

**Differential Pressure Transmitters**  
**Handheld Pressure Gauges**  
**Pressure Calibration Systems**  
**Absolute Pressure Gauges**



## Properties of pressure gauges

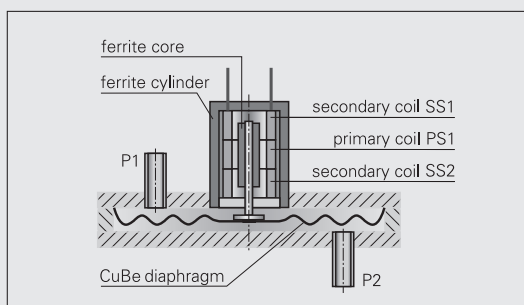
Differential pressure transmitters made by halstrup-walcher GmbH have been designed for non-aggressive, gaseous media. These gauges work according to an inductive measurement principle whereby an inductive displacement transmitter measures the deflection of a beryllium bronze diaphragm without making contact. The diaphragm is situated between two measurement chambers, thereby making it possible to record both positive and negative differential pressures. The measuring cell has no frictional parts or parts subject to mechanical wear. Beryllium bronze is a highly elastic material that is stable for long periods of time, behaves well under a variety of temperature conditions and is extremely resistant to hysteresis. As a result, this technology can be used to create high-quality pressure gauges capable of taking measurements at pressures as low as a few Pa.

### halstrup-walcher utilizes two different measuring systems:

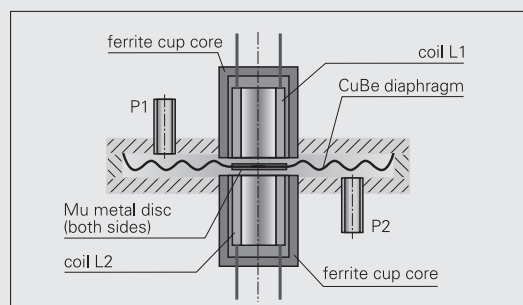
Due to the excellent linearity afforded by its design, the linear variable differential transformer (LVDT) is primarily used for pressure calibration devices. The dual inductive pickup system sends a differential signal that is linearized by an electronic analysis unit. This system has been slated for use in manufacturing high-quality differential pressure transmitters and hand-held pressure gauges.

### Advantages

- perfect for positive or negative differential pressures and for either symmetrical or non-symmetrical measuring ranges
- devices can be calibrated
- especially suitable for very small measuring ranges
- available with a variety of different display unit options
- calibration certificates available in German or English from either the factory or from the German Calibration Service (DKD)



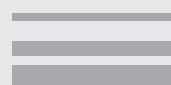
Design of the LVDT



Design of the dual inductive pickup system

Type	Description	Special features	Page
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<b>PU/PI</b>	Differential pressure transmitter	For standard applications	10 – 11
<b>PIZ</b>	Differential pressure transmitter	In two-wire technology	10 – 11
<b>PS 10</b>	Differential pressure transmitter	Excellent price/performance ratio	12 – 13
<b>PK 15</b>	Differential pressure transmitter	With adjustable limit switches	14 – 15
<b>PS 18</b>	Differential pressure transmitter	Pressure transmitter with IP20	16 – 17
<b>PS 11/PK 11</b>	Differential pressure transmitter	For use in control cabinets For top-hat rail mounting	18 – 19
<b>REG 21</b>	Differential pressure transmitter	With two limit switches in the control panel housing	20 – 21
<b>EMA 200</b>	Hand-held pressure gauge	Portable, digital pressure gauge with min./max. value memory	22 – 23
<b>EMA 84</b>	Hand-held pressure gauge	Provides highly accurate measurements	24 – 25
<b>KAL 84</b>	Pressure calibration device	Portable calibration device	26 – 27
<b>KAL 100</b>	Pressure calibration device	Portable, with integrated pressure generation	28 – 29
<b>KAL 200</b>	Pressure calibration device	Portable, with integrated pressure generation	30 – 31
<b>AD/BA 1000</b>	Absolute pressure transmitter	Absolute pressure transmitter	32 – 33
<b>BA 90</b>	Absolute pressure transmitter	Digital precision barometer	34 – 35

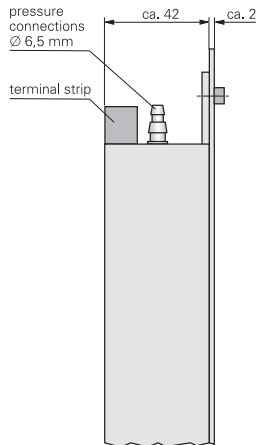
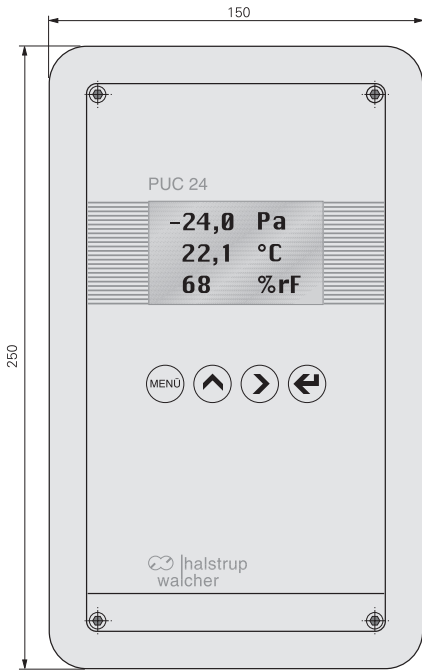
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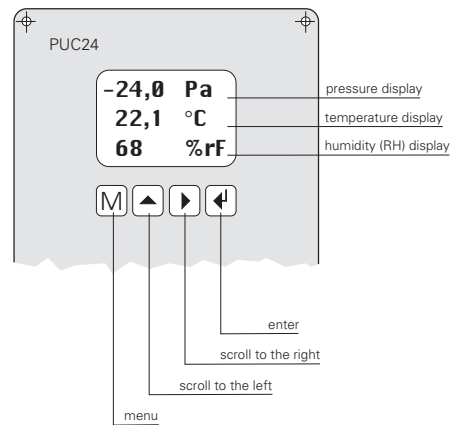
**Walcher**  
**Meßtechnik** GmbH

## PUC 24

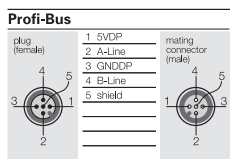
### Dimension drawing



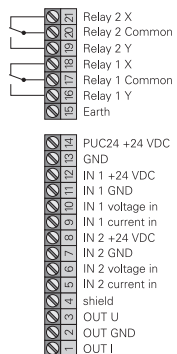
### Operating elements



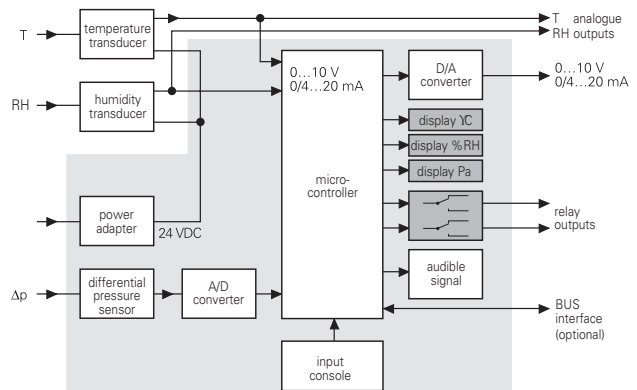
### Connection diagram



### Supply voltage



### Functional block diagram



## PUC 24

Process monitoring device  
for clean rooms



### Special features

- particularly suitable for use in clean rooms
- inputs for humidity and temperature sensors
- stable measurements thanks to cyclical self-calibration of the zero point (differential pressure)
- alarm thresholds (switching contacts)
- graphic LC display
- Profibus DP interface (optional)
- surface resistant against solvents
- acoustic alarm when alarm thresholds are reached, may be reset by push-button
- bilingual menu (English/German)

measurement ranges	± 100 Pa or ± 250 Pa freely scalable within this range
margin of error (0.3 Pa margin of error for reference)	0.3 Pa + 0.5 % of end value for measurement ranges ≤ 60 Pa, 0.5% of end value for measurement ranges > 60 Pa
deflection drift / temperature	0.03 %/K (+10 °C...+50 °C)
zero point drift / temperature	± 0 % (cyclical zero-point correction)
overload capacity	200 x
medium	air, all non-aggressive gases
max. system pressure	10 kPa for measurement ranges ≤ 10 kPa for measurement ranges > 10 kPa max. nominal pressure of sensor
sensor response time	25 ms
time constants	25 ms ... 60 s (adjustable)
input signal	0 ... 10 V, R <sub>i</sub> = 100 kΩ
humidity/temperature module (galvanically separated)	0/4 ... 20 mA, R <sub>L</sub> = 50 Ω adjustable
operating temperature	+ 10 °C ... + 50 °C
storage temperature	- 10 °C ... + 70 °C
power consumption	approx. 7 VA
weight	approx. 1 kg
pressure ports	for hose Ø 3...6 mm
protection class	IP 65
testing	CE

### Technical data

data interface	<b>A</b>
none	0
Profibus DP (optional)	DP
supply voltage	24 VDC, ± 10 % smoothed
output signals	0 ... 10 V (R <sub>i</sub> > 2 kΩ) 0/4 ... 20 mA (R <sub>L</sub> < 500 Ω) adjustable 2 contact points, 6 A, 230 VAC, may be configured as desired within this pressure range

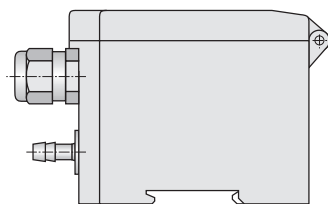
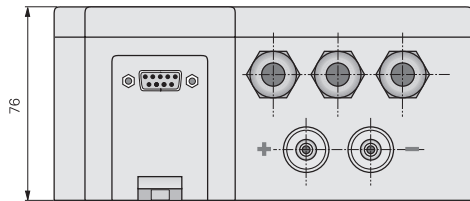
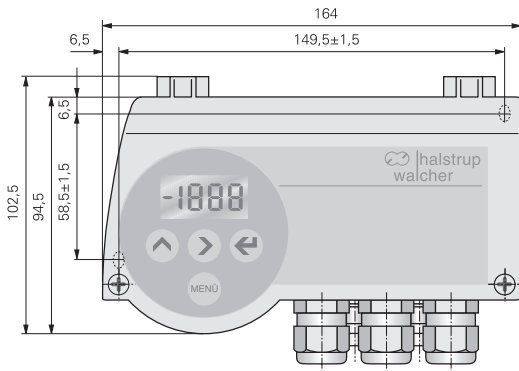
### Order key

<b>A</b>	
PUC 24	-
accessories	
<input type="checkbox"/> DKD calibration certificate, German	9601.-0001
<input type="checkbox"/> DKD calibration certificate, English	9601.-0004
<input type="checkbox"/> factory calibration certificate	9601.-0002

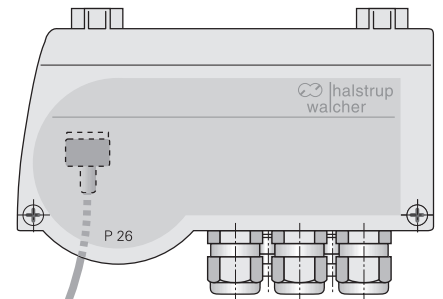
**P 26**

**Dimension drawing**

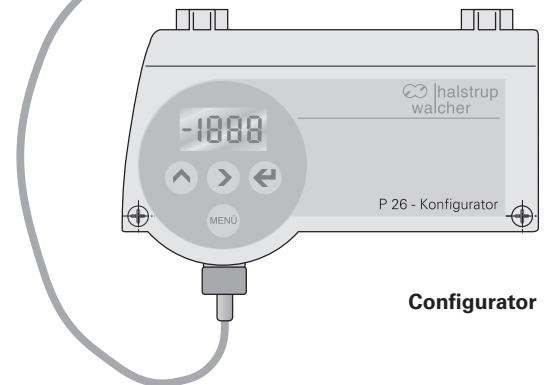
**P 26 with LCD**



**no LCD**



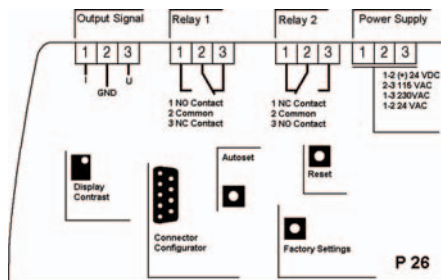
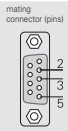
Hand-held-unit for configuration of P26 without LCD by the customer



**Configurator**

**Connection diagram**

RS 232 C	
D-sub socket (female connector)	1 -
	2 RxD
	3 TxD
	4 -
	5 GND
	6 -
	7 -
	8 -
	9 -



