Universal Calibrator DIGISTANT®

Built to use in the field

Model 4420

Code:	4420 EN
Delivery:	ex stock
Warranty:	24 months

For quality control, set-up and service technicians.

4420 EN

- **Calibration and measurement unit for voltages, currents, temperatures and resistances**
- **All functions can be fully controlled and configured via RS232 interface**
- **Simultaneous transmission and measurement**
- **Automatic ramp function**
- **Simple menu assistance via display**
- **Voltage range ± 1 µV to ± 11.000 V**
- **Current range ± 200 nA to ± 22.000 mA**

Application

The DIGISTANT® model 4420 universal calibrator, built to use in the field, is ideal for checking and calibrating temperature measurement and control devices. The versatile functions of this portable unit allow to be used on-site or at a fixed location, on the test floor or in the laboratory.
The unit allows the simulation and measurement of voltages, currents, temperatures and resistances.
Simultaneous transmission and measurement allow, for example, controllers to be checked precisely.
The automatic ramp function is used for controlling processes.
The universal calibrator measures and simulates 14 models of thermocouples and Pt100. In addition, resistances can be measured from 10 mΩ to 2 kΩ and simulated from 10 Ω to 4 kΩ.
The reference junction temperature can be entered manually via keypad; if required, however, an automatic reference to an internal or external point is also possible.
Basic values and the corresponding Δ-values can be stored with 10 freely programmable memories each for voltage, current, temperature and resistance. Relevant values can be added and subtracted by operating the Δ+ and Δ-keys respectively.

Description

The microprocessor controlled universal calibration source is operated via a clearly arranged membrane keyboard. The value entry keys have a different color to the function and memory keys, thus allowing clear differentiation between measurement and transmission variables.
Measurement and transmission values are indicated on a high-contrast, alphanumeric, supertwist LCD in two lines of 20 characters each. Transmission values are shown with the appropriate units. For the "simulate thermocouple" function, the thermocouple is displayed together with its standard symbol and the type of reference junction. When the unit is turned off, the values entered last are retained in memory.
In the "measure thermocouple" mode, the selected thermocouple, type of reference junction compensation, and measurement value are displayed. An internal reference junction was included especially for measuring and simulating thermocouples, to allow compensation of even large fluctuations in the ambient temperature.
The integrated NiMH accumulator is protected against overload and total discharge. The accompanying plug-in power supply allows the unit to be charged in the buffer mode as well.

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Technical Data

Voltage Measurement Instruments

Range	Resolution	R_E	I_E	Zero Drift	TC	Zero Error	Tolerance
± 9.999 mV	1 µV	> 1 GΩ	< 20 nA	< 0.8 µV/K	30 ppm/K	≤ 7 µV	0.035 % of range
± 99.99 mV	10 µV	> 1 GΩ	< 20 nA	< 1.5 µV/K	30 ppm/K	≤ 15 µV	0.035 % of range
± 999.9 mV	100 µV	> 1 GΩ	< 20 nA	< 7 µV/K	30 ppm/K	≤ 100 µV	0.035 % of range
± 12.000 V	1 mV	> 1 GΩ	< 20 nA	< 7 µV/K	30 ppm/K	≤ 1 mV	0.035 % of range

Voltage Source

Range	Resolution	R_i	Zero Drift	TC	Zero Error	Tolerance
± 0.000 mV to ± 9.999 mV	1 µV	< 5 mΩ	0.5 µV/K	30 ppm/K	< 5 µV	0.02 % of range
± 10.00 mV to ± 99.99 mV	10 µV	< 5 mΩ	0.8 µV/K	30 ppm/K	< 8 µV	0.015 % of range
±100.0 mV to ±999.9 mV	100 µV	< 5 mΩ	1 µV/K	30 ppm/K	< 80 µV	0.015 % of range
± 1.000 V to ± 11.000 V	1 mV	< 5 mΩ	3 µV/K	30 ppm/K	< 0.8 mV	0.015 % of range

Current Measuring Instruments

Range	Resolution	R_E	Zero Drift	TC	Zero Error	Tolerance
± 30.000 mA	1 µV	< 10 Ω	0.5 µA/K	40 ppm/K	≤ 3 µA	0.025 % of range

Current Source

Range	Resolution	R_i	Zero Drift	TC	Zero Error	Tolerance
0.0000 mA to ± 1.9999 mA	100 nA	< 100 MΩ	40 nA/K	40 ppm/K	< 500 nA	0.02 % of range
± 2.000 mA to ± 22.000 mA	1 µA	< 100 MΩ	80 nA/K	40 ppm/K	< 1.6 µA	0.015 % of range

