USB Sensor Interface
Model 9205
Preliminary Manual

Valid from: 15.08.06

Manufacturer:
burster praezisionsmesstechnik gmbh & co kg
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Note:
The information contained in the following document and in the technical specification may be changed without prior notification. We also make state explicitly that we do not accept liability for consequential damage caused by improper use of the device, and that such damage is not covered by our warranty.

burster präzisionsmesstechnik

EG-Konformitätserklärung

EC- Declaration of Conformity

Gemäß ISO/IEC Leitfaden 22 und EN 45014

According to ISO/IEC guidelines 22 and EN 45014 standard

Name des Herstellers: *Manufacturer*	burster präzisionsmeßtechnik gmbh & co kg
Adresse des Herstellers: *Address of the manufacturer*	Talstr. 1-5 76593 Gernsbach
erklärt, dass das Produkt Produktname: *Declares that the product with name*	Gleichspannungsmessverstärker / USB Sensor Interface *DC voltage measuring amplifier / USB sensor interface*
Modellnummer(n) (Typ): *Model / Type*	9205
Produktoptionen: *Options*	Alle *all*

den folgenden Produktspezifikationen entsprechen

is conform with following specifications of product

Sicherheit *Safety requirements*	IEC 61010-1	EN 61010-1:2001	Schutzklasse 3
EMV Störaussendung *EMC Generic emission*		EN 61326:1997 + A1:1998 + A2:2001	
EMV Störfestigkeit *EMC Generic immunity*		EN 61326:1997 + A1:1998 + A2:2001	Industrie Bereich *Industrial environment*

Ergänzende Informationen:

Additional Information

Das Produkt entspricht den Anforderungen der Niederspannungsrichtlinie 73/23/EEC, 93/68/EEC und der EMV-Richtlinie 89/336/EEC, 92/31/EEC, 93/68/EEC. Es ist mit dem CE-Konformitätskennzeichen versehen. Das Produkt wurde in einer typischen Konfiguration getestet.

The product is conform with the low voltage guideline 73/23/EEC, 93/68/EEC and the ELECTROMAGNETIC COMPATIBILITY guideline 89/336/EEC, 92/31/EEC, 93/68/EEC. It is provided with the EC-conformity sign. The product was tested in a typical configuration.

i.V.

Gernsbach den 21.08.2006 Unterschrift des Herstellers oder Händlers

Place / Date *Signature of manufacturer*


ENTWURF

Photo

Warnung!

The following instructions must be followed to prevent electric shock and injuries:

Achtung!

The following points must be followed to prevent injuries and damage to property:

Contents

1. General preliminary remarks

1.1 About this manual

This equipment manual contains important information on the operation, installation and configuration of the type 9205 USB Sensor Interface.

1.2 Important note

Note that the type 9205 USB Sensor Interface must be used in accordance with the instructions, technical data and conditions of use listed in this manual. If handled improperly or used incorrectly, one cannot rule out the possibility of faults, incorrect measurements, effects on or from other equipment and installations or potential risks to life and property. Please note the specific requirements that must be observed for applications in a hazardous area (EExi, ...). The type 9205 USB Sensor Interface comes with ferrite beads as standard for protection against EMC interference.

1.3 Unpacking

The unit is packaged for protection against shock during shipment. Carefully unpack the unit and verify that all items are present.

Inspect the instrument carefully for damage. If you suspect that the unit has been damaged during shipping, notify the delivery company immediately.

The packaging should be retained for examination by a representative of the manufacturer and/or the delivery company. The type 9205 USB Sensor Interface must be shipped only in its original packaging provided by us or in a container capable of providing an equivalent degree of protection.

1.4 Deliverables

A single-channel device includes the following parts as standard:

- 1 type 9205 USB Sensor Interface
- 1 CD-ROM containing configuration and analysis software
- 1 manual

2. Description of operation

2.1 Device function

The type 9205 USB Sensor Interface is intended for the acquisition and processing of sensor signals.

The type 9205 USB Sensor Interface is a user-configurable single-channel device, or optionally a multi-channel device housed in a desktop unit. The device is configured via the USB port. The type 9205 USB Sensor Interface is ideally suited to measuring mechanical variables such as force, torque, pressure, acceleration, position and angle. It makes acquisition and processing of strain-gage, potentiometric and standard signals straightforward.

Signal conditioning parameters such as gain, offset correction etc., which depend on the sensors used, can be custom set in software. No external amplifier needs to be used. A high-performance A/D converter combined with special ratiometric measurement techniques ensure accurate and high-speed processing of the analog sensor signals.

Functions such as arithmetic averaging, tare and MIN/MAX buffer can be configured and recorded using the configuration and analysis software. High-speed data acquisition is guaranteed by a measurement rate of up to 2500 readings/s. The free software only supports a measurement rate of up to 200 readings/s.

The device itself generates a stable and precise sensor supply voltage. The calibration and configuration data is saved in an EEPROM to prevent data loss in the event of power failure.

The device includes a free version of the DigiVision configuration and analysis software, which can run on standard commercial PCs under Windows 2000, XP and Vista.

2.2 Applications

The type 9205 USB Sensor Interface has been developed specifically for high-speed measurements, and therefore covers a huge range of applications. Designed for use with a variety of analog sensors, the device can capture a huge range of output signals for conditioning in mobile systems.

Industry-compatible connection and installation technologies make it easier for the user to adapt and integrate the unit in existing mechanical and electrical environments. The outstanding measuring quality combined with a large number of values used for averaging makes it ideally suited to use in both development and testing.

The type 9205 USB Sensor Interface is designed only for measurement functions in industry and test laboratories, and for reference measurements, but is not intended for use in medical applications or where people are at risk.

Typical applications of the type 9205 USB Sensor Interface include:

- Mobile test measurements via laptop
- Laboratory test set-ups
- Instrumentation and control
- Diagnostic measurements in the chemical industry
- PC-based recording of expansion figures in biotechnology

3. Operating instructions

3.1 Installation / Fixing

The type 9205 USB Sensor Interface can be fixed in place using standard screw-clips or cable ties.

3.2 Degree of protection

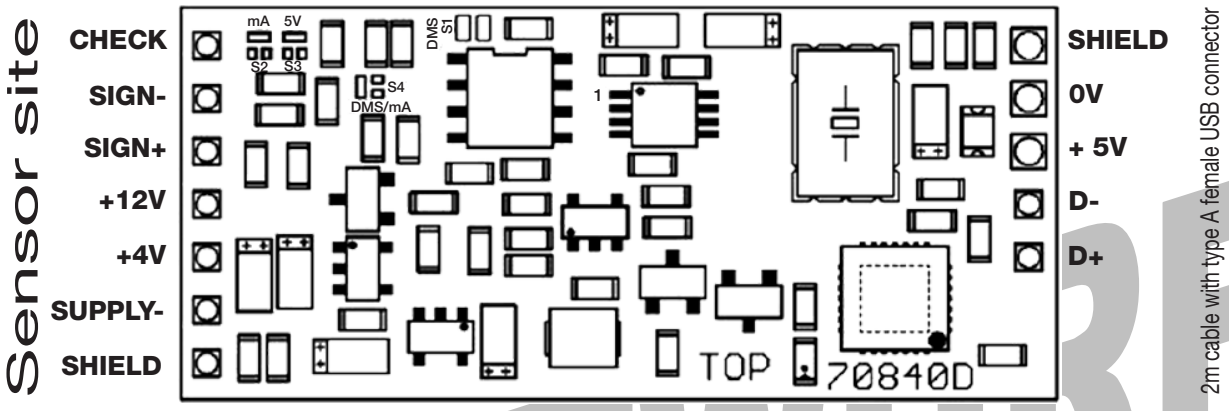
The type 9205 USB Sensor Interface has IP65 degree of protection. This means that the device is protected against ingress of water and ingress of solid bodies of diameter ≥ 12.5 mm.

3.3 Ambient temperature

The permitted ambient temperature range for the type 9205 USB Sensor Interface during operation is 0 °C to +50 °C. The device can be stored at temperatures between -10 °C and +70 °C.

3.4 Terminal assignments

The solder terminals on the circuit board of the type 9205 USB Sensor Interface are shown below.



9205-V001 terminal assignment for strain-gage sensors

Supply-	excitation ground
4V.	excitation voltage, 4V
Sign.+	signal input +
Sign.-	signal input -
Check	(if present in sensor)
Shield	braid (cable shielding, do not connect to sensor housing)

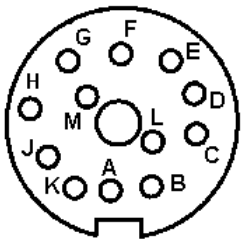
9205-V002 terminal assignment for potentiometric sensors and DC/DC sensors

Supply-	excitation ground
12 V	excitation voltage, 12 V
4 V	excitation voltage, 4 V; use for excitation of potentiometric sensors.
Sign.+	signal input; + 0-±5V
Sign.-	signal input - ; connect internally to Supply-
Check	(if present in sensor)

Shield braid (cable shielding, do not connect to sensor housing)

Sensor pin assignment in the 12-pin circular socket

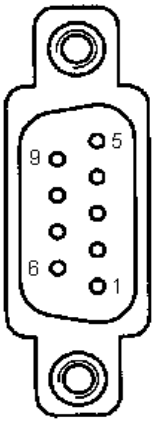
Function	Signal	PIN
- sensor excitation	Supply-	A+B
+ sensor excitation	+4V/+12V	C+D
- measurement signal	SIGN-	F
+ measurement signal	SIGN+	G
not connected		H
not connected		K
shield - ground	SHIELD	J



View: connector 9941 from solder side

Pin assignment of the 9-pin socket

Function	Signal	PIN
- sensor excitation	Supply-	5
+ sensor excitation	+4V/+12V	1
- measurement signal	SIGN-	5
+ measurement signal	SIGN+	6
not connected		7
not connected		8
shield - ground	SHIELD	9



View: towards the device socket

Examples of pin assignments for the different sensors are given in the following sections:

- Strain gage in section 5.2
- Potentiometric sensors in section 6.1
- DC/DC sensors in section 7.1

3.5 Software installation

The configuration and analysis software can run on the following operating systems:

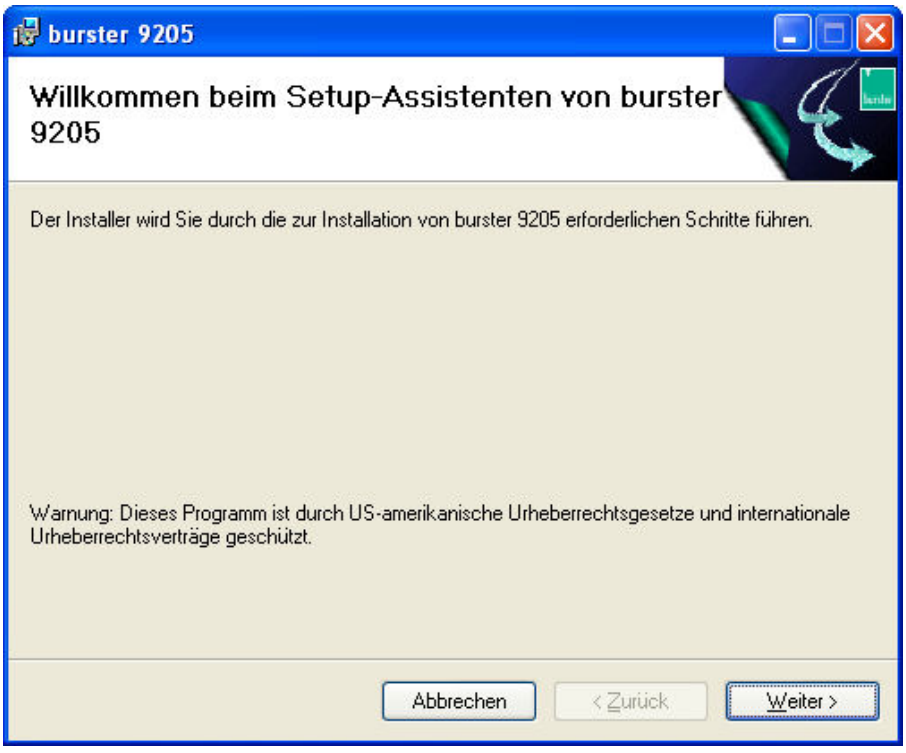
- Windows 200x
- Windows XP
- Windows Vista

System requirements for 9205-P001/9205-P100:

Processor:	minimum recommended, Pentium 2.0 GHz
Graphics:	min. VGA 800 * 600, min. 256 colors
Memory:	min. 64 MB RAM (Win 2000, Win XP)
Hard disk:	approx. 200 Mbyte available
Operating systems:	Windows 200x, Windows XP, Vista
Input devices:	MS-compatible mouse, standard keyboard
Font setting:	Small fonts
Miscellaneous:	The user must be logged onto the system at least as user.

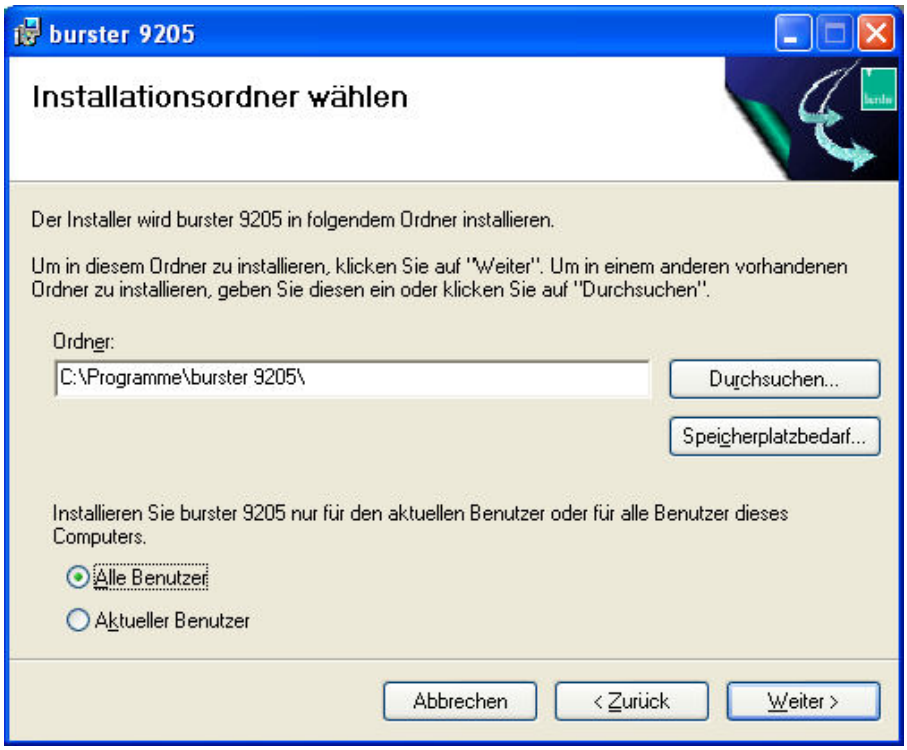
To start installation of the configuration and analysis software, insert the supplied CD-ROM in the CD-ROM drive.

➢ Switch to the directory of your CD-ROM drive and run the Setup wizard by double-clicking on "setup.exe".



➢ Accept the license agreement then confirm with "Next".

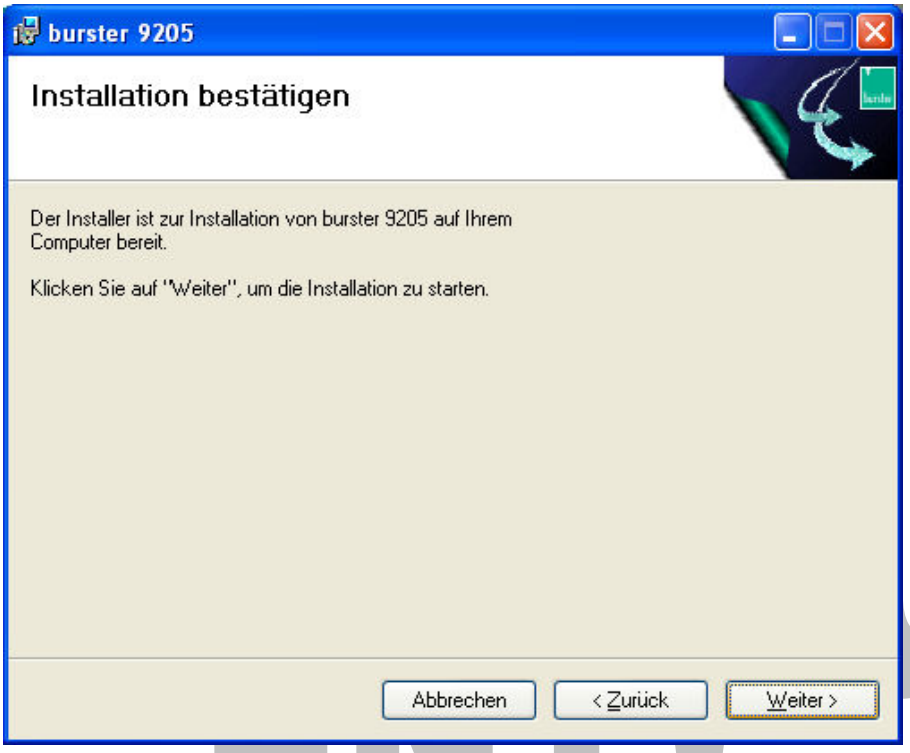
The installation will terminate if you do not accept the license agreement.