## P 26

### Intelligent differential pressure transmitter with scalable range



#### Special features

- range and display scalable
- switching contacts with adjustable switching thresholds
- time constants and output characteristics can be configured (root-extraction / linear)
- automatic zero-point calibration prevents zero-point drift
- unit conversion (e. g. mmH<sub>2</sub>O, mmHg, etc.)
- integrated valve provides a high level of overpressure protection
- available with interface RS232 (optional)
- also for top-hat rail mounting
- multilingual menu (English, German, Italian, French)
- ± measuring ranges

measurement ranges (others available upon request)	10/50/100/250/500 Pa 1/2,5/5/10/20/50/100 kPa free scalable from 10..100% within a range
margin of error (0.3 Pa margin of error for reference)	0.5% + 0.3 Pa of scaled range (40..100% of end value)
deflection drift / temperature	0.03 %/K (+10 °C...+50 °C)
zero point drift / temperature	± 0 % (cyclical zero-point correction)
overload capacity	600 kPa for measurement ranges ≥ 2,5 kPa 200x for measurement ranges < 2,5 kPa
medium	air, all non-aggressive gases
max. line pressure	10 kPa for measurement ranges ≤ 10 kPa for measurement ranges > 10 kPa max. nominal pressure of sensor
sensor response time	25 ms
time constants	25 ms ... 60 s (adjustable)
operating temperature	+10 °C ... +50 °C
storage temperature	-10 °C ... +70 °C
power consumption	approx. 6 VA
cable glands	3 x M 16
pressure ports	for hose NW 6 mm, others available upon request
protection class	IP 65
testing	CE, CSA, GOST

#### Technical Data

output	<b>A</b>	power supply	<b>B</b>
0 ... 10 V ( $R_L \geq 2 \text{ k}\Omega$ )	1	24 V AC/DC	24ACDC
0...20 mA ( $R_L \leq 500 \Omega$ )	0	24 VAC <small>with galvanic separation</small>	24AC
4...20 mA ( $R_L \leq 500 \Omega$ )	4	230/115 VAC	230/115
± 5 V ( $R_L \geq 2 \text{ k}\Omega$ )	5		
measurement range	<b>C</b>	margin of error	<b>D</b>
measurement range e. g., 0 – 10 Pa, mbar, mmHg, etc.		standard ±0.2% of end value, but min. 0.3 Pa	S 2
LCD	<b>E</b>	contact points	<b>F</b>
none	0	none	0
LCD and buttons for configuration	LT	2 switching relays max. 230 VAC, 6 A	2
interface			<b>G</b>
none			0
RS 232			RS

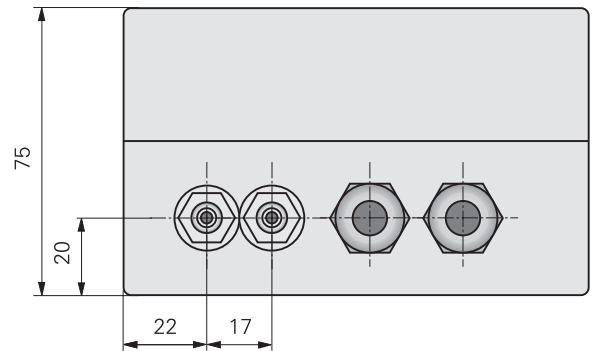
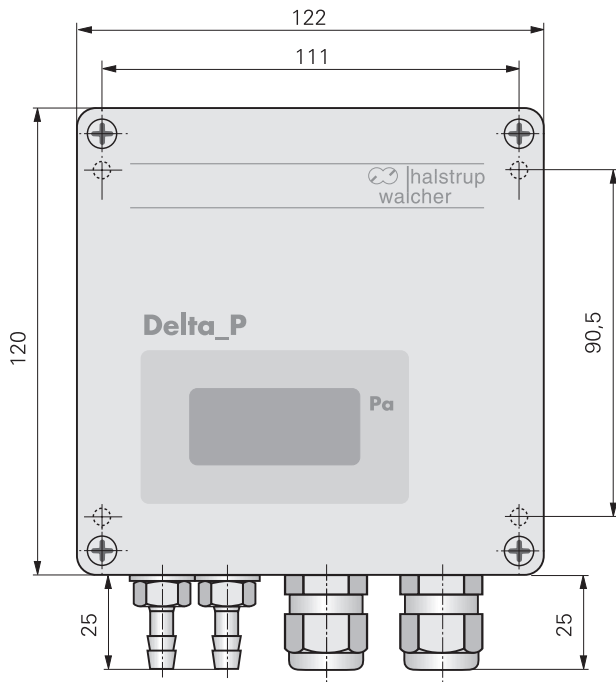
#### Order key

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>
<b>P 26</b>	-	-	-	-	-	-	-

accessories	
<input type="checkbox"/> configurator	9601.-0068
<input type="checkbox"/> DKD calibration certificate, German	9601.-0001
<input type="checkbox"/> DKD calibration certificate, English	9601.-0004
<input type="checkbox"/> factory calibration certificate	9601.-0002

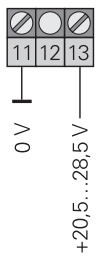
**P 82 R**

**Dimension drawing**

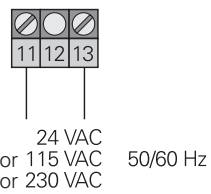


**Connection diagram**

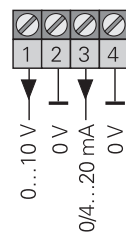
DC power supply



AC power supply



analogue outputs





## P 82 R

Pressure transmitter with root-extracted output for measuring volume flow



### Special features

- highly accurate and stable for long periods
- very little hysteresis; largely independent of temperature
- differential pressure  $\Delta p$  at the measuring orifice is expressed as either a linear ( $U_L, I_L$ ) or root-extracted function  $U_{RAD} = \sqrt{10 V} \times \sqrt{U_L}$ ,  $I_R = \sqrt{20 mA} \times \sqrt{I_L}$  or  $I_R = 4 mA + \sqrt{16 mA} \times \sqrt{(I_L - 4 mA)}$

measurement ranges (others available upon request)	100/250/500 Pa 1/2.5/5/10/20 kPa
margin of error	1 % of end value
deflection drift / temperature	0.04 %/K (+10 °C...+50 °C)
zero point drift / temperature	0.05 %/K (+10 °C...+50 °C)
zero point drift / time	0.5 %/year
overload capacity	5x
medium	air, all non-aggressive gases
max. system pressure	10 kPa for measurement ranges $\leq 10$ kPa for measurement ranges $> 10$ kPa max. nominal pressure of sensor
sensor response time	20 ms
leak flow suppression	adjustable from 0 ... 10% of end value
operating temperature	+10 °C ... +60 °C
storage temperature	-10 °C ... +70 °C
power consumption	approx. 3 VA
weight	approx. 0.8 kg
cable glands	2 x PG 11
pressure ports	for hose $\varnothing 6$ mm
protection class	IP 65
testing	CE, CSA

### Technical data

output	<b>A</b>	power supply	<b>B</b>
0 ... 10 V ( $R_L \geq 5 k\Omega$ )	1	24 VDC	24D
0 ... 20 mA ( $R_L \leq 500 \Omega$ )	0	24 VAC	24A
4 ... 20 mA ( $R_L \leq 500 \Omega$ )	4	115 VAC	115
		230 VAC	230
measurement range	<b>C</b>		
measurement range in Pa, kPa, mmHg, etc. (e.g., 0 - 100 Pa)			
time constants	<b>D</b>		
none	0		
1 s	1		
2 s	2		
5 s	5		
LCD	<b>E</b>		
none	0		
3 1/2 digit	3		
4 1/2 digit	4		

### Order key

**P 82 R** - **A** - **B** - **C** - **D** - **E**

accessories	
<input type="checkbox"/> DKD calibration certificate, German	9601.-0001
<input type="checkbox"/> DKD calibration certificate, English	9601.-0004
<input type="checkbox"/> factory calibration certificate	9601.-0002

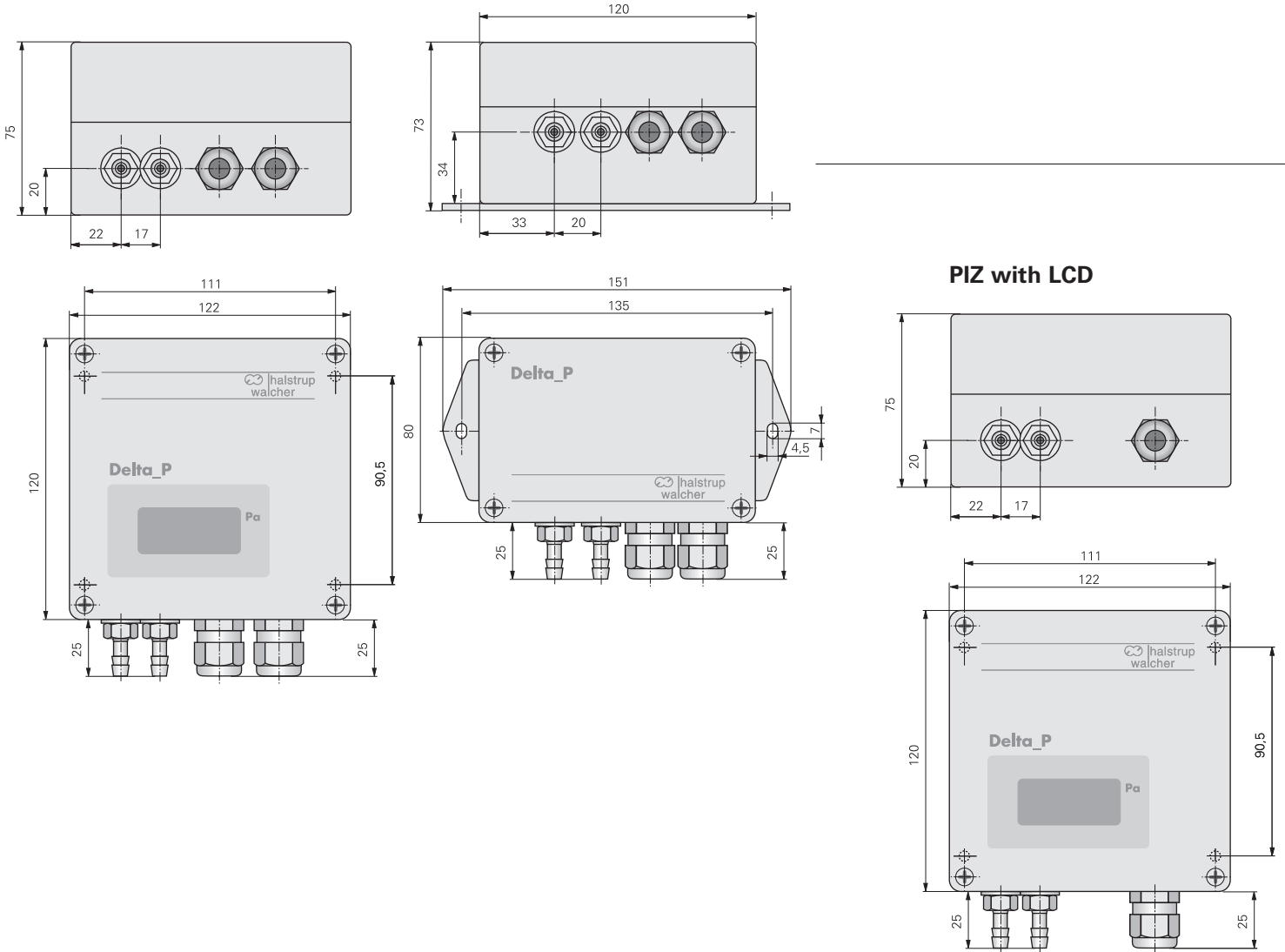
PU/PI/PIZ

Dimension drawing

PU/PI with LCD

no LCD

PIZ with LCD



Connection diagram

PU/PI

DC power supply



+20.5...28.5 V  
0 V

AC power supply



24 VAC  
or 115 VAC  
or 230 VAC  
50/60 Hz

analogue outputs



0 V  
0...10 V  
0/4...20 mA

PIZ

DC power supply  
4...20 mA output



10...32 VDC  
0 V



#### Special features

- for positive and negative differential pressures
- highly accurate and stable for long periods
- little zero point drift or hysteresis; largely independent of temperature
- also available as a two-wire system (PIZ model)

measurement ranges (others available upon request)	50/100/250/500 Pa 1/2.5/5/10/20/50/100 kPa
margin of error	1% of end value, 0.5% of end value for measurement ranges $\geq 250$ Pa, 0.2% of end value for measurement ranges $\geq 250$ Pa
deflection drift / temperature	0.04 %/K (+10 °C...+50 °C)
zero point drift / temperature	0.04 %/K (+10 °C...+50 °C)
zero point drift / time	0.5 %/year
overload capacity	10x for measurement ranges $\leq 20$ kPa 2x for measurement ranges $> 20$ kPa
medium	air, all non-aggressive gases
max. system pressure	10 kPa for measurement ranges $\leq 10$ kPa for measurement ranges $> 10$ kPa max. nominal pressure of sensor
sensor response time	20 ms
operating temperature	+10 °C... +60 °C
storage temperature	-10 °C... +70 °C
power consumption	approx. 3 VA
weight	0.8 kg
cable glands	PU/PI: 2xPG 7, others available upon request PIZ: 1xPG 7, others available upon request
pressure ports	for hose $\varnothing 6$ mm
protection class	IP 65
testing	CE, CSA

