

Universal Calibrator DIGISTANT®

Model 4422

Code:	4422 E
Manufacturer:	burster
Delivery:	ex stock
Warranty:	12 months
Issue:	1.4.2002



**New Function
Pressure Measurement**

4422-E

- Calibration and measurement unit for voltages, currents, temperatures and resistances
- All functions can be fully controlled and configured via the RS232 interface
- Simultaneous transmission and measurement
- Automatic ramp function, data logger
- Simple menu assistance via display
- $\pm 1 \mu\text{V}$ to $\pm 11,000 \text{ V}$, $\pm 200 \text{ nA}$ to $\pm 22,000 \text{ mA}$
- Connection of external pressure measurement modules

Application

The DIGISTANT® model 4422 universal calibrator is ideal for checking and calibrating temperature measurement and control devices, and documenting the measurement results. 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 measurement of voltages, currents, temperatures and resistances. In combination with the pressure modules series 7131 pressure can be measured authentically. 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 types of thermocouples, Ni 100, Pt 100, Pt 200, Pt 500 and Pt 1000. In addition, resistances can be measured from 10 m Ω to 2 k Ω and simulated from 10 Ω to 2 k Ω .

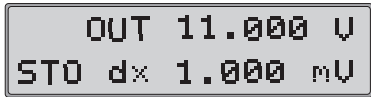
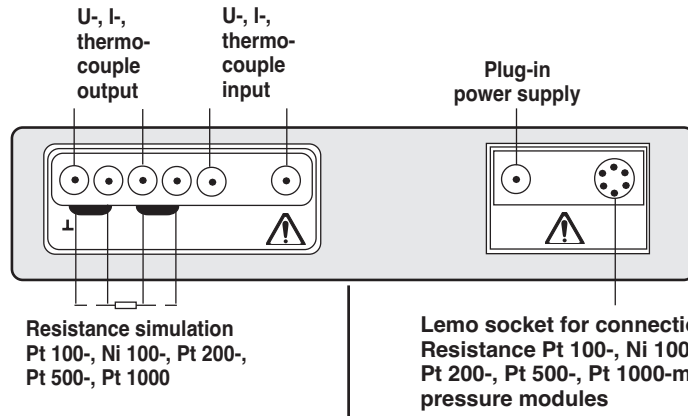
The reference junction temperature can be entered manually via the keypad; if required, however, an automatic reference to an internal or external point is also possible. Basic values and the corresponding Δ -values for stored with 10 freely programmable memories each can be the voltage, current, temperature 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 model 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 NC 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.



High contrast two line LCD-display with background illumination

Store key current value and currently set delta x-value or function datalogger

Switching over between transmission an mesurement

Selecting RTD transmissions/measurement 14 thermocouples Pt 100, Ni 100, Pt 200, Pt 500, Pt 1000

