

# Hand-held multifunction calibrator

## Models Pascal 100, Pascal 100/IS

WIKA data sheet CT 18.01



### Applications

- Calibration service companies and service industry
- Measurement and control laboratories
- Quality assurance

### Special features

- Measurement and simulation of the following parameters: pressure, electrical signals (mA, mV, V,  $\Omega$ ), temperature (TC, RTD), frequency and pulse
- Large display with touchscreen
- Internal pressure/vacuum generation
- Option: intrinsically safe version II 2G Ex ib IIC T4 Gb -  $T_{amb}$ : -10 ... +50 °C
- Option: integrated HART® module for communication with HART® instruments



Hand-held multifunction calibrator, model Pascal 100

## Description

### General

Due to its versatility the hand-held multifunction calibrator Pascal series is ideally suited for on-field testing and calibration of industrial measuring instruments. The typical application is the calibration of pressure transmitters, temperature transmitters, pressure gauges, temperature probes and other measuring devices. The calibration data are stored in the instrument's memory. The communication with a PC is used to remotely control the unit and to download the calibration reports.

The Pascal 100 is the most advanced portable multifunction calibrator for the measurement and simulation of the following parameters: relative and absolute pressure, electrical signals (mA, mV, V,  $\Omega$ ), temperature (TC, RTD), frequency and pulse. In addition, there is the possibility to include an optional HART® module which allows communication with HART® instruments.

### Features

The calibrator Pascal 100 has a large touchscreen display with a user-friendly interface, that allows an easy and fast configuration of the calibrator. The availability of ATEX approval II 2G Ex ib IIC T4 Gb -  $T_{amb}$ : -10 ... +50 °C expands the possible applications of this calibrator into hazardous areas (only for Pascal 100/IS). Even in the ATEX version the DC 24 V voltage supply for external transmitters is available.

The calibrator has four measurement channels and is thus capable to carry out up to four simultaneous measures. For more flexibility on on-field calibrations, the Pascal 100 has an on-board memory for data storage that allows the evaluation of logged measuring values and calibration reports. In laboratory applications the real-time communication allows the remote control of the Pascal 100 from a PC.

The Pascal 100 can be modularly configured with up to two input and two output modules as well as one HART® module and one output module, which are galvanically isolated from each other. The measurement/simulation of the electrical signals or temperature as well as up to six pressure sensors (four internal and two external sensors) enables the operator to configure the calibrator according to his specific requirements.

The environmental parameters module (option) is another plus of Pascal 100, it allows the monitoring of the barometric pressure, the ambient temperature and the relative humidity. The values will be stored in the calibration report.

### Pressure

The Pascal 100 has an integrated pressure/vacuum generation by means of a built in hand pump from

-0.9 ... +21 bar (-13 ... +300 psi). The presence of a fine precision regulator allows the operator to adjust small pressure increments.

Many different pressure configurations are available, e.g.:

- in combination with internal pressure sensors that can be connected to the internal pump (up to 21 bar (300 psi))
- in combination with external pressure sensors that can be connected directly to the external plugs.

Low pressure internal sensors are protected against overpressure by means of protection valves. High flexibility in measurement is given by the availability of multiple pressure engineering units.

## Specifications

### Models Pascal 100 and Pascal 100/IS

Base instrument	
<b>Indication</b>	
Display	Touchscreen + 5 keys
Dimensions	320 x 240 Dots Dot size: 0.34 x 0.34 mm (0.013 x 0.013 in)
Backlight	LED
<b>Electrical input and output</b>	
Number and type	banana-plug inputs for electrical parameters, resistance thermometers and thermocouples
Resistance thermometer (RTD)	Pt100 (385, 3616, 3906, 3926, 3923), Pt200, Pt500, Pt1000 (385, 3916), Ni100, Ni120, Cu10, Cu100
Thermocouples	Types J, K, T, F, R, S, B, U, L, N, E, C
Voltage signal	input: DC $\pm 100$ mV, $\pm 2$ V, $\pm 80$ V output: DC 20 V
Current signal	input: DC $\pm 100$ mA output: DC 20 mA
Frequency signal	0 ... 50,000 Hz
Pulses signal	1 ... 999,999
Resistance	0 ... 10,000 $\Omega$
Voltage supply	DC 24 V
<b>HART® communication</b>	
HART® module	based on HART® universal and common practice commands
Resistance	HART® resistance 250 $\Omega$ (activatable)
Loop current	max. DC 24 mA
Voltage supply	DC 24 V
<b>Pressure connection</b>	1/8 BSP (female)
<b>Permissible media</b>	clean, dry, non-corrosive gases
<b>Temperature compensation</b>	-10 ... +50 °C (14 ... 122 °F)
<b>Temperature coefficient</b>	0.001 % of reading/°C, outside of 19 ... 23 °C (66 ... 73 °F)
<b>Units</b>	bar, mbar, psi, psf, Pa, hPa, kPa, MPa, torr, atm, kg/cm <sup>2</sup> , kg/m <sup>2</sup> , mmHg (0 °C), cmHg (0 °C), mHg (0 °C), inHg (0 °C), mmH <sub>2</sub> O (4 °C), cmH <sub>2</sub> O (4 °C), mH <sub>2</sub> O (4 °C), inH <sub>2</sub> O (4 °C), ftH <sub>2</sub> O (4 °C)

## Base instrument

### Voltage supply

Battery type	rechargeable battery NiMH
Battery life (fully-charged)	8 hours for typical usage
Power supply	AC 100 ... 240 V, 50/60 Hz