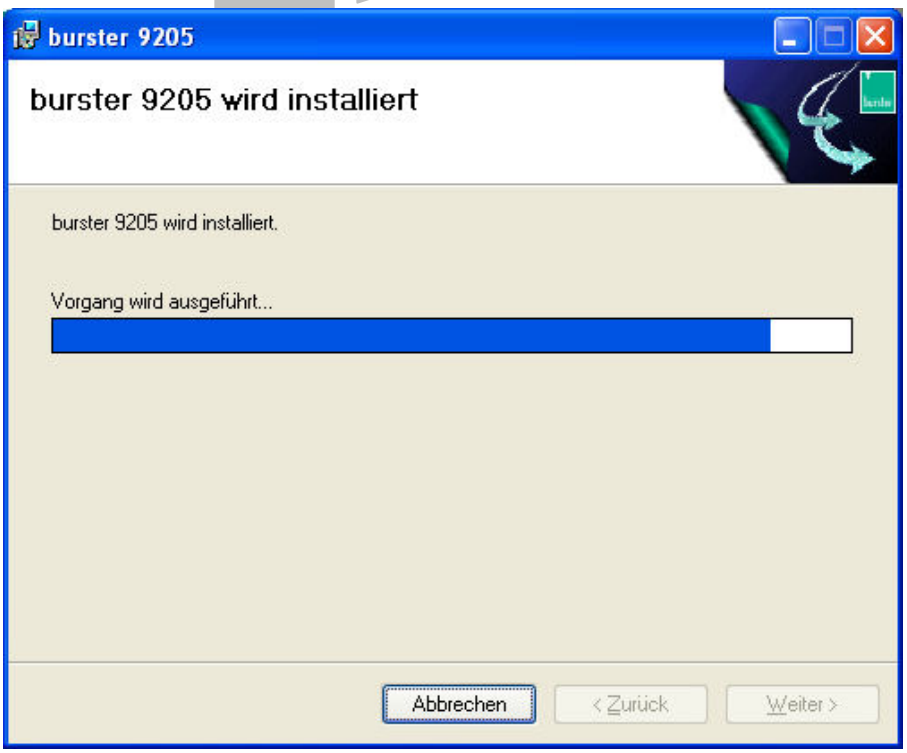
➢ Specify the directory in which you wish to install the software.

You can select your own directory or accept the directory suggested. Also specify which users can use the software.

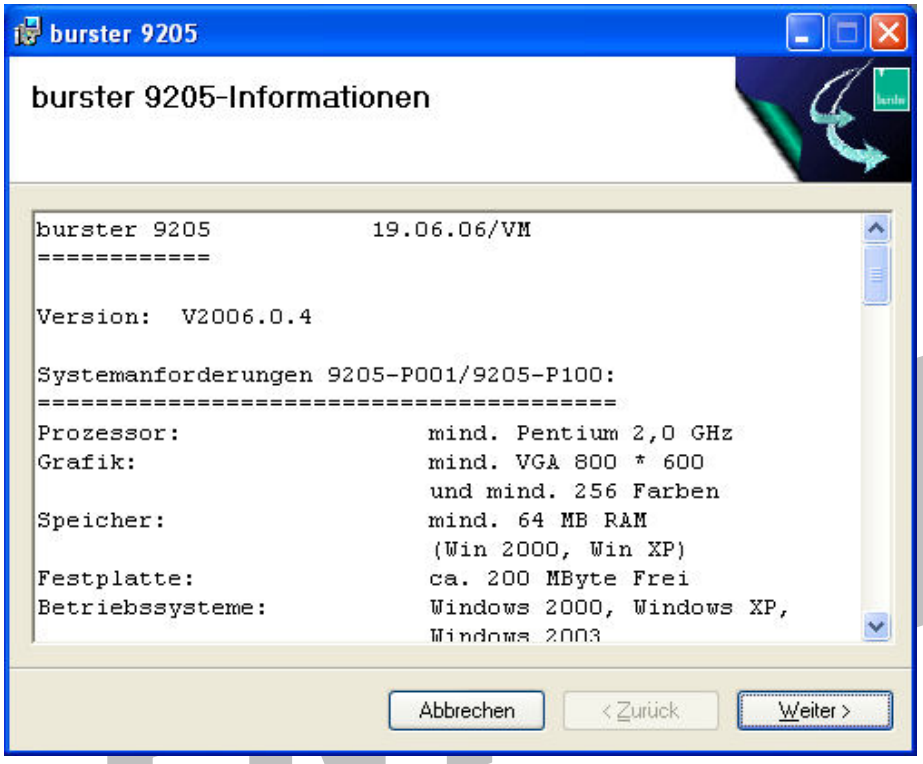
➢ Confirm with "Next".



- To start the installation finally, click on "Next".
  If Microsoft Framework 2.0 is not already installed on the PC, it is installed automatically.

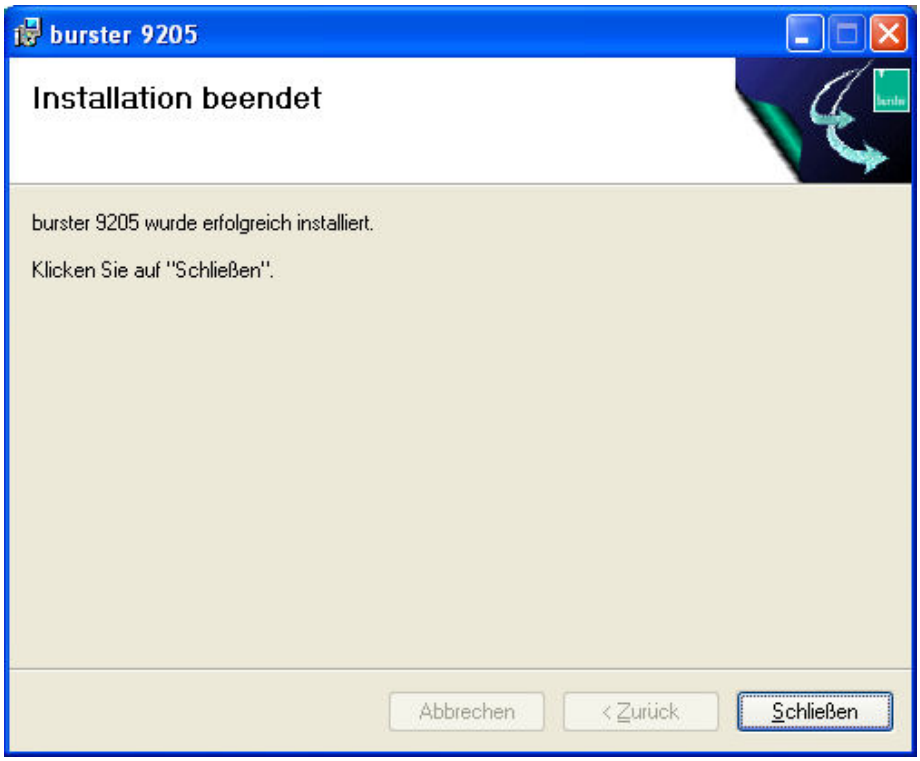


The DigiVision software is now being installed on your system.



This window lists again all relevant information. This information is also held in the file readme.txt, if you need to refer to it again later.

- Confirm with "Next".



The DigiVision configuration and analysis software is now fully installed on your system. Click on "Finish" to close the Setup wizard.

3.6 Driver installation

This guide describes how to install the drivers under Windows 2000. The installation procedure under Windows XP is effectively the same.

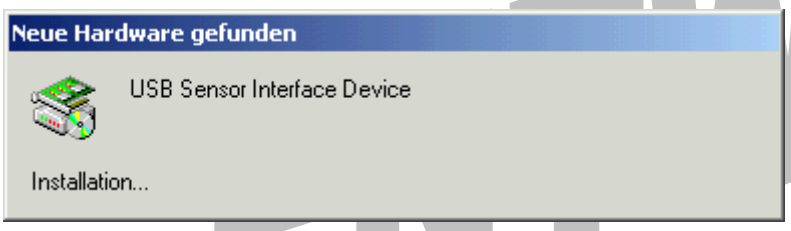
Hinweis:

It is a Windows requirement that you must have Administrator rights to install drivers. Please contact your system administrator if you do not have these rights.

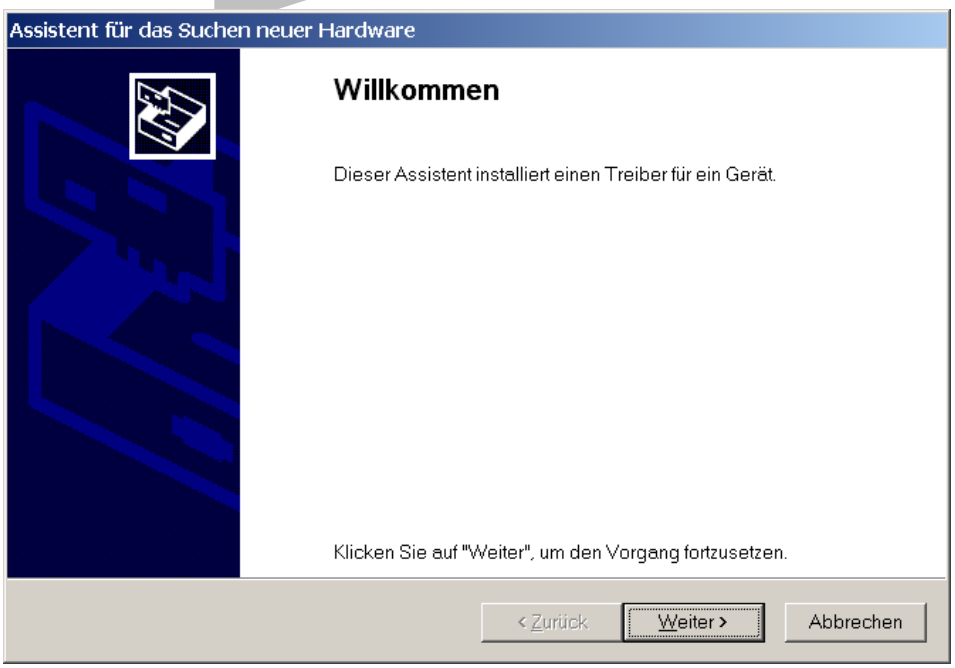
- Plug the type 9205 USB Sensor Interface into a spare USB port of your PC.

  If you are using a USB hub, make sure that this can supply sufficient current. In the multi-channel version, a USB hub is already included in the unit.

  The device is detected automatically.



- Click on "Next" to start the driver installation.



- Let the installation software search for a suitable driver, and confirm with "Next".

- Select "Specify other source" then confirm with "Next".

- Specify the path to the driver installation files.

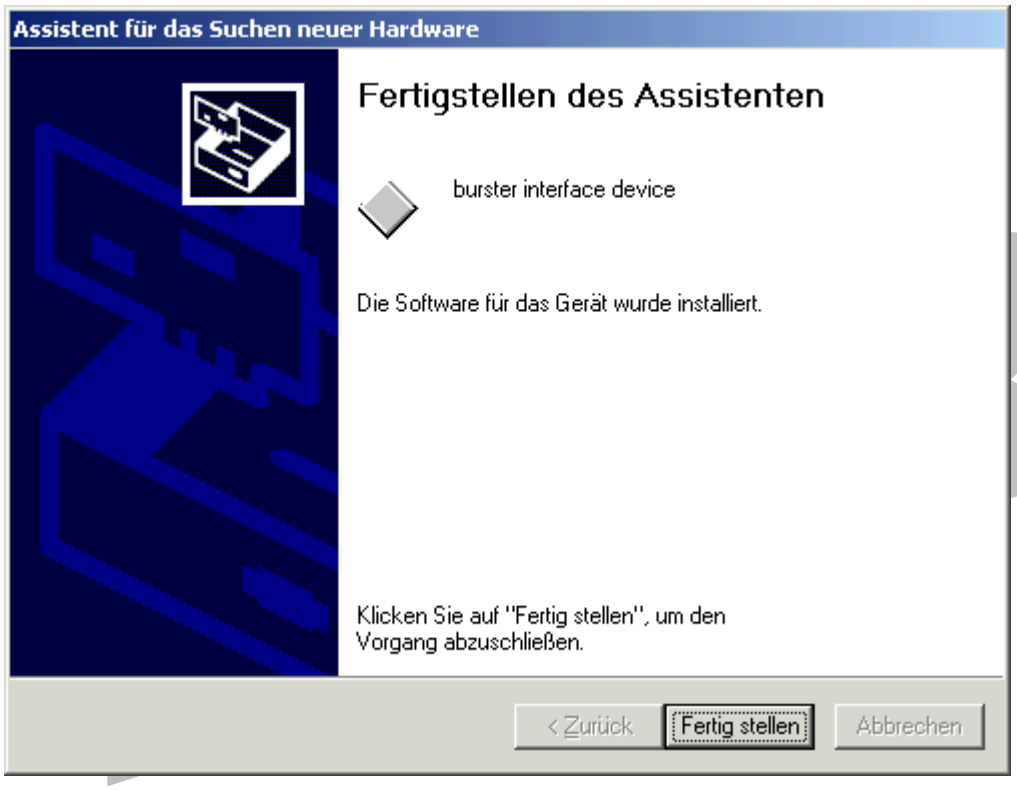
  After installing the DigiVision configuration and analysis software, these files are located in the directory shown at the bottom. You can use the "Browse" button to select the correct directory.

- Confirm your selection with "OK".

If the operating system has found a suitable driver, the path is shown again.

- Confirm this driver with "Next".

The operating system now confirms that the driver for the type 9205 USB Sensor Interface has been installed successfully.

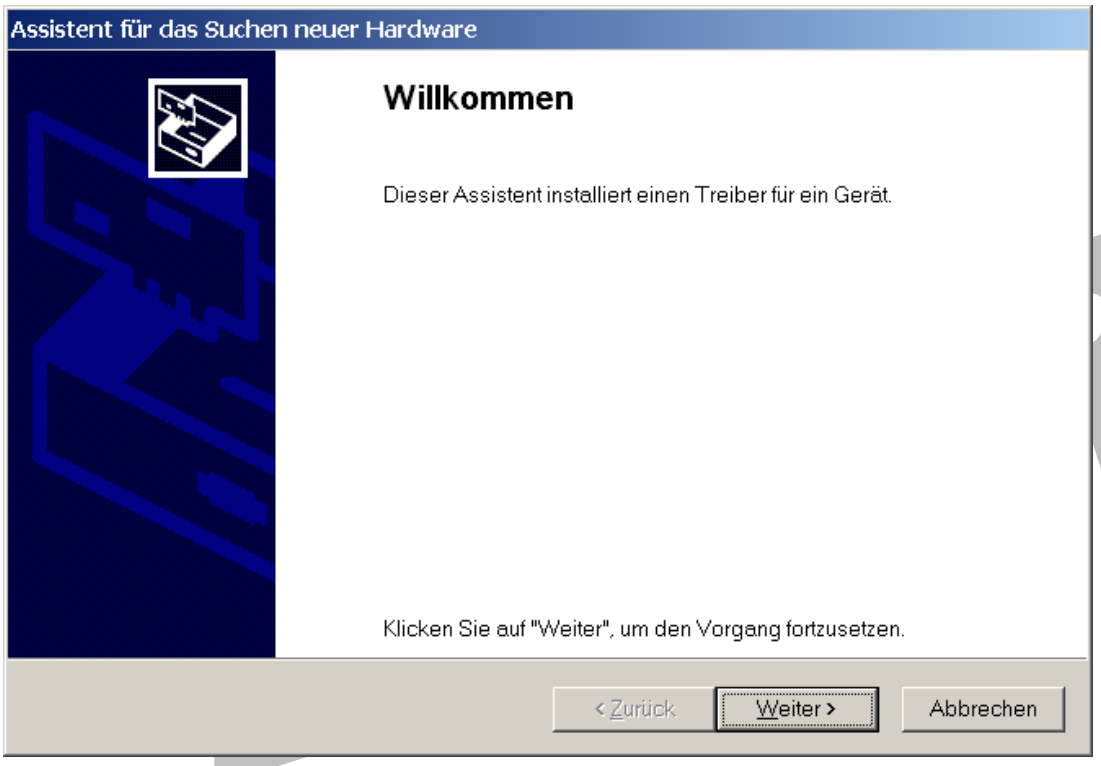


The installation procedure for the virtual COM port then starts.

Once again, the operating system detects the type 9205 USB Sensor Interface.

The wizard for driver installation starts again.

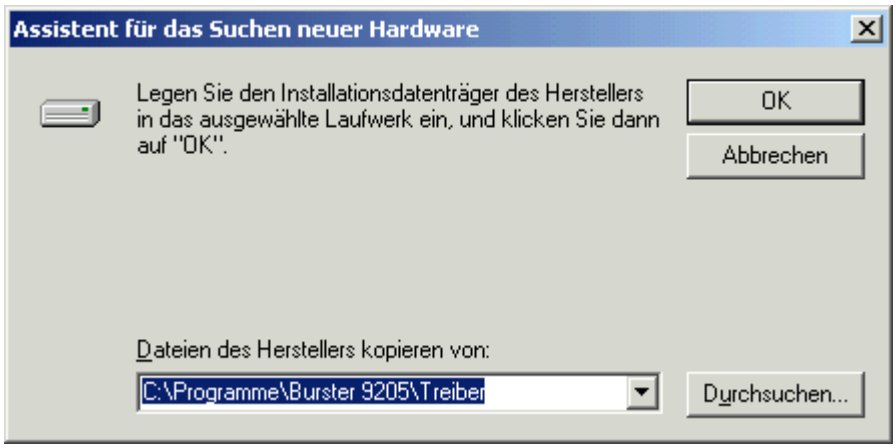
- Confirm with "Next".