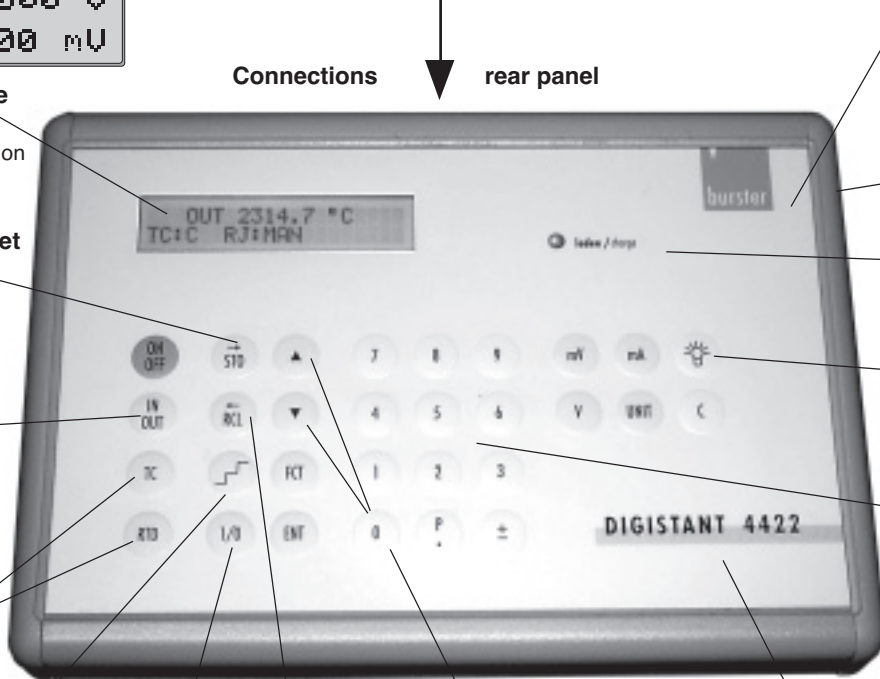
Ramp key

Start/Stop key Ramp function

Recall of stored value pairs

Menu control

Internal NC accumulator for at least 8 h (with protection against total discharge)



Connections

rear panel

EMC compact alu housing

RS232-interface

Charging level

Background illumination with switch-off automatic

10 number keys for numerical entry

Temperature Measurement and Calibration Accessories

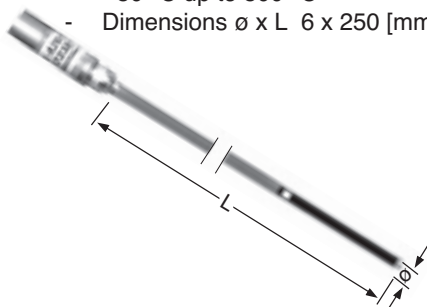
External reference junction model 4485-V001 for thermocouples

- High accuracy measuring and simulation
- Integrated Pt 100 sensor for temperature measurement
- Thermically stable and decoupled set-up
- Connection: Miniature female connector



Pt 100 resistance thermometer RTD model 42510

- Standard laboratory sensor, class A, 1/6 DIN at 0 °C
- Temperature range - 50 °C up to 500 °C
- Dimensions $\varnothing \times L$ 6 x 250 [mm]



Thermo-plug model 4489

- Clearly reduced measuring error due to temperature measurement in the instrument
- Material identical with thermocouple
- Available for measurement and simulation for 10 different tc-types
- Measurement and simulation up to 1820 °C
- Weight approx. 6 g

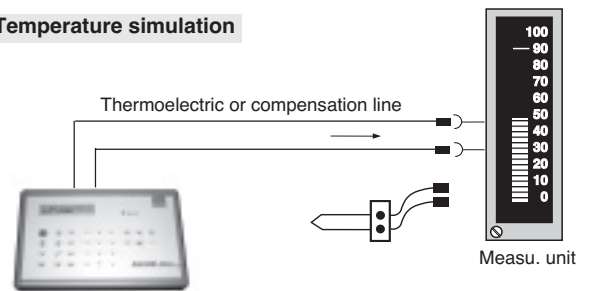


Sample Applications



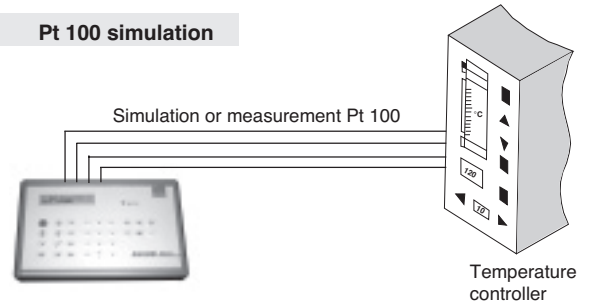
Measurement and simulation of thermocouples: Temperature simulation

14 of the most common types are available (refer to the technical specifications)
 Reference junction:
 Internal reference junction
 External reference junction - Manual entry of the temperature
 - Automatic measurement of the temperature



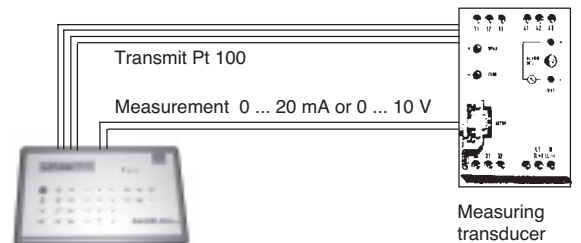
Measurement and simulation of resistance thermometers: Pt 100 simulation

Measurement unit and electronic for Ni 100, Pt 100, Pt 200, Pt 500 and Pt 1000.
 The "measurement" and "simulation" temperature range cover 200 °C to +849 °C. Units of K, °C, °F and Ω can be selected.



