High Precision Calibration Source
For voltage, current and thermocouples
DIGISTANT®
Model 4462

Application
The precision calibration unit combines high accuracy, low drift, low noise and superior long-term stability with multiple functionality and simple operation. Ramps, $\Delta+/\Delta-$, and multiple setpoint storage make the operation of the device easier for the user.

For that reason the application possibilities are many:

► Calibration of current and DC-voltage meters
► Precise testing of thermocouple temperature measuring instruments
► Calibration of controllers, sensors, detection devices and other devices used in process control
► Open-loop process control with the aid of integrated ramp function

DIGISTANT® model 4462 can be used both as a stand-alone table-top device, as well as in automatic, computer-assisted manufacturing and testing systems.

Description
It is possible to set current of ±200 nA ... ±52 mA, voltage of ±1 µV ... ±30 V and, optionally temperature setpoint value of 14 thermocouples types.

The output value is fed back via the sense line to eliminate voltage drops across the measuring leads.

The device has an adjustable current/voltage limitation. An external voltage divider of 1 up to 1:1000 can be considered internally.

With the thermovoltage sourcing option you can enter °C, °F and K, the temperature scales ITS 90 or IPTS 68 and the comparison point mode constant/external. Furthermore, when sourcing thermocouples a calibrated external comparison point can be used, whereby the data for calibration in the device can be taken into consideration.

Indication of the source value is carried out in large 12 mm figures on an illuminated graphics-LCD.

The device can be operated both via the keyboard as well as the interface.

- High precision current and voltage source
  ±52 mA, ±30 V
  Option: ±22 mA, ±60 V
- Precision simulation for all conventional thermocouple types (optional)
- Error limit 0.003 % Rdg.
- Standard with RS232 and IEEE488 interface, USB and Ethernet (optional)
- Current "SINK"

Code: 4462 EN
Delivery: upon request
Warranty: 24 months
### Operating Examples

**Ramp 1 Configuration menu**

- **SEQUENZ:** TRIANGLE
- **REPETITIONS:** 17
- **START-VAL:** 0.0 mV
- **END-VAL:** 250.0 mV
- **DELTA-VAL:** 25.0 mV
- **DELTA-TIME:** hh:mm:ss

**Current/voltage, limit setting**

- **U-LIMIT:** 20 V
- **I-LIMIT:** 10 mA
- **1 V >...< 32 V**

**TC/Temperature menu**

- **TC-TYPE:** IPTS68
- **RJ-TYPE:** EXTERN
- **RJ-TEMP:** 300.00 K
- **TEMP. DIMENSION:** K

**Pt100 scale (measurement with external RJ)**

- **A = 0.0039083**
- **Ro = 100**
- **B = -5.775E-07**
- **C = -4.183E-12**
- **D**
- **N EN: 0.0039083**
- **0.003 <--- > 0.006**
- **Exp. EN**

**Ramp function:**

- Ramp 1 with constant delta values and delta time
- Ramp 2 with variable delta values and internal time.

The ramp function allows single or repeated outputs in sawtooth or triangular form. The number of steps can set from 0 to 99 (0 is continuous). The **START**, **END** and **DELTA** values can be entered in µV, mV, V, mA and temperature values. **DELTA time** is displayed as shown in the menu.

**Current/voltage limit:**

If a voltage or temperature value is given, the current limit is automatically active. If current is sourced the voltage limit is active. The voltage limit ranges from 1 V to 32 V and the current limit ranges from 1 mA to 55 mA.

### Optional thermocouples

Optionally the thermocouples types R, S, B, J, T, E, K, U, L, N, M, C, D and G2 can be simulated. For the *manual* reference junction at 0 °C the accuracy depends on the thermocouple model starting at 0.1 K. The connection occurs directly at the standard terminals or *externally* via an external, attachable reference junction model 4485-V001, at which the temperature is detected with a Pt100 sensor (see application 1).
### Technical Data

#### Voltage source

<table>
<thead>
<tr>
<th>Range (V)</th>
<th>Resolution (mV)</th>
<th>Error limits (µV at +23°C ± reading)</th>
<th>TC with resp. to +23°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 V</td>
<td>0.1 mV</td>
<td>0.003/(- to +4.5 V) +200 µV (+ to +4.5 V) +1.1 mV</td>
<td>8 ppm/K+10 µV/K</td>
</tr>
<tr>
<td>3 V</td>
<td>10 µV</td>
<td>0.003/(to ± 450 V) +20 µV (+ to ± 450 V) +110 µV</td>
<td>8 ppm/K+1 µV/K</td>
</tr>
<tr>
<td>300mV</td>
<td>1 µV</td>
<td>0.003/(to ± 45 V) +3 µV (+ to ± 45 V) +11 µV</td>
<td>8 ppm/K+0.35µV/K</td>
</tr>
</tbody>
</table>

