High-Precision Process Calibrator
Model CED7000

Applications

- Research and development laboratories
- Calibration service companies
- Industry (laboratory, workshop and production)
- National institutes and institutions

Special Features

- Excellent calibration accuracy up to 0.0025 % of reading
- Source/Read thermocouples (13) and RTDs (9), voltage, current and pressure (read only)
- Custom RTD and SPRT profiles
- Beryllium copper binding posts reduce thermal EMFs
- Isolated measurement channel

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Description

General

The CED7000 process calibrator combines all the features of a signal, temperature and pressure calibrator in a single instrument. With the performance of a laboratory instrument, an additional isolated measurement channel and optional external pressure modules, the CED7000 is perfect for the widest range of calibration tasks. The excellent stability and accuracy of the CED7000 are verified to DKD standards.

Extensive applications

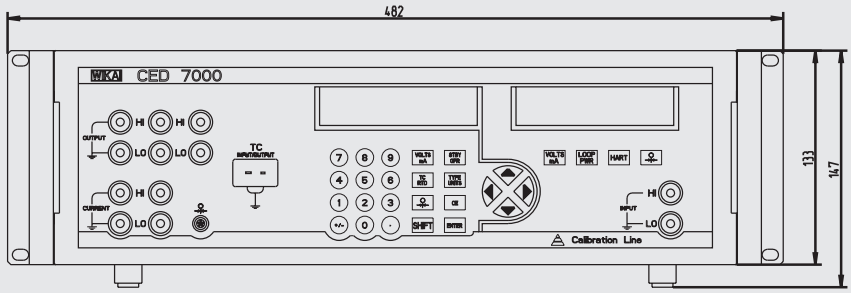
There is a wide range of application capabilities for the CED7000. It can be used for calibration in industry (laboratory, production, workshops) as well as in laboratories and institutes.

Performance

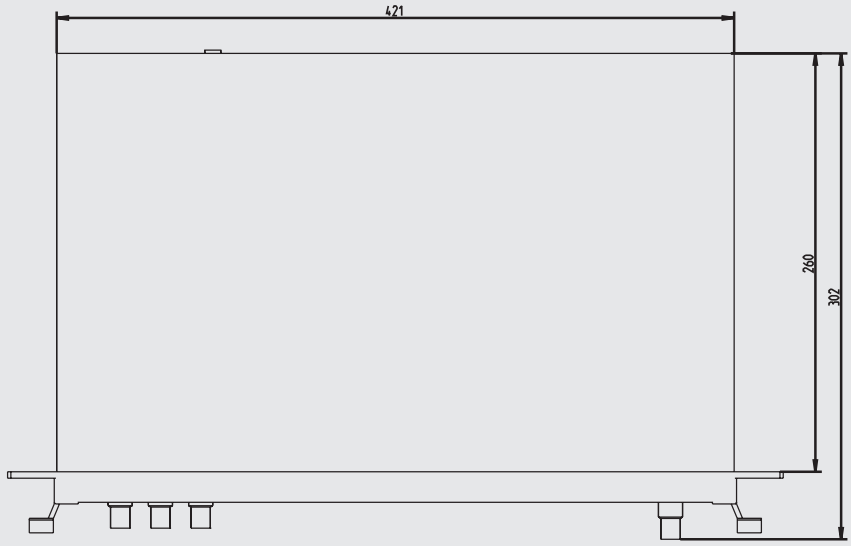
The signal calibration capability of the CED7000 includes current, voltage and resistance. In thermocouple and RTD mode the unit can read and source any of 13 different thermocouples and 9 RTD types.
For pressure measurement, an external pressure sensor is required. The best results for this are delivered by the Mensor 6100 series. The accuracy and resolution is dependent on the respective pressure sensor.
The fully isolated measurement channel enables the calibration of transmitters and signal isolators. Thus the CED7000 combines both measuring and simulation functions in just one instrument.
The CED7000 is very easy to use. It supports direct keypoard entry of mode, range and value. External PC control is possible via the RS-232, IEEE-488 or optional USB interface cable.

