

Portable multi-function calibrator Model CPH8000



for further approvals
see page 4

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, Ω), temperature (TC, RTD), frequency and pulse
- Large colour touchscreen display with new intuitive and user-friendly interface
- 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



Left: Model CPH8000-ET (Hand-held design)
Right: Model CPH8000-P1 (case design)

Description

General

Due to their versatility, the portable multi-function calibrators are ideally suited for on-field testing and calibration of industrial measuring instruments. The typical application is the calibration of pressure transmitters, pressure measuring instruments, temperature transmitters, temperature probes and other measuring instruments. 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 instruments are the most advanced portable multi-function calibrators for the measurement and simulation of the following parameters: gauge and absolute pressure, electrical signals (mA, mV, V, Ω), 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 calibrators have a large touchscreen with a new intuitive 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. Even in the ATEX version the DC 24 V voltage supply for external transmitters is available.

The calibrators have four measurement channels and are thus capable to carry out up to four simultaneous measures. For more flexibility on on-field calibrations, the instruments have an on-board memory for data storage that allows the evaluation of logged measuring values and calibration reports.

The multi-function calibrator 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 new multi-function calibrator model CPH8000 includes the new high-precision sensors manufactured by Mensor.

The internal reference sensor CPR8100 and the external reference sensor CPT8100 can be configured for gauge or absolute pressure types and is characterised over the full pressure and temperature range to achieve up to 0.02 % FS accuracy and up to 0.02 % of reading accuracy for the barometer.

The environmental parameters module (option) is another plus of CPH8000, 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 model CPH8000-P1 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

Base instrument	
Indication	
Display	Touchscreen + 5 keys
Dimensions	640 x 480 Dots Dot size: 0.06 x 0.06 mm (0.002 x 0.002 in)
Backlighting	LED
Electrical input and output	
Number and type	DIN-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 ±100 mV, ±2 V, ±80 V Output: DC 20 V
Current signal	Input: DC ±100 mA Output: DC 20 mA
Frequency signal	0 ... 50,000 Hz
Pulses signal	1 ... 999,999
Resistance	0 ... 10,000 Ω
Voltage supply	DC 24 V
HART® communication	
HART® module	Based on HART® universal and common practice commands
Resistance	HART® resistance 250 Ω (activatable)
Loop current	max. DC 24 mA
Voltage supply	DC 24 V


Base instrument	
Connections	
Pressure connection	1/8 BSP (female)
Overpressure safety	2 x pressure range; static pressure < 3.5 bar [< 50 psi]
Wetted parts	Ranges ≤ 0.350 bar [≤ 5 psi] - Silicon, 316 SS, glass-filled resins, epoxy Ranges > 0.350 ... 100 bar [> 5 ... 1,500 psi] - 316 SS Ranges > 100 bar [> 1,500 psi] - 316 SS, fluorocarbon rubber
Permissible media	Ranges ≤ 0.350 bar [≤ 5 psi] - clean, dry, non-corrosive gases Ranges > 0.350 bar [> 5 psi] - media compatible with the listed wetted parts
Compensated temperature range	-10 ... +50 °C [14 ... 122 °F]
Measuring rate	10 values/second, (not adjustable)
Units	bar, mbar, psi, psf, Pa, hPa, kPa, MPa, torr, atm, kg/cm ² , kg/m ² , mmHg (0 °C), cmHg (0 °C), mHg (0 °C), inHg (0 °C), mmH ₂ O (4 °C), cmH ₂ O (4 °C), mH ₂ O (4 °C), inH ₂ O (4 °C), ftH ₂ O (4 °C)
Voltage supply	
Operating voltage	AC 100 ... 240 V, 50/60 Hz
Battery type	Rechargeable battery NiMH
Battery life (fully charged)	6 ... 8 hours for typical usage
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	approx. 3 kg [6 lbs 6 oz] (ET version) approx. 6 kg [13 lbs 2 oz] (P1 version)






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

Approvals

Approvals included in the scope of delivery

Logo	Description	Country
	EU declaration of conformity	European Union
	EMC directive EN 61326 emission (group 1, class B) and immunity (portable test and measuring equipment)	
	RoHS directive	