**Option: 60 V** (Range 30 V will be dropped)

<table>
<thead>
<tr>
<th>Range (V)</th>
<th>Resolution (mV)</th>
<th>Error limits (µV at +23°C ± reading)</th>
<th>TC with resp. to +23°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 V</td>
<td>0.2 mV</td>
<td>0.003/(to ± 9 V) +500 µV (+ to ± 9 V) +2.2 mV</td>
<td>8 ppm/K+10 µV/K</td>
</tr>
</tbody>
</table>

- **Output current:** max. 52 mA at 30 V, source resistance < 10 mΩ (max. 22 mA at 60 V, model -VXX1)
- **Burden voltage:** max. 52 mA at 60 V, source resistance > 500 MΩ

#### Current source

<table>
<thead>
<tr>
<th>Range (mA)</th>
<th>Resolution (µA)</th>
<th>Error limits (µA at +23°C ± reading)</th>
<th>TC with resp. to +23°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>52 mA (22 mA)</td>
<td>200 nA</td>
<td>0.007/(to ± 7.5 mA) +0.6 µA (+ to ± 7.5 mA) +3 µA</td>
<td>10 ppm/K+10 nA/K</td>
</tr>
</tbody>
</table>

- **Burden voltage:** max. 30 V at 52 mA, source resistance > 500 MΩ
- **Confidence coefficient for the specified errors:** 95 % (K=2).
- **Burden voltage:** max. 60 V at 22 mA, model -VXX1)

#### Option: Thermocouple simulation

<table>
<thead>
<tr>
<th>Model</th>
<th>Range</th>
<th>Error (K)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>-50.0 °C ... 1768 °C</td>
<td>0.4 (+ 250 ... 1768 °C)</td>
</tr>
<tr>
<td>S</td>
<td>-50.0 °C ... 1768 °C</td>
<td>0.4 (+ 350 ... 1768 °C)</td>
</tr>
<tr>
<td>B</td>
<td>0.0 °C ... 1820 °C</td>
<td>0.5 (+ 800 ... 1820 °C)</td>
</tr>
<tr>
<td>J</td>
<td>-210 °C ... 1200 °C</td>
<td>0.2 (- 210 ... 900 °C)</td>
</tr>
<tr>
<td>T</td>
<td>-270 °C ... 400 °C</td>
<td>0.2 (- 170 ... 400 °C)</td>
</tr>
<tr>
<td>E</td>
<td>-270 °C ... 1000 °C</td>
<td>0.2 (- 220 ... 1000 °C)</td>
</tr>
<tr>
<td>K</td>
<td>-270 °C ... 1372 °C</td>
<td>0.1 (- 50 ... 800 °C)</td>
</tr>
<tr>
<td>U</td>
<td>-200 °C ... 600 °C</td>
<td>0.3 (- 100 ... 600 °C)</td>
</tr>
<tr>
<td>L</td>
<td>-200 °C ... 900 °C</td>
<td>0.2 (- 100 ... 750 °C)</td>
</tr>
<tr>
<td>N</td>
<td>-270 °C ... 1300 °C</td>
<td>0.2 (- 120 ... 1200 °C)</td>
</tr>
<tr>
<td>M</td>
<td>-50 °C ... 1410 °C</td>
<td>0.1 (- 50 ... 900 °C)</td>
</tr>
<tr>
<td>C</td>
<td>0.0 °C ... 2315 °C</td>
<td>0.2 (+ 100 ... 900 °C)</td>
</tr>
<tr>
<td>D</td>
<td>0.0 °C ... 2315 °C</td>
<td>0.2 (+ 300 ... 1100 °C)</td>
</tr>
<tr>
<td>G2</td>
<td>0.0 °C ... 2315 °C</td>
<td>0.3 (+ 300 ... 2100 °C)</td>
</tr>
</tbody>
</table>

*The errors are defined at “manual” reference junction 0 °C.