#### Technical data

output signals			<b>A</b>
0...10 V ( $R_L \geq 2$ k $\Omega$ )			U
0...20 mA ( $R_L \leq 500$ $\Omega$ )			I0
4...20 mA ( $R_L \leq 500$ $\Omega$ )			I4
4...20 mA two-wire ( $R_L \leq 50$ [U <sub>B</sub> (V) - 10 V] $\Omega$ )			IZ
measurement range	<b>B</b>	margin of error	<b>C</b>
measurement range (e. g., 0...100 Pa, mbar, mmHg etc.)		1% of end value	1
		0.5%*, $\geq 250$ Pa only	05
		0.2%*, $\geq 250$ Pa only	02
		*of end value	
supply voltage			<b>D</b>
24 VDC, +20% / -15%			24D
24 VAC, +6% / -15% (50/60 Hz)			24A
115 VAC, +6% / -15% (50/60 Hz)			115
230 VAC, +6% / -15% (50/60 Hz)			230
+10...+32 VDC (two-wire system)			PIZ
time constants	<b>E</b>	LCD	<b>F</b>
none	0	none	0
1 s	1	3 1/2 digit	3
2 s	2	4 1/2 LCD (PU/PI only)	4
5 s	5		

#### Order key

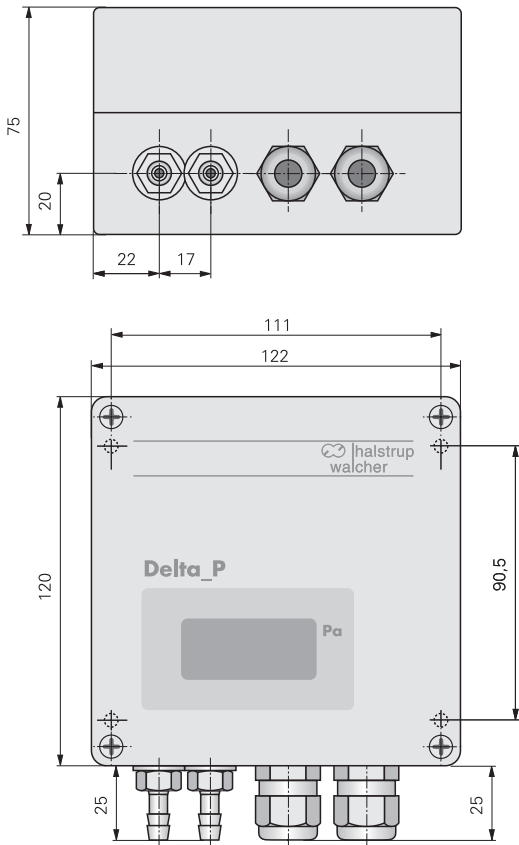
<b>P</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>
P	-	-	-	-	-	-

accessories	
<input type="checkbox"/> DKD calibration certificate, German	9601-0001
<input type="checkbox"/> DKD calibration certificate, English	9601-0004
<input type="checkbox"/> factory calibration certificate	9601-0002

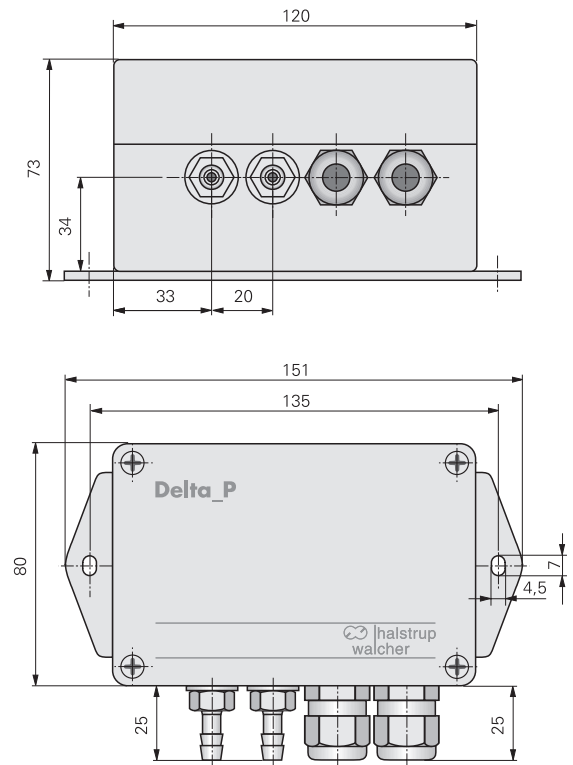
**PS 10**

**Dimension drawing**

**with LCD**



**no LCD**



**Connection diagram**

DC power supply



+20.5...28.5 V  
0 V

AC power supply



24 VAC  
or 115 VAC  
or 230 VAC  
50/60 Hz

analogue outputs



0 V  
0...10 V  
0/4...20 mA

## PS 10

Excellent  
price/performance ratio



### Special features

- for positive and negative differential pressures
- highly accurate and stable for long periods
- little zero point drift or hysteresis; largely independent of temperature
- excellent price/performance ratio

measurement ranges (others available upon request)	250/500 Pa 1/2.5/5/10/20/50/100 kPa
margin of error	2 % of end value
deflection drift / temperature	0.1 %/K (+10 °C...+50 °C)
zero point drift / temperature	0.1 %/K (+10 °C...+50 °C)
zero point drift / time	0.5 %/year

overload capacity	10x for measurement ranges ≤ 20 kPa 2x for measurement ranges > 20 kPa
medium	air, all non-aggressive gases
max. system pressure	10 kPa for measurement ranges ≤ 10 kPa for measurement ranges > 10 kPa max. nominal pressure of sensor

sensor response time	20 ms
----------------------	-------

operating temperature	+10 °C... +60 °C
storage temperature	-10 °C... +70 °C

power consumption	approx. 3 VA
weight	approx. 0.8 kg
cable glands	2 x PG7, others available upon request
pressure ports	for hose Ø 6 mm
protection class	IP 65
testing	CE, CSA

### Technical data

output signals	<b>A</b>
0 ... 10 V ( $R_L \geq 2 \text{ k}\Omega$ )	1
0 ... 20 mA ( $R_L \leq 500 \Omega$ )	0
4 ... 20 mA ( $R_L \leq 500 \Omega$ )	4

measurement range	<b>B</b>
measurement range in Pa, kPa, mmHg, etc. (e. g., 0 ... 250 Pa)	

power supply	<b>C</b>
24 VDC, +20% / -15%	24D
24 VAC, +6% / -15% (50/60 Hz)	24A
115 VAC, +6% / -15% (50/60 Hz)	115
230 VAC, +6% / -15% (50/60 Hz)	230

time constants	<b>D</b>	LCD	<b>E</b>
none	0	none	0
1 s	1	3 1/2 digit	3
2 s	2	4 1/2 digit	4
5 s	5		

### Order key

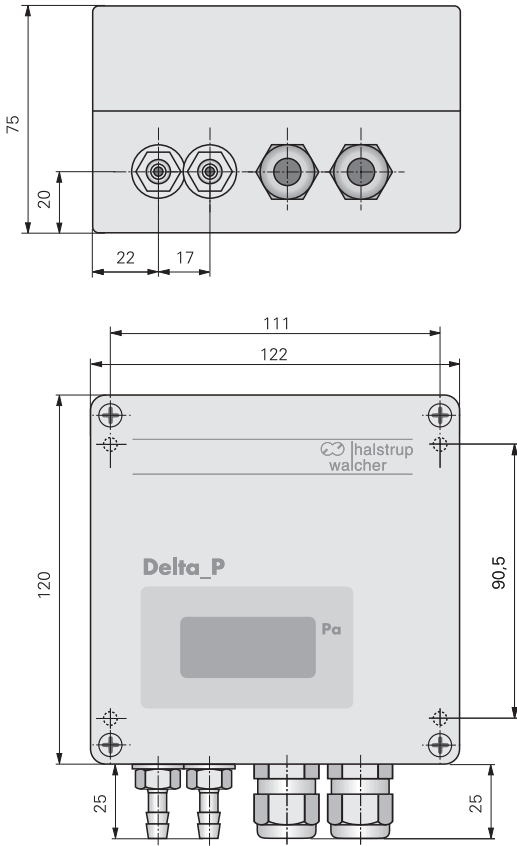
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
PS 10	-	-	-	-	-

accessories	
<input type="checkbox"/> DKD calibration certificate, German	9601.-0001
<input type="checkbox"/> DKD calibration certificate, English	9601.-0004
<input type="checkbox"/> factory calibration certificate	9601.-0002

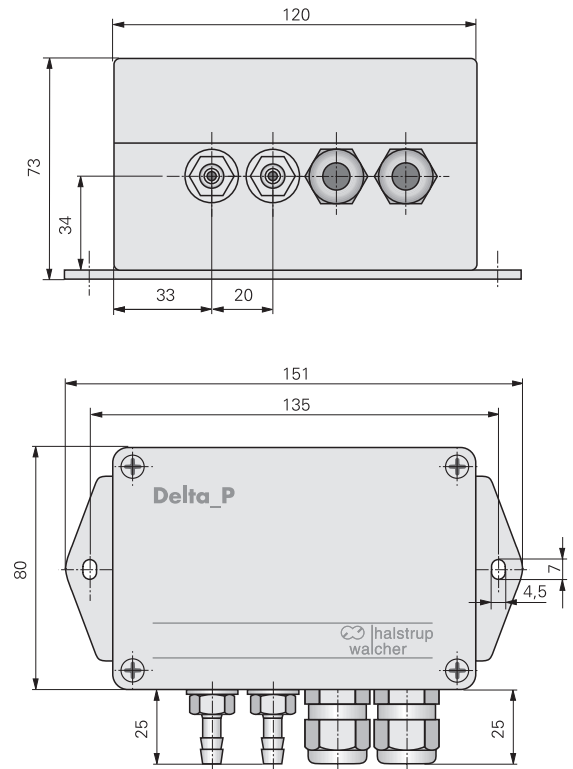
**PK 15**

**Dimension drawing**

**with LCD**

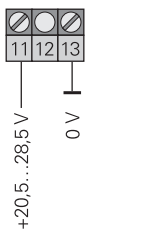


**no LCD**

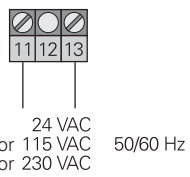


**Connection diagram**

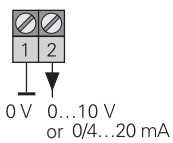
DC power supply



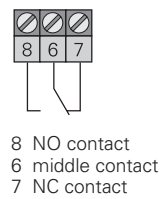
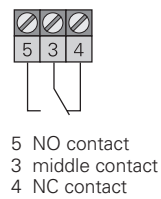
AC power supply



analogue outputs



relay outputs



## PK 15

### Pressure transmitter with adjustable switching contacts



#### Special features

- for positive and negative differential pressures
- highly accurate and stable for long periods
- little zero point drift or hysteresis; largely independent of temperature
- switching contacts with adjustable switching thresholds

measurement ranges (others available upon request)	50/100/250/500 Pa 1/2.5/5/10/20/50/100 kPa
margin of error	2% of end value, 1% of end value (opt.) 0.5% of end value for measurement ranges $\geq 250$ Pa (optional)
deflection drift / temperature	0.1% /K 0.04% /K (+10 °C...+50 °C at 1% accuracy)
zero point drift / temperature	0.1% /K 0.04% /K (+10 °C...+50 °C at 1% accuracy)
zero point drift / time	0.5% /year
overload capacity	10x for measurement ranges $\leq 20$ kPa 2x for measurement ranges $> 20$ kPa
medium	air, all non-aggressive gases
max. system pressure	10 kPa for measurement ranges $\leq 10$ kPa for measurement ranges $> 10$ mbar max. nominal pressure of sensor
sensor response time	20 ms
operating temperature	+10 °C... +60 °C
storage temperature	-10 °C... +70 °C
power consumption	approx. 3 VA
weight	approx. 0.8 kg
cable glands	2 x PG 9
pressure ports	for hose $\varnothing 6$ mm
protection class	IP 65
testing	CE, CSA

#### Technical data

output	<b>A</b>	power supply	<b>B</b>
0...10 V ( $R_L \geq 2$ k $\Omega$ )	1	24 VDC	24D
0...20 mA ( $R_L \leq 500$ $\Omega$ )	0	24 VAC	24A
4...20 mA ( $R_L \leq 500$ $\Omega$ )	4	115 VAC	115
		230 VAC	230
measurement range	<b>C</b>	margin of error	<b>D</b>
measurement range (e.g., 0...100 Pa, mbar, mmHg etc.)		2% of end value	2
		1% of end value (optional)	1
		0.5% of end value $\geq 250$ Pa only (opt.)	05
time constants	<b>E</b>	LCD	<b>F</b>
none	0	none	0
1 s	1	3 1/2 digit	3
2 s	2	4 1/2 digit	4
5 s	5		
contact points			<b>G</b>
1 switching relay (standard) max. 230 VAC, 6 A			1
2 switching relays (optional) max. 230 VAC, 6 A (required at $\pm$ measurement ranges)			2
adjustable response threshold (via potentiometer)			