### Permissible ambient conditions

Operating temperature	-10 ... +50 °C (14 ... 122 °F)
Storage temperature	-30 ... +80 °C (-22 ... +176 °F)
Relative humidity	Operating humidity: 10 ... 90 % r. h. (non-condensing) Storage humidity: 0 ... 90 % r. h. (non-condensing)





## Case

Material	Front panel aluminium
Ingress protection	IP54
Dimensions	330 x 270 x 170 mm (13 x 10.6 x 7 in)
Weight	6 kg (13 lbs 2 oz)

## Ignition protection type for model Pascal 100/IS

ATEX directive	II 2G Ex ib IIC T4 Gb - T <sub>amb</sub> : -10 ... +50 °C
<b>Connection values</b>	
Max. voltage	U <sub>0</sub> = 29.7 V
Max. current	I <sub>0</sub> = 31 mA
Max. power	P <sub>0</sub> = 0.92 W
Max. effective internal capacitance	C <sub>0</sub> = 69 nF
Max. effective internal inductance	L <sub>0</sub> = 30 mH
<b>Power supply circuit</b>	
Max. voltage	U <sub>i</sub> = 30 V
Max. current	I <sub>i</sub> = 100 mA
Max. power	P <sub>i</sub> = 0.75 W
Max. effective internal capacitance	C <sub>i</sub> = negligible
Max. effective internal inductance	L <sub>i</sub> = negligible

## Approvals for Pascal 100/IS

Logo	Description	Country
 	<b>EC declaration of conformity</b> <ul style="list-style-type: none"><li>EMC directive 2004/108/EC EN 61326-1 emission (group 1, class B) and interference immunity (portable test and measuring equipment)</li><li>Low voltage directive 2006/95/EC, EN 61010-1:2010</li><li>ATEX directive 94/9/EG II 2G Ex ib IIC T4 Gb - T<sub>amb</sub>: -10 ... +50 °C</li></ul>	European Community
	<b>BelGIM</b> Metrology, measurement technology	Belarus
	<b>DNOP-MakNII</b> Hazardous areas	Ukraine

## Approvals for Pascal 100

Logo	Description	Country
	<b>EAC</b> ■ Electromagnetic compatibility ■ Low voltage directive	Eurasian Economic Community
	<b>BelGIM</b> Metrology, measurement technology	Belarus

## Certificates

Certificate	
<b>Calibration</b>	Standard: 3.1 calibration certificate per DIN EN 10204 Option: ACCREDIA calibration certificate
<b>Recommended recalibration interval</b>	1 year (dependent on conditions of use)

Approvals and certificates, see website

## Pressure module

### Internal sensors

(other pressure ranges available on request)

- One year specifications
- Temperature effect: 0.002 % of reading \*  $|t - t_c|$  for  $t : 0\text{ °C} \leq t \leq 18\text{ °C}$  and  $28\text{ °C} \leq t \leq 50\text{ °C}$  and  $t_c = 20\text{ °C}$   
 $32\text{ °F} \leq t \leq 64.4\text{ °F}$  and  $82.4\text{ °F} \leq t \leq 122\text{ °F}$  and  $t_c = 68\text{ °F}$
- Pneumatic connection: depending on the Pascal model

Measuring range	Precision (% FS)	Accuracy (% FS)	Resolution
<b>Relative pressure</b>			
-60 ... +60 mbar (-0.9 ... 0.9 psi)	0.08	0.1	0.01 mbar (0.0001 psi)
-500 ... +500 mbar (-7.3 ... 7.3 psi)	0.015	0.025	0.01 mbar (0.0001 psi)
-900 ... +1,500 mbar (-13.1 ... 21.8 psi)	0.015	0.025	0.01 mbar (0.0001 psi)
0 ... 7 bar (0 ... 100 psi)	0.015	0.025	0.1 mbar (0.001 psi)
0 ... 21 bar (0 ... 305 psi)	0.015	0.025	0.1 mbar (0.001 psi)
0 ... 50 bar (0 ... 725 psi)	0.015	0.025	1 mbar (0.015 psi)
0 ... 100 bar (0 ... 1,450 psi)	0.015	0.025	1 mbar (0.015 psi)
<b>Absolute pressure</b>			
600 ... 1,300 mbar abs. (8.7 ... 18.9 psi abs.)	0.015	0.025	0.01 mbar (0.0001 psi)
0 ... 1,500 mbar abs. (0 ... 21.8 psi abs.)	0.015	0.025	0.01 mbar (0.0001 psi)
0 ... 2,500 mbar abs. (0 ... 36.2 psi abs.)	0.015	0.025	0.01 mbar (0.0001 psi)
0 ... 2,500 mbar abs. (0 ... 36.2 psi abs.)	0.010	0.015	0.01 mbar (0.0001 psi)
0 ... 5 bar abs. (0 ... 72.5 psi abs.)	0.015	0.025	0.1 mbar (0.001 psi)
0 ... 7 bar abs. (0 ... 100 psi abs.)	0.015	0.025	0.1 mbar (0.001 psi)
0 ... 21 bar abs. (0 ... 305 psi abs.)	0.015	0.025	0.1 mbar (0.001 psi)
0 ... 81 bar abs. (0 ... 1,175 psi abs.)	0.015	0.025	1 mbar (0.015 psi)
0 ... 100 bar abs. (0 ... 1,450 psi abs.)	0.015	0.025	1 mbar (0.015 psi)