Dimensions in mm

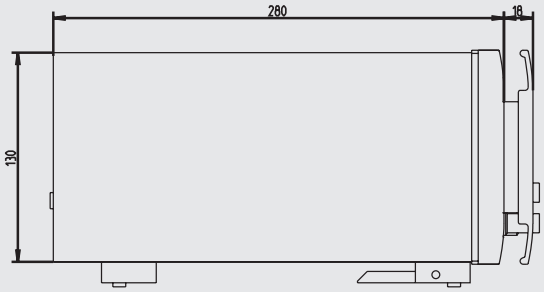
Front view



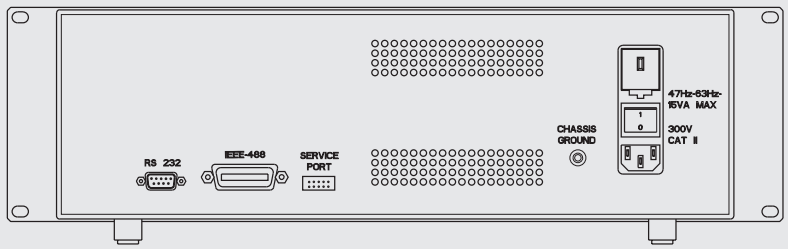
Top view



Side view



Rear view



Specifications Model CED7000

Voltage output								
Range	**Absolute uncertainty, ± (% of output +µV)**				**Stability**		**Resolution**	**Maximum load**
	90 days		**1 year**		**24 hours, ±1 °C ± (% of output +µV)**			
0 ... 100.000 mV	0.0025	3	0.003	3	0.0005	2	1 µV	10 mA
0 ... 1.00000 V	0.0025	10	0.003	10	0.0004	10	10 µV	10 mA
0 ... 10.0000 V	0.0025	100	0.003	100	0.0004	100	100 µV	10 mA
0 ... 100.000 V	0.0025	1 mV	0.003	1 mV	0.0005	1 mV	1 mV	1 mA
TC Output and input								
-10 ... 75.000 mV	0.0025	3 µV	0.003	3 µV	0.0005	2	1 µV	10 Ω
Isolated voltage input								
Range	**Absolute uncertainty, ± (% of reading +mV)**				**Resolution**			
0 ... 10.0000 V	0.005		0.2		100 µV			
0 ... 100.000 V	0.005		2.0		1 mV			
Current output								
Range	**Absolute uncertainty, ± (% of output +µA)**				**Resolution**		**Maximum output voltage**	**Maximum inductive load**
	90 days		**1 year**					
0 ... 100.000 mA	0.004	1	0.005	1	1 µA		12 V	100 mH
Isolated current input								
Range	**Absolute uncertainty, ± (% of reading +µA)**				**Resolution**			
0 ... 50.0000 mA	0.01		1		0.1 µA			
Resistance output								
Range	**Absolute uncertainty, ± Ω**				**Resolution**		**Nominal current**	
	90 days		**1 years**					
5 ... 400.000 Ω	0.012		0.015		0.001 Ω		1 ... 3 mA	
5 ... 4.00000 kΩ	0.25		0.3		0.01 Ω		100 µA ... 1 mA	
Resistance input								
Range	**Absolute uncertainty, ± (% of reading +Ω)**				**Resolution**		**Stimulus current**	
	90 Tage		**1 Jahr**					
5 ... 400.000 Ω	0.002 + 0.0035		0.002 + 0.004		0.001 Ω		1 mA	
5 ... 4.00000 kΩ	0.002 + 0.035		0.002 + 0.04		0.01 Ω		0.1 mA	