- Once again enable the option "Search for a suitable driver", and confirm with "Next".

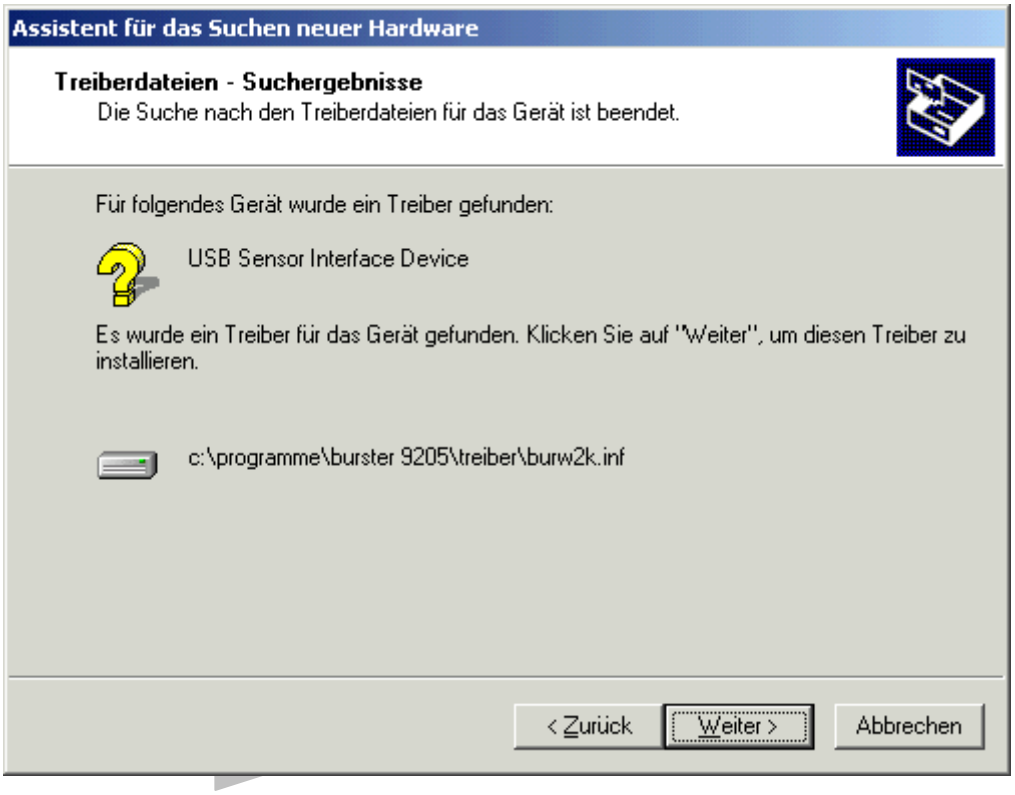
- Select "Specify other source" then confirm with "Next".

- Specify the same file path as in the first part of the installation process and confirm with "OK".



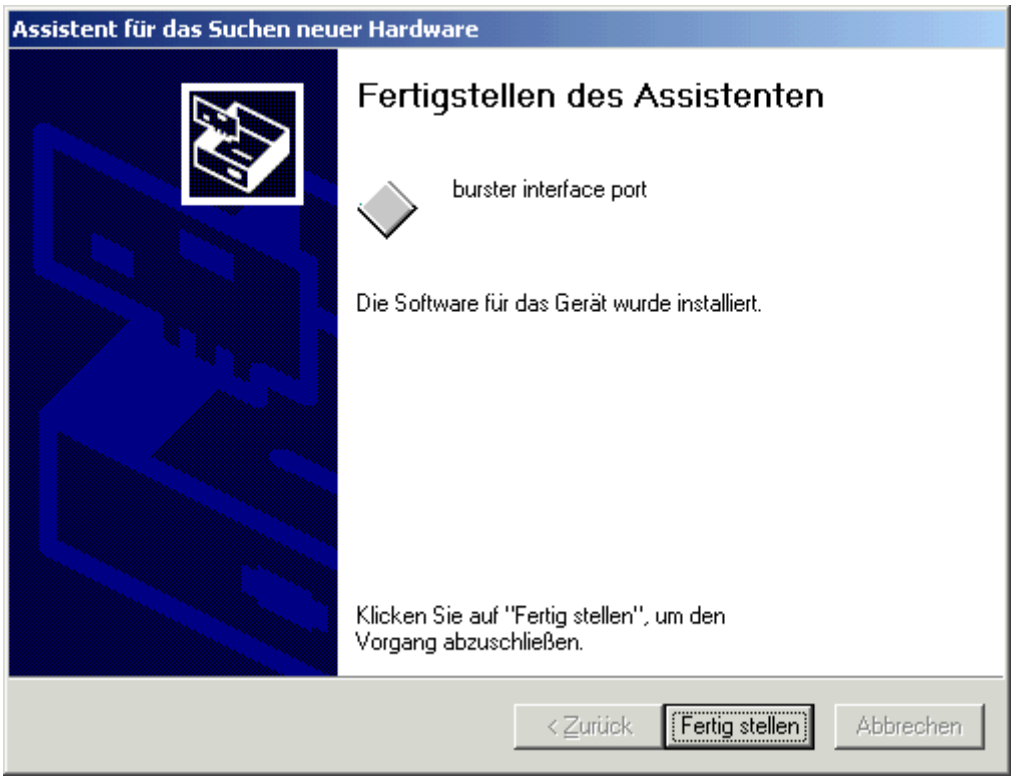
The operating system again confirms the selected path.

➢ Confirm this driver with "Next".



The operating system confirms that the virtual COM port has been installed.

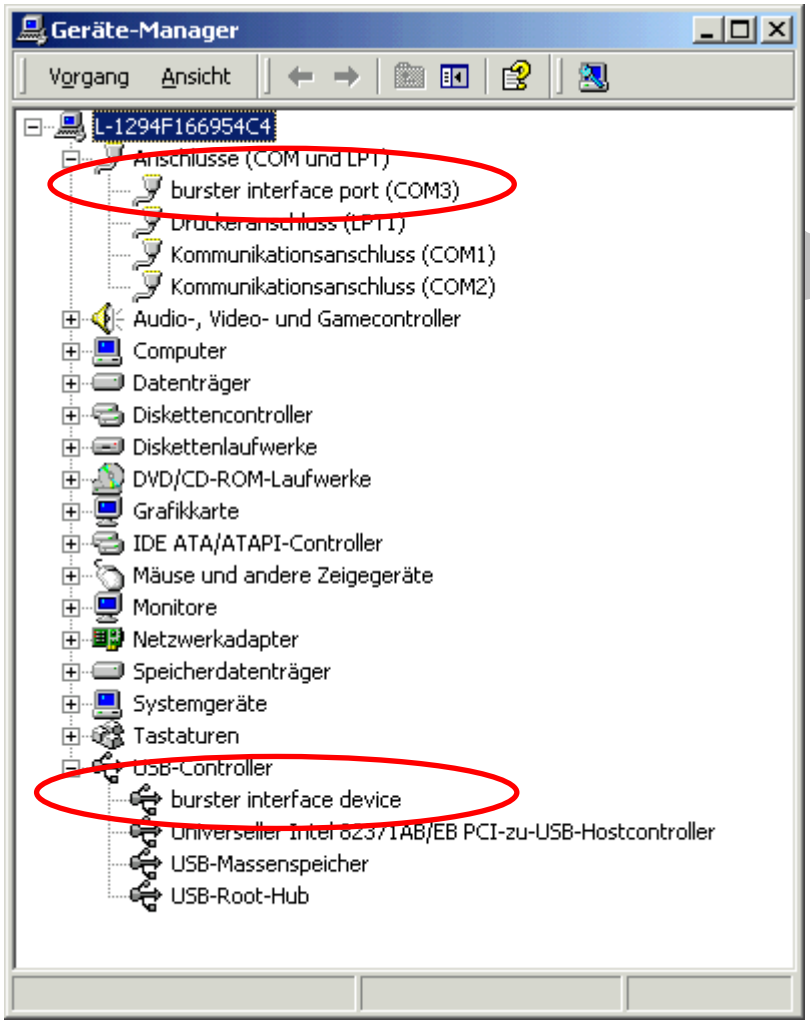
➢ Click on "Finish" to close this window.



You will now find two new devices in the Device Manager. The COM port listed here is now assigned to this type 9205 USB Sensor Interface, and is always visible when the type 9205 USB Sensor Interface is plugged into a USB port.

If you are using more than one type 9205 USB Sensor Interface at the same time on one computer, then each device is assigned a separate COM port. → see 3.5 Driver installation

If a previously installed type 9205 USB Sensor Interface is plugged in again, Administrator rights are no longer needed. It is only when you plug in another type 9205 USB Sensor Interface for the first time that you need Administrator rights again to install it.



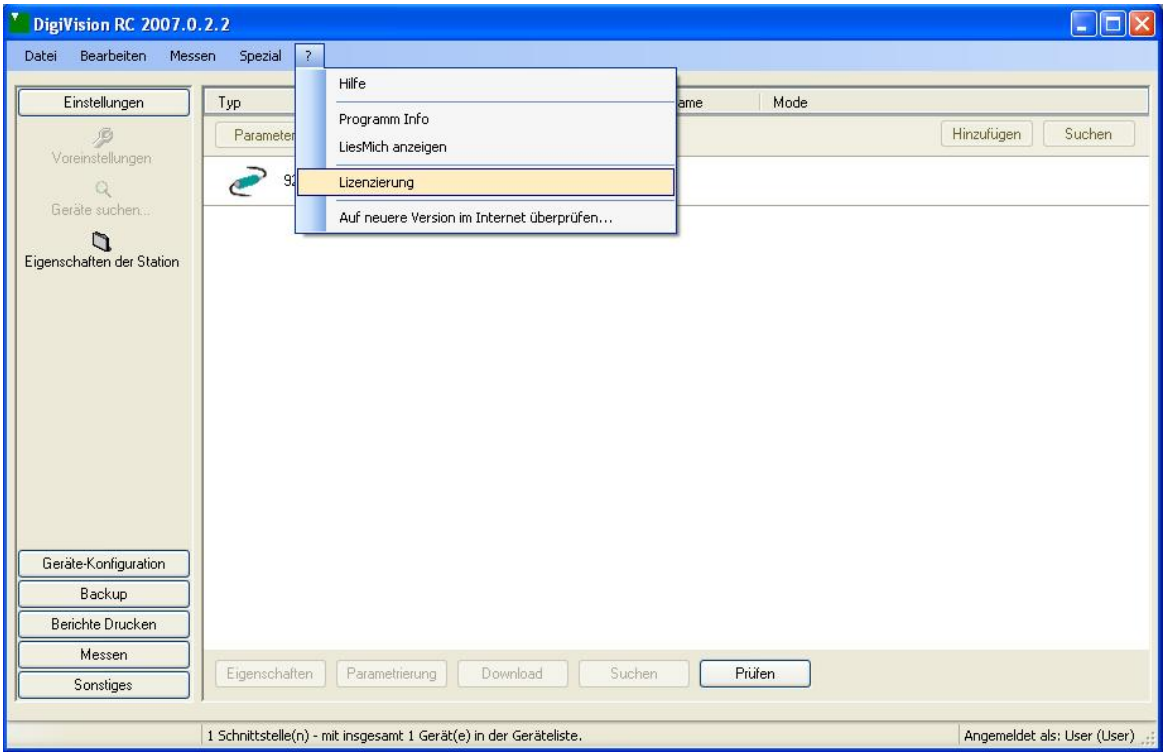
If you wish to connect another type 9205 USB Sensor Interface, then you will need to go through the installation procedure again. The virtual COM port is installed on the basis of the serial number, i.e. you can use the same COM port to drive the type 9205 USB Sensor Interface on any USB port of the PC.

After re-starting the computer, you can now run the burster 9205 configuration and analysis software.

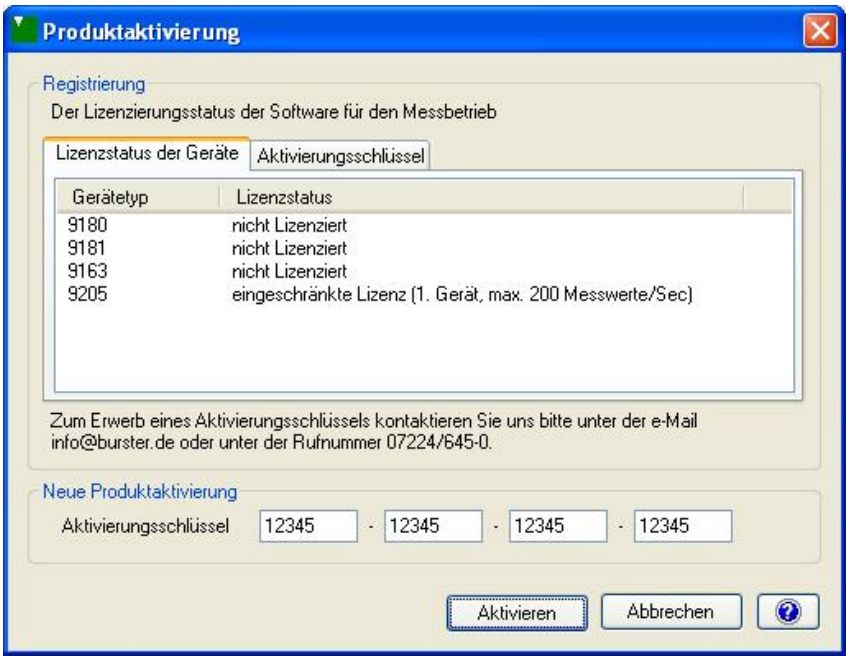
3.7 Software licensing for 9205-P100 multi-channel operation

The multi-channel version, which you can always order subsequently, provides a graphical display facility for up to eight type 9205 USB Sensor Interfaces in parallel. This version also releases the full measurement rate capability of 2500 measurements/second.

To enable the multi-channel version for the 9205 equipment series in DigiVision, follow the steps below:



- After clicking on "**?→Licensing**", enter the license code.



This could look like this:

12345-12345-12345-12345

Make sure that you enter the license code exactly as it appears in your license documents.

- After clicking on "Next", if the license code has been entered correctly then the corresponding device type is enabled.

  If the license code is invalid, the licensing process is terminated.

4. Preparing for use

4.1 Internal signal processing

The A/D converter amplifies and converts the signals according to the design and type of the connected sensor. The A/D converter digitizes all incoming signals with a resolution of 16 bits. The analog multiplexer and A/D converter are controlled by the microprocessor.

The configuration settings, linearization and scaling data etc. required by the microprocessor are saved in an EEPROM to prevent data loss in the event of power failure.

The large signal amplification required for small input signals inevitably means a higher noise component. In order to increase the measurement accuracy in this case, the user can select to use averaging as part of signal conditioning. This method performs arithmetic averaging over a number of measured values. Although this does reduce the measurement rate, the measurement accuracy is increased dramatically. The number of values used to find the average can be set in the range 1 to 256.

4.2 Supply voltage

The type 9205 USB Sensor Interface takes its supply from the USB port of the connected PC or USB hub. In the multi-channel version, power is supplied from an external power supply unit included in the package.

To avoid unnecessary noise on the supply-voltage line of the single-channel devices, we recommend using a dedicated external voltage supply for sensors with high current consumption.

The maximum power consumption of the type 9205 USB Sensor Interface is 0.2 VA.

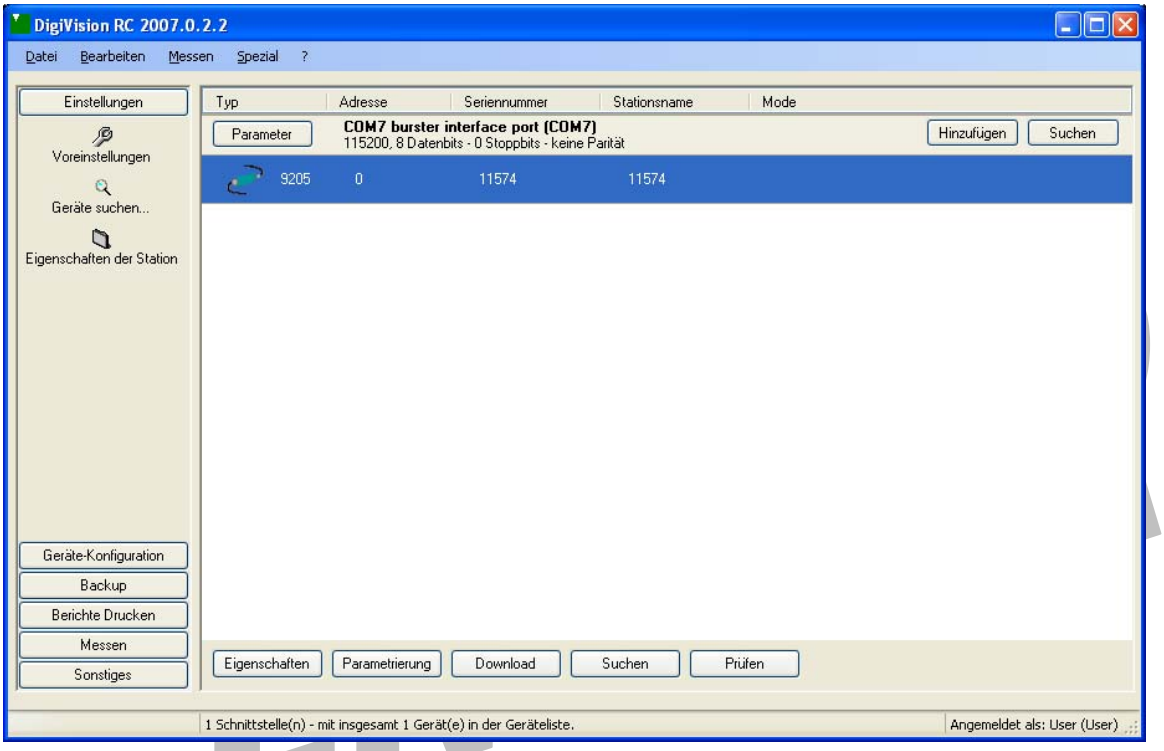
4.3 Calibration using PC software 9205-P001/P100

The PC configuration program “9205-P001/P100” (P100 is the multi-channel version available at extra cost) and a notebook or PC can be used for convenient configuration of the device via the USB port. The "9205-P001" configuration program is held on the CD-ROM included with the device.