## External sensors

### (other pressure ranges available on request)

- One year specifications
- Temperature effect:  $0.002\% \text{ of reading} * |t - t_c|$  for  $t: 0\text{ °C} \leq t \leq 18\text{ °C}$  and  $28\text{ °C} \leq t \leq 50\text{ °C}$  and  $t_c = 20\text{ °C}$   
 $32\text{ °F} \leq t \leq 64.4\text{ °F}$  and  $82.4\text{ °F} \leq t \leq 122\text{ °F}$  and  $t_c = 68\text{ °F}$
- Pneumatic connection: depending on the Pascal model

Measuring range		Precision (% FS)	Accuracy (% FS)	Resolution	
<b>Relative pressure</b>					
-60 ... +60 mbar	(-0.9 ... 0.9 psi)	0.1	0.15	0.01 mbar	(0.0001 psi)
-500 ... +500 mbar	(-7.3 ... 7.3 psi)	0.015	0.025	0.01 mbar	(0.0001 psi)
-900 ... +1,500 mbar	(-13.1 ... 21.8 psi)	0.015	0.025	0.01 mbar	(0.0001 psi)
0 ... 7 bar	(0 ... 100 psi)	0.015	0.025	0.1 mbar	(0.001 psi)
0 ... 21 bar	(0 ... 305 psi)	0.015	0.025	0.1 mbar	(0.001 psi)
0 ... 50 bar	(0 ... 725 psi)	0.015	0.025	1 mbar	(0.015 psi)
0 ... 100 bar	(0 ... 1,450 psi)	0.015	0.025	1 mbar	(0.015 psi)
0 ... 200 bar	(0 ... 2,900 psi)	0.015	0.025	10 mbar	(0.145 psi)
0 ... 400 bar	(0 ... 5,800 psi)	0.015	0.025	100 mbar	(1.45 psi)
0 ... 700 bar	(0 ... 10,150 psi)	0.025	0.05	100 mbar	(1.45 psi)
0 ... 1,000 bar	(0 ... 14,500 psi)	0.025	0.05	100 mbar	(1.45 psi)
<b>Absolute pressure</b>					
0 ... 1,500 mbar abs.	(0 ... 21.8 psi abs.)	0.015	0.025	0.01 mbar	(0.0001 psi)
0 ... 2,500 mbar abs.	(0 ... 36.6 psi abs.)	0.015	0.025	0.01 mbar	(0.0001 psi)
0 ... 5 bar abs.	(0 ... 72.5 psi abs.)	0.015	0.025	0.1 mbar	(0.001 psi)
0 ... 7 bar abs.	(0 ... 100 psi abs.)	0.015	0.025	0.1 mbar	(0.001 psi)
0 ... 21 bar abs.	(0 ... 305 psi abs.)	0.015	0.025	0.1 mbar	(0.001 psi)
0 ... 81 bar abs.	(0 ... 1,175 psi abs.)	0.015	0.025	1 mbar	(0.015 psi)
0 ... 100 bar abs.	(0 ... 1,450 psi abs.)	0.015	0.025	1 mbar	(0.015 psi)

## Electrical input signal

Electrical signal	Measuring range	Full scale	Precision % of rdg $\pm\%$ FS	Accuracy % of rdg $\pm\%$ FS	Max. resolution
<b>Voltage DC 1) 2)</b>	$\pm 100\text{ mV}$ 3)	100 mV	0.008 % $\pm 0.002\%$ FS	0.01 % $\pm 0.003\%$ FS	0.0001 mV
	$\pm 2\text{ V}$ 3)	2 V	0.008 % $\pm 0.002\%$ FS	0.01 % $\pm 0.003\%$ FS	0.000001 V
	$\pm 80\text{ V}$ 4)	80 V	0.008 % $\pm 0.002\%$ FS	0.01 % $\pm 0.003\%$ FS	0.00001 V
<b>Current DC 1) 5)</b>	$\pm 100\text{ mA}$	100 mA	0.008 % $\pm 0.003\%$ FS	0.01 % $\pm 0.003\%$ FS	0.0001 mA
<b>Resistance 1) 6)</b>	0 ... 400 $\Omega$	400 $\Omega$	0.008 % $\pm 0.002\%$ FS	0.01 % $\pm 0.003\%$ FS	0.001 $\Omega$
	0 ... 10,000 $\Omega$	10,000 $\Omega$	0.008 % $\pm 0.002\%$ FS	0.01 % $\pm 0.003\%$ FS	0.01 $\Omega$
<b>Frequency 7)</b>	0.5 ... 10,000 Hz 8)	50,000 Hz	0.01 Hz	0.01 Hz	0.001 Hz
	10,000 ... 20,000 Hz 8)	50,000 Hz	0.1 Hz	0.1 Hz	0.001 Hz
	20,000 ... 30,000 Hz 9)	50,000 Hz	1 Hz	1 Hz	0.001 Hz
	30,000 ... 50,000 Hz 9)	50,000 Hz	20 Hz	20 Hz	0.001 Hz
<b>Pulses 10)</b>	1 ... 999,999	999,999	N/A	N/A	1

1) One year specifications with temperature effect:  $0.001\% \text{ of reading} * |t - t_c|$  for  $t: -10\text{ °C} \leq t \leq 19\text{ °C}$  and  $23\text{ °C} \leq t \leq 50\text{ °C}$  and  $t_c = 20\text{ °C}$   
 $14\text{ °F} \leq t \leq 66.2\text{ °F}$  and  $73.4\text{ °F} \leq t \leq 122\text{ °F}$  and  $t_c = 68\text{ °F}$

2) Maximum input voltage: DC  $\pm 100\text{ V}$

3) Input impedance:  $> 100\text{ M}\Omega$

4) Input impedance:  $0.5\text{ M}\Omega$

5) Maximum input current:  $\pm 120\text{ mA}$ ; Input impedance:  $< 20\text{ }\Omega$