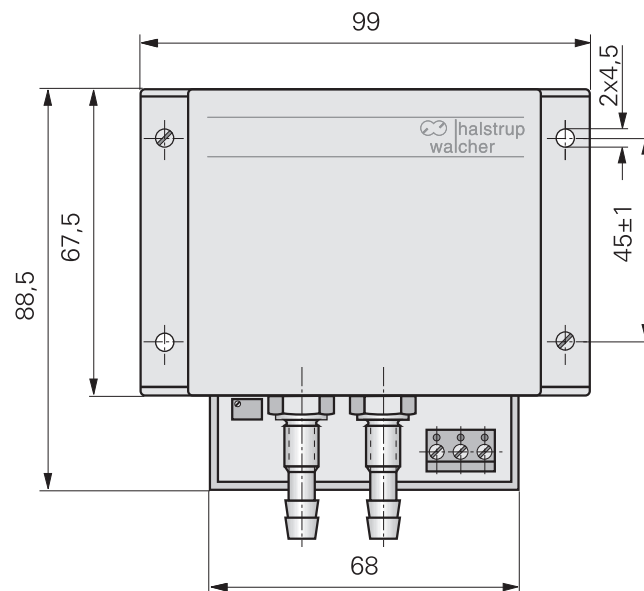
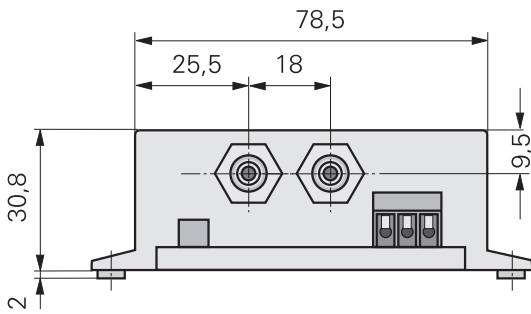
#### Order key

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>
PK 15	-	-	-	-	-	-	-

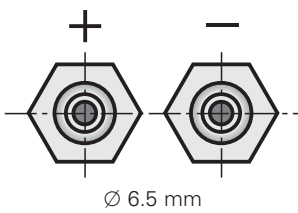
accessories	
<input type="checkbox"/> DKD calibration certificate, German	9601.-0001
<input type="checkbox"/> DKD calibration certificate, English	9601.-0004
<input type="checkbox"/> factory calibration certificate	9601.-0002

**PS 18**

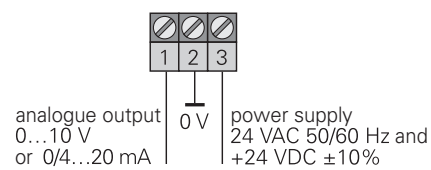
**Dimension drawing**



**Pneumatic connection**



**Connection diagram**





## PS 18

### Pressure transmitter with IP 20



#### Special features

- for positive and negative differential pressures
- little zero point drift or hysteresis
- highly accurate and stable for long periods
- excellent price/performance ratio

measurement ranges (others available upon request)	250/500 Pa 1/2.5/5/10/20/50/100 kPa
margin of error	2.5 % of end value
deflection drift / temperature	0.1 %/K (+10 °C...+50 °C)
zero point drift / temperature	0.1 %/K (+10 °C...+50 °C)
zero point drift / time	0.5 %/year

overload capacity	10x for measurement ranges ≤ 20 kPa 2x for measurement ranges > 20 kPa
medium	air, all non-aggressive gases
max. system pressure	10 kPa for measurement ranges ≤ 10 kPa for measurement ranges > 10 kPa max. nominal pressure of sensor

sensor response time	20 ms
----------------------	-------

operating temperature	+10 °C... +60 °C
storage temperature	-10 °C... +70 °C

power consumption	approx. 3 VA
weight	approx. 0.3 kg
pressure ports	for hose Ø 6 mm
protection class	IP 20
testing	CE

#### Technical data

output signals	<b>A</b>
0 ... 10 V ( $R_L \geq 2 \text{ k}\Omega$ )	<input type="checkbox"/> 1
0 ... 20 mA ( $R_L \leq 500 \Omega$ )	<input type="checkbox"/> 0
4 ... 20 mA ( $R_L \leq 500 \Omega$ )	<input type="checkbox"/> 4

measurement range	<b>B</b>
measurement range in Pa, kPa, mmHg, etc. (e. g., 0 ... 10 kPa)	<input type="text"/>

supply voltage	
24 VDC/24 VAC (50/60 Hz) ±10 % no galvanic separation between power supply and output	<input type="text"/>

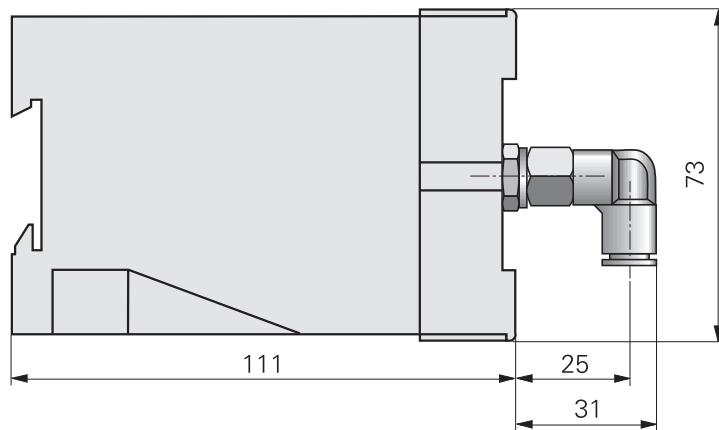
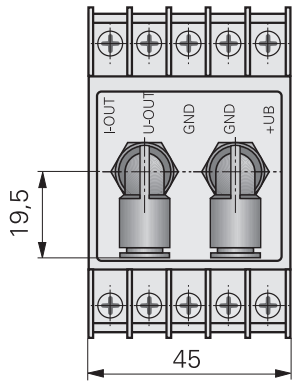
#### Order key

	<b>A</b>	<b>B</b>
<b>PS 18</b>	- <input type="text"/>	- <input type="text"/>

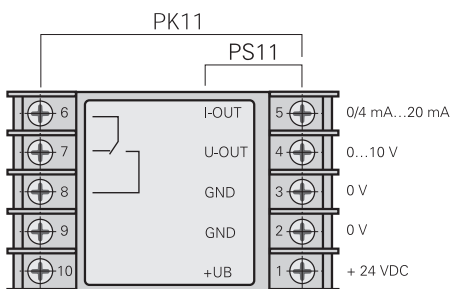
accessories	
<input type="checkbox"/> DKD calibration certificate, German	9601.-0001
<input type="checkbox"/> DKD calibration certificate, English	9601.-0004
<input type="checkbox"/> factory calibration certificate	9601.-0002

**PS 11/PK 11 (with switching contact)**

**Dimension drawing**



**Connection diagram**



## PS 11/ PK 11 (with switching contact)

Compact pressure transmitter  
for top-hat rail mounting



### Special features

- for positive and negative differential pressures
- particularly suitable for use in control cabinets
- highly accurate and stable for long periods
- little zero point drift or hysteresis; largely independent of temperature
- compact design
- PS 11 with optional switching contact

measurement ranges (others available upon request)	300/500 Pa 1/2.5/5/10/20/50/100/200 kPa
margin of error	1.5 % v. E.
deflection drift / temperature	0.1 % /K (+10 °C...+50 °C)
zero point drift / temperature	0.1 % /K (+10 °C...+50 °C)
zero point drift / time	0.5 %/year
overload capacity	10x for measurement ranges ≤ 20 kPa 2x for measurement ranges > 20 kPa
medium	air, all non-aggressive gases
max. system pressure	10 kPa for measurement ranges ≤10 kPa for measurement ranges > 10 kPa max. nominal pressure of sensor
sensor response time	20 ms
supply voltage	24 VDC, +20 %/-15 % or 24 VAC, +6/-15 % (50/60 Hz) (no galvanic separation between output and power supply)
operating temperature	+10 °C... +60 °C
storage temperature	-10 °C... +70 °C
power consumption	approx. 3 VA
weight	approx. 0.3 kg
cable glands	screw collars for cables up to 2 mm Ø
pressure ports	FESTO elbow quick connector for PVC tubing (Ø = 6 mm)
protection class	IP 40
testing	CE

### Technical data

switching contact	<b>A</b>
no switching contact (PS 11)	PS 11
1 relay with floating changeover contact (PK 11) 230 VAC (50/60 Hz), 6 A	PK 11
output signals	<b>B</b>
0 ... 10 V ( $R_L \geq 2 \text{ k}\Omega$ )	1
0 ... 20 mA ( $R_L \leq 500 \Omega$ )	0
4 ... 20 mA ( $R_L \leq 500 \Omega$ )	4
measurement range	<b>C</b>
measurement range in Pa, kPa, mmHg, etc. (e.g., 0 ... 10 kPa)	
time constants	<b>D</b>
none	0
2 s	2
5 s	5
pressure connections	<b>E</b>
FESTO quick connectors	F
standard connectors for 6 mm diameter tubing	S

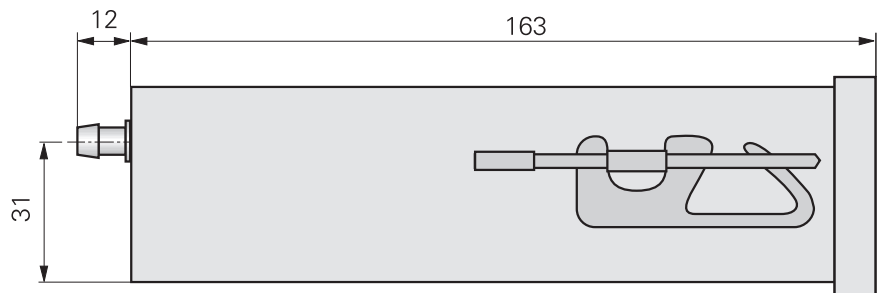
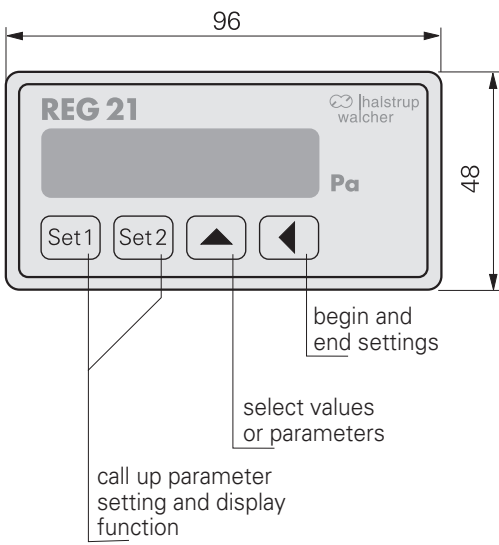
### Order key

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
PS 11 – PK 11	-	-	-	-	-
accessories					
<input type="checkbox"/> DKD calibration certificate, German					9601.-0001
<input type="checkbox"/> DKD calibration certificate, English					9601.-0004
<input type="checkbox"/> factory calibration certificate					9601.-0002

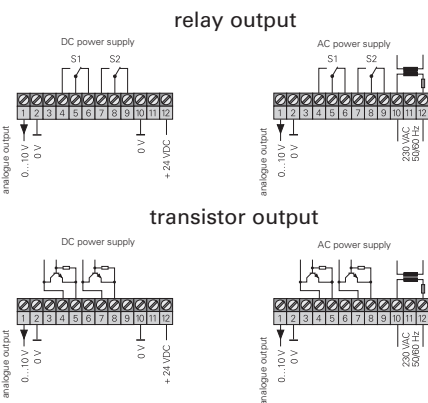
**REG 21**

**Dimension drawing**

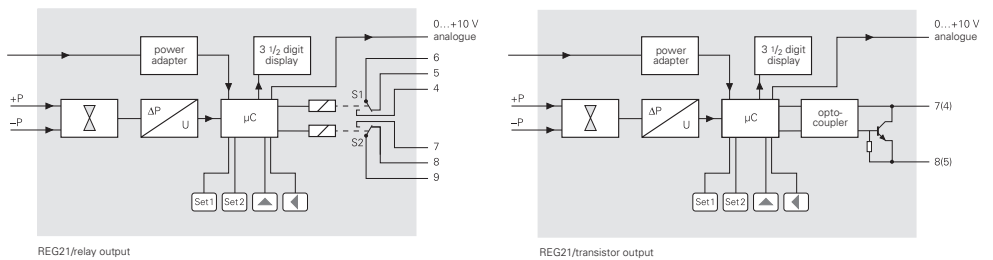
**Panel housing**



**Connection diagram**



**Functional block diagram**



## REG 21

### Pressure transmitter with 2 switching contacts



#### Special features

- for positive and negative differential pressures
- can be used as a two- or three-position controller
- highly accurate and stable for long periods
- very little hysteresis; largely independent of temperature
- automatic zero-point calibration
- switching contacts available as relay or transistor outputs with adjustable switching thresholds
- panel housing

measurement ranges (others available upon request)	50/100/250/500 Pa 1/2.5/5/10/20/50/100 kPa
margin of error	1 % of end value, 0.5 % of end value for measurement ranges $\geq 250$ Pa
deflection drift / temperature	0.04 %/K (+10 °C...+50 °C)
zero point drift / temperature	$\pm 0$ % (cyclical zero-point correction)
overload capacity	200x for measurement ranges $< 2.5$ kPa 600 kPa for measurement ranges $\geq 2.5$ kPa
medium	air, all non-aggressive gases
max. system pressure	10 kPa for measurement ranges $\leq 10$ kPa for measurement ranges $> 10$ kPa max. nominal pressure of sensor
sensor response time	20 ms
time constants	adjustable up to 10 s
operating temperature	+10 °C... +60 °C
storage temperature	-10 °C... +70 °C
power consumption	ca. 5 VA
weight	ca. 0.8 kg

pressure ports	for hose $\varnothing 6$ mm
The following may be adjusted from the keyboard	zero-point calibration for sensor control method (two- or three-position controller) switching point and hysteresis switching signal inversion response delay of relay outputs and analogue output
testing	CE