You can use this software to:

- Create device configurations offline and online
- Create and reload backups of device configurations
- Print device configurations
- Perform teach-ins of sensor signals
- View measurements in graphical displays
- Make general settings
- Conveniently archive measurement reports
- Export into XLS files

4.4 Device list



You can use the device finder facility to get the computer to detect automatically the type 9205 USB Sensor Interfaces that are connected. All detected devices are displayed.

To display all connected devices:

- After opening the DigiVision software, click on the "Find" button.

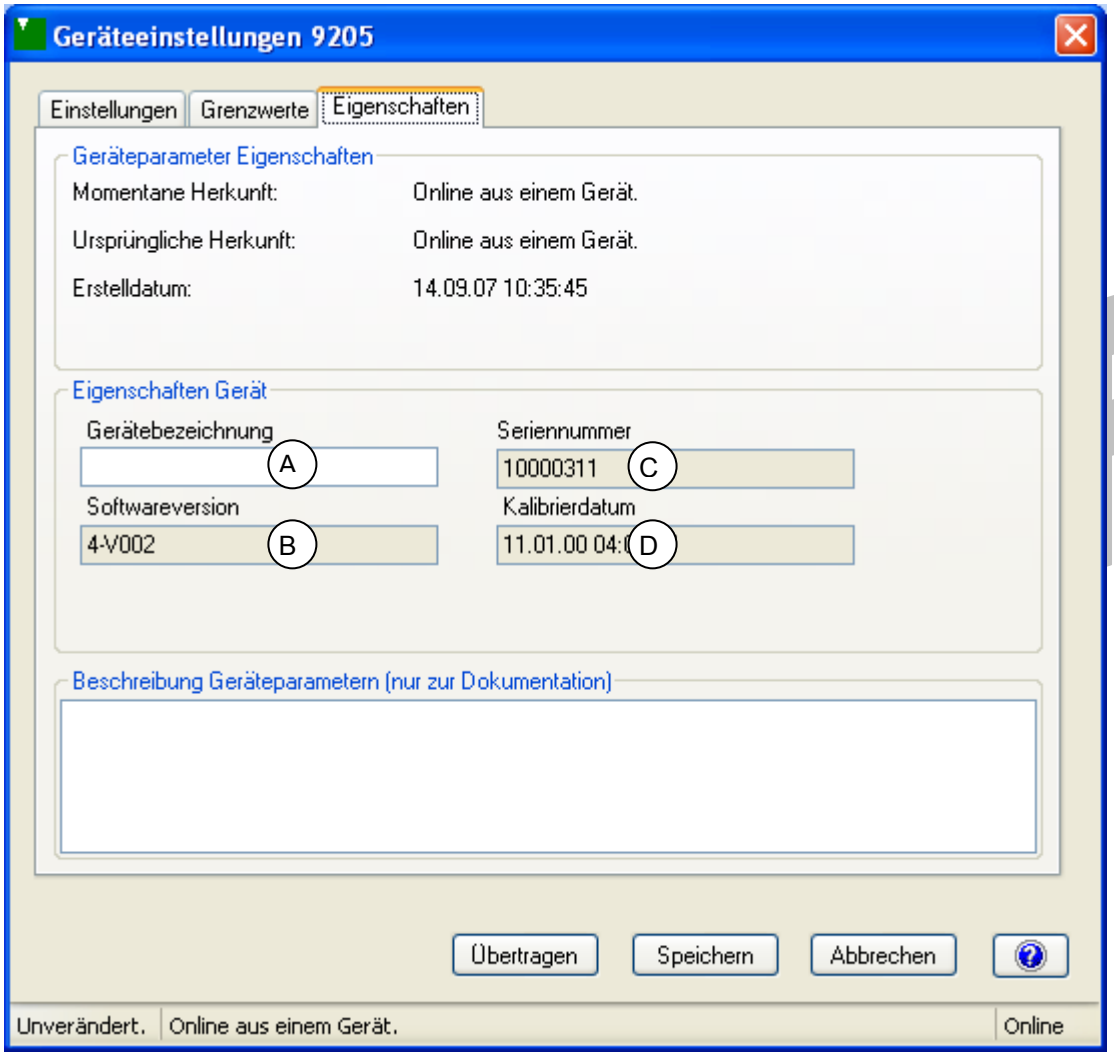
  A list is displayed of all available serial ports present, and a search made for existing devices. Once they have been found, the interfaces are listed under the ports.

4.5 Device settings

Once the devices have been found, the interfaces can be configured as follows:

- Select the interface you wish to configure by clicking on it once
- Click on the "Parameterization" button

  This takes you to the Device Settings page



Device name (A)

You can enter any device name of your choice in this field.

Software version (B)

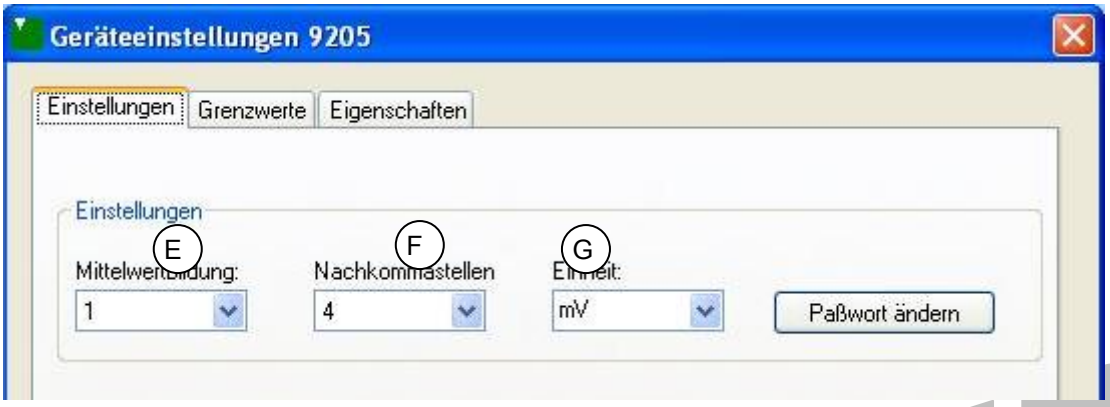
Shows the current software version in the type 9205 USB Sensor Interface

Serial number (C)

This field displays the serial number of the type 9205 USB Sensor Interface currently connected.

Calibration date (D)

The calibration date is updated with the date and time whenever new data is transferred to the type 9205 USB Sensor Interface.



Mean value (E)

The large signal amplification required for small input signals inevitably means a higher noise component. In order to increase the measurement accuracy in this case, the user can select to use averaging as part of signal conditioning. This method performs arithmetic averaging over a number of measured values. Although this does reduce the measurement rate, the measurement accuracy is increased. The number of values used to find the average can be set in the range 1 to 256.

Decimal places (F)

The setting for decimal places refers to the measured value. The number of decimal places can range from 0 to 4. The number of decimal places is permanently set to 4 for calibration values. If the connected sensor supports less than 4 decimal places, trailing zeros can be added to fill the remaining places.

Units (G)

Set here the physical units required for the measurement. If the units that you require are not included in the list, you can also enter these by hand.

The calibration area of the software is described in the following sections.

5. Calibration of strain gage sensors

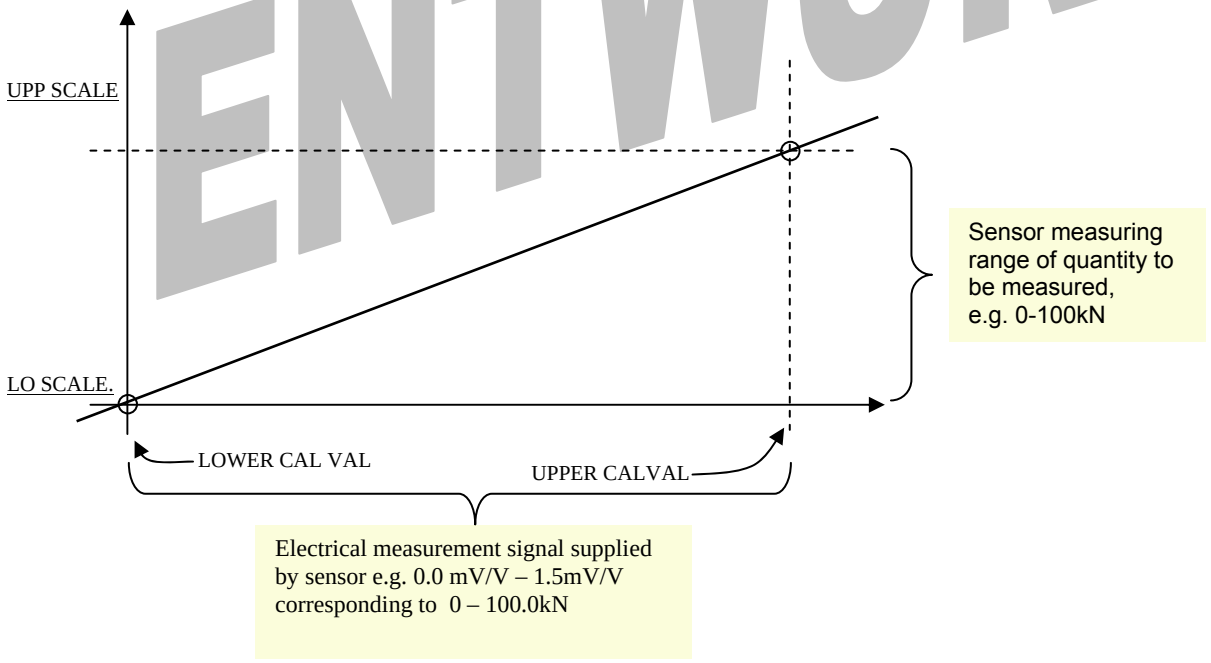
5.1 General information

The type 9205 USB Sensor Interface can be calibrated (scaled) by a choice of methods.

- Calibration using a physical variable
- Calibration by entering data from the sensor test certificate

The following sections describe in greater detail the various calibration and adjustment options.

The calibration procedure is used to define the relationship between the electrical measurement signal from the connected strain gage sensor (lower calibration value, upper calibration value) and the measurement that is to be displayed (lower scale value, upper scale value). It is a simple two-point calibration procedure.



The values are related as follows:

Lower scale value ←→ Lower calibration value

Upper scale value ←→ Upper calibration value

The lower calibration value is the electrical signal from the sensor when the “load” given by the lower scale value is applied (usually the zero point of the sensor). Since the zero point of a strain gage tends to shift from the origin as a result of the way the gage is mounted (components used to transfer the force exert an initial load themselves) or material ageing, the electrical value specified under "zero point" in the sensor test certificate rarely tallies with the value actually measured. We therefore advise that you always perform the teach-in for this value.

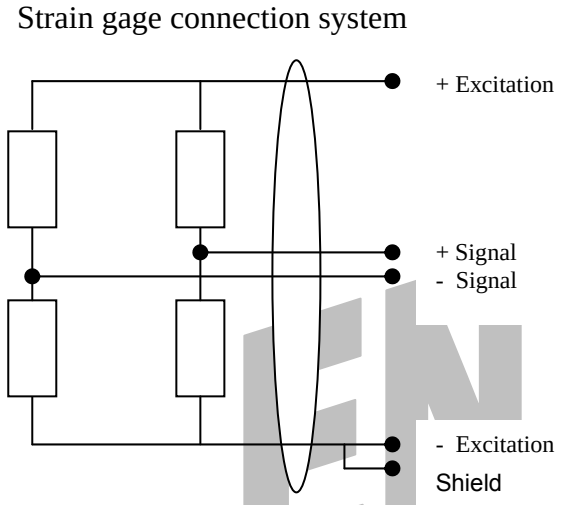
Other terms:

Rated load ➔ Upper scale value
Zero signal ➔ Zero point, zero signal without assembly parts, lower calibration value
Rated output ➔ Output signal at rated load, sensitivity in preferential measurement direction, upper calibration value

5.2 Types of connection

The type 9205 USB Sensor Interface has been developed primarily for use with 350 Ω full-bridge strain-gages. It is also possible, however, to process voltage values in the range ± 5 V in the 9205-V002 version.

4-wire technology



A measuring chain contains a number of components, each contributing to the overall measurement accuracy of the test setup. One can avoid these accuracy problems by using the standard solution of the 6-wire circuit, or by calibrating as a unit the 4-wire circuit as the complete measuring chain.

In most applications, however, the 4-wire connection is quite adequate.

Hinweis:

The 9205-V001 only supports 4-wire technology.

5.3 Calibration using a physical variable by the teach-in method

This method involves a two-stage online teach-in of sensor data to the type 9205 USB Sensor Interface, where two teach-in states are applied sequentially. The first state is the zero point under no load (lower scale value), and the second state is the upper limit (upper scale value).

- Start the software and make sure that the type 9205 USB Sensor Interface is connected correctly and appears in the device list.
- Then click in the left-hand menu bar on "Import parameters from device (online)"

  When you do this, you import the sensor parameters saved in the type 9205 USB Sensor Interface into the configuration software.

  Now you can perform the teach-in to obtain the new sensor parameters.

Perform the teach-in as follows:

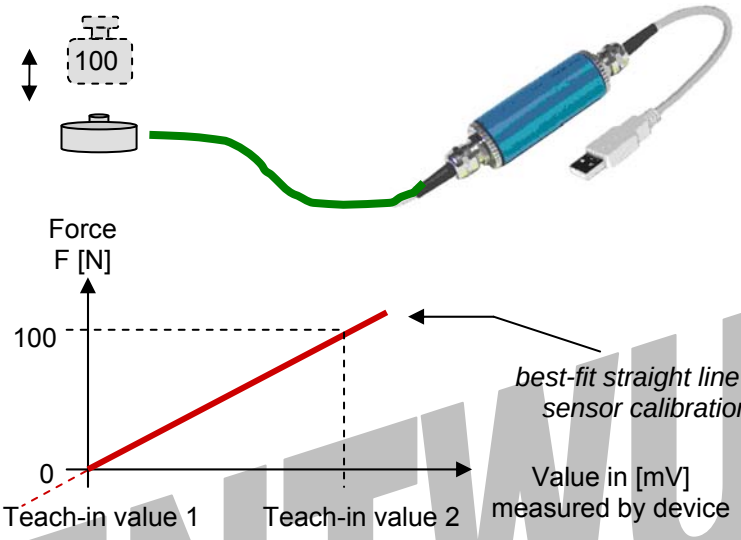
- Remove any load from the load cell to set the zero point, F = 0 N (A). (lower scale value).
- Now enter the lower scale value of the sensor measurement range. This is normally 0.
- Then click on the "*Teach-in lower calibration value*" button (B) and confirm with "OK".
- The lower calibration value now appears in the field (e.g. –0.0130).

  This value is the electrical signal from the sensor when the "load" given by the lower scale value is applied (usually the zero point of the sensor). With strain-gage sensors, the way in which the sensor is mounted (components used to transfer the force, couplings, adapters etc. exert an initial load themselves) or material ageing can often cause a shift in the zero point. This means that the electrical value entered for the zero point in the sensor test certificate rarely agrees with the actual value measured. We therefore advise that you always perform the teach-in for this value.
- Now enter the upper scale value of the sensor measurement range.