Optional approvals

Logo	Description	Country
	ATEX directive Hazardous areas II 2G Ex ib IIC T4 Gb - Tamb: -10 ... +50 °C	European Union
	IECEX Hazardous areas Ex ib IIC T4 Gb - Tamb: -10 ... +50 °C	International
	EAC ■ Electromagnetic compatibility ■ Low voltage directive	Eurasian Economic Community
	DNOP-MakNII Hazardous areas	Ukraine
	BelGIM Metrology, measurement technology	Belarus
-	MTSCHS Permission for commissioning	Kazakhstan

Certificates

Certificate	
Calibration	<ul style="list-style-type: none"> ■ 3.1 calibration certificate per DIN EN 10204 ■ ACCREDIA calibration certificate
Recommended recalibration interval	1 year (dependent on conditions of use)

Approvals and certificates, see website

Pressure module

Internal sensors

(further pressure ranges available on request)

- One year specifications
- Pneumatic connection: depending on the model

Measuring range		Precision ¹⁾ (% FS)	Accuracy ^{2) 3)} (% FS)	Resolution	
Gauge pressure					
-25... +25 mbar ⁴⁾	[-10 ... +10 inH ₂ O (4 °C)]	0.015	0.025	0.001 mbar	[0.00001 psi]
-100 ... +100 mbar	[-40 ... +40 inH ₂ O (4 °C)]	0.015	0.025	0.001 mbar	[0.00001 psi]
-250 ... +250 mbar	[-100 ... +100 inH ₂ O (4 °C)]	0.015	0.025	0.001 mbar	[0.00001 psi]
-400 ... +400 mbar	[-150 ... +150 inH ₂ O (4 °C)]	0.015	0.025	0.001 mbar	[0.00001 psi]
-600 ... +600 mbar	[-8 ... +8 psi]	0.015	0.025	0.001 mbar	[0.00001 psi]
-900 ... +1,500 mbar	[-14.5 ... 20 psi]	0.015	0.025	0.01 mbar	[0.0001 psi]
-1 ... 7 bar	[-14.5 ... 100 psi]	0.015	0.025	0.01 mbar	[0.0001 psi]
-1 ... 10 bar	[-14.5 ... 150 psi]	0.015	0.025	0.1 mbar	[0.001 psi]
-1 ... 21 bar	[-14.5 ... 300 psi]	0.015	0.025	0.1 mbar	[0.001 psi]
-1 ... 40 bar ⁴⁾	[-14.5 ... 500 psi] ⁴⁾	0.015 ⁴⁾	0.025 ⁴⁾	0.1 mbar ⁴⁾	[0.001 psi] ⁴⁾
0 ... 60 bar ⁴⁾	[0 ... 900 psi] ⁴⁾	0.015 ⁴⁾	0.025 ⁴⁾	0.1 mbar ⁴⁾	[0.001 psi] ⁴⁾
0 ... 100 bar ⁴⁾	[0 ... 1,500 psi] ⁴⁾	0.015 ⁴⁾	0.025 ⁴⁾	1 mbar ⁴⁾	[0.015 psi] ⁴⁾
Absolute pressure					
552 ... 1.172 mbar abs.	[8 ... 17 psi abs.]	0.015	0.025	0.01 mbar	[0.0001 psi]
0 ... 1,500 mbar abs.	[0 ... 20 psi abs.]	0.015	0.025	0.01 mbar	[0.0001 psi]
0 ... 2,500 mbar abs.	[0 ... 30 psi abs.]	0.015	0.025	0.01 mbar	[0.0001 psi]
0 ... 7 bar abs.	[0 ... 100 psi abs.]	0.015	0.025	0.1 mbar	[0.0001 psi]
0 ... 11 bar abs.	[0 ... 165 psi abs.]	0.015	0.025	0.1 mbar	[0.001 psi]
0 ... 21 bar abs.	[0 ... 355 psi abs.]	0.015	0.025	0.1 mbar	[0.001 psi]
0 ... 81 bar abs. ⁴⁾	[0 ... 1,015 psi abs.] ⁴⁾	0.015 ⁴⁾	0.025 ⁴⁾	1 mbar ⁴⁾	[0.015 psi] ⁴⁾
0 ... 100 bar abs. ⁴⁾	[0 ... 1,515 psi abs.] ⁴⁾	0.015 ⁴⁾	0.025 ⁴⁾	1 mbar ⁴⁾	[0.015 psi] ⁴⁾

1) In general, "Precision" includes non-linearity, hysteresis and non-repeatability.