6) Measure current:  $< 200\text{ }\mu\text{A}$

7) Maximum Input Voltage:  $\pm 100\text{ V}$ ; Input impedance:  $> 100\text{ M}\Omega$   
 Minimum amplitude of square wave:  $1.5\text{ V p-p @ } 50\text{ kHz}$ ,  $0.7\text{ V p-p @ } 5\text{ Hz}$   
 Configurable duty cycle from 10 % up to 90 % with minimum amplitude of  $5\text{ V p-p}$

8) For both frequency inputs simultaneously (IN A + IN B)

9) For only one frequency input (IN A or IN B) in the same time

10) Amplitude: 1 ... 80 V, frequency: 0.5 ... 20 Hz

## Electrical output signal

Electrical signal	Measuring range	Full scale	Precision % of rdg ±% FS	Accuracy % of rdg ±% FS	Max. resolution
<b>Voltage DC 1)</b>	0 ... 100 mV 2)	100 mV	0.01 % ±0.003 % FS	0.015 % ±0.003 % FS	0.0001 mV
	0 ... 2 V 3)	2 V	0.01 % ±0.003 % FS	0.015 % ±0.002 % FS	0.000001 V
	0 ... 20 V 3)	20 V	0.015 % ±0.003 % FS	0.02 % ±0.003 % FS	0.00001 V
<b>Current DC 4)</b>	0 ... 20 mA 5)	100 mA	0.02 % ±0.003 % FS	0.025 % ±0.003 % FS	0.0001 mA
<b>Resistance 4)</b>	0 ... 400 Ω	400 Ω	0.008 % ±0.003 % FS	0.01 % ±0.002 % FS	0.001 Ω
	0 ... 10,000 Ω	10,000 Ω	0.008 % ±0.002 % FS	0.01 % ±0.001 % FS	0.01 Ω
<b>Frequency</b>	0.5 ... 50,000 Hz	50,000 Hz	0.1 Hz	0.1 Hz	0.001 Hz
<b>Pulses 6)</b>	1 ... 999,999	999,999	N/A	N/A	1

1) One year specifications with temperature effect: 0.001 % output \*  $t - t_c$  for  $t$ :  $-10\text{ °C} \leq t \leq 19\text{ °C}$  and  $23\text{ °C} \leq t \leq 50\text{ °C}$  and  $t_c = 20\text{ °C}$   
 $14\text{ °F} \leq t \leq 66.2\text{ °F}$  and  $73.4\text{ °F} \leq t \leq 122\text{ °F}$  and  $t_c = 68\text{ °F}$

2) Output impedance = 10 Ω - R<sub>lmin</sub> > 1 kΩ

3) Output impedance < 30 mΩ - R<sub>lmin</sub> > 1 kΩ

4) One year specifications with temperature effect: 0.002 % output \*  $t - t_c$  for  $t$ :  $-10\text{ °C} \leq t \leq 19\text{ °C}$  and  $23\text{ °C} \leq t \leq 50\text{ °C}$  and  $t_c = 20\text{ °C}$   
 $14\text{ °F} \leq t \leq 66.2\text{ °F}$  and  $73.4\text{ °F} \leq t \leq 122\text{ °F}$  and  $t_c = 68\text{ °F}$

5) Output impedance > 100 MΩ - R<sub>lmax</sub> < 750 Ω

6) Amplitude: 0.1 ... 15 V<sub>rms</sub>, frequency: 0.5 ... 200 Hz

### HART® module:

- For communication with HART® instruments
- Supports a selected set of HART® universal and common practice commands
- Read basic device information and trim the mA output on most HART® enabled transmitters
- No necessity to use DDL specific libraries
- Integrated 250 Ω resistance
- Integrated 24 V voltage supply

### HART® communication:

The Pascal 100 offers an optional HART® module with following commands:

- Read unique identifier
- Read current and percentage of range
- Read current and four (predefined) dynamic variables
- Read tag (TAG), descriptor (DD), date
- Read PV sensor information
- Read output information
- Write tag (TAG), descriptor (DD), date
- Enable/disable fixed current mode
- Trim DAC zero
- Trim DAC gain

## Resistance thermometer measurement

- One year specifications
- Temperature effect see "Electrical input signal/Resistance"
- Measure current: < 200  $\mu$ A
- Specification for 4-wire measurements with  $I_{\text{meas.}} < 0.2$  mA