#### Technical data

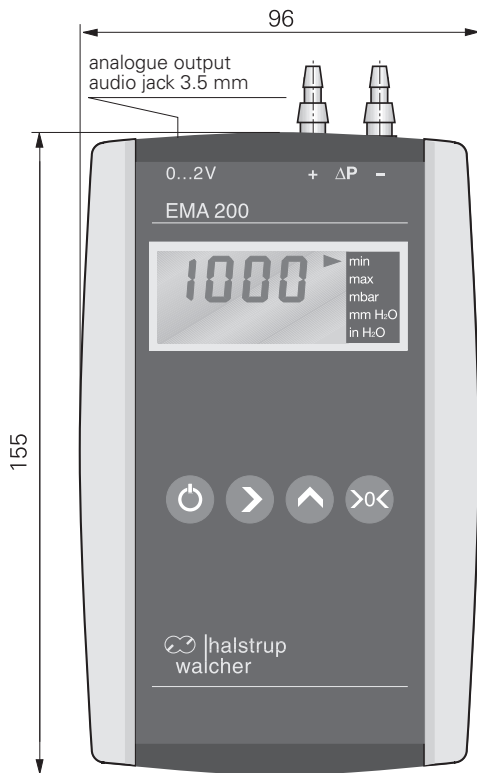
output signals		<b>A</b>	
0...10 V ( $R_L \geq 2$ k $\Omega$ )		1	
$\pm 5$ V ( $R_L \geq 2$ k $\Omega$ )		5	
0...20 mA ( $R_L \leq 500$ $\Omega$ )		0	
4...20 mA ( $R_L \leq 500$ $\Omega$ )		4	
measurement range	<b>B</b>	margin of error	<b>C</b>
measurement range (e.g., 0...100 Pa, mbar, mmHg, etc.)		1 % of end value	1
		0.5 % of end value $\geq 250$ Pa only	05
supply voltage		<b>D</b>	
24 VDC, +20 % / -15%		24D	
24 VAC, +6 % / -15% (50/60 Hz)		24A	
115 VAC, +6 % / -15% (50/60 Hz)		115	
230 VAC, +6 % / -15% (50/60 Hz)		230	
switching contacts		<b>E</b>	
2 relays with floating changeover contacts 230 VAC (50/60 Hz), 6 A		R	
2 transistors with open collector $U_{CE} \leq 50$ V; $I_C \leq 200$ mA, floating		T	

#### Order key

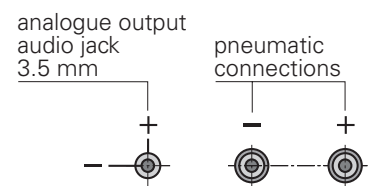
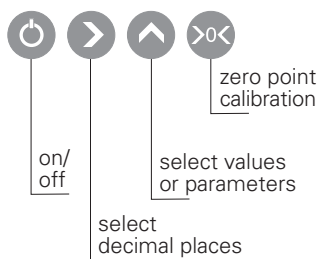
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
REG 21	-	-	-	-	-
accessories					
<input type="checkbox"/> DKD calibration certificate, German					9601.-0001
<input type="checkbox"/> DKD calibration certificate, English					9601.-0004
<input type="checkbox"/> factory calibration certificate					9601.-0002

EMA 200

Dimension drawing



Connection diagram



**EMA 200**

Portable, digital pressure gauge  
with min./max. value memory

**Special features**

- flow-rate measurements taken in conjunction with a pitot tube
- displays pressure and flow rate
- stores min. and max. value
- scalable analogue output of 0 – 2 V
- can convert between Pa, kPa, mmHg, mmH<sub>2</sub>O, inH<sub>2</sub>O
- temperature measurement
- ± measuring ranges
- measuring range change-over

accuracy	0.5 % of end value
overload capacity	10 x for measurement ranges ≤ 10 kPa 2 x for measurement ranges > 10 kPa 1.2 x in the 200 kPa measurement range
air-speed calculation	$v = 1.291 \cdot \sqrt{\Delta p}$ air-speed given in m/s and $\Delta p$ = differential pressure at pitot tube in Pa
zero point calibration	electronically by pressing zero point key
medium	air, all non-aggressive gases
analogue output	0...2 V ( $R_L \geq 2 \text{ k}\Omega$ ) only for positive range 0...1...2 V ( $R_L \geq 2 \text{ k}\Omega$ ) for negative and positive range
display	3 1/2 digit LCD, character height = 10 mm
operating temperature	0 °C... +50 °C
storage temperature	-10 °C... +70 °C
power supply	9 V battery (display reads "low bat" when power falls below a certain minimum level) power automatically switches off after approx. 20 min.
weight	approx. 0.4 kg
pressure ports	for hose $\varnothing$ 6 mm
testing	CE

**Technical data**

measurement range			A
± 200 Pa	(±2 mbar)	0 (1.5) ... 18 m/s	0
± 2 kPa	(±20 mbar)	0 (5) ... 58 m/s	1
± 20 kPa	(±200 mbar)	0 (15) ... 180 m/s	10
± 200 kPa	(±2000 mbar)		100

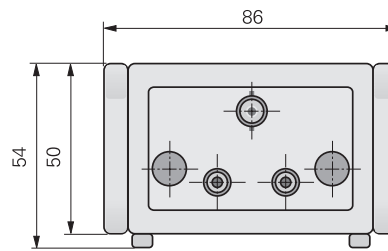
**Order key**

A	
EMA 200	-

accessories	
<input type="checkbox"/> carrying bag	9074.-0001
<input type="checkbox"/> DKD calibration certificate, German	9601.-0001
<input type="checkbox"/> DKD calibration certificate, English	9601.-0004
<input type="checkbox"/> factory calibration certificate	9601.-0002

EMA 84

Dimension drawing





**EMA 84**Portable digital  
pressure gauge**Special features**

- highly accurate and stable for long periods
- extremely durable
- little zero point drift or hysteresis; largely independent of temperature
- analogue output of 0 – 1 V (optional)
- easy to operate

margin of error	1 % of end value 0.5 % of end value for measurement ranges $\geq 1$ kPa (optional) 0.2 % of end value for measurement ranges $\geq 1$ kPa (optional)
overload capacity	10x for measurement ranges $\leq 10$ kPa 2x for measurement ranges $> 10$ kPa
zero point calibration	via potentiometer on front face
medium	air, all non-aggressive gases
analogue output	0 ... 1 V ( $R_L \geq 2$ k $\Omega$ ) BNC connector
display	3 1/2 digit LCD, character height = 13 mm
time constants	toggles between 0.02 s; 0.2 s; 1 s
operating temperature	+10 °C ... +60 °C
storage temperature	-10 °C ... +70 °C
operating position	preferably horizontal
power supply	9 V battery
weight	approx. 0.8 kg
pressure ports	for hose $\varnothing$ 6 mm
testing	CE

**Technical data**

measurement ranges	<b>A</b>
0 ... 100 Pa (0 ... 1 mbar)	0
0 ... 1 kPa (0 ... 10 mbar)	1
0 ... 10 kPa (0 ... 100 mbar)	10
0 ... 100 kPa (0 ... 1000 mbar)	100
accuracy	<b>B</b>
1 % of end value	1
0.5 % of end value (only for measurement ranges $\geq 1$ kPa)	5
0.2 % of end value (only for measurement ranges $\geq 1$ kPa)	2
analogue output	<b>C</b>
none	0
0 ... 1 V (optional)	1

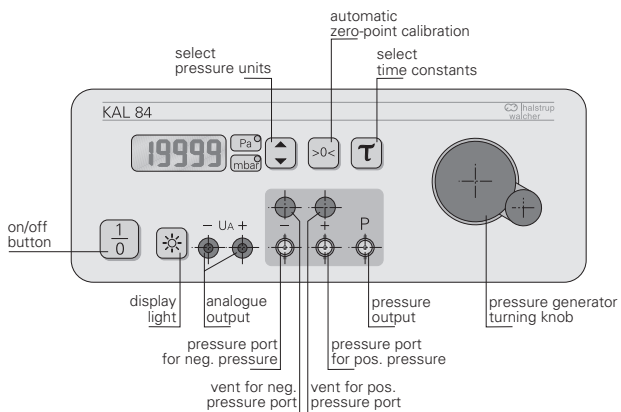
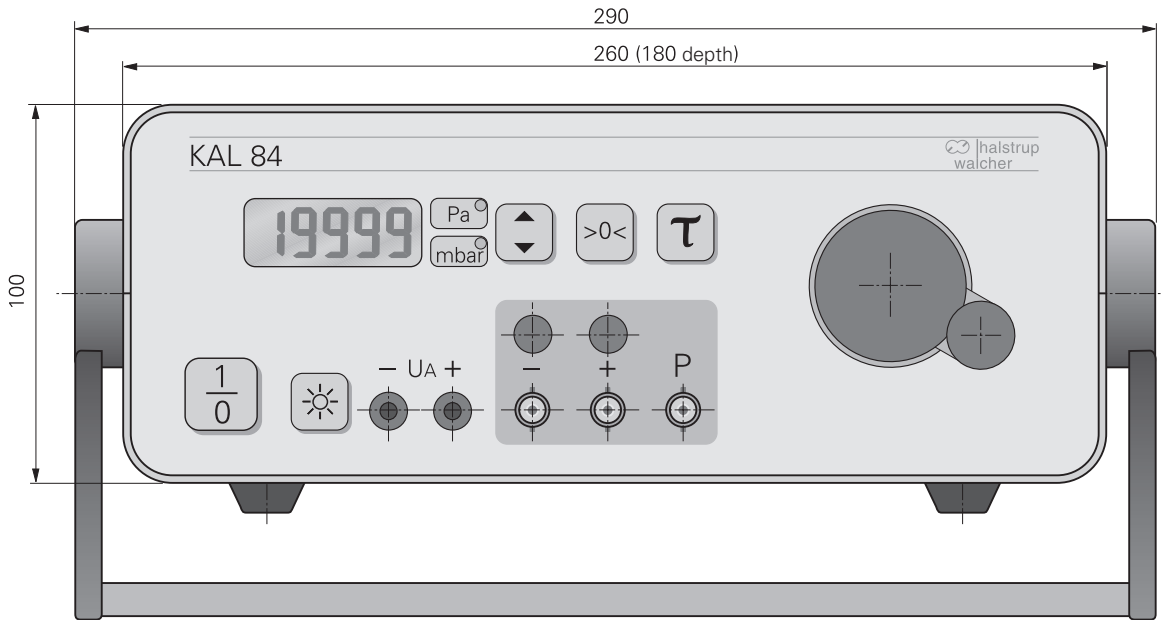
**Order key**

	<b>A</b>	<b>B</b>	<b>C</b>
EMA 84	-	-	-

accessories	
<input type="checkbox"/> carrying bag	9063.-0001
<input type="checkbox"/> shoulder bag	9064.-0001
<input type="checkbox"/> DKD calibration certificate, German	9601.-0001
<input type="checkbox"/> DKD calibration certificate, English	9601.-0004
<input type="checkbox"/> factory calibration certificate	9601.-0002

**KAL 84**

**Dimension drawing**



## KAL 84

### Portable pressure calibration device



#### Special features

- highly accurate, reproducible results
- internal pressure generation
- extremely durable; excellent for service applications
- unit conversion, e.g. mmHg/kPa, mbar/kPa
- rechargeable battery allows for portable operation

margin of error	0.5 % of end value ± 1 digit 0.2 % of end value ± 1 digit for measurement ranges ≥ 1 kPa All measurement ranges have a 99 % overrange. Linearity data pertains to a measurement range of 0 – 100 %.
hysteresis	0.1 %
temperature effect (zero point)	not applicable; panel button available for resetting zero point
temperature effect (span)	0.04 %/K (+10 °C... +50 °C)
calibration temperature	+22 °C
medium	air, all non-aggressive gases
displacement volume	pressure transmitter, approx. 100 cm <sup>3</sup> (1, 10, 100 kPa) approx. 200 cm <sup>3</sup> (100 Pa)
analogue output	0... 1 V (R <sub>L</sub> ≥ 2 kΩ) two connectors Ø 4 mm
display	4 1/2 digit LCD, character height = 10 mm
time constants	toggles between 0.1 s; 1 s
operating temperature	+10 °C... +40 °C
storage temperature	-10 °C... +70 °C
power supply	NiCd rechargeable 9 V battery with AC adaptor
weight	approx. 3 kg
pressure ports	for hose Ø 6 mm
testing	CE