2) Premium accuracy 0.02 % FS available for some ranges on request.

3) It is defined by the total measurement uncertainty, which is expressed with the coverage factor (k = 2) and includes the following factors: the intrinsic performance of the instrument, the measurement uncertainty of the reference instrument, long-term stability, influence of ambient conditions, drift and temperature effects over the compensated range during a periodic zero point correction.

4) Only for model CPH8000-ET.

External sensors

(further pressure ranges available on request)

- One year specifications
- Pneumatic connection: 1/2" BSP male, others available on request with adapters

Measuring range		Precision 1) (% FS)	Accuracy 2) 3) (% FS)	Resolution	
Gauge pressure					
-25...+25 mbar	[-10 ... +10 inH ₂ O (4 °C)]	0.015	0.025	0.001 mbar	[0.00001 psi]
-100 ... +100 mbar	[-40 ... +40 inH ₂ O (4 °C)]	0.015	0.025	0.001 mbar	[0.00001 psi]
-250 ... +250 mbar	[-100 ... +100 inH ₂ O (4 °C)]	0.015	0.025	0.001 mbar	[0.00001 psi]
-400 ... +400 mbar	[-150 ... +150 inH ₂ O (4 °C)]	0.015	0.025	0.001 mbar	[0.00001 psi]
-600 ... +600 mbar	[-8 ... +8 psi]	0.015	0.025	0.001 mbar	[0.00001 psi]
-900 ... +1,500 mbar	[-14.5 ... 20 psi]	0.015	0.025	0.01 mbar	[0.0001 psi]
-1 ... 7 bar	[-14.5 ... 100 psi]	0.015	0.025	0.1 mbar	[0.001 psi]
-1 ... 10 bar	[-14.5 ... 150 psi]	0.015	0.025	0.1 mbar	[0.001 psi]
-1 ... 21 bar	[-14.5 ... 300 psi]	0.015	0.025	0.1 mbar	[0.001 psi]
-1 ... 40 bar	[-14.5 ... 500 psi]	0.015	0.025	1 mbar	[0.015 psi]
0 ... 60 bar	[0 ... 900 psi]	0.015	0.025	1 mbar	[0.015 psi]
0 ... 100 bar	[0 ... 1,500 psi]	0.015	0.025	1 mbar	[0.015 psi]
0 ... 250 bar	[0 ... 3,000 psi]	0.015	0.025	1 mbar	[0.015 psi]
0 ... 400 bar	[0 ... 5,000 psi]	0.015	0.025	1 mbar	[0.015 psi]
0 ... 700 bar	[0 ... 10,000 psi]	0.015	0.025	1 mbar	[0.015 psi]
Absolute pressure					
552 ... 1.172 mbar abs.	[8 ... 17 psi abs.]	0.015	0.025	0.01 mbar	[0.0001 psi]
0 ... 1,500 mbar abs.	[0 ... 20 psi abs.]	0.015	0.025	0.01 mbar	[0.0001 psi]
0 ... 2,500 mbar abs.	[0 ... 30 psi abs.]	0.015	0.025	0.01 mbar	[0.0001 psi]
0 ... 7 bar abs.	[0 ... 100 psi abs.]	0.015	0.025	0.1 mbar	[0.001 psi]
0 ... 11 bar abs.	[0 ... 165 psi abs.]	0.015	0.025	0.1 mbar	[0.001 psi]
0 ... 21 bar abs.	[0 ... 355 psi abs.]	0.015	0.025	0.1 mbar	[0.001 psi]
0 ... 81 bar abs.	[0 ... 1,015 psi abs.]	0.015	0.025	1 mbar	[0.015 psi]
0 ... 100 bar abs.	[0 ... 1,515 psi abs.]	0.015	0.025	1 mbar	[0.015 psi]

1) In general, "Precision" includes non-linearity, hysteresis and non-repeatability.

2) Premium accuracy 0.02 % FS available for some ranges on request.

3) It is defined by the total measurement uncertainty, which is expressed with the coverage factor (k = 2) and includes the following factors: the intrinsic performance of the instrument, the measurement uncertainty of the reference instrument, long-term stability, influence of ambient conditions, drift and temperature effects over the compensated range during a periodic zero point correction.