Resistance Measuring Range

Range	Resolution	Source	Accuracy	TC
0.00 Ω to ± 200.00 Ω	0.01 Ω	0.6 mA	0.04 Ω	50 ppm/K
200.0 Ω to ± 2000.0 Ω	0.1 Ω	0.6 mA	0.4 Ω	50 ppm/K

Resistance Simulator

Range	Resolution	Source	Zero Drift	TC	Zero Error	Tolerance
10.00 Ω to 399.99 Ω	0.02 Ω	150 µA - 2.5 mA	3 µV/K/Imess	60 ppm/K	< 40 mΩ	0.025 % of range
400.0 Ω to 4000.0 Ω	0.2 Ω	50 µA - 2.5 mA	5 µV/K/Imess	60 ppm/K	< 400 mΩ	0.025 % of range

Temperature Measuring / Thermocouples / Thermocouples Simulator

Model	Thermocouples	Standard Specification	Range	Accuracy Simulating	Accuracy Measuring
R	PtRh 13 - Pt	EN 60584-1 / ITS 90	- 50.0 °C ... + 1767.9 °C	1.0 K	1.4 K (+150 ... 953 °C
S	PtRh 10 - Pt	EN 60584-1 / ITS 90	- 49.8 °C ... + 1767.8 °C	0.9 K	1.4 K (+200 ... 1027 °C
B	PtRh 30 - PtRh 6	EN 60584-1 / ITS 90	+ 99.2 °C ... + 1820.0 °C	1.0 K	1.4 K (+850 ... 1482 °C
J	Fe - CuNi	EN 60584-1 / ITS 90	- 210.0 °C ... + 1200.0 °C	0.4 K	0.7 K (-210 ... 1200 °C
T	Cu - CuNi	EN 60584-1 / ITS 90	- 269.4 °C ... + 400.0 °C	0.5 K	0.7 K (-200 ... 400 °C
E	NiCr - CuNi	EN 60584-1 / ITS 90	- 269.5 °C ... + 1000.0 °C	0.4 K	0.6 K (-220 ... 1000 °C
K	NiCr - NiAl	EN 60584-1 / ITS 90	- 269.1 °C ... + 1372.0 °C	0.5 K	0.7 K (-200 ... + 243 °C
U	Cu - CuNi	DIN 43710 / IPTS 68	- 199.9 °C ... + 599.9 °C	0.6 K	0.7 K (-150 ... + 213 °C
L	Fe - CuNi	DIN 43710 / IPTS 68	- 199.9 °C ... + 899.9 °C	0.3 K	0.4 K (-100 ... + 181 °C
N	NiCrSi - NiSi	EN 60584-1 / ITS 90	- 270.0 °C ... + 1299.9 °C	0.5 K	0.7 K (-150 ... 315 °C
M	NiMo 18 - Ni	General Electric IPTS 68	0.0 °C ... + 1400.0 °C	0.5 K	0.9 K (0 ... 1400 °C
C	W5Re - W26Re	Hoskins ITS 90	0.0 °C ... + 2314.9 °C	0.6 K	0.8 K (0 ... 563 °C
D	W3Re - W25Re	Hoskins ITS 90	0.0 °C ... + 2315.0 °C	0.5 K	0.7 K (+200 ... 590 °C
G2	W - W26Re	Hoskins ITS 90	0.0 °C ... + 2315.0 °C	0.9 K	1.3 K (+200 ... 780 °C

The EN 60584-1 / ITS 90 standard is equivalent to NIST 175 and IEC 584-1: 1995
Accuracy without deviation. Accuracy is referred to definition of characteristic curve. (Valid for Junction RJ-Man 0 °C)
*Error of reference junction: internal 0.4 K external with 4485-V001 0.3 K additional

Temperature Measuring / RTD Simulator [Pt-DIN EN 60751 // Ni-DIN 43760; IPTS 68]

Pt100			Pt200			Pt500			Pt1000		
Range	Tolerance Simulating	Tolerance Measuring	Range	Tolerance Simulating	Tolerance Measuring	Range	Tolerance Simulating	Tolerance Measuring	Range	Tolerance Simulating	Tolerance Measuring
- 200 ... 266.3°C	0.3 K	0.08 K	- 200 ... - 0.1°C	0.15 K	0.06 K	- 200 ...-149.4 °C	0.05 K	0.03 K	- 200 ... + 260 °C	0.3 K	0.15 K
267 ... +849 °C	0.3 K	0.8 K	0 ... 266.3°C	0.15 K	-	- 149.5... 50.8 °C	0.05 K	-	+ 260 ... + 849 °C	0.3 K	-
			0 ... +849 °C	-	0.7 K	- 51 ...+849 °C	0.7 K	-			
			267 ... +849 °C	1.8 K	-	- 149.5...+849 °C	-	0.3 K			

Ni100		
Range	Tolerance Simulating	Tolerance Measuring
- 60 ... + 249 °C	0.25 K	0.08 K

The radio interference suppression class B according to VDE 0871 is only observed in connection with the standard power supply burster model 4495-V001.