Input signals	Measuring range	Precision	Accuracy	Resolution
<b>Pt100 (385) 1)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.07 °C (0.13 °F)	0.09 °C (0.16 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.15 °C (0.27 °F)	0.17 °C (0.31 °F)	
<b>Pt100 (3916) 2)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.07 °C (0.13 °F)	0.09 °C (0.16 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.15 °C (0.27 °F)	0.17 °C (0.31 °F)	
<b>Pt100 (3902) 3)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.07 °C (0.13 °F)	0.09 °C (0.16 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.15 °C (0.27 °F)	0.17 °C (0.31 °F)	
<b>Pt100 (3926) 4)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.07 °C (0.13 °F)	0.09 °C (0.16 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.15 °C (0.27 °F)	0.17 °C (0.31 °F)	
<b>Pt100 (3923) 5)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.07 °C (0.13 °F)	0.09 °C (0.16 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.15 °C (0.27 °F)	0.17 °C (0.31 °F)	
<b>Pt200 (385) 1)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.09 °C (0.16 °F)	0.1 °C (0.18 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.18 °C (0.32 °F)	0.21 °C (0.38 °F)	
<b>Pt500 (385) 1)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.09 °C (0.16 °F)	0.1 °C (0.18 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.18 °C (0.32 °F)	0.21 °C (0.38 °F)	
<b>Pt1000 (385) 1)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.09 °C (0.16 °F)	0.1 °C (0.18 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.18 °C (0.32 °F)	0.21 °C (0.38 °F)	
<b>Pt1000 (3916) 2)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.09 °C (0.16 °F)	0.1 °C (0.18 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.18 °C (0.32 °F)	0.21 °C (0.38 °F)	
<b>Cu10 (42) 6)</b>	-70 ... 0 °C (-94 ... +32 °F)	0.23 °C (0.41 °F)	0.28 °C (0.5 °F)	0.1 °C (0.18 °F)
	0 ... 40 °C (32 ... 104 °F)	0.24 °C (0.43 °F)	0.29 °C (0.52 °F)	
	40 ... 150 °C (104 ... 302 °F)	0.27 °C (0.49 °F)	0.3 °C (0.54 °F)	
<b>Cu100 7)</b>	-180 ... 0 °C (-295 ... +32 °F)	0.06 °C (0.11 °F)	0.07 °C (0.13 °F)	0.01 °C (0.02 °F)
	0 ... 80 °C (32 ... 176 °F)	0.07 °C (0.13 °F)	0.08 °C (0.14 °F)	
	80 ... 150 °C (176 ... 302 °F)	0.08 °C (0.14 °F)	0.09 °C (0.16 °F)	
<b>Ni100 (617) 8)</b>	-60 ... 0 °C (-76 ... 32 °F)	0.04 °C (0.07 °F)	0.05 °C (0.09 °F)	0.01 °C (0.02 °F)
	0 ... 100 °C (32 ... 212 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	
	100 ... 180 °C (212 ... 356 °F)			
<b>Ni120 (672) 9)</b>	0 ... 100 °C (32 ... 212 °F)	0.04 °C (0.07 °F)	0.05 °C (0.09 °F)	0.01 °C (0.02 °F)
	100 ... 150 °C (212 ... 302 °F)	0.05 °C (0.09 °F)		

1) IEC 751 ( $\alpha = 0.00385$  °C<sup>-1</sup>)

2) JIS C1604 ( $\alpha = 0.003916$  °C<sup>-1</sup>)

3) U.S. Standard ( $\alpha = 0.003902$  °C<sup>-1</sup>)

4) Old U.S. Standard ( $\alpha = 0.003926$  °C<sup>-1</sup>)

5) SAMA ( $\alpha = 0.003923$  °C<sup>-1</sup>)

6)  $\alpha = 0.0042$  °C<sup>-1</sup>

7)  $\alpha = 0.0042$  °C<sup>-1</sup>

8) DIN 43760 ( $\alpha = 0.00617$  °C<sup>-1</sup>)

9)  $\alpha = 0.00672$  °C<sup>-1</sup>

## Resistance thermometer simulation

- One year specifications
- Temperature effect see "Electrical output signal/Resistance"

Output signals	Measuring range	Precision	Accuracy	Resolution
<b>Pt100 (385) 1)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.07 °C (0.13 °F)	0.09 °C (0.16 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.15 °C (0.27 °F)	0.17 °C (0.31 °F)	
<b>Pt100 (3916) 2)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.07 °C (0.13 °F)	0.09 °C (0.16 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.15 °C (0.27 °F)	0.17 °C (0.31 °F)	
<b>Pt100 (3902) 3)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.07 °C (0.13 °F)	0.09 °C (0.16 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.15 °C (0.27 °F)	0.17 °C (0.31 °F)	
<b>Pt100 (3926) 4)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.07 °C (0.13 °F)	0.09 °C (0.16 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.15 °C (0.27 °F)	0.17 °C (0.31 °F)	
<b>Pt100 (3923) 5)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.07 °C (0.13 °F)	0.09 °C (0.16 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.15 °C (0.27 °F)	0.17 °C (0.31 °F)	
<b>Pt200 (385) 1)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.09 °C (0.16 °F)	0.1 °C (0.18 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.18 °C (0.32 °F)	0.21 °C (0.38 °F)	
<b>Pt500 (385) 1)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.09 °C (0.16 °F)	0.1 °C (0.18 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.18 °C (0.32 °F)	0.21 °C (0.38 °F)	
<b>Pt1000 (385) 1)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.09 °C (0.16 °F)	0.1 °C (0.18 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.18 °C (0.32 °F)	0.21 °C (0.38 °F)	
<b>Pt1000 (3916) 2)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)
	0 ... 300 °C (32 ... 572 °F)	0.09 °C (0.16 °F)	0.1 °C (0.18 °F)	
	300 ... 850 °C (572 ... 1,562 °F)	0.18 °C (0.32 °F)	0.21 °C (0.38 °F)	
<b>Cu10 (42) 6)</b>	-70 ... 0 °C (-94 ... +32 °F)	0.23 °C (0.41 °F)	0.28 °C (0.5 °F)	0.1 °C (0.18 °F)
	0 ... 40 °C (32 ... 104 °F)	0.24 °C (0.43 °F)	0.29 °C (0.52 °F)	
	40 ... 150 °C (104 ... 302 °F)	0.27 °C (0.49 °F)	0.3 °C (0.54 °F)	
<b>Cu100 7)</b>	-180 ... 0 °C (-295 ... +32 °F)	0.06 °C (0.11 °F)	0.07 °C (0.13 °F)	0.01 °C (0.02 °F)
	0 ... 80 °C (32 ... 176 °F)	0.07 °C (0.13 °F)	0.08 °C (0.14 °F)	
	80 ... 150 °C (176 ... 302 °F)	0.08 °C (0.14 °F)	0.09 °C (0.16 °F)	
<b>Ni100 (617) 8)</b>	-60 ... 0 °C (-76 ... 32 °F)	0.04 °C (0.07 °F)	0.05 °C (0.09 °F)	0.01 °C (0.02 °F)
	0 ... 100 °C (32 ... 212 °F)	0.05 °C (0.09 °F)	0.06 °C (0.11 °F)	
	100 ... 180 °C (212 ... 356 °F)			
<b>Ni120 (672) 9)</b>	0 ... 100 °C (32 ... 212 °F)	0.04 °C (0.07 °F)	0.05 °C (0.09 °F)	0.01 °C (0.02 °F)
	100 ... 150 °C (212 ... 302 °F)	0.05 °C (0.09 °F)		