Electrical input signal

Electrical signal	Measuring range	Full scale	Precision % of rdg ±% FS	Accuracy % of rdg ±% FS	Max. resolution
DC voltage 1) 2)	±100 mV 3)	100 mV	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS	0.0001 mV
	±2 V 3)	2 V	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS	0.000001 V
	±80 V 4)	80 V	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS	0.00001 V
DC current 1) 5)	±100 mA	100 mA	0.008 % ±0.003 % FS	0.01 % ±0.003 % FS	0.0001 mA
Resistance 1) 6)	0 ... 400 Ω	400 Ω	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS	0.001 Ω
	0 ... 10,000 Ω	10,000 Ω	0.008 % ±0.002 % FS	0.01 % ±0.003 % FS	0.01 Ω

Electrical signal	Measuring range	Full scale	Precision % of rdg ±% FS	Accuracy % of rdg ±% FS	Max. resolution
Frequency 7)	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
Pulses 10)	1 ... 999,999	999,999	N/A	N/A	1

- 1) One year specifications with temperature effect:
0.001 % of reading * It - tcl for t: -10 °C ≤ t ≤ 19 °C and 23 °C ≤ t ≤ 50 °C and t_c = 20 °C
14 °F ≤ t ≤ 66.2 °F and 73.4 °F ≤ t ≤ 122 °F and t_c = 68 °F
- 2) Maximum input voltage: DC ±100 V
- 3) Input resistance: > 100 MΩ
- 4) Input resistance: 0.5 MΩ
- 5) Maximum input current: ±120 mA; Input resistance: < 20 Ω
- 6) Measuring current: < 200 μA
- 7) Maximum input voltage: ±100 V; Input resistance: > 100 MΩ
Minimum amplitude of square wave: 1.5 V p-p @ 50 kHz, 0.7 V p-p @ 5 Hz
Configurable duty cycle from 10 % up to 90 % with minimum amplitude of 5 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
DC voltage 1)	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 % ±0.003 % FS	0.000001 V
	0 ... 20 V 3)	20 V	0.015 % ±0.003 % FS	0.02 % ±0.003 % FS	0.00001 V
DC current 4)	0 ... 20 mA 5)	20 mA	0.02 % ±0.003 % FS	0.025 % ±0.003 % FS	0.0001 mA
Resistance 4)	0 ... 400 Ω	400 Ω	0.008 % ±0.003 % FS	0.01 % ±0.003 % FS	0.001 Ω
	0 ... 10,000 Ω	10,000 Ω	0.008 % ±0.002 % FS	0.01 % ±0.002 % FS	0.01 Ω
Frequency	0.5 ... 20,000 Hz	20,000 Hz	0.1 Hz	0.1 Hz	0.001 Hz
Pulses 6)	1 ... 999,999	999,999	N/A	N/A	1

- 1) One year specifications with temperature effect:
0.001 % output * It - tcl for t: -10 °C ≤ t ≤ 19 °C and 23 °C ≤ t ≤ 50 °C and t_c = 20 °C
14 °F ≤ t ≤ 66.2 °F and 73.4 °F ≤ t ≤ 122 °F and t_c = 68 °F
- 2) Output resistance = 10 Ω - Rlmin > 1 kΩ
- 3) Output resistance < 30 mΩ - Rlmin > 1 kΩ
- 4) One year specifications with temperature effect:
0.002 % output * It - tcl for t: -10 °C ≤ t ≤ 19 °C and 23 °C ≤ t ≤ 50 °C and t_c = 20 °C
14 °F ≤ t ≤ 66.2 °F and 73.4 °F ≤ t ≤ 122 °F and t_c = 68 °F
- 5) Output resistance > 100 MΩ - Rlmax < 750 Ω
- 6) Amplitude: 0.1 ... 15 Vrms, 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 calibrator 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"
- Measuring current: < 200 μ A
- Specification for 4-wire measurements with $I_{\text{meas.}} < 0.2 \text{ mA}$

Output signals	Measuring range	Precision	Accuracy	Resolution
Pt100 (385) ¹⁾	-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]	
Pt100 (3916) ²⁾	-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]	
Pt100 (3902) ³⁾	-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]	
Pt100 (3926) ⁴⁾	-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]	
Pt100 (3923) ⁵⁾	-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]	
Pt200 (385) ¹⁾	-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]	
Pt500 (385) ¹⁾	-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]	
Pt1000 (385) ¹⁾	-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]	
Pt1000 (3916) ²⁾	-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]	
Cu10 (42) ⁶⁾	-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]	
Cu100 ⁷⁾	-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]	
Ni100 (617) ⁸⁾	-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]			
Ni120 (672) ⁹⁾	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) $\alpha = 0.00672 \text{ } ^\circ\text{C}^{-1}$