Pressure measurement	
■ Range	Dependent on pressure module
■ Accuracy and Resolution	Dependent on pressure module
■ Units	PSI, in H_2O (4 °C, 20 °C, 60 °F); cm H_2O (4 °C, 20 °C); mm H_2O (4 °C, 20 °C); bar, mbar, kPa, Mpa, in HG 0 °C: mm HG 0 °C; Kg/cm²
General data	
Settling time	Less than 5 seconds
Warm-up time	30 minutes
Temperature	
■ Operating temperature	0 °C ... 50 °C
■ Calibration temperature	18 °C ... 28 °C
■ Storage temperature	-20 ... +70 °C
■ Temperature coefficient	10 % of the measuring uncertainty specification per °C outside of the calibration temperature
Relative humidity	
■ Usage	< 80 % to 30 °C < 70 % to 40 °C < 40 % to 50 °C
■ Storage	< 95 % non-condensing
Voltage	100 V ... 240 V (< 15 VA)
Interface	RS-232, IEEE-488
Dimensions	48.3 x 17.7 x 27.9 cm
Weight	4 kg

Thermocouples output and input

	Range (°C)		Absolute uncertainty ± (°C)	
TC type	**Minimum**	**Maximum**	**MIN**	**MAX**
B	600	1820	0.39	0.46
C	0	2316	0.21	0.84
E	-250	+1000	0.14	0.50
J	-210	+1200	0.14	0.27
K	-200	+1372	0.14	0.40
L	-200	+900	0.17	0.37
N	-200	+1300	0.14	0.40
R	0	1750	0.30	0.58
S	0	1750	0.30	0.56
T	-250	+400	0.12	0.63
U	-200	+600	0.27	0.56
XK	-200	+800	0.12	0.22
BP	0 °C	2500	0.32	0.80

RTD output

	Range (°C)		Absolute uncertainty ± (°C)	
RTD Type	**Minimum**	**Maximum**	**MIN**	**MAX**
Pt 385, 100 Ω	-200	+800	0.03	0.05
Pt 3926, 100 Ω	-200	+630	0.03	0.05
Pt 3916, 100 Ω	-200	+630	0.03	0.05
Pt 385, 200 Ω	-200	+630	0.31	0.50
Pt 385, 500 Ω	-200	+630	0.13	0.19
Pt 385, 1000 Ω	-200	+630	0.06	0.09
Ni 120, 120 Ω	-80	+260	0.01	0.02
Cu 427, 10 Ω	-100	+260	0.30	0.38
YSI 400	15	50	0.005	0.007

RTD input

	Range (°C)		Absolute uncertainty ± (°C)	
RTD Type	**Minimum**	**Maximum**	**MIN**	**MAX**
Pt 385, 100 Ω	-200	+800	0.011	0.057
Pt 3926, 100 Ω	-200	+630	0.011	0.046
Pt 3916, 100 Ω	-200	+630	0.006	0.047
Pt 385, 200 Ω	-200	+630	0.008	0.076
Pt 385, 500 Ω	-200	+630	0.007	0.053
Pt 385, 1000 Ω	-200	+630	0.011	0.047
Ni 120, 120 Ω	-80	+260	0.009	0.012
Cu 427, 10 Ω	-100	+260	0.067	0.069
YSI 400	15	50	0.005	0.007
SPRT	-200	+660	0.05	0.06

Operation

The CED7000 process calibrator is very simple and user-friendly in its operation.
The input can be entered directly, where the actual value is entered via the numerical keys, or through the cursor keys, which are used to change individual digits.
In Voltage mode, in order to always achieve the highest accuracy, the CED7000 adjusts itself automatically to the appropriate range for the value entered.

Voltage mode

The CED7000 process calibrator offers four precision voltage simulation modes (100 mV, 1 V, 10 V, 100 V) with a measurement uncertainty of only 0.003 % (30 ppm). These ranges are ideal for the calibration of a wide range of DC-voltage instruments.
All voltage simulations comply with their full specification in less than 20 milliseconds, making the CED7000 ideal for automatic calibration systems.
An automatic Standby mode guarantees that a voltage of more than 30 V DC must be acknowledged by the operator before the voltage is made available at the terminals. This provides the optimal protection for the calibration instrument against voltage overload.

Current mode

The CED7000 has a very precise current simulation range (100 mA) with a measurement uncertainty of 0.005 % (50 ppm). This offers the ideal characteristics for the calibration of process instruments, particularly 4 ... 20 mA instruments.
With a full 12 V of compliance at 100 mA, virtually any precision DC current instrument can be calibrated. As with voltage mode, this mode features a fast reaction time and an Operate/Stand-by mode.