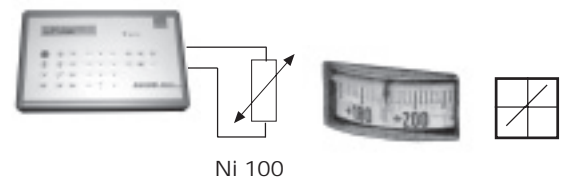
Simultaneous simulation and measurement of process variables: Process control

The DIGISTANT® model 4422 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.



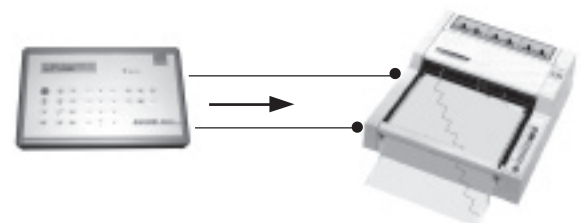
Data logging function: Process monitoring

Memory for 256 measured values
 - Including the date and time of measurement
 - Manual or time-controlled recording from 1 s - 1h
 - 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.
 Ramp 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 Pt 100 sensor

The DIGISTANT® model 4422, together with a connected Pt 100 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.



4422-E

Pressure Calibration with the DIGISTANT® Model 4422

Complete equipment in a measurement case:

Pressure module model 7131



- Accuracy starting at 0.05 %
- Measurement ranges 2 bar, 35 bar relative
- Measuring range 2 bar absolute
- Check-up and calibration of manometers, pressure transducers, pressure controllers, etc.
- Extensive accessories equipment of hand pumps, pressure hoses, pressure adapters, etc.



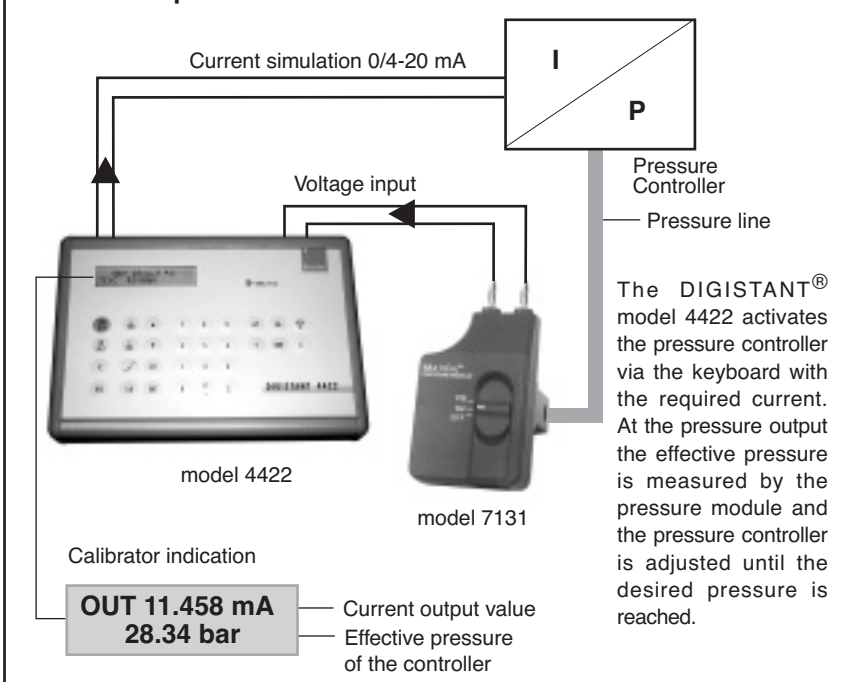
Description

Up to 10 pressure modules (ex work or from end-user through down load software) can be stored in the DIGISTANT® together with model, measurement range, desired indication format (i.e. bar, PASCAL, etc.) and calibration data. Via the keyboard or the interface the single pressure modules can be recalled with the following measurement programs:

- Pressure measurement, authentic indication on the DIGISTANT® display
- Pressure measurement via pressure module and simultaneous measurement at the output of P/U resp. P/I-transducer
- Check-up and calibration of a pressure controller: Pre-set of the adjusting current and simultaneous check-up of the relevant pressure
- Storage of pressure measurement in the datalogger

Model	Measurement [Switch position]	Measuring range [bar]	Tolerance
7131-5002-V002	0 ... 30 PSIA	0 ... 2 abs.	0.08 % v.M. + 0.7 mbar
7131-5002-V001	-100 ... -407 in. H ₂ O	-0.25 ... Vacuum	0.25 % v.M. typ.
	0 ... -100 in. H ₂ O	0 ... -0,25	0.05 % v.M. + 0.3 mbar
	0 ... 830 in. H ₂ O	0 ... 2	0.05 % v.M. + 0.3 mbar
7131-5035	0 ... 14.7 PSI	0 ... Vacuum	0.25 % v.M. typ.
	0 ... 500 PSI	0 ... 34.5	0.1 % v.M. + 1.4 mbar

i.e. Check-up and Calibration of a Pressure Controller On-Site



Pressure connection: 2 * 1/8 "NPT
Internal thread available with pressure hose

Overload: 50 % above nominal value

Weight: approx. 165 g

Dimensions (LxWxH): 118 x 64 x 51 [mm]

Battery operation: 9 V block battery for 400 h operation time

Accessories

Pressure hose usable up to 250 bar, both sides with adaptor, external thread 1/8" NPT, length 1,5 m model- 7131-Z001

Voltage Measuring Instrument							
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	≤ 5 µV	0.025 % 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	< 4 µV	0.015 % 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 Instrument						
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 % 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 Instrument				
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/lmess	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/lmess	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	0.8 K	1 K (+150 ... 953 °C)	
S	PtRh 10 - Pt	EN 60584-1 / ITS 90	- 49.8 °C ... + 1767.8 °C	0.8 K	1 K (+200 ... 1027 °C)	
B	PtRh 30 - PtRh 6	EN 60584-1 / ITS 90	+ 99.2 °C ... + 1820.0 °C	0.8 K	1 K (+850 ... 1482 °C)	
J	Fe - CuNi	EN 60584-1 / ITS 90	- 210.0 °C ... + 1200.0 °C	0.5 K	0.8 K (-210 ... 1200 °C)	
T	Cu - CuNi	EN 60584-1 / ITS 90	- 269.4 °C ... + 400.0 °C	0.5 K	0.8 K (-220 ... +400 °C)	
E	NiCr - CuNi	EN 60584-1 / ITS 90	- 269.5 °C ... + 1000.0 °C	0.5 K	0.6 K (-240 ... 1000 °C)	
K	NiCr - NiAl	EN 60584-1 / ITS 90	- 269.1 °C ... + 1372.0 °C	0.4 K	0.5 K (-200 ... +243 °C)	
U	Cu - CuNi	DIN 43710 / IPTS 68	- 199.9 °C ... + 599.9 °C	0.5 K	0.6 K (-150 ... +213 °C)	
L	Fe - CuNi	DIN 43710 / IPTS 68	- 199.9 °C ... + 899.9 °C	0.3 K	0.3 K (-100 ... +181 °C)	
N	NiCrSi - NiSi	EN 60584-1 / ITS 90	- 270.0 °C ... + 1300.0 °C	0.4 K	0.5 K (-150 ... 315 °C)	
M	NiMo 18 - Ni	General Electric IPTS 68	0.0 °C ... + 1400.0 °C	0.7 K	1 K (0 ... 1400 °C)	
C	W5Re - W26Re	Hoskins ITS 90	0.0 °C ... + 2314.9 °C	0.5 K	0.6 K (0 ... 563 °C)	
D	W3Re - W25Re	Hoskins ITS 90	0.0 °C ... + 2315.0 °C	0.4 K	0.5 K (+200 ... 590 °C)	
G2	W - W26Re	Hoskins ITS 90	0.0 °C ... + 2315.0 °C	0.7 K	0.9 K (+200 ... 780 °C)	

Accuracy without deviation. Accuracy is referred to definition of characteristic curve (Valid for RJ-Man 0 °C).