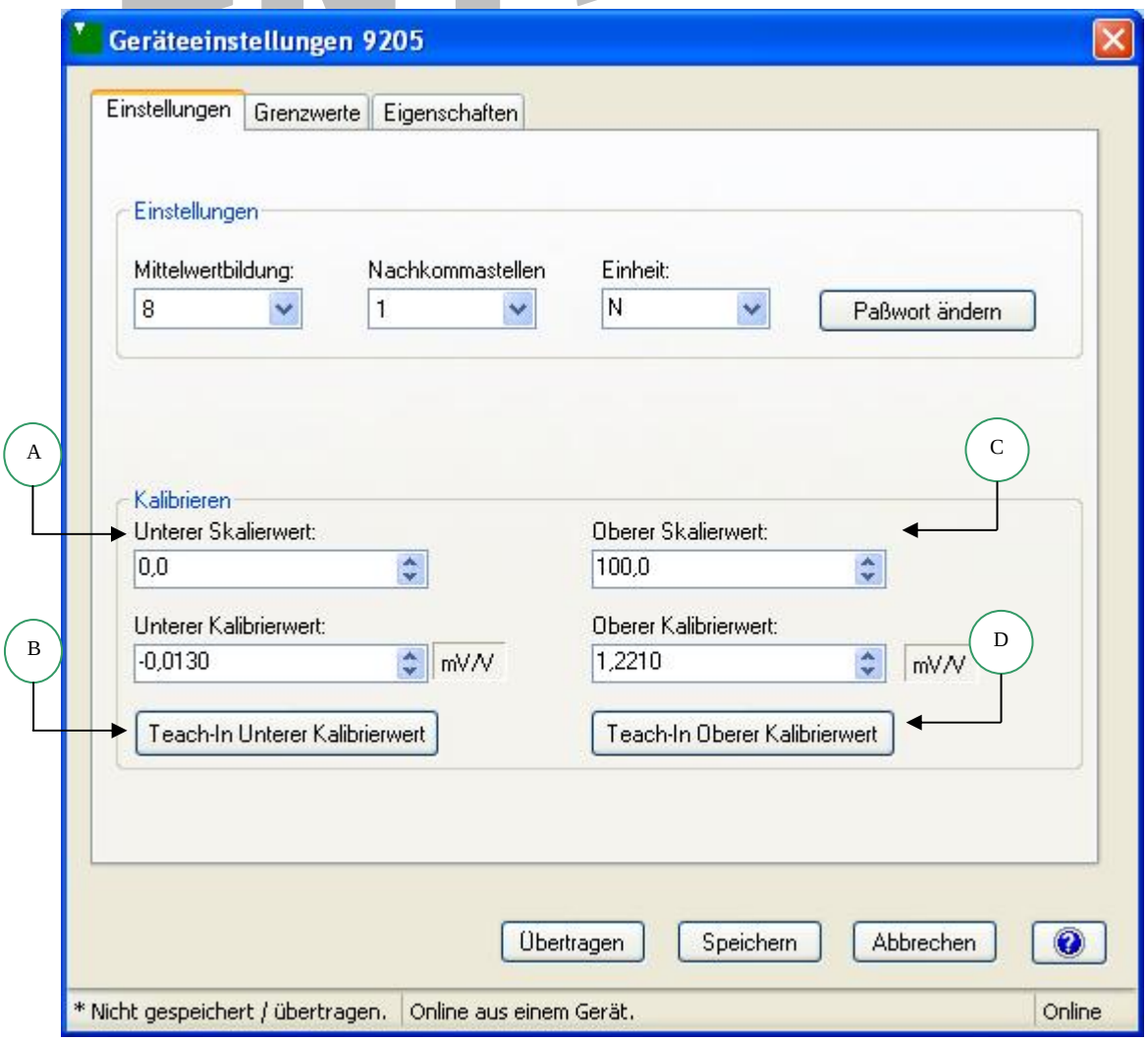
  For load cells, this is usually the rated load of the sensor. In our example the rated load (nominal force) equals 100N.
- Then apply a known reference load to the load cell e.g. F = 100 N (C) to set the upper limit (upper scale value).
- Now press the "*Teach-in upper calibration value*" button (D).
- Then click on "OK".

The value obtained from the teach-in will in practice differ from the theoretical value given in the sensor test certificate. One reason for this may be that the reference load used for the teach-in cannot be 100% accurate.

This can be remedied by entering a corrected value for the rated output of the sensor in the preferential measurement direction. Add the teach-in value for the lower calibration value (–0,0130 in our example) to the rated output of the sensor. This value appears in the sensor test certificate (e.g. 1.2340). Type in the corrected value (1.2340 + (-0,0130) = 1.2210) as the upper calibration value (D).

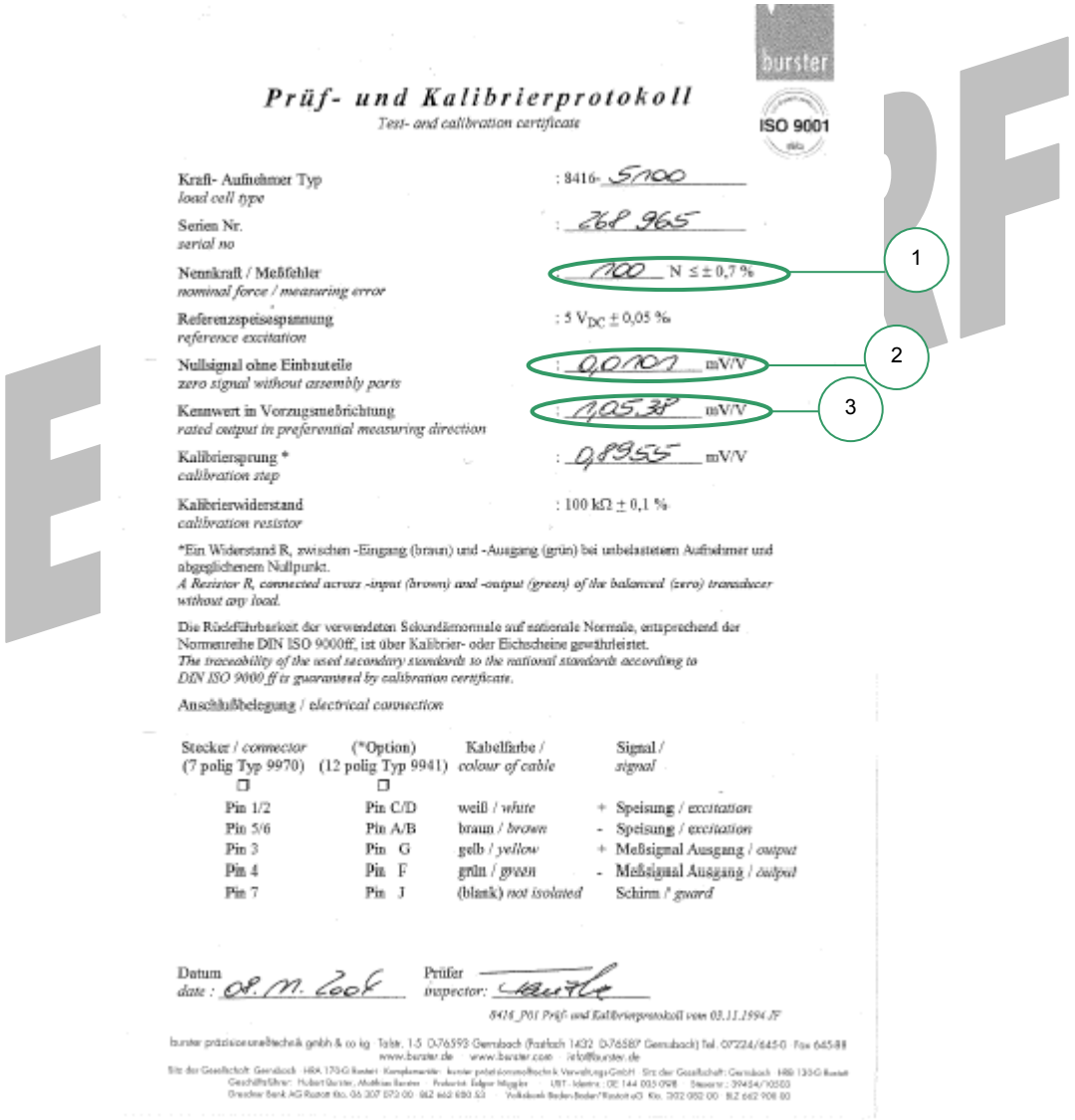


You now need to "*Transfer*" these sensor parameters to the sensor interface; you can also save them in a file.



5.4 Calibration using the sensor test and calibration certificate

This method involves using the test and calibration certificate to enter the sensor data directly in the type 9205 USB Sensor Interface. All necessary calibration data can be found from the sensor test certificate.



Prüf- und Kalibrierprotokoll
Test- and calibration certificate

burster
ISO 9001

Kraft- Aufnehmer Typ / *load cell type* : 8416- 5100

Serien Nr. / *serial no* : 268 965

Nennkraft / Meßfehler / *nominal force / measuring error* 100 N ≤ ± 0,7 % — 1

Referenzspeisespannung / *reference excitation* : 5 V_{DC} ± 0,05 %

Nullsignal ohne Einbauteile / *zero signal without assembly parts* : 0,0101 mV/V — 2

Kennwert in Vorzugsmeßrichtung / *rated output in preferential measuring direction* : 1,0538 mV/V — 3

Kalibriersprung * / *calibration step* : 0,9955 mV/V

Kalibrierwiderstand / *calibration resistor* : 100 kΩ ± 0,1 %

*Ein Widerstand R, zwischen -Eingang (braun) und -Ausgang (grün) bei unbelastetem Aufnehmer und abgeglichenem Nullpunkt.
A Resistor R, connected across -input (brown) and -output (green) of the balanced (zero) transducer without any load.

Die Rückführbarkeit der verwendeten Sekundärnormale auf nationale Normale, entsprechend der Normenreihe DIN ISO 9000ff, ist über Kalibrier- oder Eichscheine gewährleistet.
The traceability of the used secondary standards to the national standards according to DIN ISO 9000 ff is guaranteed by calibration certificate.

Anschlußbelegung / *electrical connection*

Stecker / *connector* (7 polig Typ 9970)	(*Option) (12 polig Typ 9941)	Kabelfarbe / *colour of cable*	Signal / *signal*
Pin 1/2	Pin C/D	weiß / *white*	+ Speisung / *excitation*
Pin 5/6	Pin A/B	braun / *brown*	- Speisung / *excitation*
Pin 3	Pin G	gelb / *yellow*	+ Meßsignal Ausgang / *output*
Pin 4	Pin F	grün / *green*	- Meßsignal Ausgang / *output*
Pin 7	Pin J	(blank) *not isolated*	Schirm / *guard*

Datum / *date* : 08.11.2006 Prüfer / *inspector*:

8416_P01 Prüf- und Kalibrierprotokoll vom 03.11.1994 JF

About the values:

① This value is adopted directly from the test and calibration certificate.

Formula for calculating the upper calibration value:

Rated output + (zero signal without assembly parts) = upper calibration value

This method is a two-point calibration of the sensor data for the type 9205 USB Sensor Interface, with two points being entered one after the other. The first point is the zero point without load (lower scale value), and the second point is the upper limit (upper scale value).

- Start the software and make sure that the type 9205 USB Sensor Interface is connected correctly and appears in the device list.
- Then click in the left-hand menu bar on "Import parameters from device (online)" When you do this, you import the sensor parameters saved in the type 9205 USB Sensor Interface into the configuration software.

  Now you can enter the new sensor parameters.

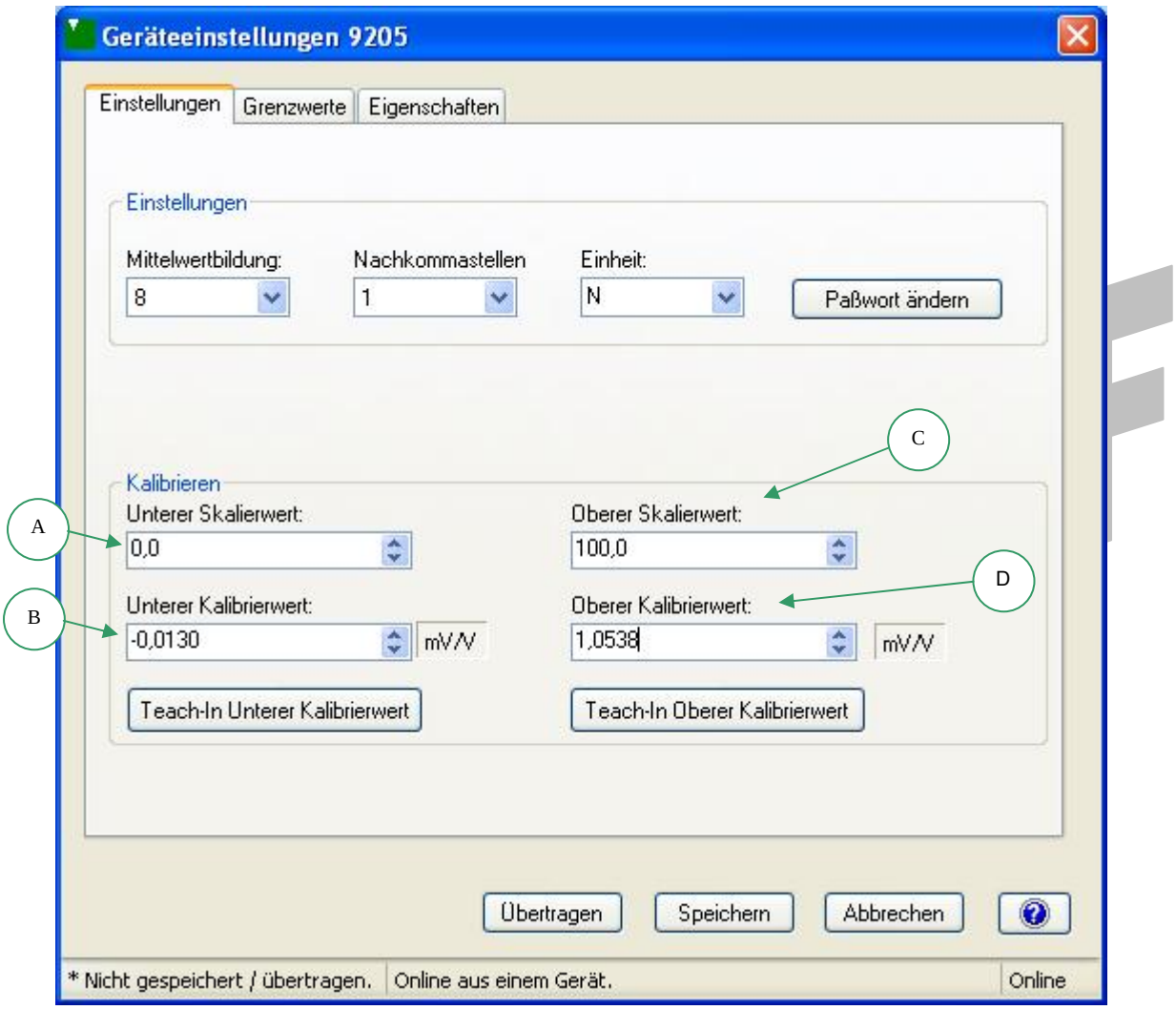
To do this, follow these steps ➔

- Remove any load from the load cell to set the zero point, F = 0 N (A) (lower scale value).
- Now enter the lower scale value of the sensor measurement range.

  This is normally "0".
- Then click on the "*Teach-in lower calibration value*" button and confirm with "OK".
- The lower calibration value (B) now appears in the field (e.g. -0.0130).

  This value is the electrical signal from the sensor when the "load" given by the lower scale value is applied (usually the zero point of the sensor). With strain-gage sensors, the way in which the sensor is mounted (components used to transfer the force, couplings, adapters etc. exert an initial load themselves) or material ageing can often cause a shift in the zero point. This means that the electrical value entered for the zero point in the sensor test certificate rarely agrees with the actual value measured. We therefore advise that you always perform the teach-in for this value.
- Now enter the upper scale value (C) of the sensor measurement range.
- For load cells, this is usually the rated load of the sensor. In our example the rated load (nominal force) equals 100 N.
- Now you need to enter a corrected value for the rated output of the sensor in the preferential measurement direction. Add the teach-in value for the lower calibration value (-0.0130 in our example) to the rated output of the sensor.

  This value appears in the sensor test certificate (e.g. 1.2340). Type in the corrected value (1.234 + (-0,0130) = 1.2210) as the upper calibration value (D)
- You now need to "*Transfer*" these sensor parameters to the sensor interface; you can also save them in a file.


Geräteeinstellungen 9205
Einstellungen
Grenzwerte
Eigenschaften
Einstellungen
Mittelwertbildung:
8
Nachkommastellen
1
Einheit:
N
Paßwort ändern
Kalibrieren
Unterer Skalierwert:
0,0
Oberer Skalierwert:
100,0
Unterer Kalibrierwert:
-0,0130
mV/V
Oberer Kalibrierwert:
1,0538
mV/V
Teach-In Unterer Kalibrierwert
Teach-In Oberer Kalibrierwert
Übertragen
Speichern
Abbrechen
* Nicht gespeichert / übertragen.
Online aus einem Gerät.
Online
A
B
C
D

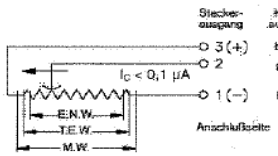
6. Calibration of potentiometric position sensors

Calibration is necessary in order to define the relationship between the electrical signals measured by the connected sensors and the measured values to be displayed. A two-point calibration procedure is used here. Normally the sensors have a test and calibration certificate containing details of the electrical signals.

The typical certificate might look like the example shown below, where the most important values are highlighted. Measurements using a calibrated gage block have proved to be the most straightforward and practical way of calibrating systems that measure position and length (such as potentiometric position sensors). Potentiometric angle sensors can also be connected.

