

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 $\pm 1 \mu\text{V}$ to $\pm 11.000 \text{ V}$
- Current range $\pm 200 \text{ nA}$ to $\pm 22.000 \text{ mA}$

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 m Ω to 2 k Ω and simulated from 10 Ω to 4 k Ω .

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 $\Delta+$ and $\Delta-$ 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.

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 | 0.025 % of range |
| ± 999.9 mV | 100 µV | > 1 GΩ | < 20 nA | < 7 µV/K | 30 ppm/K | ≤ 100 µV | 0.025 % of range |
| ± 12.000 V | 1 mV | > 1 GΩ | < 20 nA | < 7 µV/K | 30 ppm/K | ≤ 1mV | 0.025 % 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 µA | < 10 Ω | 0.5 µA/K | 40 ppm/K | ≤ 3 µA | 0.025 % v.E. | |

| 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 | 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 ... +1300.0 °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 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 | | Range | Tolerance | | Range | Tolerance | | Range | Tolerance | |
| | Simulating | Measuring | | Simulating | Measuring | | Simulating | Measuring | | Simulating | 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 | |
| - 60 ... + 249 °C | 0.25 K | 0.08K |
| 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 | | |

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

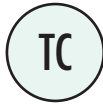
RS232 interface
 Opto-isolated, baudrate 600-19200 all functions can be fully controlled and configured via the RS232 interface, 3-pin jack bush, protocol ANSI X. 3.28 subcategory 2.5, A3/A4, language SCPI, version 1993.0

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:

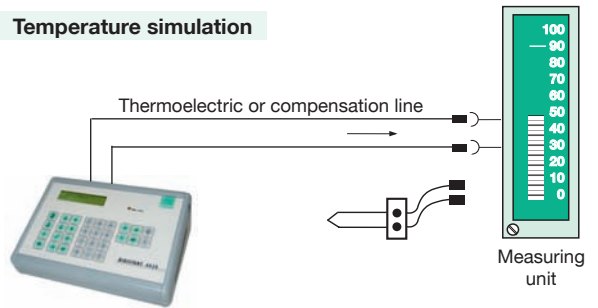
Temperature simulation



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

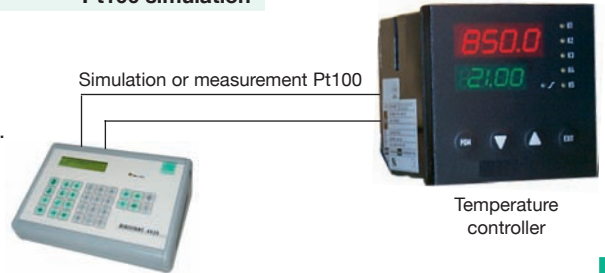


Measurement and simulation of resistance thermometers:

Pt100 simulation



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.

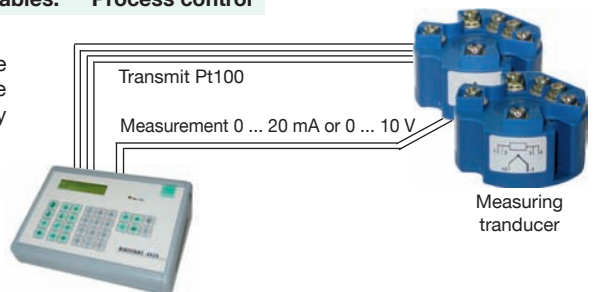


Simultaneous simulation and measurement of process variables:

Process control



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.

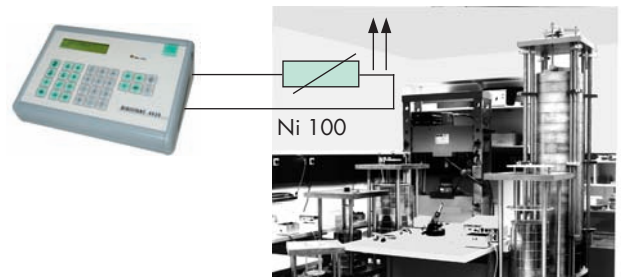


Data logging function:

Checking the temperature stability in a climatic chamber



- 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



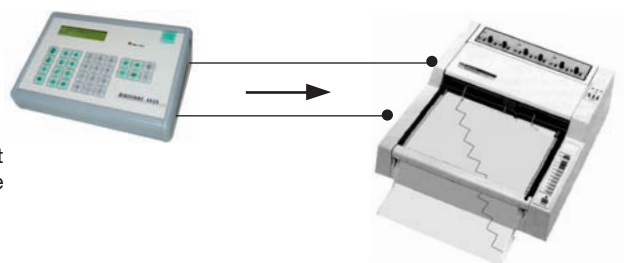
The curve shape and number of passes can be adjusted for:

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



The DIGISTANT® model 4420-V001 together with a connected Pt100 sensor serves as a practical, high-precision thermometer. With a DKD 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.



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 \varnothing 4 mm plugs (4 pole measurement), Lemos connection plugs (6 pole, 1B) **Model 4499**
- 1 pair of measuring cables, length 1 m, with 2 \varnothing 4 mm plugs and 2 miniature terminal probes **Model 4490**
- 1 connection plug for Pt100 input **Model 4291-0**
- 1 thermo-plug
-R,-S,-B,-J,-T,-E,-K,-U,-L,-N
(please add model of thermocouples when ordering) **Model 4489**
- 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
(refer to data sheet 42-Pt100 EN) **Model 4281-0**

Temperature Measurement and Calibration Accessories

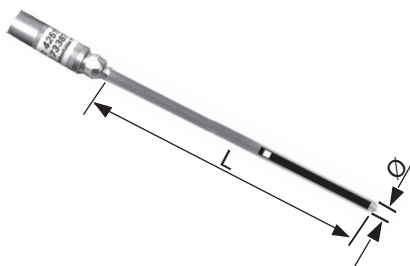
External reference junction model 4485-V001 for thermocouples

- high accuracy measuring and simulation
- integrated Pt100 sensor for temperature measurement
- thermally 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 \varnothing 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**
- 1 aluminium case for universal calibrator model 4420-V001 **Model 4493-V002**



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

DKD calibration or proprietary calibration standard calibration certificate with 167 points:

- with 4 measuring points for each voltage measuring / simulating range
for each current measuring / simulating range
- with 2 measuring points for 10 thermocouples in operating modes "measuring" and "simulation", temperature of the reference junction 0 °C measuring values in mV and calculating values in °C
- with 26 measuring / simulating points for Pt100, Pt200, Pt500, Pt1000, Ni100 in operating modes "measuring" and "simulation" measuring values in Ω and calculation values in °C
- with 1 measuring / simulation point for resistance measurement and simulation range **Model 44 DKD-4420-V001**
Model 44 WKS-4420-V001