Resistance thermometer simulation

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

Output signals	Measuring range	Precision	Accuracy	Resolution
Pt100 (385) ¹⁾	-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]	
Pt100 (3916) ²⁾	-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]	
Pt100 (3902) ³⁾	-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]	
Pt100 (3926) ⁴⁾	-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]	
Pt100 (3923) ⁵⁾	-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]	
Pt200 (385) ¹⁾	-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]	
Pt500 (385) ¹⁾	-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]	
Pt1000 (385) ¹⁾	-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]	
Pt1000 (3916) ²⁾	-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]	
Cu10 (42) ⁶⁾	-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]	
Cu100 ⁷⁾	-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]	
Ni100 (617) ⁸⁾	-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]			
Ni120 (672) ⁹⁾	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		Linearity error		Resolution		Precision % of rdg ±% FS	Accuracy % of rdg ±% FS
Type J 1)	-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]				
Type K 1)	-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]				
Type T 1)	-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]				
Type F 1)	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
Type R	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
Type S	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
Type B 1)	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
Type U 1)	-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]						
Type L 1)	-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]				
Type N	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
Type E	-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]				
Type C 1)	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 electromagnetic field values (emf values)
 For measurements with internal cold junction compensation: cold junction error = 0.15 °C
 Maximum input voltage: DC ±100 V
 Input resistance: > 100 MΩ
 Temperature effect:
 0.001 % of reading * |t - t_c| for t: -10 °C ≤ t ≤ 19 °C and 23 °C ≤ t ≤ 50 °C and t_c = 20 °C
 14 °F ≤ t ≤ 66.2 °F and 73.4 °F ≤ t ≤ 122 °F and t_c = 68 °F
 One year specifications

Thermocouple simulation

Output signals	Measuring range		Linearity error		Resolution		Precision % of rdg ±% FS	Accuracy % of rdg ±% FS
Type J 1)	-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]				
Type K 1)	-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]				
Type T 1)	-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]				
Type F 1)	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
Type R	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
Type S	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
Type B 1)	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
Type U 1)	-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]						
Type L 1)	-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]				
Type N	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

Output signals	Measuring range		Linearity error		Resolution		Precision % of rdg ±% FS	Accuracy % of rdg ±% FS
	Type E	-200 ... 0 °C	[-328 ... +32 °F]	0.03 °C	[0.05 °F]	0.01 °C	[0.02 °F]	0.01 % ±0.003 % FS
0 ... 1,000 °C		[32 ... 1,832 °F]	0.04 °C	[0.07 °F]				
Type C 1)	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

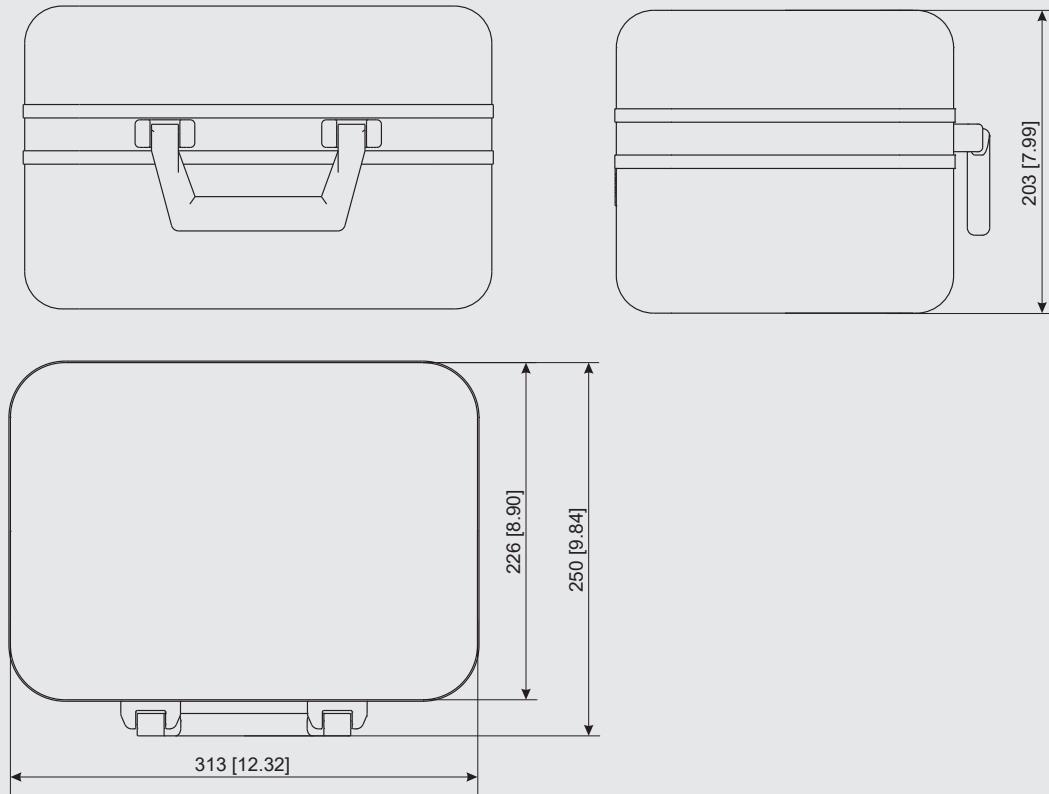
1) Precision and accuracy of the electromagnetic field generation (emf generation)
For temperature simulation with internal cold junction compensation: cold junction error = 0.15 °C