Prüf- und Kalibrierprotokoll

Test- and Calibration Certificate



Potentiometrischer Wegtaster

Potentiometric displacement sensor

Typ / *Type* : **8712-100**

Serien-Nr. / *Serial no.* : **8705121581**

ISO 9001

Messweg (Elektrischer Nutzweg)	/ *Range (useful electrical stroke)*	*E.N.W.*	: **100 mm + 1 / - 0 mm**
Theoretischer elektrischer Weg	/ *Theoretical electrical stroke*	*T.E.W.*	: **E.N.W + 1 mm ± 1 mm**
Mechanischer Weg	/ *Mechanical stroke*	*M.W.*	: **E.N.W + 5 mm**
Maximal zulässige Speisespannung	/ *Maximum applicable voltage*	U_{max}	: **≤ 50 V_{DC}**
Anschlusswiderstand	/ *Connecting resistance*	$R_{E.N.W.}$	: **5 kΩ ± 20 %**
Empfohlener Strom im Schleiferkreis	/ *Recommended cursor current*	I_C	: **< 0,1 µA**
Fehlergrenze (Linearitätsabweichung)	/ *Error limit (Independent linearity)*	f_{lin}	: **± 0,1 % v.E. / FS** (innerhalb E.N.W / *within E.N.W.*)
Isolationswiderstand	/ *Electrical isolaton*	R_{iso}	: **> 100 MΩ**
Arbeitstemperaturbereich	/ *Operating Temperature range*	t_A	: **-30 ... 100 °C**
Temperaturkoeffizient	/ *Temperature Coefficient*	*TK*	: **< 1,5 ppm/K**
Verstellgeschwindigkeit	/ *Displacement speed*		: **≤ 10 m/s**
Schutzart (nach)	/ *Grade of Protection (according to)*		: **IP40** (DIN VDE 0470 / EN 60 529 / IEC 529)
Validiert nach Prüfanweisung	/ *Validated according to Inspection Instruction*		: **417**

Die Rückführbarkeit der verwendeten Sekundärnormale auf nationale bzw. internationale Normale, entsprechend der Normenreihe DIN EN ISO 9000 ff, ist über Kalibrier- oder Eichscheine gewährleistet. Die verwendeten Normale sind auf Kalibrierlaboratorien rückführbar, die nach ISO/IEC 17025 akkreditiert sind.

The traceability of the used secondary standards to the national respectively international standards, according to DIN EN ISO 9000 ff, is guaranteed by Calibration certificate. The used standards are traceable to calibration laboratories, which are accredited to ISO/IEC 17025.

Das Produkt erfüllt die im Datenblatt angegebenen Spezifikationen.
The device performs the specifications mentioned in the data sheet.

Nach der vorliegenden Erfahrung ist es empfehlenswert, das Produkt im Abstand von etwa 24 Monaten neu zu kalibrieren. */ According to our experience it is recommended to recalibrate this product in intervals of 24 months.*

Anschlussbelegung:	**Steckertyp / *Connector model***
	9991
Signal	/ ***Signal***
+ Speisung	/ *Excitation* 3
- Speisung /Signal	/ *Excitation* 1
+ Ausgangssignal	/ *Output* 2

Raumtemperatur / *Ambient temperatur* : 23 °C ± 3 K Rel. Feuchte / *Relative humidity* : 50 % ± 20 %

Datum / *Date* :

Protokoll erstellt durch / *Certificate written by* :

6.1 Calibration of a potentiometer by the teach-in method

This method involves a two-stage online teach-in of sensor data to the type 9205 USB Sensor Interface, where two teach-in states are applied sequentially.

The first state is the lower scale value, and the second state is the upper scale value.

- Start the software and make sure that the type 9205 USB Sensor Interface is connected correctly and appears in the device list.
- Then click in the left-hand menu bar on "Import parameters from device (online)"

  When you do this, you import the sensor parameters saved in the type 9205 USB Sensor Interface into the configuration software.

Now you can perform the teach-in to obtain the new sensor parameters.

To do this, follow the steps below:

Position measurement using the example of a potentiometric position sensor type 8712-100:

Set the position sensor to the zero position 0.00 mm. Usually this is when the sliding shaft of the sensor is fully pushed in, but there may be slight differences between the mechanical and electrical zero points.

- Now enter the lower scale value (A) of the sensor measurement range.

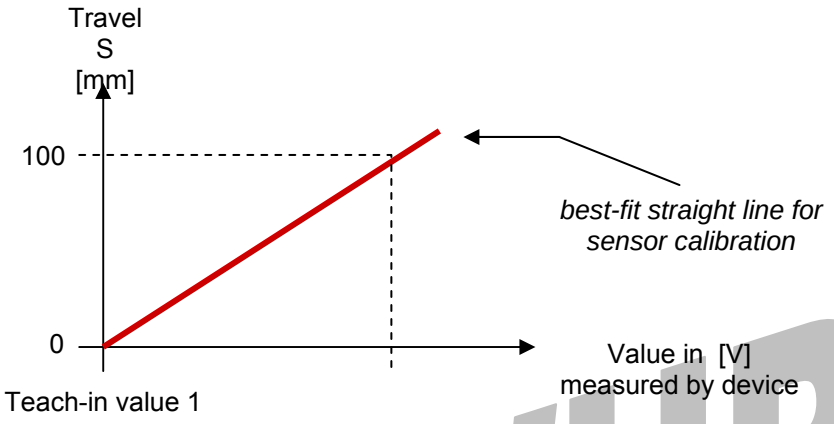
  Usually this will be the lower range value of the sensor, e.g. 0.00 mm.
- Now press button (B) "*Teach-in lower calibration value*".

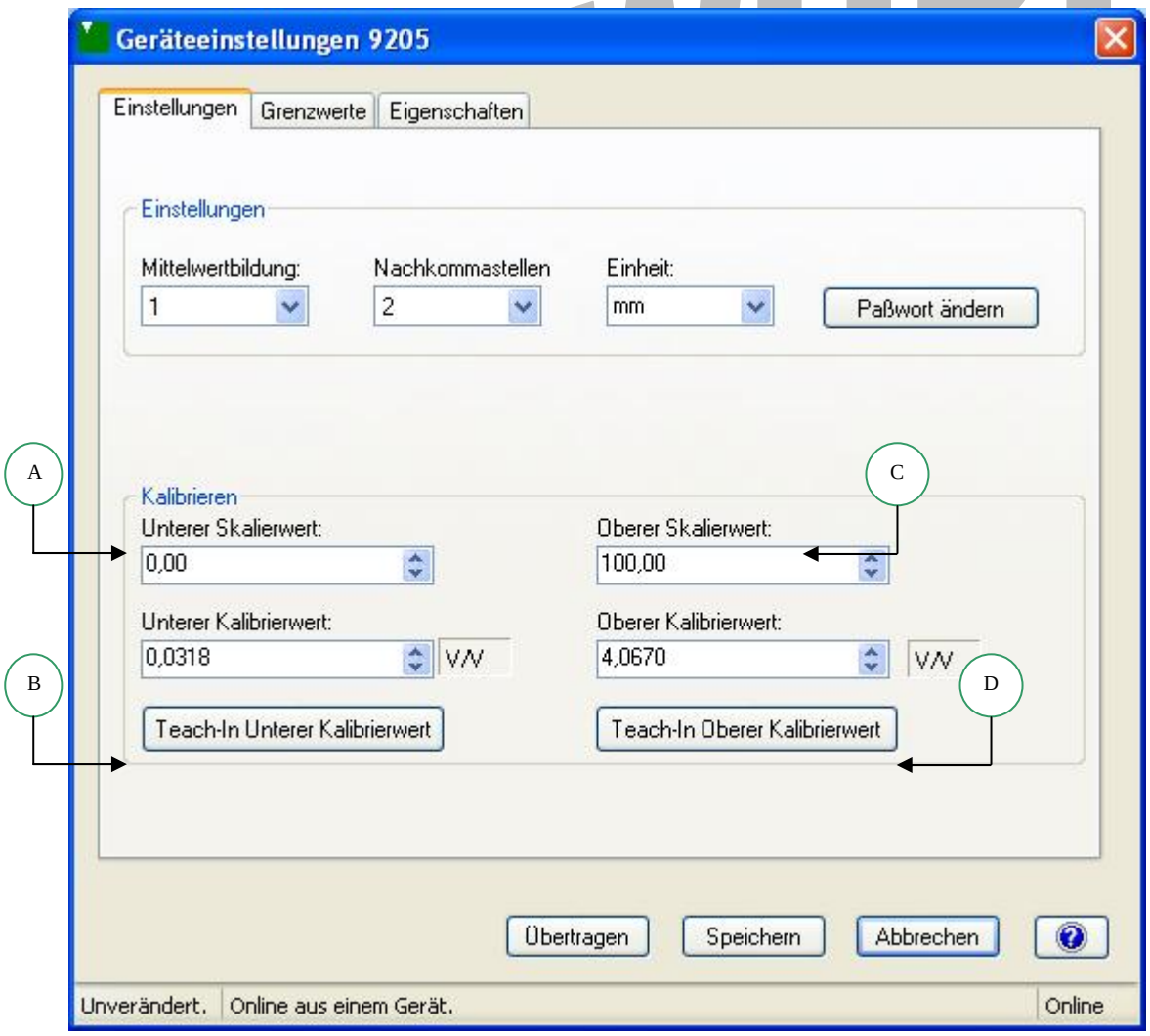
  The value of the voltage at the input of the USB Sensor Interface appears in the field as the lower calibration value.
- Now enter the upper scale value (C) of the sensor measurement range, e.g. 100.00 mm.
- Now move the sliding shaft using a calibrated gage block to S = 100 mm to set the upper scale value.
- Now press button (D) "*Teach-in upper calibration value*".

  The value of the voltage at the input of the USB Sensor Interface appears in the field as the lower calibration value.

In our example we have specified "2" decimal places.

- You now need to "*Transfer*" these sensor parameters to the sensor interface; you can also save them in a file.


Travel
S
[mm]
100
0
Teach-in value 1
best-fit straight line for
sensor calibration
Value in [V]
measured by device


Geräteeinstellungen 9205
Einstellungen
Grenzwerte
Eigenschaften
Einstellungen
Mittelwertbildung:
1
Nachkommastellen
2
Einheit:
mm
Paßwort ändern
A
B
C
D
Kalibrieren
Unterer Skalierwert:
0,00
Oberer Skalierwert:
100,00
Unterer Kalibrierwert:
0,0318
V/V
Oberer Kalibrierwert:
4,0670
V/V
Teach-In Unterer Kalibrierwert
Teach-In Oberer Kalibrierwert
Übertragen
Speichern
Abbrechen
Unverändert.
Online aus einem Gerät.
Online

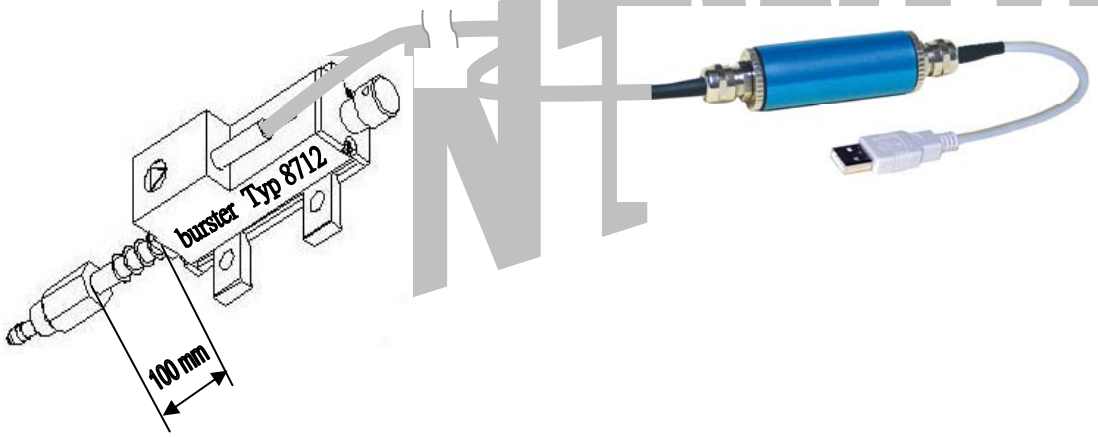
6.2 Sensor excitation voltage

The maximum applicable sensor excitation voltage for the potentiometric position sensors is given in the test and calibration certificate. To enable practical measurements, choose the terminal with the 4V excitation voltage. The maximum measurement signal output from potentiometers to the type 9205 USB Sensor Interface is always the excitation voltage.

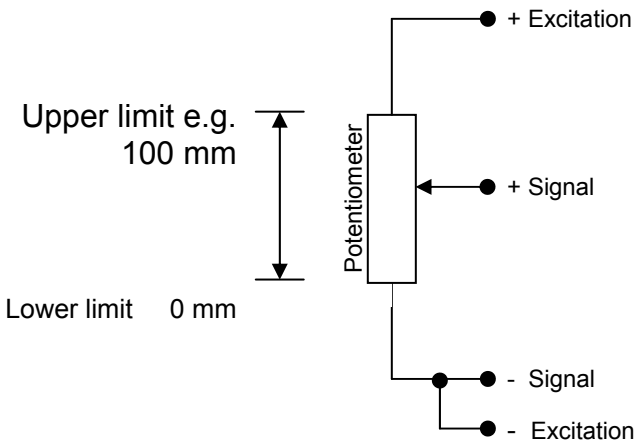
6.3 Connection

The connector-pin numbering for the potentiometric position sensor is given in the test and calibration certificate.

Diagram showing physical connection



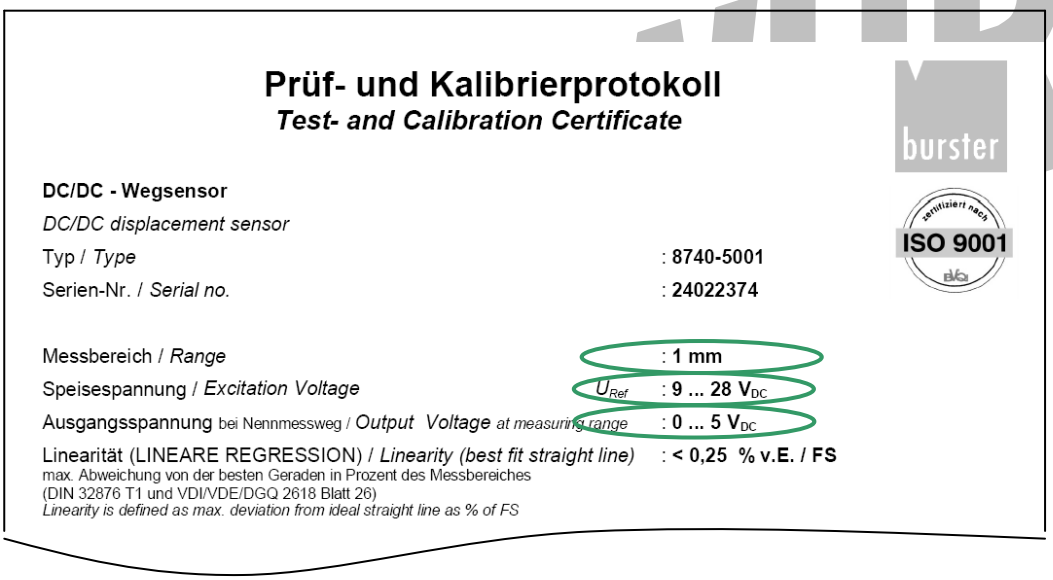
Circuit diagram



7. Calibration of transmitters or sensors having a standard signal output

Calibration is necessary in order to define the relationship between the electrical signals measured by the connected sensors and the measured values to be displayed. A two-point calibration procedure is used here. Normally the sensors have a test and calibration certificate containing details of the electrical signals.

The typical certificate might look like the example shown below, where the most important values are highlighted.



Prüf- und Kalibrierprotokoll
Test- and Calibration Certificate

burster

zertifiziert nach ISO 9001

DC/DC - Wegsensor
DC/DC displacement sensor

Typ / *Type*		: **8740-5001**
Serien-Nr. / *Serial no.*		: **24022374**
Messbereich / *Range*		: **1 mm**
Speisespannung / *Excitation Voltage*	U_{Ref}	: **9 ... 28 V_{DC}**
Ausgangsspannung bei Nennmessweg / *Output Voltage at measuring range*		: **0 ... 5 V_{DC}**
Linearität (LINEARE REGRESSION) / *Linearity (best fit straight line)*		: **< 0,25 % v.E. / FS**

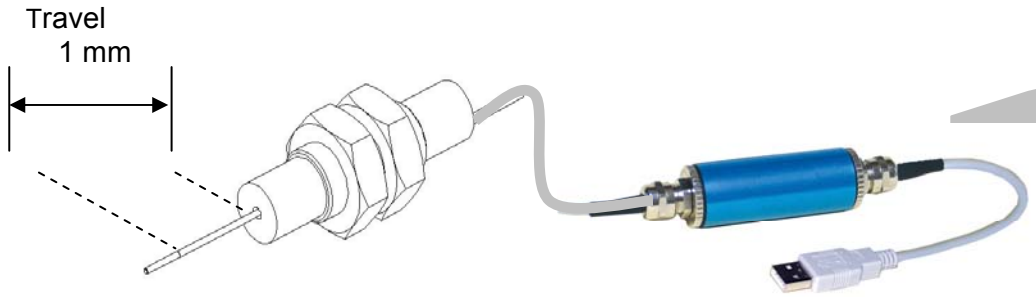
max. Abweichung von der besten Geraden in Prozent des Messbereiches
(DIN 32876 T1 und VDI/VDE/DGQ 2618 Blatt 26)
Linearity is defined as max. deviation from ideal straight line as % of FS

7.1 Connection

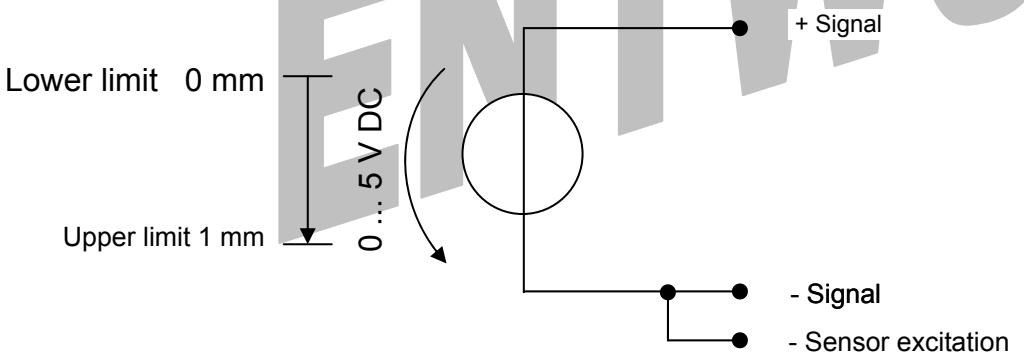
The connector-pin numbering for the sensor is given in the test and calibration certificate.