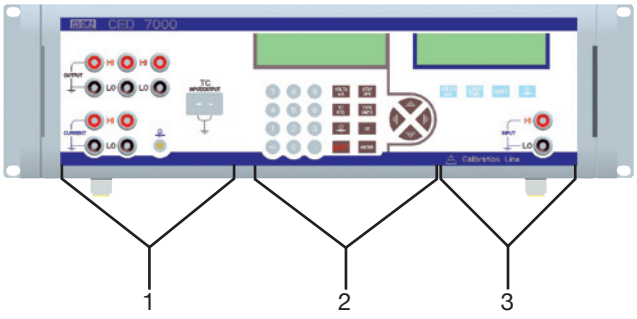
Thermocouple mode

The CED7000 process calibrator can both read and simulate 13 different thermocouple types. The thermocouple inputs and outputs are cold-junction compensated via an extremely stable Pt 1000 sensor.

RTD mode

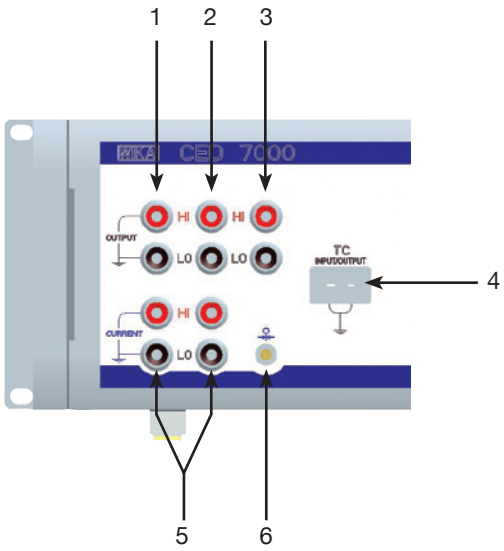
9 different RTD thermocouple types as well as YSI 400 and resistances for non-standard curves can be read and simulated. The coefficients A, B, C and R0 can be input directly. It is also possible for the instrument to memorise up to 5 industrial curves and one SPRT curve. The performance of the CED7000 can compare with other RTD measuring instruments, while the display is always enabled with a resolution of 0.001. The CED7000 is very fast and, through the use of averaging in the calculation of values, a high-precision result is achieved.

Front panel view



(1) Primary input / output terminals
(2) Primary input / output display and operator controls
(3) Isolated measurement channel

Primary input and output terminals



(1) Voltage output
(2) Current output
(3) RTD and resistance output
(4) Thermocouple input / output
(5) RTD and resistance input
(6) Connection for external pressure sensor

Pressure mode
With the CED7000 pressure can be displayed in many units with a measuring uncertainty of 0.025 % of the full scale. Through the isolated measurement channel it is possible to display pressure simultaneously in different pressure units. All BetaPort-P pressure modules, Fluke 700 series and Mensor 6100 precision pressure modules can be connected.

Remote Control
All operating functions can be accessed and read over the RS-232, IEEE-488 or USB interfaces. As a result, standard PC-Fluke Met/Cal® Software, Windows® HyperTerminal or other ASCII code-based software can be used. The use of customer-specific programmes is also possible, if they are written with programming software such as C++.

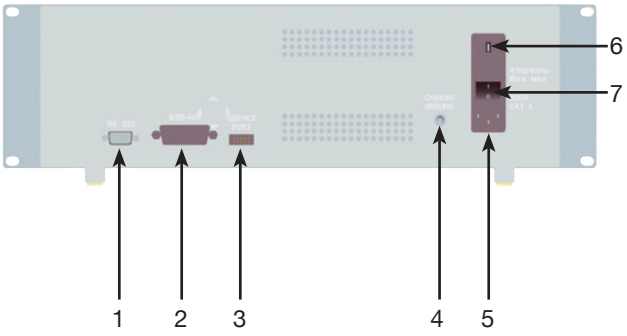
Total setpoint control
Up to 9 setpoints can be defined for each output mode. Setpoints can be very easily recalled using just 3 keys. Any selection of stored setpoints can be automatically retrieved with complete control over the dwell time. Using this function enables the fast set-up and re-running of tests.