- 1) IEC 751 ( $\alpha = 0.00385 \text{ } ^\circ\text{C}^{-1}$ )
- 2) JIS C1604 ( $\alpha = 0.003916 \text{ } ^\circ\text{C}^{-1}$ )
- 3) U.S. Standard ( $\alpha = 0.003902 \text{ } ^\circ\text{C}^{-1}$ )
- 4) Old U.S. Standard ( $\alpha = 0.003926 \text{ } ^\circ\text{C}^{-1}$ )
- 5) SAMA ( $\alpha = 0.003923 \text{ } ^\circ\text{C}^{-1}$ )
- 6)  $\alpha = 0.0042 \text{ } ^\circ\text{C}^{-1}$
- 7)  $\alpha = 0.0042 \text{ } ^\circ\text{C}^{-1}$
- 8) DIN 43760 ( $\alpha = 0.00617 \text{ } ^\circ\text{C}^{-1}$ )
- 9)  $\alpha = 0.00672 \text{ } ^\circ\text{C}^{-1}$



## Thermocouple measurement

Input signals	Measuring range	Linear error	Resolution	Precision % of rdg ±% FS	Accuracy % of rdg ±% FS
<b>Type J 1)</b>	-190 ... 0 °C (-310 ... +32 °F)	0.05 °C (0.09 °F)	0.01 °C (0.02 °F)	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS
	0 ... 1,200 °C (32 ... 2,192 °F)	0.04 °C (0.07 °F)			
<b>Type K 1)</b>	-160 ... 0 °C (-256 ... +32 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS
	0 ... 1,260 °C (32 ... 2,300 °F)	0.04 °C (0.07 °F)			
<b>Type T 1)</b>	-130 ... 0 °C (-202 ... +32 °F)	0.05 °C (0.09 °F)	0.01 °C (0.02 °F)	0.01 % ±0.003 % FS	0.01 % ±0.003 % FS
	0 ... 400 °C (32 ... 752 °F)	0.04 °C (0.07 °F)			
<b>Type F 1)</b>	0 ... 400 °C (32 ... 752 °F)	0.05 °C (0.09 °F)	0.1 °C (0.18 °F)	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS
<b>Type R</b>	160 ... 1,760 °C (320 ... 3,200 °F)	0.04 °C (0.07 °F)	0.1 °C (0.18 °F)	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS
<b>Type S</b>	170 ... 1,760 °C (338 ... 3,200 °F)	0.04 °C (0.07 °F)	0.1 °C (0.18 °F)	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS
<b>Type B 1)</b>	920 ... 1,820 °C (1,688 ... 3,308 °F)	0.1 °C (0.18 °F)	0.1 °C (0.18 °F)	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS
<b>Type U 1)</b>	-160 ... 0 °C (-256 ... +32 °F)	0.04 °C (0.07 °F)	0.01 °C (0.02 °F)	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS
	0 ... 400 °C (32 ... 752 °F)				
<b>Type L 1)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.03 °C (0.05 °F)	0.01 °C (0.02 °F)	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS
	0 ... 760 °C (32 ... 1,400 °F)	0.04 °C (0.07 °F)			
<b>Type N</b>	0 ... 1,300 °C (32 ... 2,372 °F)	0.04 °C (0.07 °F)	0.01 °C (0.02 °F)	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS
<b>Type E</b>	-200 ... 0 °C (-328 ... +32 °F)	0.03 °C (0.05 °F)	0.01 °C (0.02 °F)	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS
	0 ... 1,000 °C (32 ... 1,832 °F)	0.04 °C (0.07 °F)			
<b>Type C 1)</b>	0 ... 2,000 °C (32 ... 3,632 °F)	0.05 °C (0.09 °F)	0.1 °C (0.18 °F)	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS

- 1) Precision and Accuracy of the e.m.f. values  
 For measurements with internal cold junction compensation: cold junction error = 0.15 °C  
 Maximum input voltage: DC ±100 V  
 Input Impedance: > 100 MΩ  
 Temperature effect: 0.001 % of reading \*  $t - t_0$  for  $t: -10 °C \leq t \leq 19 °C$  and  $23 °C \leq t \leq 50 °C$  and  $t_0 = 20 °C$   
 $14 °F \leq t \leq 66.2 °F$  and  $73.4 °F \leq t \leq 122 °F$  and  $t_0 = 68 °F$   
 One year specifications