Diagram showing physical connection:

e.g. Position sensor type 8740-5001



Circuit diagram



7.2 Sensor excitation voltage

The type 9205 USB Sensor Interface provides excitation voltages of 4 V or 12 V for sensors and transmitters. You can find out which of these two excitation voltages is the right voltage for your transmitter or sensor by looking at the test and calibration certificate for the transmitter/sensor.

Hinweis:

Please note that the sensor must not draw a current greater than 20 mA, otherwise there could be problems with the USB.

7.3 Input range

The measurement signal from the transmitter to be connected, or the standard signal, must lie in the specified range of ± 5 V.

7.4 Calibration of a transmitter having a voltage output using the teach-in method

This method involves a two-stage online teach-in of sensor data to the type 9205 USB Sensor Interface, where two teach-in states are applied sequentially.

The first state is the lower scale value, and the second state is the upper scale value.

- Start the software and make sure that the type 9205 USB Sensor Interface is connected correctly and appears in the device list.
- Then click in the left-hand menu bar on "Import parameters from device (online)" When you do this, you import the sensor parameters saved in the type 9205 USB Sensor Interface into the configuration software.

  Now you can perform the teach-in to obtain the new sensor parameters.

To do this, follow the steps below:

Position measurement using the example of a potentiometric position sensor type 8740-5001.

Set the position sensor to the zero position 0.00 mm. Usually this is when the sliding shaft of the sensor is fully extended, but there may be slight differences between the mechanical and electrical zero points.

- Now enter the lower scale value (A) of the sensor measurement range.

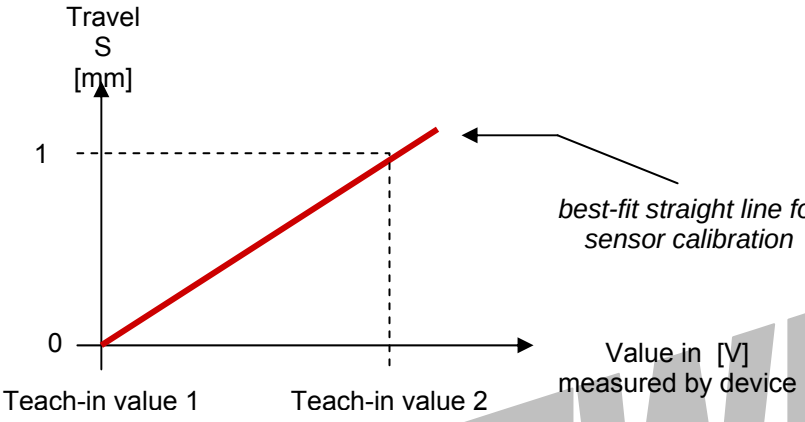
  Usually this will be the lower range value of the sensor, e.g. 0.00 mm.
- Now press button (B) "*Teach-in lower calibration value*".

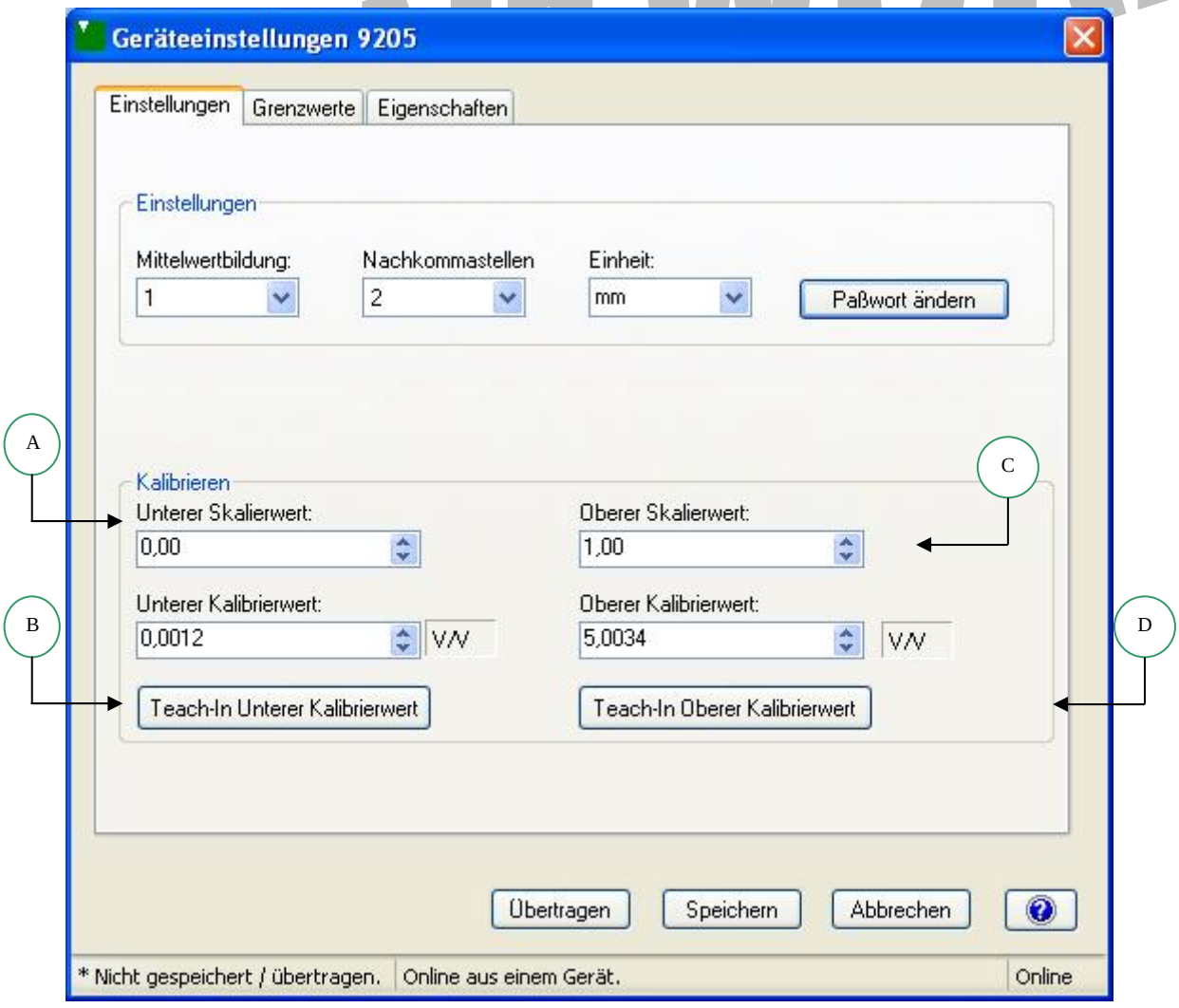
  The value of the voltage at the input of the USB Sensor Interface appears in the field as the lower calibration value.
- Now enter the upper scale value (C) of the sensor measurement range, e.g. 100.00 mm.
- Now move the sliding shaft using a calibrated gage block to S = 100 mm to set the upper scale value.
- Now press button (D) "*Teach-in upper calibration value*".

  The value of the voltage at the input of the USB Sensor Interface appears in the field as the upper calibration value.

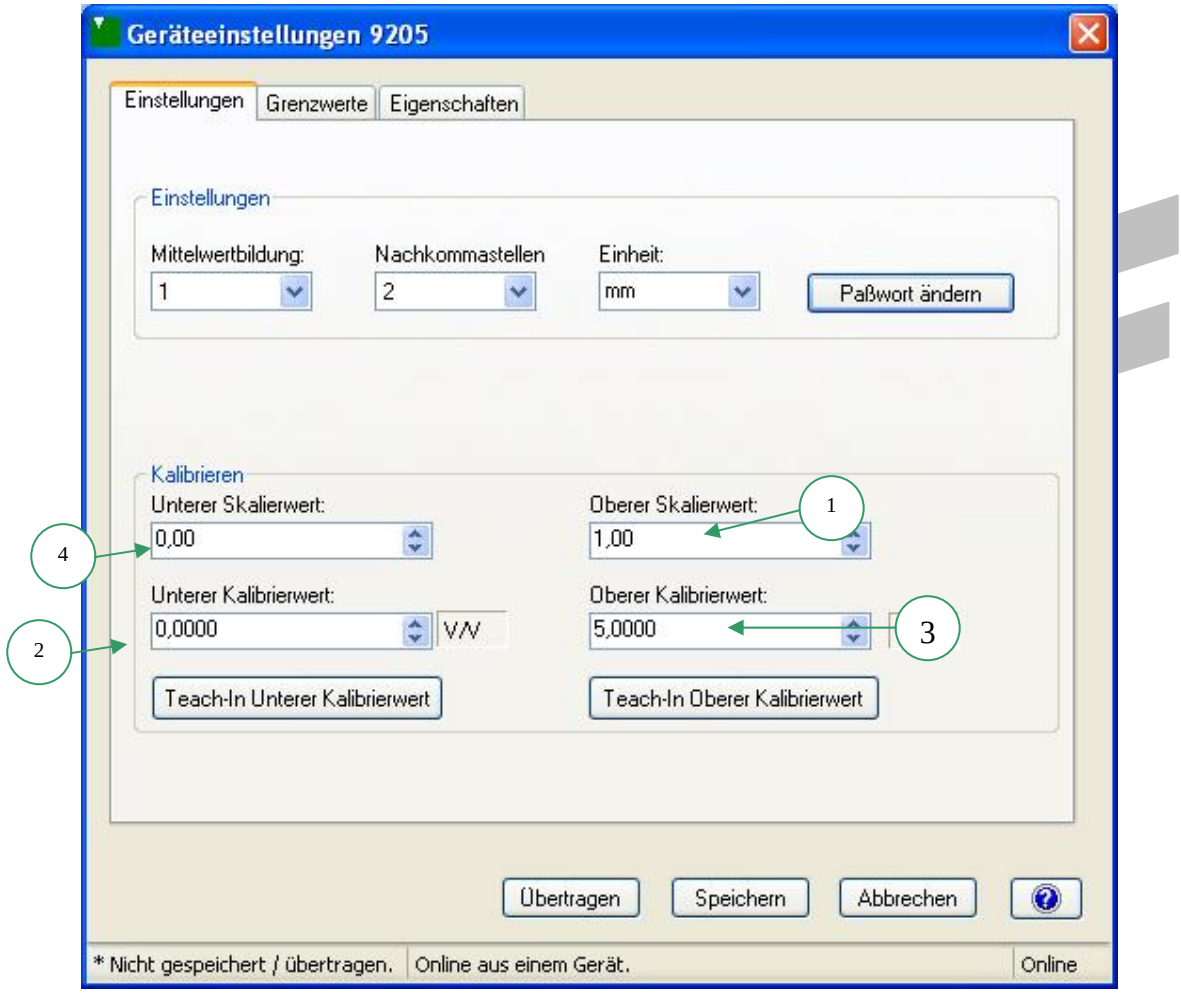
In our example we have specified "2" decimal places.

You now need to "*Transfer*" these sensor parameters to the sensor interface; you can also save them in a file.


Travel
S
[mm]
1
0
best-fit straight line for
sensor calibration
Value in [V]
measured by device
Teach-in value 1
Teach-in value 2


Geräteeinstellungen 9205
Einstellungen
Grenzwerte
Eigenschaften
Einstellungen
Mittelwertbildung:
1
Nachkommastellen
2
Einheit:
mm
Paßwort ändern
A
C
Kalibrieren
Unterer Skalierwert:
0,00
Oberer Skalierwert:
1,00
B
Unterer Kalibrierwert:
0,0012
V/V
Oberer Kalibrierwert:
5,0034
V/V
D
Teach-In Unterer Kalibrierwert
Teach-In Oberer Kalibrierwert
Übertragen
Speichern
Abbrechen
* Nicht gespeichert / übertragen.
Online aus einem Gerät.
Online

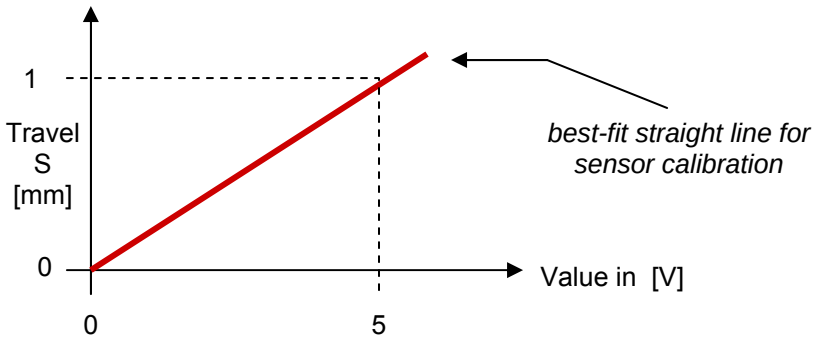
7.5 Calibration using the sensor test certificate



About the values:

① ... ③ These values are adopted directly from the test and calibration certificate.

④ Origin of slope. In this case this equals 0 (zero)



The calibration was performed as follows:

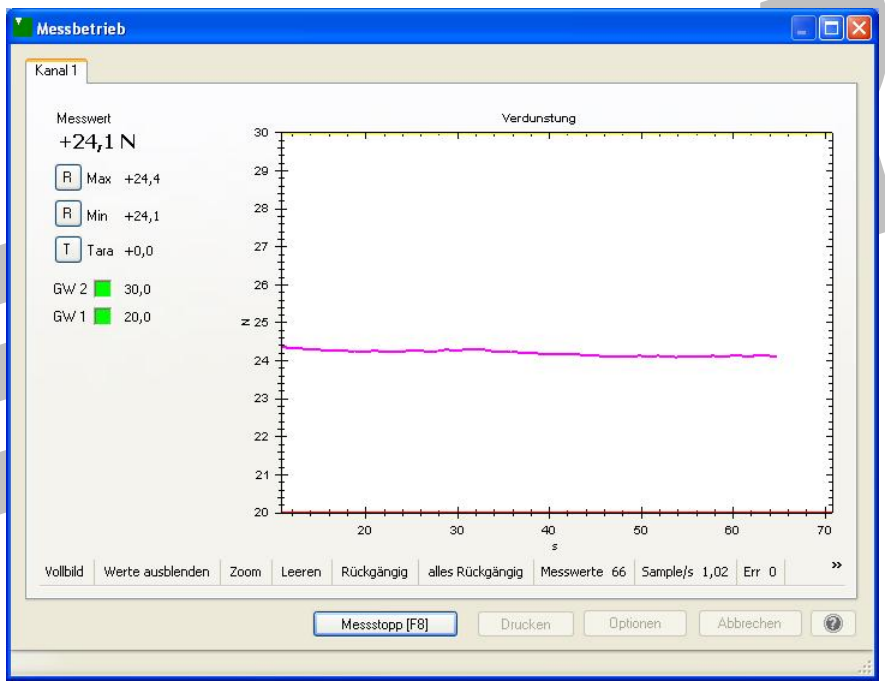
Electrical range of 0 to 5 V corresponds to a mechanical range of 0 to 1 mm.

This calibration data must now be transferred to the sensor interface device; if required it can also be saved.

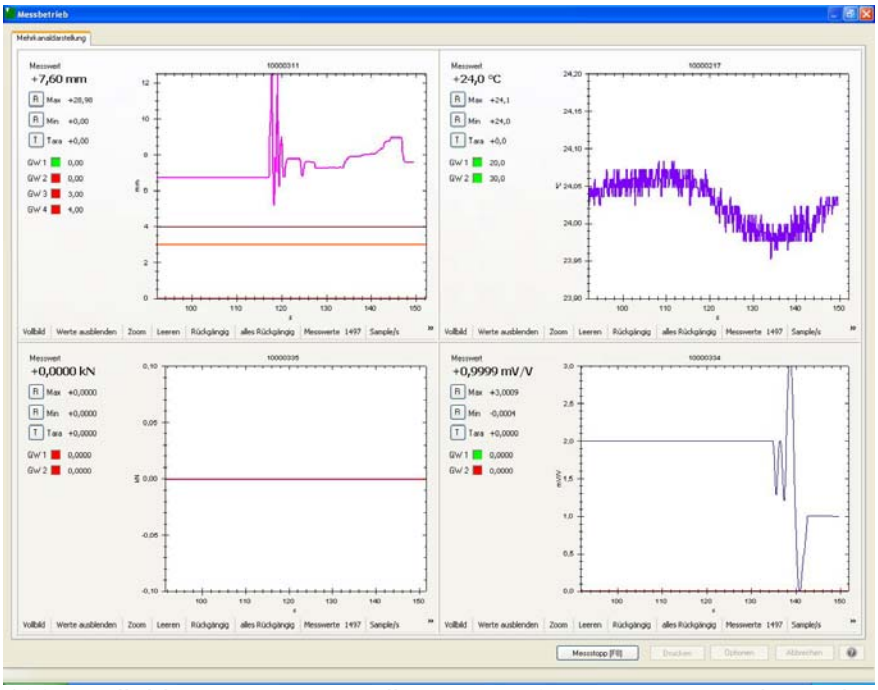
8. Measurement mode

8.1 Display

The measurement curve is displayed in a line graph of measurement value plotted against time. A separate measurement curve is displayed for each measurement channel. the MIN and MAX values are also shown with the curve. In addition, a TARE function is provided for each measurement channel. The measurement channels can be shown and hidden individually.