Long-term stability: < 25 ppm/month

Environment

Operating temperature range: 0 ...23 ... 50 °C, 0 ... 70 % humidity, non -condensing
Storage temperature: - 10 ... 60 °C
Charging temperature: 10 ... 23 ... 35 °C

Power supply:
a.) NiMH accumulator, firmly fitted operating period 7 - 10 hours
b.) 230 V AC + 6 %, - 10 %, 50 - 60 Hz (115 V upon request)
Protection: IP 50

RS232 interface

Opto-isolated, baudrate 600-19200 all functions can be fully controlled and configured via the RS232 interface, 3-pin jack bush, protocol ANSI X. 3.28 subcategary 2.5, A3/A4, language SCPI, version 1993.0

Housing

Aluminium housing, desk-shaped, side covers made of plastic material
Dimensions (W x H x D): 235 x 85 x 175 [mm]
Weight: 2,5 kg

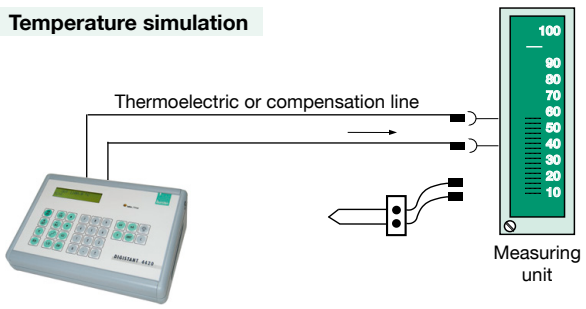
Sample Applications

Measurement and simulation of thermocouples: **Temperature simulation**

TC

14 of the most common models are available
(refer to the technical specifications)

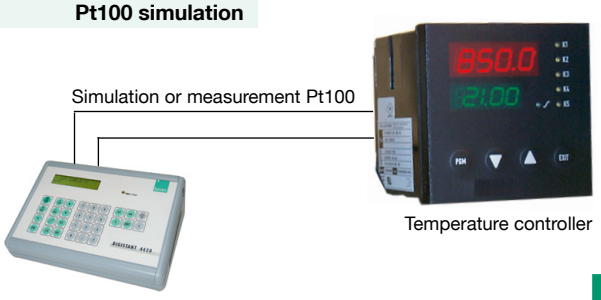
Internal reference junction:
internal reference junction
external reference junction - manual entry of the temperature
- automatic measurement of the temperature



Measurement and simulation of resistance thermometers: **Pt100 simulation**

RTD

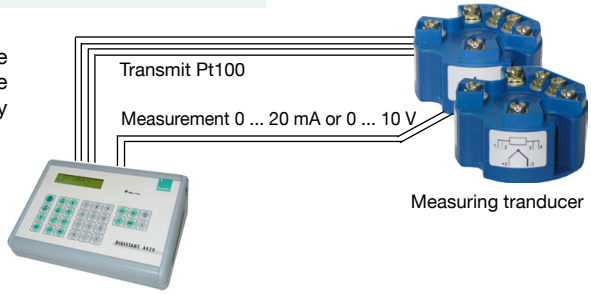
Measurement unit and electronic for Ni100, Pt100, Pt200, Pt500 and Pt1000.
The "measurement" and "simulation" temperature range cover - 200 °C to + 849 °C. Units of K, °C, °F and Ω can be selected.



Simultaneous simulation and measurement of process variables: **Process control**

V/mA

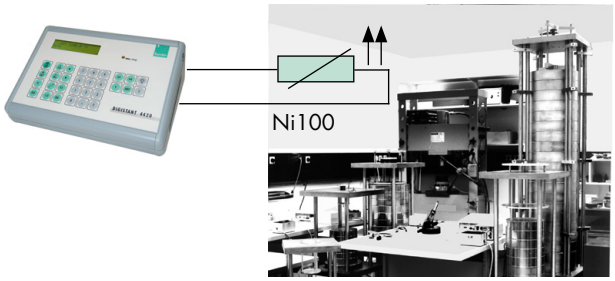
The DIGISTANT® model 4420-V001 simulates a temperature sensor at the input of the measurement transducer. The voltage or current output signal is measured and converted for display by the calibrator.



Data logging function: **Checking the temperature stability in a climatic chamber**

data logging

Memory for 256 measured values
- including the data and time of measurement
- manual or time-controlled recording from 1 s - 1 h
- evaluation with max., min. average value and standard deviation.