## Thermocouple simulation

Output signals	Measuring range	Linear error	Resolution	Precision % of rdg ±% FS	Accuracy % of rdg ±% FS
<b>Type J 1)</b>	-190 ... 0 °C (-310 ... +32 °F)	0.05 °C (0.09 °F)	0.01 °C (0.02 °F)	0.01 % ±0.003 % FS	0.015 % ±0.003 % FS
	0 ... 1,200 °C (32 ... 2,192 °F)	0.04 °C (0.07 °F)			
<b>Type K 1)</b>	-160 ... 0 °C (-256 ... +32 °F)	0.06 °C (0.11 °F)	0.01 °C (0.02 °F)	0.01 % ±0.003 % FS	0.015 % ±0.003 % FS
	0 ... 1,260 °C (32 ... 2,300 °F)	0.04 °C (0.07 °F)			
<b>Type T 1)</b>	-130 ... 0 °C (-202 ... +32 °F)	0.05 °C (0.09 °F)	0.01 °C (0.02 °F)	0.01 % ±0.003 % FS	0.015 % ±0.003 % FS
	0 ... 400 °C (32 ... 752 °F)	0.04 °C (0.07 °F)			
<b>Type F 1)</b>	0 ... 400 °C (32 ... 752 °F)	0.05 °C (0.09 °F)	0.1 °C (0.18 °F)	0.01 % ±0.003 % FS	0.015 % ±0.003 % FS
<b>Type R</b>	160 ... 1,760 °C (320 ... 3,200 °F)	0.04 °C (0.07 °F)	0.1 °C (0.18 °F)	0.01 % ±0.003 % FS	0.015 % ±0.003 % FS
<b>Type S</b>	170 ... 1,760 °C (338 ... 3,200 °F)	0.04 °C (0.07 °F)	0.1 °C (0.18 °F)	0.01 % ±0.003 % FS	0.015 % ±0.003 % FS
<b>Type B 1)</b>	920 ... 1,820 °C (1,688 ... 3,308 °F)	0.1 °C (0.18 °F)	0.1 °C (0.18 °F)	0.01 % ±0.003 % FS	0.015 % ±0.003 % FS
<b>Type U 1)</b>	-160 ... 0 °C (-256 ... +32 °F)	0.04 °C (0.07 °F)	0.01 °C (0.02 °F)	0.01 % ±0.003 % FS	0.015 % ±0.003 % FS
	0 ... 400 °C (32 ... 752 °F)				
<b>Type L 1)</b>	-200 ... 0 °C (-328 ... +32 °F)	0.03 °C (0.05 °F)	0.01 °C (0.02 °F)	0.01 % ±0.003 % FS	0.015 % ±0.003 % FS
	0 ... 760 °C (32 ... 1,400 °F)	0.04 °C (0.07 °F)			
<b>Type N</b>	0 ... 1,300 °C (32 ... 2,372 °F)	0.04 °C (0.07 °F)	0.01 °C (0.02 °F)	0.01 % ±0.003 % FS	0.015 % ±0.003 % FS
<b>Type E</b>	-200 ... 0 °C (-328 ... +32 °F)	0.03 °C (0.05 °F)	0.01 °C (0.02 °F)	0.01 % ±0.003 % FS	0.015 % ±0.003 % FS
	0 ... 1,000 °C (32 ... 1,832 °F)	0.04 °C (0.07 °F)			
<b>Type C 1)</b>	0 ... 2,000 °C (32 ... 3,632 °F)	0.05 °C (0.09 °F)	0.1 °C (0.18 °F)	0.01 % ±0.003 % FS	0.015 % ±0.003 % FS

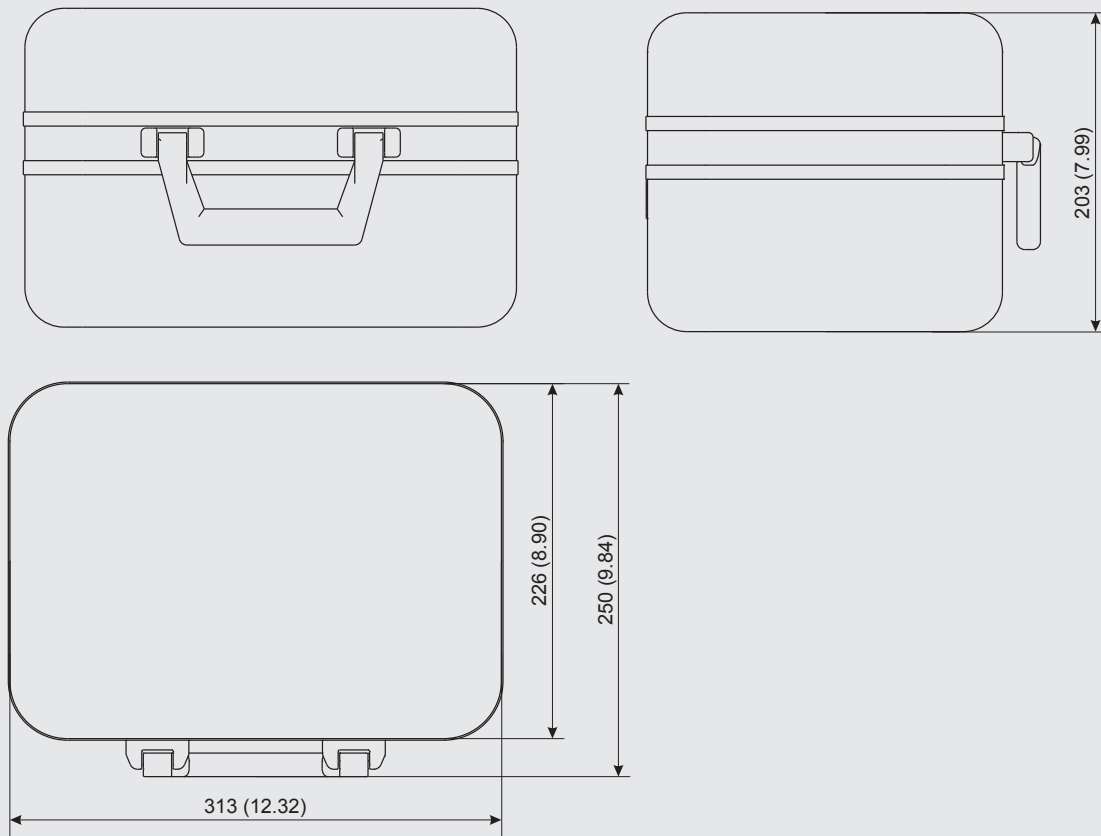
- 1) Precision and accuracy of the e.m.f. generation  
 For temperature simulation with internal cold junction compensation: cold junction error = 0.15 °C