Perfect stability
The stability and accuracy of the CED7000 is fully traceable to DKD standards. The accuracy can be specified for 90 days, as well as for a full year. Manual “Zero calibration” can be carried out for all thermocouples and pressure functions, in order to eliminate offsets.

Flexible output
Five-way copper alloy binding posts provide a wide range of possible connections. A Multi-LEMO connector for the connection of external pressure sensors is provided, as is a mini-jack input for thermocouples.

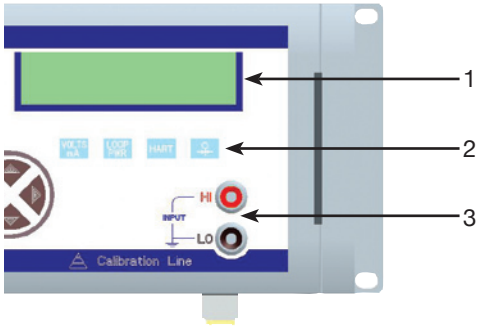
Isolated measurement channel
The CED7000 features a fully isolated measurement channel, which allows the user to calibrate process transmitters and signal isolators. This channel incorporates a 24 V voltage supply for powering 2-wire transmitters and a HART™ resistor, which enables a direct connection to HART™ communicators.

Serial connections at the back



(1) RS-232 (USB with adapter)
(2) IEEE-488
(3) Service Port
(4) Chassis ground
(5) Standard IEC AC power inlet
(6) Safety fuse
(7) Mains switch

Isolated measurement channel



(1) Display
(2) Function keys
(3) Input for voltage and current

Keys

Primary control keys

OUPUT	SHIFT 7	Change between INPUT and OUTPUT Modes
INPUT	SHIFT 8	
ZERO	SHIFT 9	Zeroing the INPUT for pressure, TCs and RTDs

SETUP	SHIFT 4	Settings
CJC	SHIFT 5	Selection of either internal or external CJC
°C / °F	SHIFT 6	Selection of Celsius and Fahrenhei

SET	SHIFT 1	Setpoint input
RECALL	SHIFT 2	Recall of setpoints
AUTOSET	SHIFT 3	Automatic stepping of preset output setpoints

RNG LOCK	SHIFT +/-	Selection of Auto-Range or Range-Lock
LOCAL	SHIFT 0	Deselection of Remote Control
EXP	SHIFT .	Entering the exponent during the entry of customer-specific RTD curves.

VOLTS mA	Change between voltage and current
TC RTD	Change between TC and RTD
	Selection of the input mode for pressure
TYPE UNITS	Cycle through TC types or RTD types
STBY OPR	Change from Standby to Operate-Modus
ENTER	Enter key
CE	Clears the input in the display
SHIFT	Selection of secondary functions over the numeric keys

Control keys for the isolated measurement channel

VOLTS mA	Change between voltage and current
LOOP PWR	Activating a 24 V supply voltage
HART	Connection of a 250 Ω HART™ resistor
	Selection of the input mode for pressure

Accessories

- Thermocouple wire kit J, K, T, E with mini plugs
- Thermocouple wire kit R/S, N, B with mini plugs
- Low EMF beryllium copper test leads (red)
- Low EMF beryllium copper test leads (black)
- Null modem cable
- USB serial adapter

Scope of supply

- High-Precision Process Calibrator CED7000
- Operation instructions
- Calibration Certificate 3.1 per DIN EN 10 204
- Mains lead for US (120 V AC)
- Mains lead for EU (240 V AC)

Products and Services within our Testing and Calibration Technology Program

- DKD calibration services for pressure
- Repair of calibration units of all makes
- Portable pressure measuring devices for testing and calibration tasks
- Precision pressure measuring units and pressure controllers
- Primary standards for pressure
- Testing technology system solutions
- DKD calibration services for temperature
- Temperature dry well calibrators
- Calibration baths and furnaces
- Temperature measuring instruments for testing and calibrating tasks
- Precision thermometers
- Primary standards for temperature
- Consulting and seminars

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