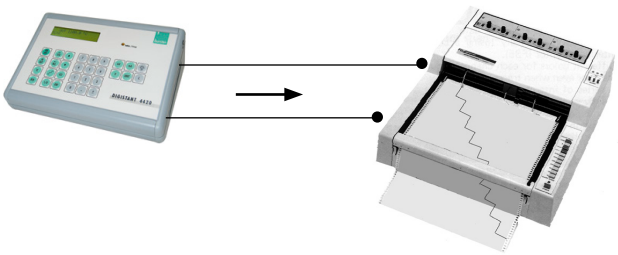


Ramp function **Recorder control**

The curve shape and number of passes can be adjusted for:

Ramp 1:
Programming of an individual ramp with initial value, delta value, final value and delta time.

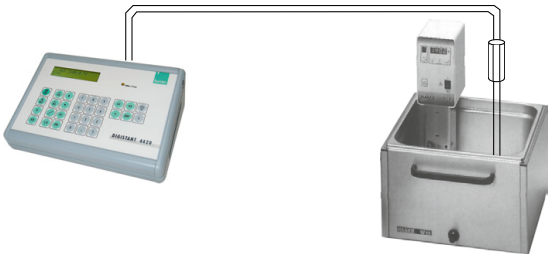
Ram 2:
Programming of a ramp with 30 steps; 30 different output values (U, I, T) and the corresponding dwell time can be specified.



Temperature measurement: **with a Pt100 sensor**

RTD

The DIGISTANT® model 4420-V001 together with a connected Pt100 sensor serves as a practical, high-precision thermometer. With a DAkkS certificate for the entire measurement chain and a liquid bath or metal-block calibrator, the measurement chain can be used as a reference for testing sensors.



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Order Information

Universal calibrator DIGISTANT® model 4420-V001 inclusive power pack, manufacturer certificate with traceability and 1 pair measuring cables **Model 4420-V001**

Accessories - Temperature

1 cable for resistance and Pt100 measurements, length 1 m, with ∅ 4 mm plugs (4 pole measurement), Lemosa connection plugs (6 pole, 1B) **Model 4499**

1 pair of measuring cables, length 1 m, with 2 ∅ 4 mm plugs and 2 miniature terminal probes **Model 4490**

1 connection plug for Pt100 input **Model 4291-0**

1 complete set of all models (R,-S,-B,-J,-T,-E,-K,-U,-L,-N) **Model 4489-X**

1 external reference junction for DIGISTANT® model 4420-V001 **Model 4485-V001**

1 platinum resistance Pt100 sensor **Model 42510**

1 transducer circuit for Pt100 sensor, length 2 m, model 42510 **Model 4281-0**

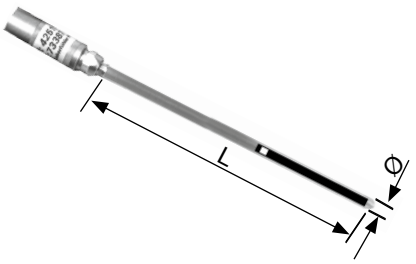
Temperature Measurement and Calibration Accessories

External reference junction model 4485-V001 for thermocouples

- high accuracy measuring and simulation
- integrated Pt100 sensor for temperature measurement
- thermically stable and decoupled set-up
- connection: miniature female connector

Pt100 resistance thermometer RTD model 42510

- standard laboratory sensor, class A, 1/6 DIN at 0 °C
- temperature range - 50 °C ... 500 °C
- dimensions ø x L 6 x 250 [mm]



Thermo-plug model 4489

- clearly reduced measuring error due to temperature measurement in the instrument
- material identical with thermocouples
- available for measurement and simulation for 10 different tc-models
- measurement and simulation up to 1820 °C
- weight approx. 6 g

Other Accessories

1 leather case with carrying strap for model 4420-V001 **Model 4493-V004**

1 aluminium case for universal calibrator model 4420-V001 **Model 4493-V002**

1 power pack (part of delivery) **Model 4495-V001**

1 pair of ∅ 4 mm plugs with terminal connection **Model 4498**

1 connection cable RS232, length 2 m, for the connection DIGISTANT® model 4420-V001 and a PC (9 pin, submin-D) **Model 9900-K343**

1 plug for RS232 interface **Model 9900-V422**

Calibration Certificates for DIGISTANT® model 4420-V001

DAkkS calibration or proprietary calibration
Standard Calibration Certificate with following points:

-	DC voltage	measure/simulate	32 measuring points
-	DC current	measure/simulate	16 measuring points
-	TC	measure/simulate	56 measuring points
-	RTD	measure/simulate	77 measuring points
-	Resistance	measure/simulate	13 measuring points

Model 44 DKD-4420-V001
Model 44 WKS-4420-V001