Ambient module

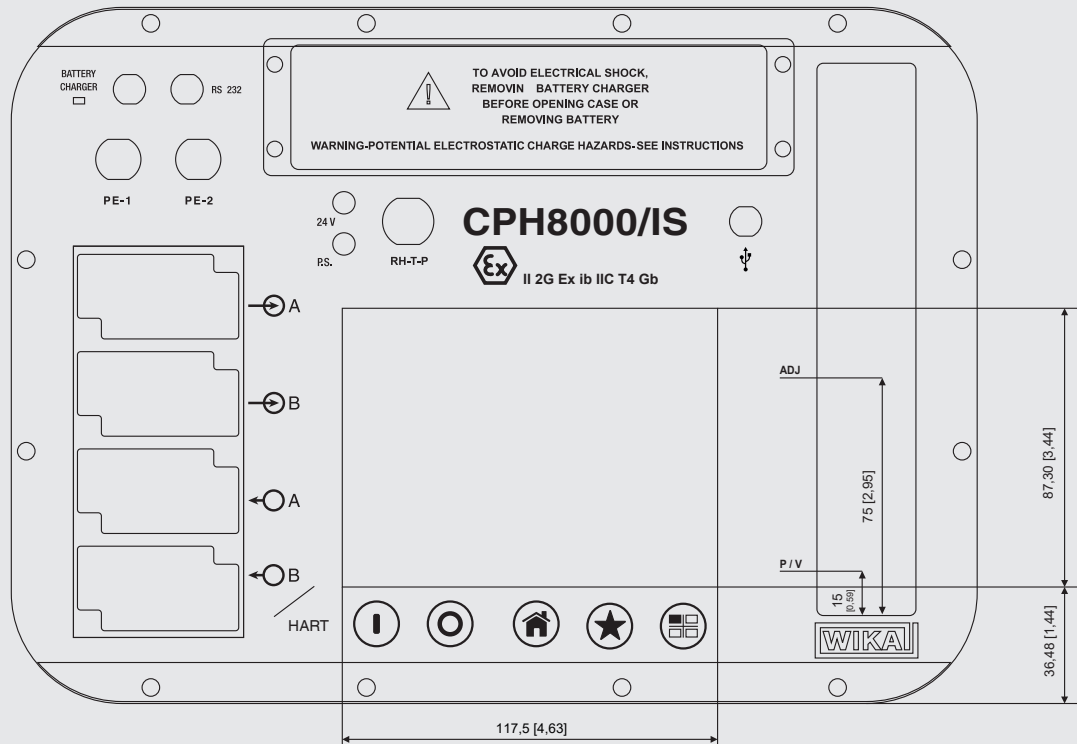
Parameter	Measuring range		Precision	Accuracy	Max. resolution
Temperature	-10 ... +50 °C	[14 ... 122 °F]	2.7 °C [4.86 °F]	3.0 °C [5.4 °F]	0.1 °C [0.18 °F]
Barometric pressure	650 ... 1,150 mbar	[9.43 ... 16.68 psi]	4 % FS	5 % FS	1 mbar [0.015 psi]
Relative humidity	10 ... 90 % r. h.		12 %	15 %	1 %

