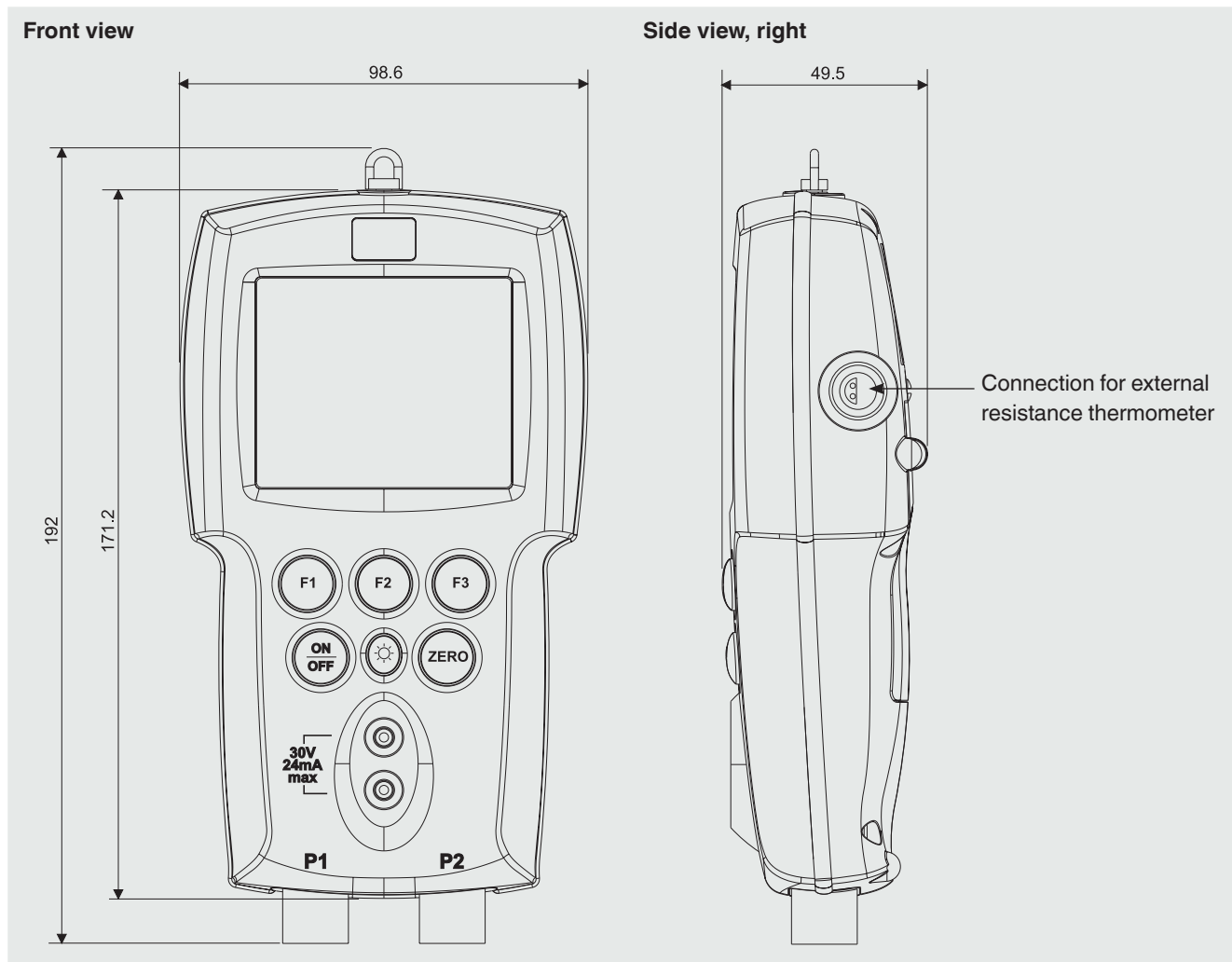
- 1) **Pressure units**  
Indication of the pressure unit (selectable from 16 pressure units)
- 2) **Units**  
Indication of the measuring unit
- 3) **Display of the span**  
Display of 4 ... 20 mA span (only with mA measurement)
- 4) **Menu list**
- 5) **Primary parameters**  
Indication of the current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