#### Technical data

measurement ranges	<b>A</b>
0...100 Pa (0...1 mbar)	0
0...1 kPa (0...10 mbar)	1
0...10 kPa (0...100 mbar)	10
0...100 kPa (0...1000 mbar)	100
0...300 mmHg (0...400 mbar)	300
0...750 mmHg (0...1000 mbar)	750

(other measurement ranges and units available upon request)

margin of error	<b>B</b>
0.5 % of end value	1
0.2% of end value (measurement ranges ≥ 1 kPa) (opt.)	2

supply voltage	<b>C</b>
230 VAC adapter	230
115 VAC adapter	115

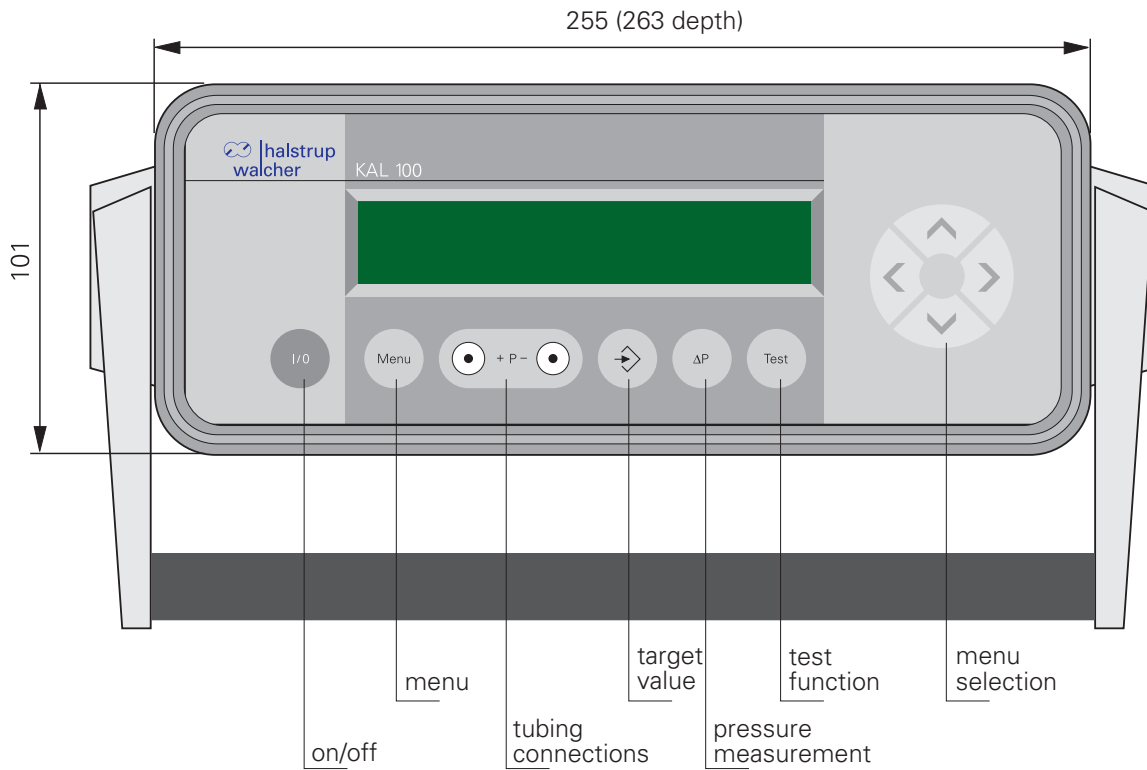
#### Order key

	<b>A</b>	<b>B</b>	<b>C</b>
KAL 84	-	-	-

accessories	
<input type="checkbox"/> carrying bag	9062.-0001
<input type="checkbox"/> hand pump	9601.-0036
<input type="checkbox"/> DKD calibration certificate, German	9601.-0001
<input type="checkbox"/> DKD calibration certificate, English	9601.-0004
<input type="checkbox"/> factory calibration certificate	9601.-0002

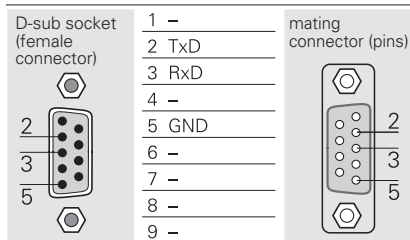
**KAL 100**

**Dimension drawing**



**PC connection (optional)**

**RS 232 C interface**



## KAL 100

Pressure calibration device  
with integrated pressure generation



### Special features

- portable, i.e. suitable for on-site calibration
- automatic zero point calibration provides high zero-point stability
- quickly provides positive or negative differential pressures up to 100 kPa
- RS232 Interface (optional)
- unit conversion (e.g., mmHg, mmH<sub>2</sub>O, psi etc.)
- excellent price/performance ratio
- multilingual menu (English, German, Italian, French, Spanish)

margin of error	0.5 % of end value ± 1 digit (100 Pa measurement range) 0.2 % of end value ± 1 digit (only for 1, 10 and 100 kPa measurement ranges)
hysteresis	0.1 %
overload capacity	600 kPa for 10 kPa and 100 kPa measurement ranges 200 kPa for 100 Pa and 1 kPa measurement ranges
temperature effect (zero point)	± 0 % (cyclical zero-point correction)
temperature effect (span)	0,04 %/K (+10 °C ... +50 °C)
calibration temperature	+22 °C
medium	air, all non-aggressive gases
interface	RS232 (optional)
display	alphanumeric display with 2x20 characters
operating temperature	+10 °C ... +40 °C
storage temperature	-10 °C ... +70 °C
power consumption	10 VA
weight	approx. 4.5 kg
pressure ports	for hose Ø 6 mm
testing	CE

### Technical data

measurement ranges	<b>A</b>
0...100 Pa (0...1 mbar)	0
0...1 kPa (0...10 mbar)	1
0...10 kPa (0...100 mbar)	10
0...100 kPa (0...1000 mbar)	100
supply voltage	<b>B</b>
230 VAC, +6 % / -15 % (50/60 Hz)	230
115 VAC, +6 % / -15 % (50/60 Hz)	115
data interface	<b>C</b>
none	0
RS232 C (optional)	1

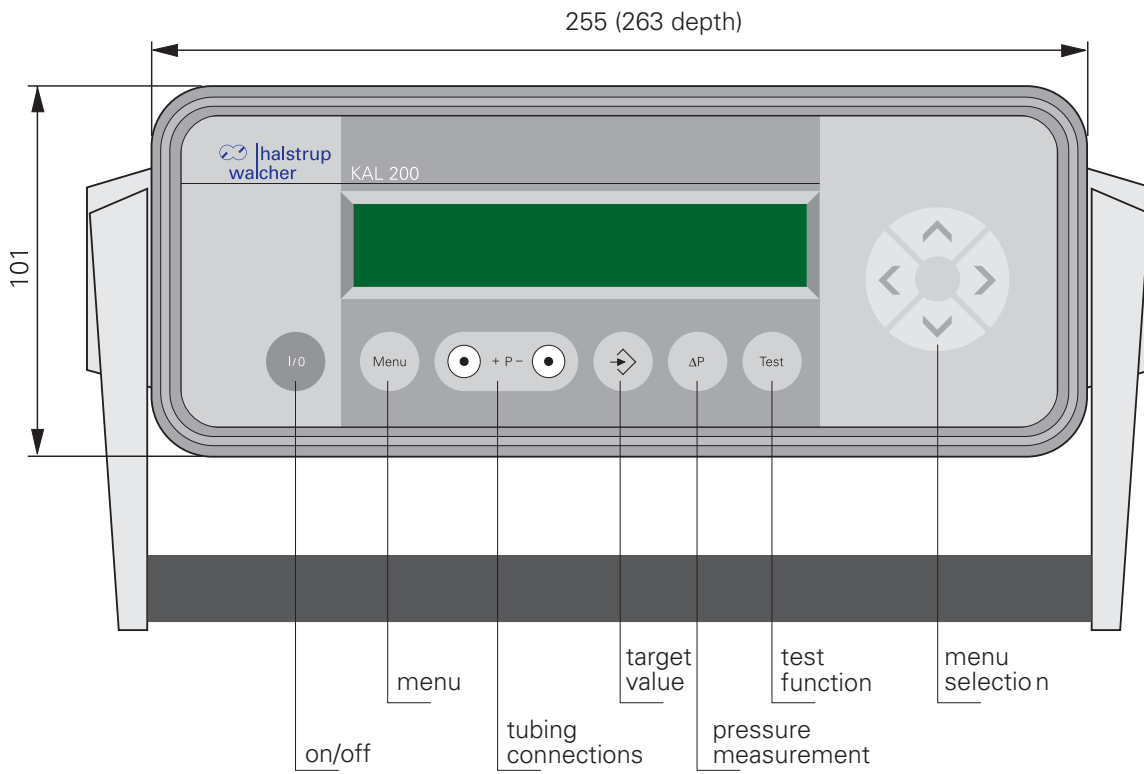
### Order key

	<b>A</b>	<b>B</b>	<b>C</b>
KAL 100	-	-	-

accessories	
<input type="checkbox"/> carrying case	9220.-0001
<input type="checkbox"/> DKD calibration certificate, German	9601.-0001
<input type="checkbox"/> DKD calibration certificate, English	9601.-0004
<input type="checkbox"/> factory calibration certificate	9601.-0002

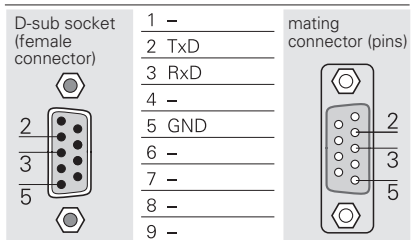
**KAL 200**

**Dimension drawing**



**PC connection**

**RS 232 C interface**



## KAL 200

Pressure calibration device  
with integrated pressure generation



### Special features

- portable, i.e. suitable for on-site calibration
- automatic zero point calibration provides high zero-point stability
- quickly provides positive or negative differential pressures up to 100 kPa
- RS232 interface makes it easy to record measured values
- unit conversion (e.g., mmHg, mmH<sub>2</sub>O, psi etc.)
- excellent price/performance ratio
- multilingual menu (English, German, Italian, French, Spanish)

margin of error	0.3% of end value ± 1 digit (100 Pa measurement range) 0.1 % of end value ± 1 digit (only for 1, 10 and 100 kPa measurement ranges)
hysteresis	0.1 %
overload capacity	600 kPa for 10 kPa and 100 kPa measurement ranges 200 kPa for 100 Pa and 1 kPa measurement ranges
temperature effect (zero point)	± 0 % (cyclical zero-point correction)
temperature effect (span)	0.03 %/K (+10 °C...+50 °C)
calibration temperature	+22 °C
medium	air, all non-aggressive gases
interface	RS232
display	alphanumeric display with 2x20 characters
operating temperature	+10 °C...+40 °C
storage temperature	-10 °C...+70 °C
power consumption	10 VA
weight	approx. 4.5 kg
pressure ports	for hose Ø 6 mm
testing	CE

### Technical data

measurement ranges	<b>A</b>
0...100 Pa (0...1 mbar)	0
0...1 kPa (0...10 mbar)	1
0...10 kPa (0...100 mbar)	10
0...100 kPa (0...1000 mbar)	100
supply voltage	<b>B</b>
230 VAC, +6 %/-15 % (50/60 Hz)	230
115 VAC, +6 %/-15 % (50/60 Hz)	115

### Order key

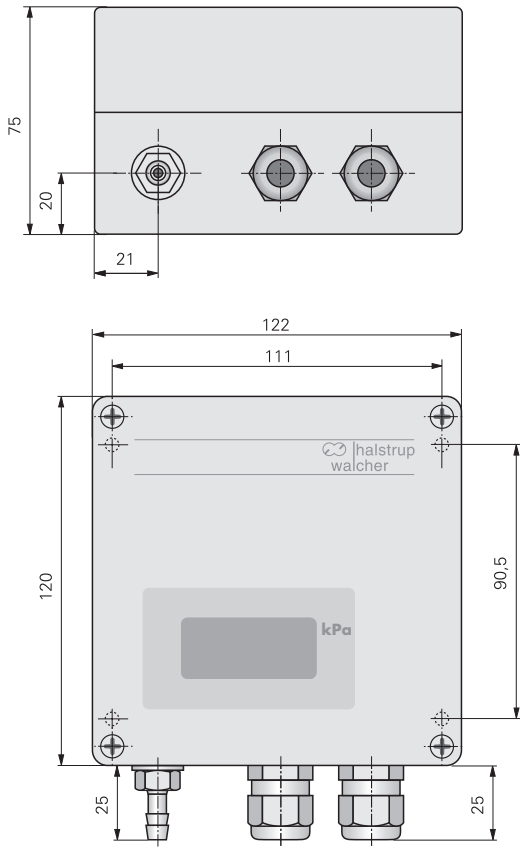
	<b>A</b>	<b>B</b>
KAL 200	-	-

accessories	
<input type="checkbox"/> carrying case	9220.-0001
<input type="checkbox"/> DKD calibration certificate, German	9601.-0001
<input type="checkbox"/> DKD calibration certificate, English	9601.-0004
<input type="checkbox"/> factory calibration certificate (inclusive for first orders)	9601.-0002