Temperature Measuring / RTD-Simulator [Pt-DIN EN 60751 // Ni-DIN 43760; IPTS 68]											
Pt 100			Pt 200			Pt 500			Pt 1000		
Range	Tolerance		Range	Tolerance		Range	Tolerance		Range	Tolerance	
	Simulating	Measuring		Simulating	Measuring		Simulating	Measuring		Simulating	Measuring
-200 ... 266.3 °C	0.3 K	0.08K	-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			

Ni 100		
Range	Tolerance	
-60 ... +249 °C	0.25 K	0.08 K

Charging temperature: 10 ... 23 ... 35 °C

Power supply:
 a.) NC-battery, firmly fitted operating period
 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

Storage temperature: - 10 ... 60 °C

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

DIGI-CAL Documentation and Calibration Software



- The preparation of automatic calibration sequences ensures rational calibration
- Calibration according to DIN ISO 9000 with documentation of measurement results
- Direct storage of measurement data in the database
- Online display (graphic or tabular) of measured values
- All applications shown can be controlled via PC software
- Processing of stored data
 - Measured values as $f(t)$
 - Measured values as $f(\text{source value})$
 - Tolerance as $f(t)$
- Read-in and storage of data logger values in the database
- Direct storage of measurement data in the database
- Password protection for different program levels
- Full controllability of the DIGISTANT® 4422

Program description

Calibration and documentation place high demands on quality assurance. A software program was developed for the DIGISTANT® model 4422 to make it fully controllable. In particular, this software is used to generate calibration sequences for the simultaneous measurement and simulation function. The calibration sequences and measured data can be stored in a database. These data are exported in ASCII format for:

- MS-Excel 2.1-3.0
- Quattro Pro
- Harvard Graphics
- MS-Works

System requirements

Processor:	80386 with a co-processor 80486 recommended
Graphic:	min. Standard VGA 640 * 480, 256 colors (also monochrome, LCD-Display)
Interface:	RS232 (V24)
Operating system:	Win 3.1, Win 3.11, Win 95, Win 98, Win NT 4.0, Win ME
Memory:	min. 8 MB RAM (Win 3.1.), min. 32 MB (Win 95, Win 98), min 64 MB (Win ME)
Hard disk space:	approx. 15 MB
Relocation file:	min. 25 MB



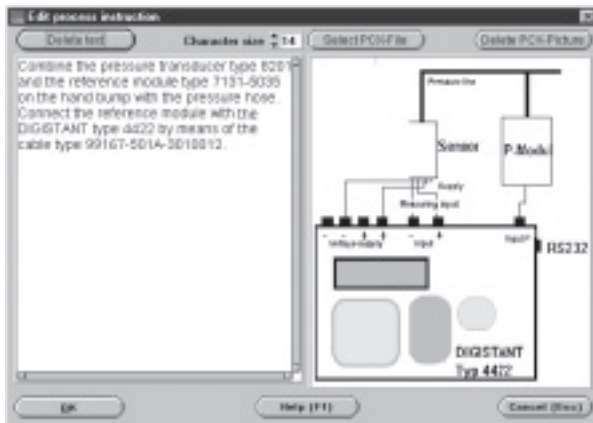
Using the DIGISTANT® model 4422 and DIGI-CAL on-site or in the lab

Industrial quality standards require a regular calibration of measuring instruments controllers, transmitters etc. used in process technology. These routine tasks are greatly facilitated through the preparation of calibration procedures with the DIGI-CAL PC software.