## Keypad

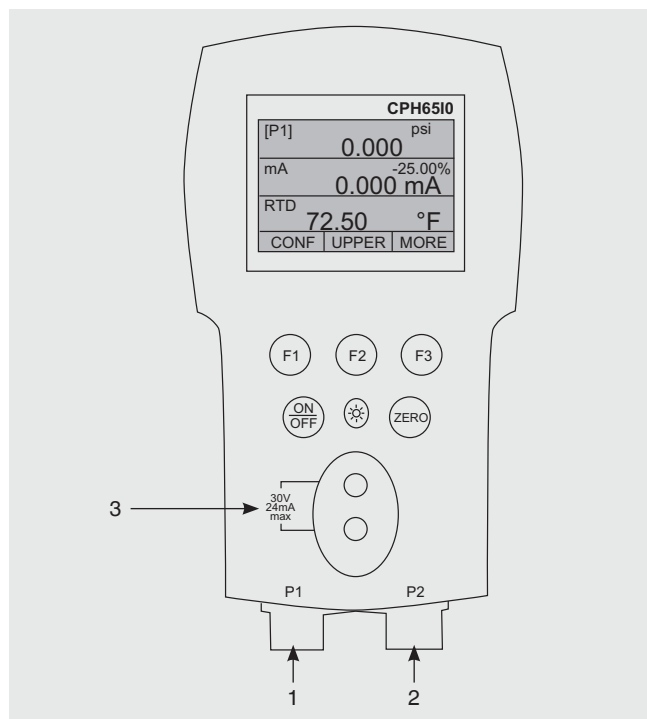


- 1) **Function keys**  
Configuration of the calibrator via these soft keys
- 2) **ON/OFF key**  
Turning the calibrator on and off
- 3) **Backlighting**  
Turning the backlighting on and off
- 4) **ZERO key**  
Zeroing of the pressure measurement

## Dimensions in mm



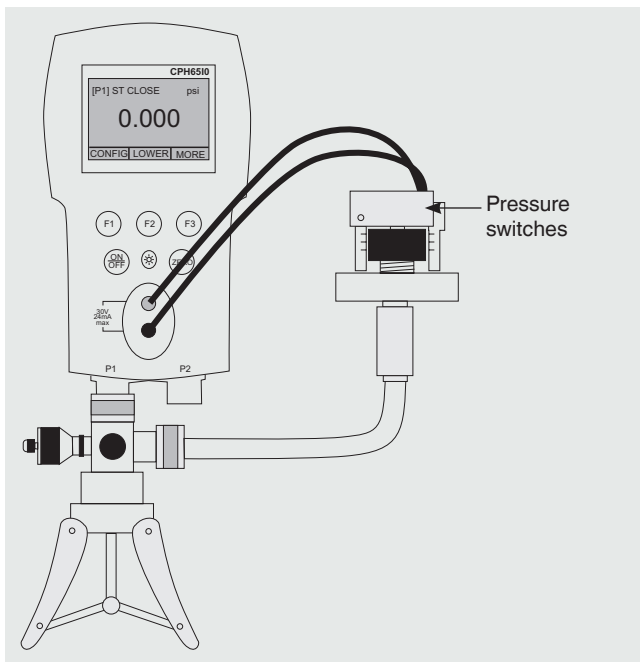
## Connections



- 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



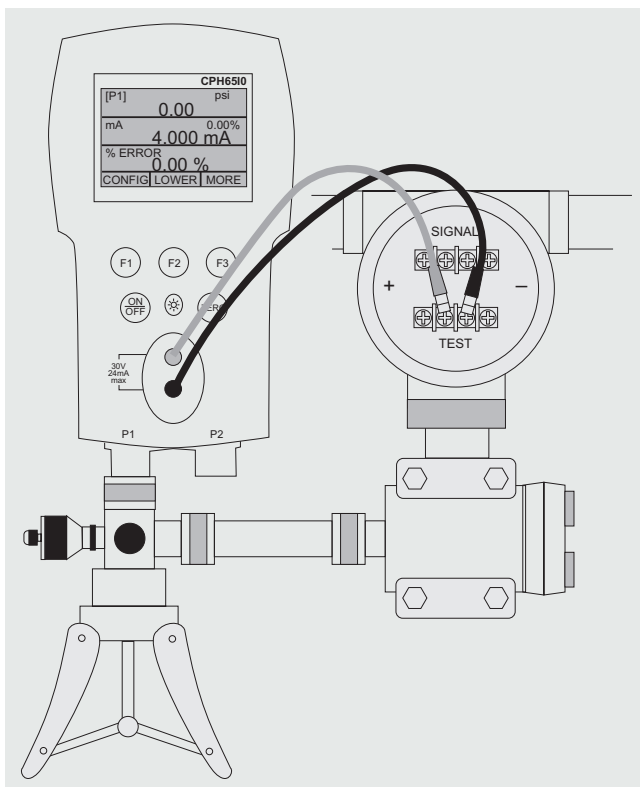
#### Pressure switch test

With the pressure switch function, the CPH6510 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 CPH6510-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 CPH6510-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 CPH6510-S2 intrinsically-safe pressure calibrator with Pt100 resistance thermometer

## Ordering information

Model / Instrument version / Unit (channel 1) / Measuring range (channel 1) / Certificate type / Unit (channel 2) / Measuring range (channel 2) / Certificate type / Temperature sensor / Temperature calibration / Additional order information

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