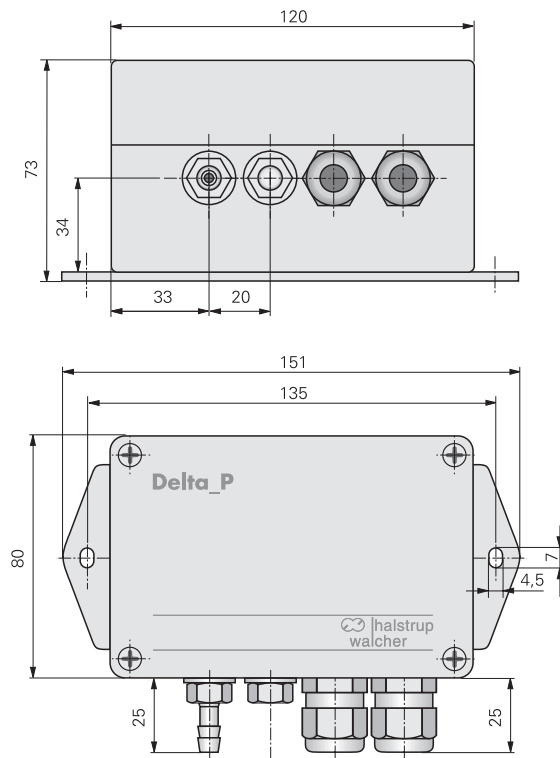
**AD 1000/BA1000**

**Dimension drawing**

**with LCD**

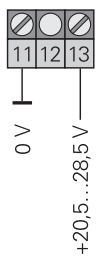


**no LCD**

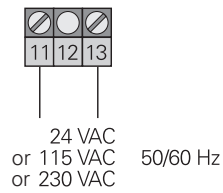


**Connection diagram**

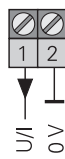
DC power supply



AC power supply



analogue outputs





## AD 1000/BA 1000

### Electronic barometer



#### Special features

- highly accurate and stable for long periods
- little zero point drift or hysteresis; largely independent of temperature
- display can be adjusted (reduced) to correspond to the height of installation site (see DIN ISO 2533)
- AD 1000 with pressure port for measuring absolute pressure
- BA 1000 for measuring barometric pressure

margin of error	$\pm 1\%$ , reference $\pm 0.5$ hPa with respect to sea level
temperature effect	0.04 %/K (+10 °C ... +50 °C)
calibration temperature	+22 °C
operating temperature	+10 °C ... +60 °C
storage temperature	-10 °C ... +70 °C
long-term drift	0.3 hPa/year
reduction	0 – 850 m above sea level (please indicate when placing your order)

power consumption	approx. 3 VA
cable glands	2 x PG 7 (for a 80 x 120 housing) 2 x PG11 (for a 120 x 122 housing)

protection class	IP 65
weight	approx. 0.6 kg
pressure ports	for hose $\varnothing$ 6 mm
testing	CE

#### Technical data

measurement ranges	A	
80...120 kPa <sup>1)</sup>	80B	
85...115 kPa <sup>1)</sup>	85B	
90...110 kPa <sup>1)</sup>	90B	
95...115 kPa <sup>1)</sup>	95B	
0...50 kPa <sup>2)</sup>	50A	
0...100 kPa <sup>2)</sup>	100A	
80...120 kPa <sup>2)</sup>	80A	
90...110 kPa <sup>2)</sup>	90A	
100...0 kPa <sup>2)</sup>	0A	

1) BA 1000 w/o pressure port

2) AD 1000 (w. pressure port)

output signals	B		power supply	C	
0...10 V ( $R_L \geq 2$ k $\Omega$ )	1	24 VDC	24D		
0...20 mA ( $R_L \leq 500$ $\Omega$ )	0	24 VAC	24A		
4...20 mA ( $R_L \leq 500$ $\Omega$ )	4	115 VAC	115		
		230 VAC	230		

LCD	D	
none	0	
3 1/2 digit	3	
4 1/2 digit	4	

reduction	E	
none	0	
(please indicate in meters)		

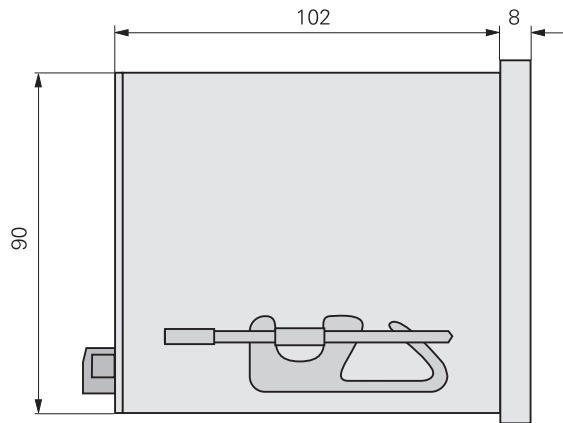
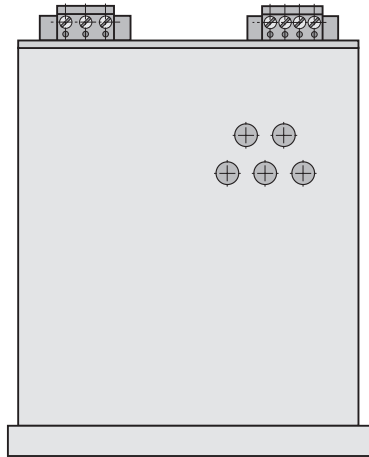
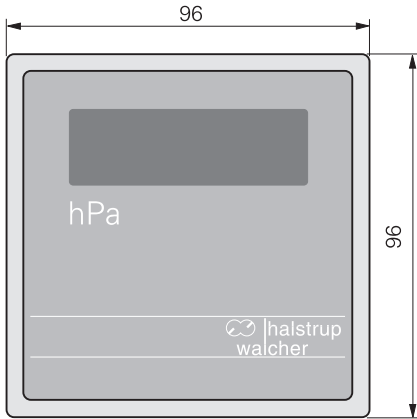
#### Order key

	A	B	C	D	E
AD-BA 1000	-	-	-	-	-

accessories	
<input type="checkbox"/> DKD calibration certificate, German	9601.-0001
<input type="checkbox"/> DKD calibration certificate, English	9601.-0004
<input type="checkbox"/> factory calibration certificate	9601.-0002

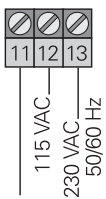
**BA 90**

**Dimension drawing**

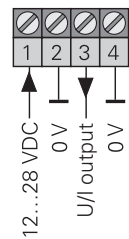


**Connection diagram**

AC power supply



DC power supply  
analogue outputs



**BA 90**

Digital  
precision barometer



**Special features**

- a potentiometer can be used to adjust (reduce) display to correspond to the height of installation site (see DIN ISO 2533)
- highly accurate and stable for long periods
- little zero point drift or hysteresis; largely independent of temperature
- 3 supply voltages in one unit

**Technical data**

measurement range	913.3 – 1113.3 hPa
margin of error	± 0.4 hPa ± 1 digit, reference ± 0.5 hPa with respect to sea level
resolution	0.1 hPa
temperature effect	± 0.2 hPa / °C, for temperatures ranging between +20 °C...+50 °C
calibration temperature	+ 22 °C
operating temperature	0 °C... +50 °C (temperature compensation between + 20 °C...+50 °C)
storage temperature	–10 °C... +70 °C
long-term drift	0.3 hPa/year
supply voltage	230 VAC +6/–15 % or 115 VAC +6/–15 % or 12 ... 28 VDC (universal voltage adapter)
reduction	0...850 m above sea level, via potentiometer
power consumption	approx. 5 VA
weight	approx. 0.8 kg
testing	CE

output signals	<b>A</b>
–2 ... +2 V ( $R_L \geq 5 \text{ k}\Omega$ )	1
0...20 mA ( $R_L \leq 250 \Omega$ )	0
4...20 mA ( $R_L \leq 250 \Omega$ )	4

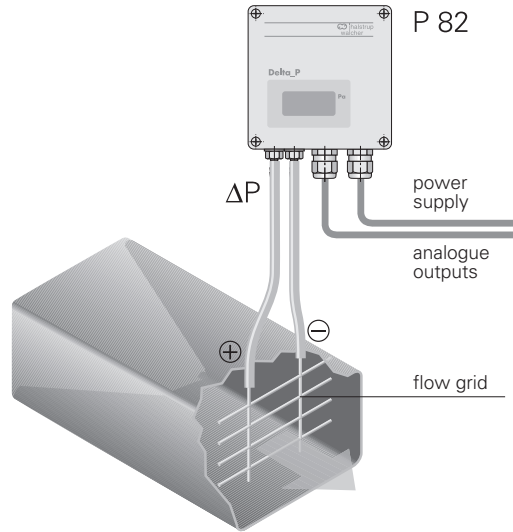
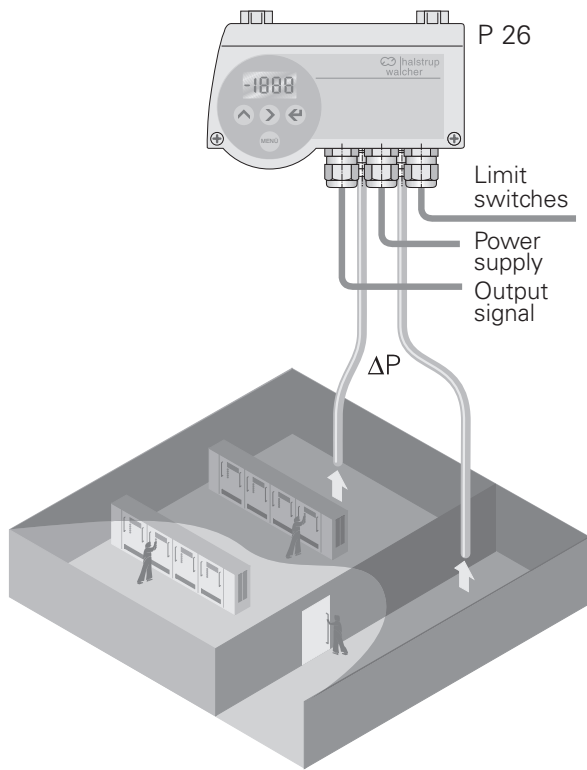
**Order key**

<b>A</b>	
<b>BA 90</b> -	
accessories	
<input type="checkbox"/> DKD calibration certificate, German	9601.-0001
<input type="checkbox"/> DKD calibration certificate, English	9601.-0004
<input type="checkbox"/> factory calibration certificate	9601.-0002

## Sample applications

### Volume flow measurement

If measured in conjunction with a differential pressure transmitter (measuring orifice, Wilson flow grid, pitot tube, etc.), the recorded differential pressure will be directly proportional to the volume flow as a result of the root-extracted function of the P 82 R / P 26 model pressure transmitter. The resulting value is then displayed on the built-in LCD. The output signal is also proportional to the volume flow, thereby eliminating the need for time-consuming calculations in the master control module.



### Measuring differential pressure

Monitoring static room pressure, as is done, for instance, in clean rooms or operating rooms, requires a pressure transmitter that can operate within very small measurement ranges, often only a few Pascals. The P 26 pressure transmitter is perfectly suited for this type of task, as it is designed to operate in measurement ranges as small as 0... 10 Pa.

### Conversion table for the most common pressure units

	Pa	hPa/mbar	kPa	bar	psi	mmH <sub>2</sub> O	inH <sub>2</sub> O	mmHg	inHg
Pa	1	0.010	0.001	0.00001	0.0001	0.102	0.004	0.008	0.0003
hPa/mbar	100	1	0.100	0.001	0.015	10.197	0.401	0.750	0.030
kPa	1000	10	1	0.010	0.145	101.968	4.014	7.502	0.295
bar	100000	1000	100	1	14.514	10196.798	401.445	750.188	29.499
psi	6891.799	68.966	6.894	0.069	1	703.235	27.701	51.813	2.036
mmH <sub>2</sub> O	9.804	0.098	0.010	0.000098	0.001	1	0.039	0.073	0.003
inH <sub>2</sub> O	249.004	2.490	0.249	0.00249	0.036	25.381	1	1.865	0.073
mmHg	133.316	1.333	0.133	0.00133	0.019	13.624	0.536	1	0.039
inHg	3386.387	33.898	3.386	0.03386	0.491	345.901	13.624	25.381	1

## DKD pressure calibration laboratory

Germany's national metrology institute (the Physikalische Technische Bundesanstalt, or PTB) has certified Walcher Meßtechnik GmbH – a member of the halstrup-walcher group of companies – to perform pressure calibrations in accordance with DIN EN ISO / IEC 17025.