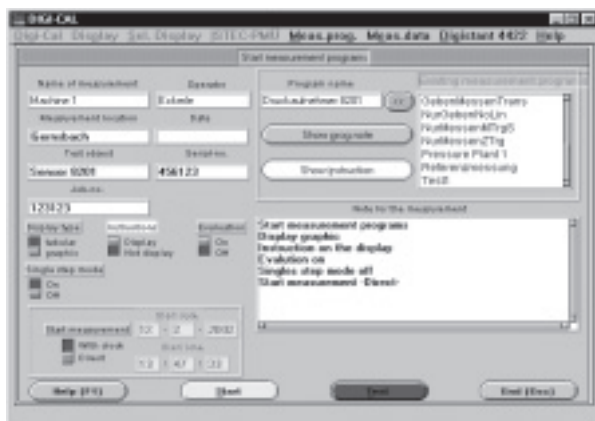
DIGISTANT® with a laptop in the instrument case while calibrating a measuring transducer

Working with DIGI-CAL

Step 1:
A one-time calibration routine is performed with the DIGI-CAL software. The desired test points to be approached and the tolerances for a GOOD/BAD evaluation are specified here. To facilitate calibration, a field is available for entering an operating instruction in text and graphic form (e.g. connection of the test object).



Step 2:
Measurement parameters like measurement data, processor, measurement point, serial number, order number, test object type and measurement program are entered into laptop. The reference module, the pressure transducer and the hand bump are connected correspondingly.



Step 3:
Measurement results are displayed graphically or in tabular form. Measurement procedures are completed with a GOOD/BAD display.

Tabular display of measurement data

No.	P-Module (bar)	Meas. Val. (bar)	Meas. Tol. (bar)	Warn. Lim. (bar)	Meas. Tol. (bar)	Eval.
1	1.8000	1.8000	1.8000	0.1500	0.0000	OK
2	1.8000	1.8000	1.8000	0.1500	0.0000	OK
3	3.1900	3.1900	3.2000	0.1500	0.0000	OK
4	4.7400	4.7400	4.2000	0.1500	0.0000	OK
5	5.1800	5.1800	5.2700	0.1500	0.0000	OK
6	5.3800	5.3800	5.3700	0.1500	0.0000	OK
7	5.5700	5.5700	7.1200	0.1500	0.0000	OK
8	7.8000	7.8000	8.9700	0.1500	0.0000	OK
9	8.9400	8.9400	9.8800	0.1500	0.0000	OK
10	9.5700	9.5700	10.5200	0.1500	0.0000	OK
11	9.8400	9.8400	11.1100	0.1500	0.0000	OK
12	8.1250	8.1250	9.2000	0.1500	0.0000	OK
13	7.7400	7.7400	7.2500	0.1500	0.0000	OK
14	6.7800	6.7800	6.2700	0.1500	0.0000	OK
15	5.1500	5.1500	5.2400	0.1500	0.0000	OK
16	4.1800	4.1800	4.2800	0.1500	0.0000	OK
17	3.1800	3.1800	3.2800	0.1500	0.0000	OK
18	1.8000	1.8000	1.8500	0.1500	0.0000	OK
19	1.8000	1.8000	1.8500	0.1500	0.0000	OK
20	0.8000	0.8000	0.8000	0.1500	0.0000	OK

Step 4:
Back at the workstation the performed calibration can be documented by printing out a test log.

Test Log

DIGI-CAL program documentation 12.02.2002

Name of program : Pressure Plant 1
Date : 12.02.2002
Operator : OE
Note :
Combine the pressure transducer type 8201 and the reference module type 7131-5035 on the hand bump with the pressure hose. Connect the reference module with the DIGISTANT type 4422 by means of the cable type 99167-501A-3010012.