Dimensions in mm [in]

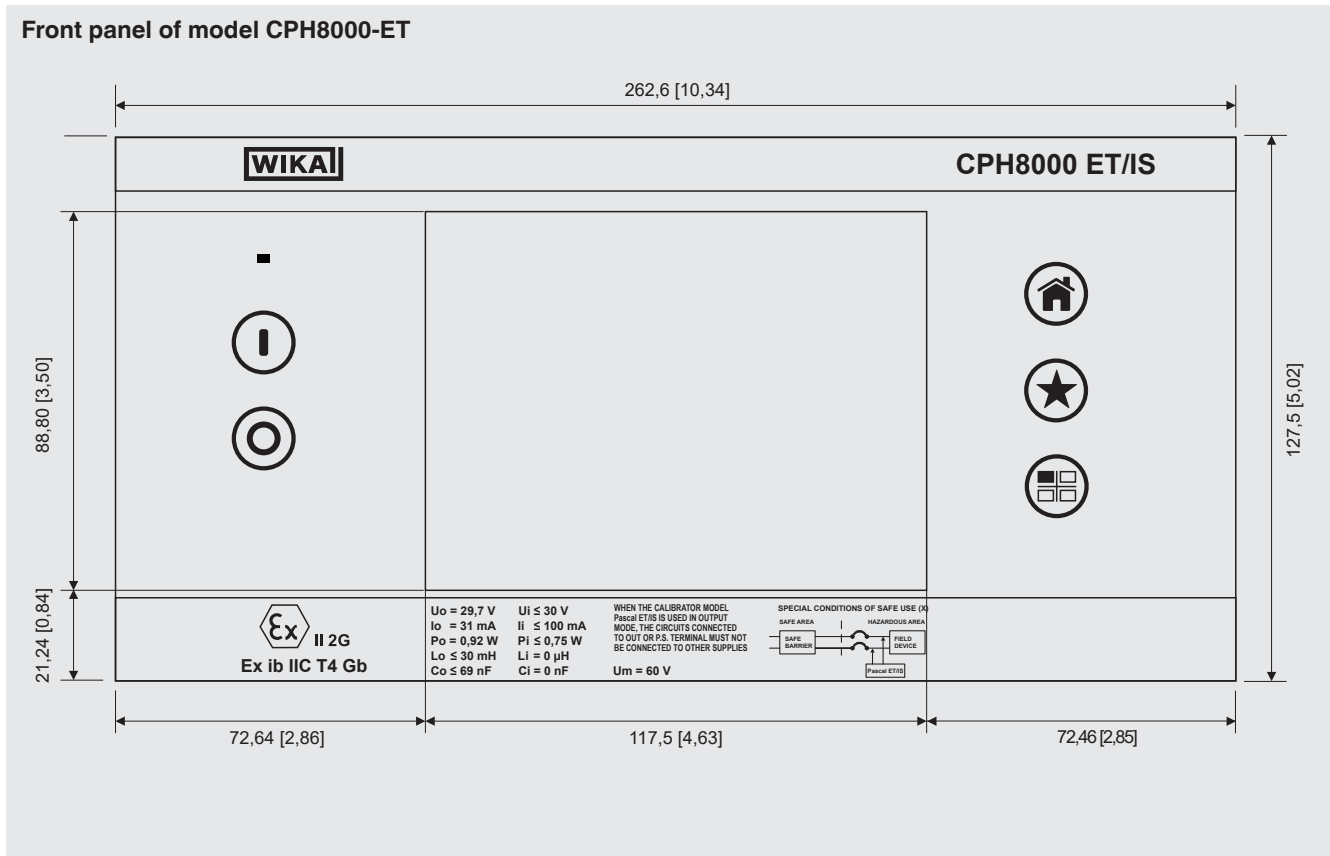
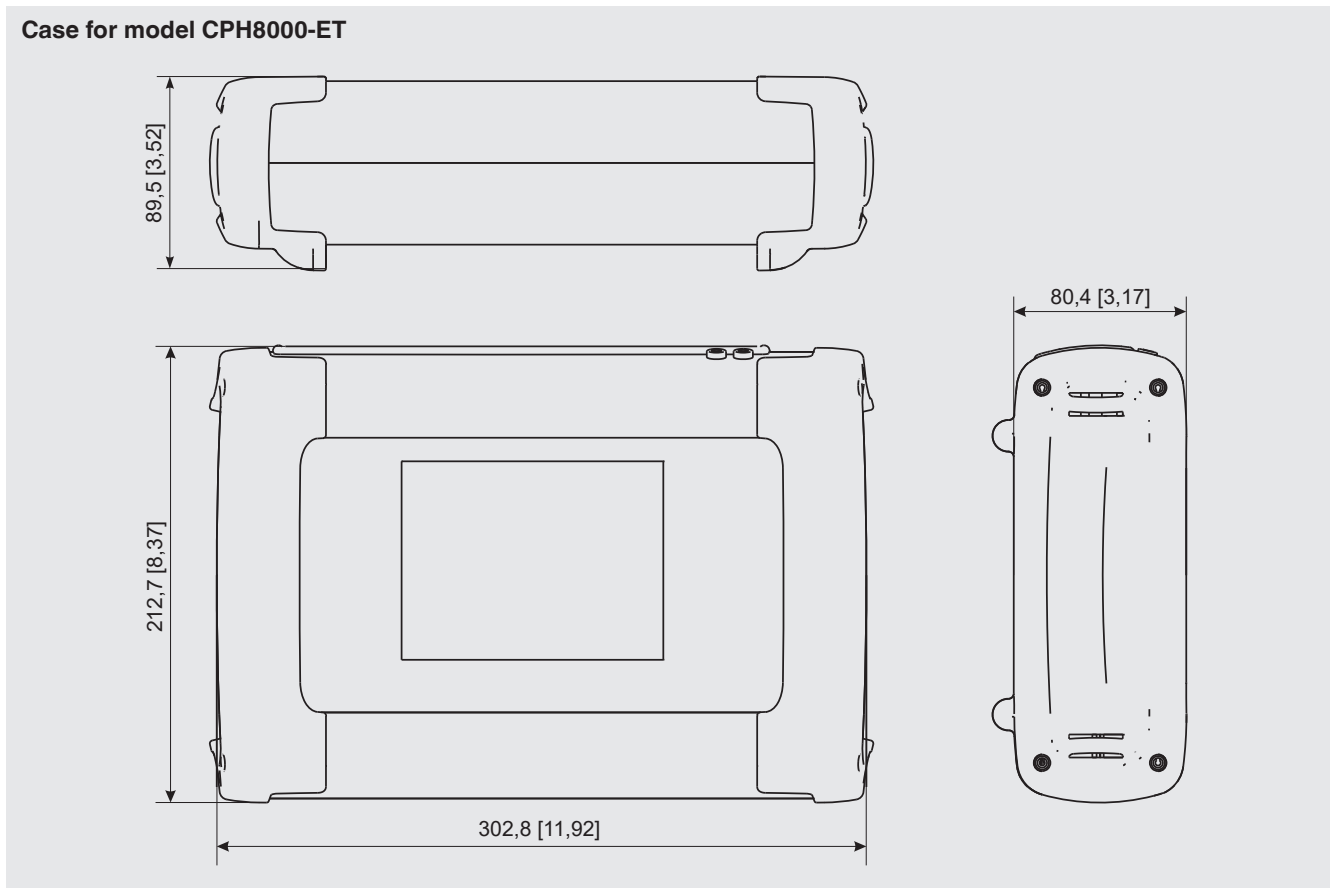
Case for model CPH8000-P1



Front panel of model CPH8000-P1



Dimensions in mm [in]



Software

CPH8000 report software

The CPH8000 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 in accordance with 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 multi-function calibrator model CPH8000
- Operating instructions
- AC adapter
- CPH8000 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
- IECEx approval
- ACCREDIA calibration certificate
- Ambient module module
- Liquid trap
- Hydraulic test pumps
- Pneumatic test pumps
- PasLog software

Ordering information

Version / Explosion protection / Electrical input module / Electrical module calibration / Electrical output module / Electrical module calibration / Ambient module / Ambient module calibration / Internal pressure sensor / Barometer / Barometer calibration / Connection for external reference sensor CPT8100 / Liquid trap / Software / USB-port / Package / Additional order information

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