This allows Walcher Meßtechnik GmbH to issue DKD calibration certificates for differential pressure transmitters, calibration devices, absolute pressure transmitters and portable pressure gauges.

Absolute pressures between 0.25 and 20 bar can be measured here, as can negative and positive differential pressures of 0 to 20 bar between gases. Measuring and calibration devices are calibrated independently of the manufacturer.

Services also include recalibration of all of the products listed above as directed by the ISO 9000 quality management system for measuring equipment.

**DEUTSCHER KALIBRIERDIENST**  
Kalibrierlaboratorium für die Messgröße Druck  
Calibration laboratory for pressure measuring instruments  
Akkreditiert durch die / accredited by the  
Akkreditierungsstelle des DKD bei der  
PHYSIKALISCH-TECHNISCHEN BUNDESANSTALT (PTB)

**DKD**

Walcher  
Meßtechnik

DKD-K-22101

2060015  
DKD-K-22101  
2006-03

Kalibrierschein  
Calibration Certificate

Kalibrierzeichen  
Calibration label

**Gegenstand**  
Object: **Pressure calibration instrument**

**Hersteller**  
Manufacturer: **halstrup-walcher GmbH**

**Typ**  
Type: **KAL 84**

**Fabrikat/Serien- Nr.**  
Serial number: **9095-0009 KF10165**

**Auftraggeber**  
Customer: **Muster  
Musterweg 1  
D - 12345 Musterhausen**

**Auftragsnummer**  
Order No.: **2060015**

**Anzahl der Seiten des Kalibrierscheines**  
Number of pages of the certificate: **3**

**Datum der Kalibrierung**  
Date of calibration: **16. März 2006**

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI).  
Der DKD ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine.  
Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.  
This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI).  
The DKD is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates.  
The user is obliged to have the object recalibrated at appropriate intervals.

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverleihen werden. Auszüge oder Änderungen bedürfen der Genehmigung sowohl der Akkreditierungsstelle des DKD als auch des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine ohne Unterschrift und Stempel haben keine Gültigkeit.  
This calibration certificate may not be reproduced other than in full except with the permission of both the Accreditation Body of the DKD and the issuing laboratory. Calibration certificates without signature and seal are not valid.

Stempel Seal      Datum Date      Leiter des Kalibrierlaboratoriums Head of the calibration laboratory      Bearbeiter Person in charge

16. März 2006      R. Heizler      R. Heizler

Walcher Meßtechnik GmbH  
Postfach 1208  
D-79196 Kirchzarten

Telefon: +49(0)7661/3963-0  
Telefax: +49(0)7661/3963-99  
e-mail: info@walcher.de

**Deutscher Kalibrierdienst (DKD)**

Walcher Meßtechnik GmbH  
D - 79199 Kirchzarten

page 2 of the certificate No. 2060015  
DKD-K-22101  
2006-03

**1. Calibration object**

type: **inductive pressure measuring transducer**  
measuring range: **0...10,000 kPa**  
measuring value: **p<sub>h</sub>**  
accuracy: **±0,2%**  
calibration mark: **2060015 DKD-K-22101**  
resolution: **0,001 kPa**

**2. working standard / reference standard**

calibration mark: **0147 PTB 04**  
uncertainty of measurement: **3 • (u) \*\* p<sub>e</sub>** but not less than 9 µbar

**3. Procedure of calibration**

calibration is in accordance to:

DKD R 6 - 1, A, March 2002  
 DKD R 6 - 1, B, March 2002  
 DKD R 6 - 1, C, March 2002  
 DIN EN 837

**4. Ambient conditions**

ambient temperature (tolerance): **20,1 (± 1,0) °C**  
barometric pressure (tolerance): **973 (± 5) hPa**  
gravity: **9,80796 (± 0,0003) m/s<sup>2</sup>**

**5. Measuring conditions**

pressure medium: **air**  
position: **0°**  
temperature of primary object: **20,1 (± 1,0) °C**  
temperature of calibration object: **20,1 (± 1,0) °C**  
running time: **24h**

**Deutscher Kalibrierdienst (DKD)**

Walcher Meßtechnik GmbH  
D - 79199 Kirchzarten

page 3 of the certificate No. 2060015  
DKD-K-22101  
2006-03

**6. Results**

p <sub>e</sub> in kPa	average value of display in kPa		deviation in kPa		measurement uncertainty in kPa	
	up	down	up	down	up	down
0,000	0,000	-0,001	0,000	-0,001	0,0010	0,0010
1,000	1,005	1,006	0,005	0,006	0,0010	0,0010
2,000	2,007	2,007	0,007	0,007	0,0008	0,0008
3,000	3,009	3,010	0,009	0,010	0,0010	0,0010
4,000	4,009	4,010	0,009	0,010	0,0010	0,0010
5,000	5,008	5,009	0,008	0,009	0,0010	0,0010
6,000	6,007	6,008	0,007	0,008	0,0010	0,0010
7,000	7,005	7,004	0,005	0,004	0,0010	0,0010
8,000	8,001	8,001	0,001	0,001	0,0008	0,0008
9,000	8,995	8,996	-0,005	-0,004	0,0010	0,0010
10,000	9,989	9,990	-0,011	-0,010	0,0008	0,0008

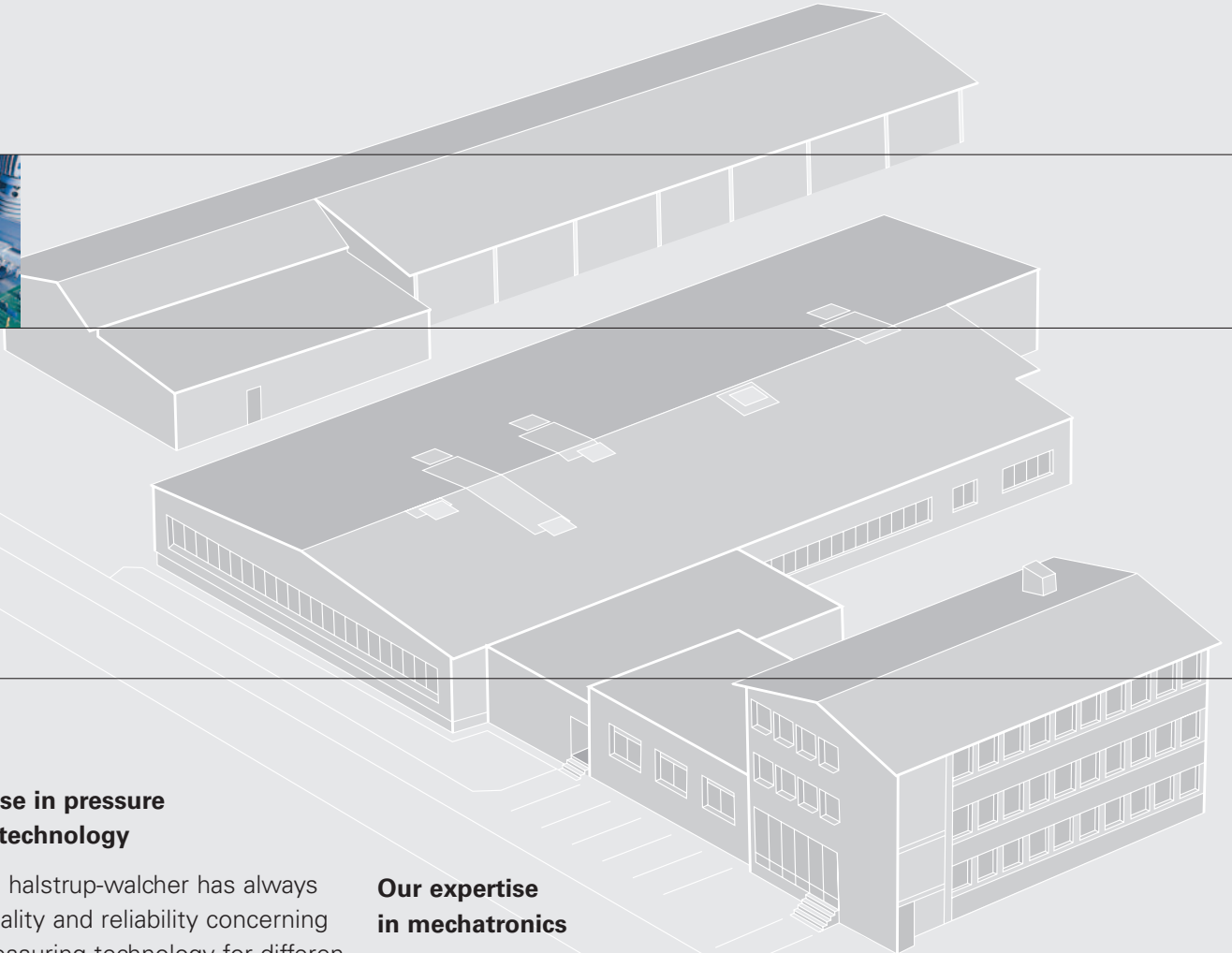
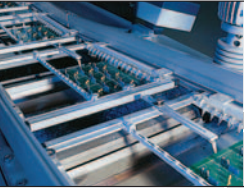
**7. Uncertainty of measurement**

The uncertainty of measurement is composed of the uncertainty of calibration method and the uncertainties of the object to be calibrated. The uncertainty does not cover a component for the long-time stability of the object to be calibrated. The uncertainty of measurement stated is the expanded uncertainty which is obtained from the standard uncertainty of measurement multiplied by the expansion factor k = 2 according DKD-3. The measuring value is with a probability of 95% within the assigned range.

The Deutscher Kalibrierdienst is signatory to the multilateral agreement of the European cooperation for Accreditation (EA) and the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates. The other signatories are presently the accreditation companies in Belgium, Denmark, Finland, France, Ireland, Italy, Netherlands, Norway, Austria, Portugal, Sweden, Switzerland, Slovakia, Spain, Czech Republic and Great Britain. Furthermore there are existing agreements with accreditation companies in Australia, Brasilia, China, India, Japan, Canada, New Zealand, Singapore, South Africa, Taiwan, the United States of America and Vietnam.

**8. Labelling**

The pressure measuring instrument is marked with a label which indicates the DKD-calibration.



### **Our expertise in pressure measuring technology**

For decades halstrup-walcher has always stood for quality and reliability concerning pressure measuring technology for differential pressures between 0-10 Pa and 0-100 kPa. Our inductive sensor element with its copper beryllium membrane guarantees a high degree of independence from varying temperature as well as long-term stability.

For measuring volume flow and mass flow, we offer models with digital displays that have been precalibrated for these parameters. All pressure transmitters are available with a display and calibration protocol, alternatively in German or English.

In addition to pressure transmitters, we also produce extremely cost-effective pressure calibration devices, e.g. to be used for medical engineering.

### **Our expertise in mechatronics**

The most remarkable feature of our mechatronic positioning systems is the integration of engine, gear, performance electronics, measuring system, controls, and interfaces on a very confined space.

### **Our expertise in drive technology**

Our focal point in manufacturing spur Gears always lies on customer specific solutions offering a maximum of cost-effectiveness for every application.

Our scope of delivery includes complete solutions including motor control gear with position feedback signal and/or adjustable limit switches. You can also have your gearbox produced according to your specific requirements.



## **halstrup-walcher GmbH – precision for your success**



halstrup-walcher GmbH was founded as Erwin Halstrup Company in 1946. It was renamed Erwin Halstrup Multur GmbH in 1981 and assumed the name halstrup-walcher GmbH in the year 2000. It became a subsidiary of the Walcher Meßtechnik GmbH in 1990. Halstrup-walcher's technical solutions stand out for their extraordinary quality, precision and innovative nature.

### **Our product range covers the following devices**

- differential pressure transmitter for low pressures
- handheld pressure gauges
- pressure calibration systems
- absolute pressure measuring systems
- barometers
- spur gearboxes
- actuators
- linear drives
- positioning systems

### **Distribution**

In-house salesmen and commercial agents take care of national sales; appointed retailers carry out international sales of our precision measuring instruments.

### **Manufacturing**

Modern machines for fitting and soldering circuit boards are used for the manufacture of the electronic modules. Climatic chambers are available for burn-ins as well as air-controlled labs for quality control and/or calibration of the end products. The mechanical manufacturing process involves punches, milling cutters (CNC), lathes (CNC) as well as electronically controlled presses to mount the gear wheels. Production cells are responsible for portions of the assembly process and perform the final inspection of mechanical parts.

**Your competent partner  
in pressure measuring technology  
between 10 Pa and 100 kPa**

**Represented worldwide  
in the following countries**

**German agencies**

**South**

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78549 Spaichingen  
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Mobile + 49 172 732 62 90  
beyerle@halstrup-walcher.de

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Thomas-Mann-Straße 54  
01219 Dresden  
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Fax + 49 35 14 70 73 72  
Mobile + 49 172 350 62 26  
schoener@halstrup-walcher.de

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breuell@halstrup-walcher.de

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schulz@halstrup-walcher.de

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Fax + 33 232 36 93 08  
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www.tei.fr

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www.krone.co.jp

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enquiry@metrologygroup.co.nz  
www.metrologygroup.co.nz

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Fax +90 322 359 36 39  
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It's the detail that counts

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