Program type : Pressure reference measurement

Reference-P-Module :
P-Module Name : 71315035
S-No. :

Measurement section :
Grounding : External
Physical variable : Sensor
Sensor Name : Sensor1
S-Nr. :

Characteristic type : Linear with constant stages
Characteristic : Triangular
Number of cycles : 1
P-Module start value : 0 bar
P-Module end value : 10 bar
Delta value : 1 bar
dt : 5 sec
P-Module bandwidth : 0.2 bar
Measurement start value : 0 bar
Measurement end value : 10 bar
Tolerance : ± 0.15 bar
Warning Limit : Off

4422-E

Order Information

Universal calibrator DIGISTANT® model 4422 incl. power pack, manufacturer certificate with traceability and 1 pair measuring cables model 4490

Model 4422

DIGI-CAL PC-Software for DIGISTANT® model 4422

Model 4422-P001

Order Packages

Universal calibrator DIGISTANT® model 4422 incl. power pack, DIGI-CAL PC-Software model 4422-P001, connecting cable model 4422-K001 and 1 pair of measuring cables model 4490

with Manufacturer Certificate with traceability

Model 4422-V001

with DKD standard Calibration Certificate model 44DKD-4422

Model 4422-V002

with Proprietary Calibration Certificate model 44WKS-4422

Model 4422-V003

Accessories Temperature

- 1 cable for resistance and Pt 100 measurements, length 1 m, with banana plugs (4 pole measurement), Lemos connection plugs (6-pole, 1B) **Model 4499**
- 1 pair of measuring cables, length 1 m, with 2 banana plug and 2 miniature terminal probes **Model 4490**
- 1 connection plug for Pt 100 input **Model 4291-0**
- 1 thermo-plug -R,-S,-B,-J,-T,-E,-K,-U,-L,-N (please add type of thermocouples when ordering) **Model 4489**
- 1 complete set of all types (R,-S,-B,-J,-T,-E,-K,-U,-L,-N) **Model 4489-X**
- 1 external reference junction for DIGISTANT® model 4422 **Model 4485**
- 1 Platinum Resistance Pt 100 sensor **Model 42510**
- 1 transducer circuit for Pt 100 sensor, length 2 m, model 42510 (refer to data sheet Pt 100) **Model 4281-0**

Accessories Pressure

Pressure modules:

- 0 ... 2 bar **Model 7131-5002-V001**
- 0 ... 2 bar **Model 7131-5002-V002**
- 0 ... 35 bar **Model 7131-5035**

- 1 connecting cable for pressure module 7131 and DIGISTANT® 4422 **Model 99167-501A-3010012**
- 1 aluminium case "big" for DIGISTANT® and pressure accessories **Model 4493-V003**
- 1 hand pump with fine set mode pressure medium: air 0 - 2 bar 0 - 20 bar **Model 7106-V1830 Model 7106-V1840**
- 1 hand pump with fine set mode pressure medium: hydraulic oil 0 - 200 bar **Model 7106-V2820**
- 1 pressure hose usable for up to 250 bar, adapters on both sides with external thread 1/8" NPT, length 1.5 m **Model 7131-Z001**

Accessories

- 1 leather case with carrying strap for model 4422 **Model 4493**
- 1 leather case with carrying strap for model 4422 and laptop **Model 4493-V001**
- 1 aluminium case for universal calibrator model 4422 **Model 4493-V002**



- 1 power pack (part of delivery) **Model 4495-V001**
- 1 pair of banana plugs with terminal connection **Model 4498**
- 1 connection cable RS232, length 2m, for the connection of DIGISTANT® model 4422 and a PC (9-pin, submin-D) **Model 99422-611A-0170020**
- 1 Plug for RS232 **Model 9900-V422**

Calibration Certificates for Model 4422

DKD-Calibration or Proprietary Calibration
Standard Calibration Certificate with 130 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 Pt 100, Pt 200 , Pt 500, Pt 1000, Ni 100 in operating modes "Measuring" and "Simulation", measuring values in Ω and calculating values in °C
 - With 1 measuring / simulating point for resistance measurement and simulation range
- Model 44 DKD-4422**
Model 44 WKS-4422

Pressure DKD Calibration or Proprietary Calibration

- For 11 points in 20 %-steps over the total measurement range for increasing or falling pressure. For each pressure module combined with the DIGISTANT® (complete measuring chain)
- Model 71 DKD-4422**
Model 71 WKS-4422