#### Reference junction

- **EXTERNAL:** The temperature is measured with an external Pt100 sensor.
- **MANUAL:** The reference junction temperature is entered manually.

| Temperature in an external reference junction or temperature measurement with Pt100 |
|----------------------------------------------|-------------------|---------------------|-------------------|
| Range                                       | Resolution (°C)   | Current (mA)        | Tolerance (%)     |
| -200 ... 850 °C                            | 0.01 °C           | approx. 0.6 mA      | 0.00006x°C + 0.045 °C |

#### General Technical Data

- **Long-term stability:** U-Drift < 20 ppm / year + 2 µV / year (300 mV)
- **U-Drift:** < 20 ppm / year + 6 µV / year (3 V)
- **U-Drift:** < 20 ppm / year +10 µV / year (30/60 V)
- **I-Drift:** < 70 ppm / year + 0.5 µA / year

- **Warm-up time:** 30 minutes, until specified error limit
- **External divider:** 1 to 1010
- **An external voltage divider can be connected.** In this case the divider function is activated and the division factor of the external divider is entered. Then the source value is entered as the value that should be present at the divider's output.
- **Display:** graphics LCD display with LED illumination
- **Visual field:** 56.3 mm x 38 mm, resolution 128 x 64 dots
- **Sockets:** + output, - output, + sensor, - sensor, gold-plated 4 mm terminals and 6 pin LEMO socket 1B for the optional PT100 connection.

- **Potential to ground:** ≤ 50 V between analog ground and digital ground
- **Temperature range:** 5 °C ... 23 °C ... 40 °C

### Order Information

#### DIGISTANT®

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 4462-V</td>
<td>Standard with RS232 and IEEE488</td>
</tr>
<tr>
<td>Option thermocouple simulation</td>
<td>1</td>
</tr>
<tr>
<td>RJ temperature recording</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Outputs and terminals on the rear side

<table>
<thead>
<tr>
<th>Standard interface</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS232C interface</td>
<td>9 pin subminiature D-socket</td>
</tr>
<tr>
<td>Baud rate 300 ... 38 400</td>
<td>Protocol ANSI X 3.28 1976</td>
</tr>
<tr>
<td>Subcategory 2.1, A3</td>
<td></td>
</tr>
<tr>
<td>Optional IEEE488 interface</td>
<td>24 pin, open collector outputs</td>
</tr>
<tr>
<td>(E1) SH1, AH1, T6, TE0, L4, LE0, SR1, RL1, PP0, DC1, DT1, CO</td>
<td></td>
</tr>
</tbody>
</table>

### Accessories (Option)

- 4 measuring leads with low thermal voltage Cu/Te safety connectors, length 1 m
- RS232 data cable for PC connection
- Interface set consisting of USB/RS232 converter
- Converter RS232 to Ethernet

### DKD/DAkkS Calibration Certificates

- **DKD/DAkkS Calibration (basic system)**
  - Each range (voltage, current) is calibrated at ±12.5 %, 25 %, 50 % and 90 % of full scale.
  - Model 444KD-4462-V100

- **DKD/DAkkS Calibration (extended system)**
  - Each range (voltage, current) is calibrated at ±12.5 %, 25 %, 50 % and 90 % of full scale. With 2 points for 10 thermocouples, temperature of the reference junction 0 °C and two points for PT100.
  - Model 444KD-4462-V110

### Calibration Certificate for the external reference junction

- At 3 points (0 °C, + 23 °C and 40 °C), if the built-in Pt100 of the reference junction is calibrated (NAMAS, DKD/DAkkS or others) and you enter the probe calibration into the DIGISTANT® model 4462-VXX1 the accuracy of the temperature measurement is ≤ 0.1 K (in the temperature range +15 °C to +35 °C).
  - Model 444KD-4485
External reference junction model 4485-V001 for thermocouples

- For an accurate simulation of thermocouples
- A built-in Pt100 for cold junction compensation
- Thermally stable and isolated construction
- Plug type: Miniature TC connector

Technical Data

- Limits: ± 0.3 K
- Long term stability: typical 0.05 K/year
- Insulation resistance between pins in disconnected status: ≥ 20 MΩ
- Operating temperature range: 0 °C ... 23 °C ... 40 °C
- Storage temperature range: -10 °C ... 60 °C

Note: Thermo cable and connector cause an additional error. We recommend to use the class 1.

Application Example

1. Calibration of a PC card with a thermocouple measurement input

Instead of the thermocouple the calibration source DIGISTANT® model 4462 is connected. Using an external DKD/DAkkS calibrated reference junction the PC card is retraceable calibrated with the optimum accuracy. Up to 14 thermocouples can be selected.

2. Calibration of measuring system in medicine engineering

In the sweep function you set different current and voltage values with individual steps. The output happens once or repeatedly in triangular or sawtooth wave.

Synthesis processes in the production of medicine require a careful check. A highly secured production process is life saving.