## Environmental parameters module

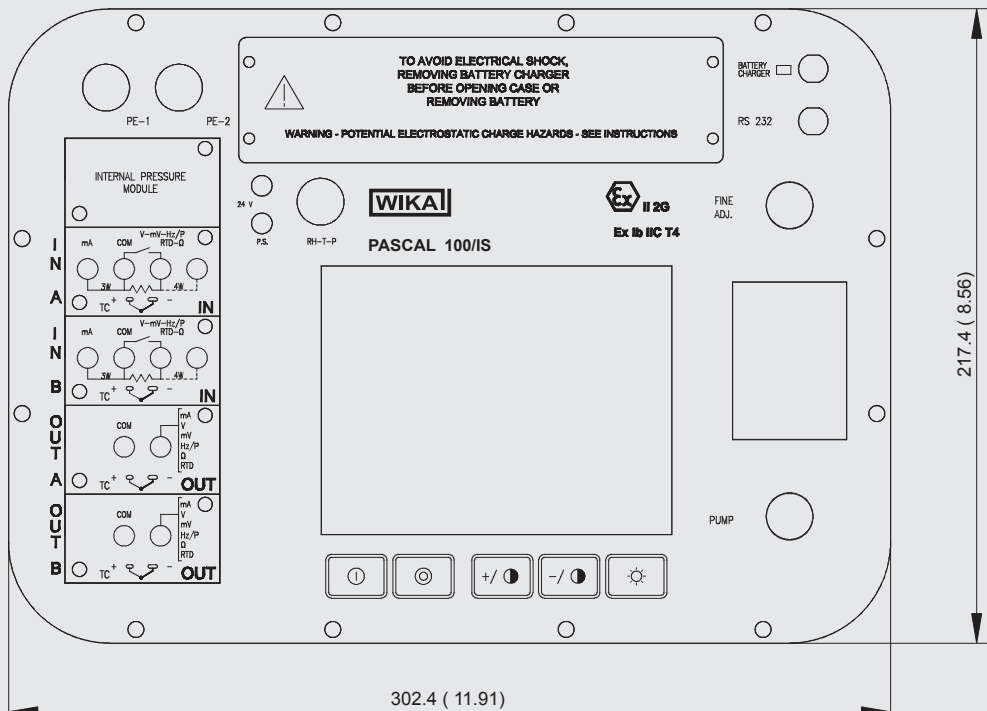
Parameter	Measuring range	Precision	Accuracy	Max. resolution
<b>Temperature</b>	-10 ... +50 °C (14 ... 122 °F)	2.7 °C (4.86 °F)	3.0 °C (5.4 °F)	0.1 °C (0.18 °F)
<b>Barometric pressure</b>	650 ... 1,150 mbar (9.43 ... 16.68 psi)	4 % FS	5 % FS	1 mbar (0.015 psi)
<b>Relative humidity</b>	10 ... 90 % r. h.	12 %	15 %	1 %

## Dimensions in mm (in)

### Case for models Pascal 100 and Pascal 100/IS



### Front panel of model Pascal 100/IS



## Software

### Pascal report software

The Pascal report software allows the configuration in A4 format of the calibration reports and/or certificates according to users standards.

Importing stored reports from the instrument by RS-232 serial interface/USB (with adapter) makes Pascal report the safer software system to support any calibration procedure according to ISO 9000 standards.

### PasLog software

The PasLog software allows the download and the management of the logging data from the instrument to the PC. Data can be displayed and print out in a tabular format as well as in a graphical one. The user interface can be customised.

## Scope of delivery

- Portable multifunction calibrator model Pascal 100 or Pascal 100/IS
- Operating instructions
- AC adapter
- Pascal report software
- RS-232 interface cable
- RS-232 to USB adapter
- Test-cable set; order no. 241076
- Pneumatic pressure set; order no. 241028 and 241029 (depending on pressure range)
- 3.1 calibration certificate per DIN EN 10204

## Option

- ATEX approval: II 2G Ex ib IIC T4 Gb - T<sub>amb</sub>: -10 ... +50 °C
- ACCREDIA calibration certificate
- Environmental parameters module
- Liquid trap
- Hydraulic test pumps
- Pneumatic test pumps
- PasLog software

## Ordering information

Model / Explosion proof / Input module electrical - temperature / Calibration electrical input module / Output module electrical - temperature / Calibration electrical output module / Pressure modules / Unit (internal sensor 1) / Measuring range (internal sensor 1) / Type of certificate (internal sensor 1) / Unit (internal sensor 2) / Measuring range (internal sensor 2) / Type of certificate (internal sensor 2) / Unit (internal sensor 3) / Measuring range (internal sensor 3) / Type of certificate (internal sensor 3) / Unit (internal sensor 4) / Measuring range (internal sensor 4) / Type of certificate (internal sensor 4) / Liquid trap / Environmental parameters module / Software / Language / Additional order information

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