Standard version 9205-P001 included with device



Version 9205-P100, available at extra cost, allows up to 8 measurement channels to be displayed.

8.2 Operation

Hinweis:

The information given here is summarized and is intended as a guide when using the device for the first time. Please refer to the software manual or the Online Help facility for further details of the DigiVision software.

8.2.1 Starting measurement

- To enter measurement mode, click on "Measure" in the left-hand menu bar.
- This opens the Measurement window; click on the "Start measurement [F5]" button to activate measurement.

Hinweis:

If you wish to save the raw data for recording the measurements, before starting the measurement you must check the box "Save raw-data measurement files" under Preferences → Data storage. During the measurement process, the instantaneous measurement value, tare value and minimum and maximum values are displayed and updated at the set measurement rate. Click on the appropriate "R" button to reset the minimum or maximum value during the measurement.

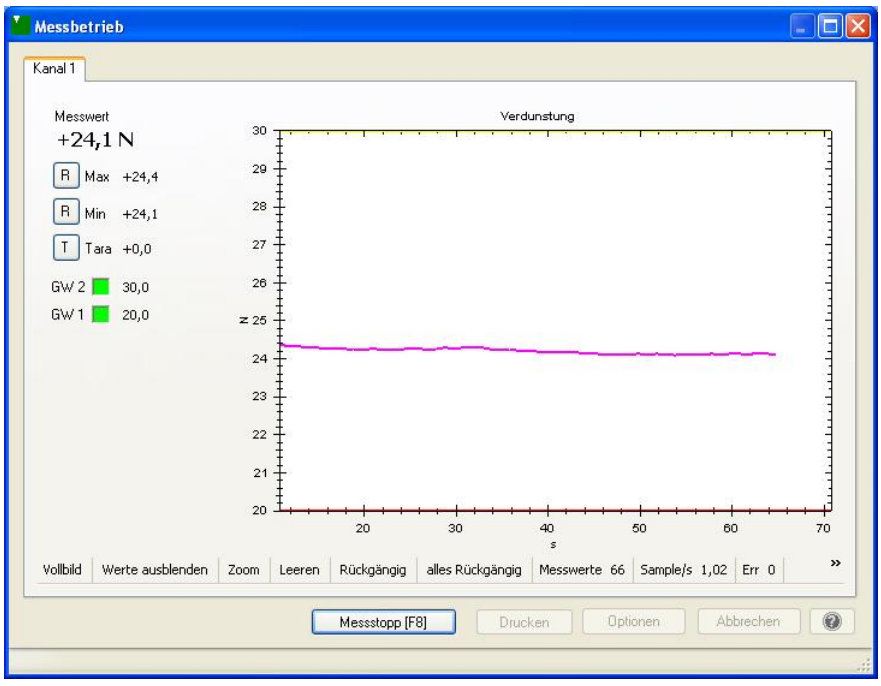
8.2.2 Stopping measurement

- Click on the "Stop measurement" button to stop the measurement manually.

The measurement can also be stopped using a trigger with a suitable stop condition.

8.2.3 Measurement display

In the 9205-P100 multi-channel version, if you wish to see a larger view of the measurement curve, you can click on the "full-screen" button to enlarge individual graphs to full-screen size during measurement mode. You can revert to the usual size by clicking on the "Normal" button.



Information such as measurement rate and the number of measurements is also provided for each measurement channel.

8.2.4 Tare function

To zero the display and the measurement curve, simply click on the Tare button in the Measurement window. The value to the right of the button then shows the tare value used to zero the display. When the tare function is active, the "T" button is backlit in red. Press the button again to de-activate the tare function.

The status of the tare function is stored at the end of the program.

8.3 Options

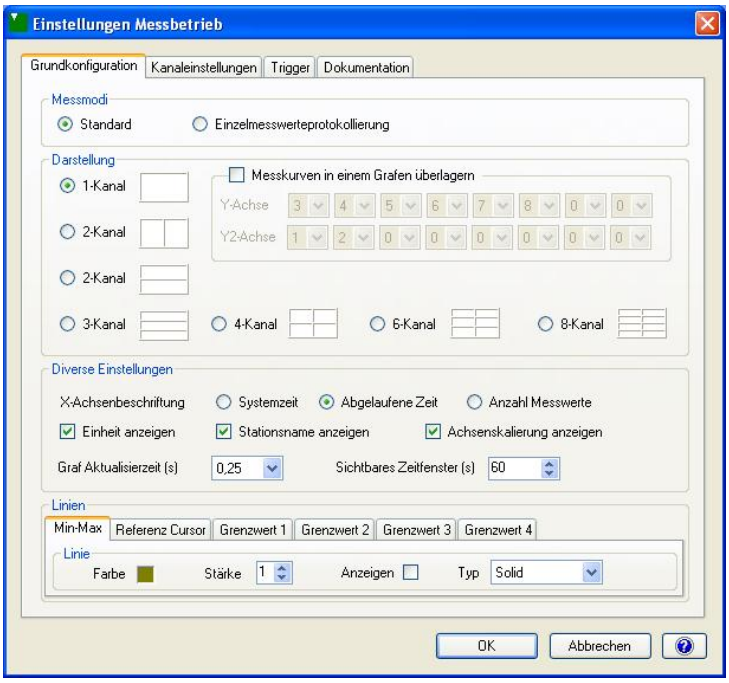
Hinweis:

The information given here is summarized and is intended as a guide when using the device for the first time. Please refer to the software manual or the Online Help facility for further details of the DigiVision software.

When the DigiVision software is run for the first time, in the free 9205-P001 version, a USB Sensor Interface is assigned measurement channel 1; in the 9205-P100 version, channels one to four are assigned. The channel settings can be changed in measurement mode using the "Options" button.

8.3.1 Basic configuration

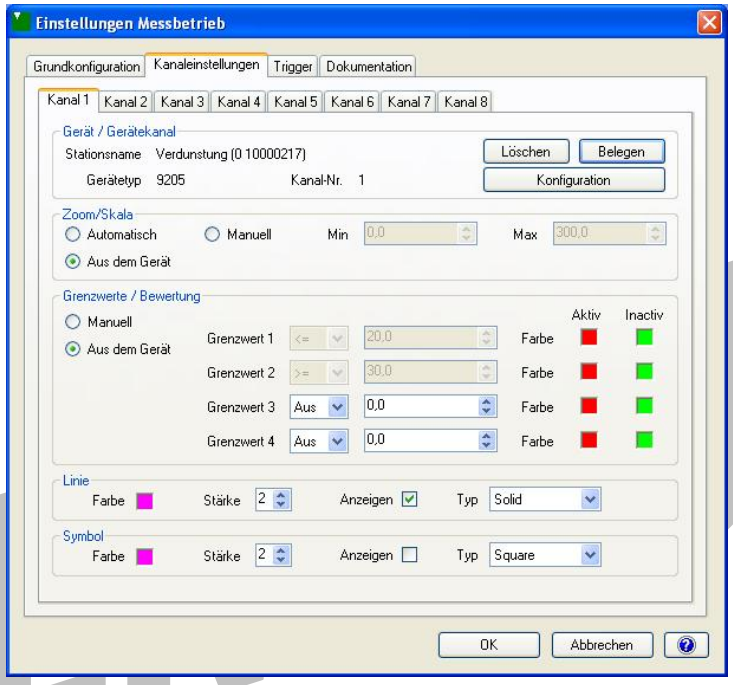
In the Basic configuration window you can specify how many channels you wish to display. The default here for the 9205-P001 version is the 1-channel display. In the 9205-P100 version, the 4-channel display is automatically selected.



You can also make various other settings here for the display and presentation of the curve.

8.3.2 Channel settings

In the Channel settings window you can set the parameters for the respective measurement channel.



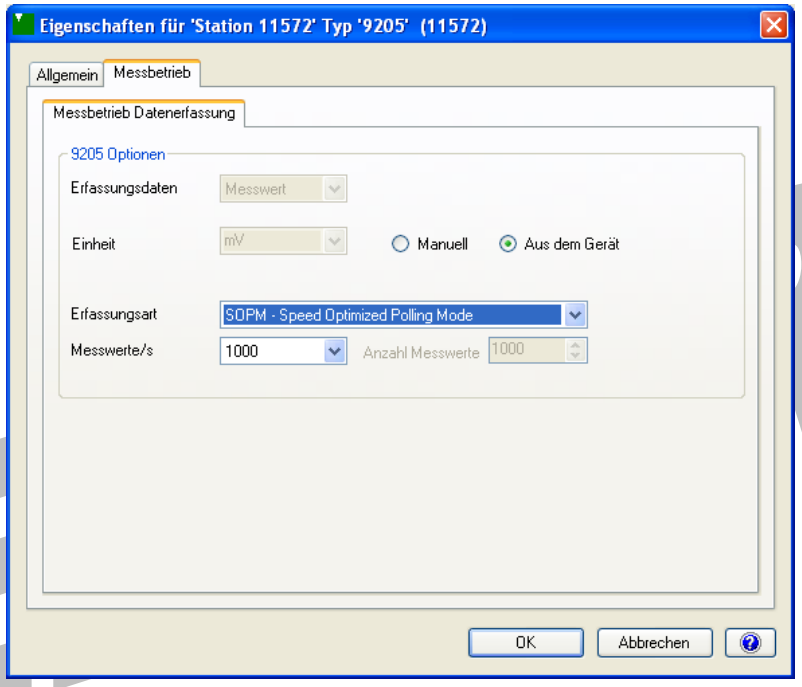
The default setting is to adopt the parameters from the device, although you can also make manual changes to any parameter. You can also define the properties of the limit values here.

The color and shape of the measurement curves and displayable symbols can also be specified here.

These settings must be made separately for each channel.

8.3.3 Selecting the measurement rate

There are two different acquisition modes for which you can select the measurement rate.



The acquisition-mode options are:

- SOPM – Speed Optimized Polling Mode
  For this mode, measurement rates of 0.1 to 1000 measurements per second are possible
- SOSM – Speed Optimized Streaming Mode
  For this mode, measurement rates of 20 to 2500 measurements per second are possible

Follow these steps to select the measurement rate

- ➢ In the Device list, select the relevant interface by clicking on it once.
- ➢ Then click on the "Properties" button and select the "Measurement mode" tab.
- ➢ You can now select the acquisition mode and the appropriate measurement rate.
- ➢ Confirm your selection with "OK".

8.4 Measurement reports

Hinweis:

The information given here is summarized and is intended as a guide when using the device for the first time. Please refer to the software manual or the Online Help facility for further details of the DigiVision software.

If you wish to save the raw data for recording the measurements, before starting the measurement you must check the box "Save raw-data measurement files" under Preferences → Data storage.

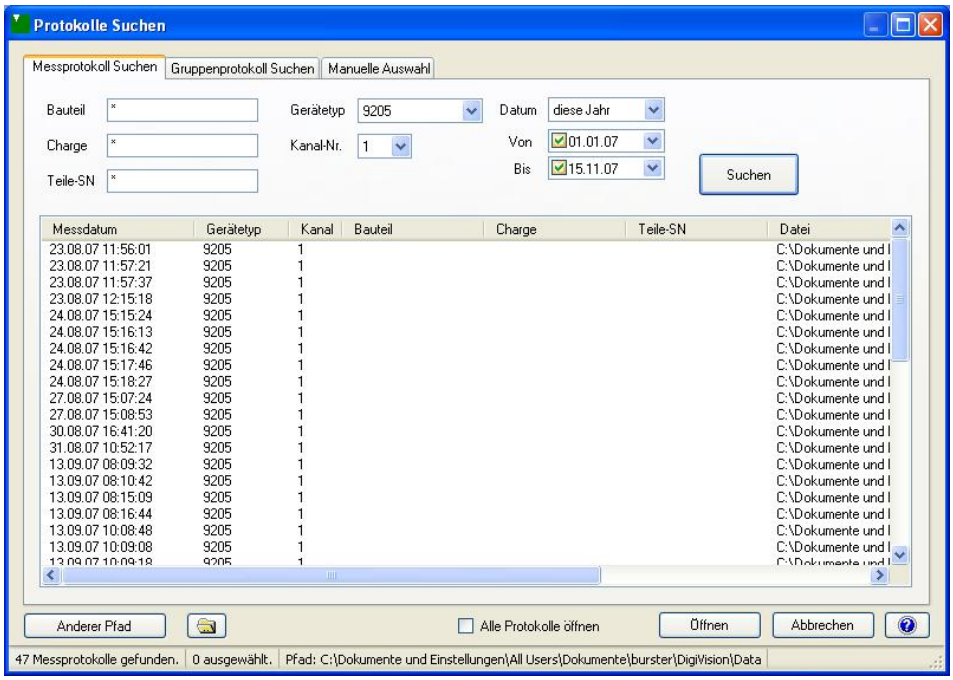
8.4.1 Measurement report finder

The DigiVision software has a convenient archiving facility for measurement reports. It lets you save all the measurements that have been made, and then retrieve them again as required. You can use the Report Finder facility to perform the following actions for one or more reports: view, analyze, print, save as a PDF document or even export to an Excel file.

- To access the Report Finder, click on "Measure" in the left-hand menu bar and then on "Find and manage measurement reports".

The search screen for the Report Finder now opens. Reports are classified under two different types here:

- Measurement report
  Measurement report for each separate device involved in the series of measurements
- Group report
  Report for the series of measurements. Each measurement report involved in the series of measurements is held here. This makes it easier to see which devices belong to the series of measurements.

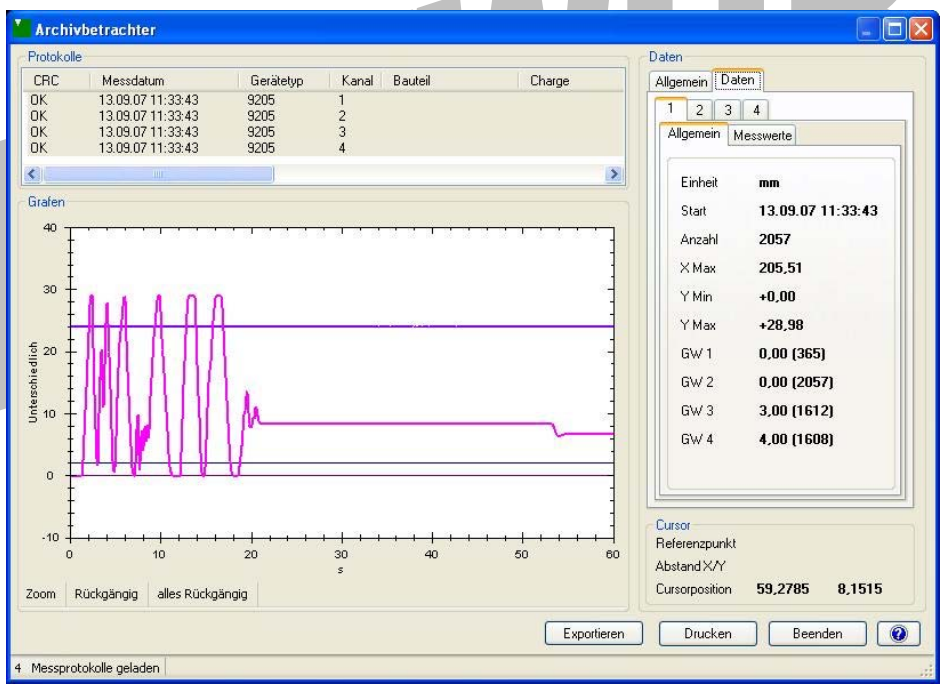


Various filters such as date and channel no. can be used to reduce the number of reports displayed for a clearer picture.

- Select the required report by left-clicking on it. If you wish to select more than one report, hold down the "CTRL" key on your keyboard at the same time.
- Once you have selected the report you require, click on "Open".

8.4.2 Archive viewer

Once you have selected the measurement reports from the Report Finder window, the Archive viewer opens. This gives you detailed information on your measurement. The Archive viewer is also the management center for viewing and editing reports.



You can view each measurement report individually.

- Left-click on the required report.

Or you can group together several measurement reports in order to superimpose the measurement curves.

- Select the required report by left-clicking on it. If you wish to select more than one report, hold down the "CTRL" key on your keyboard at the same time.

8.4.3 Exporting reports to Excel

Once you have selected the reports you require in the Archive viewer, you can export them into an XLS file by clicking on the "Export" button. Follow the steps below:

- Select the required report by left-clicking on it. If you wish to select more than one report, hold down the "CTRL" key on your keyboard at the same time.
- Click on the "Export" button.
- Specify whether you wish to export all the reports or just those you have selected.

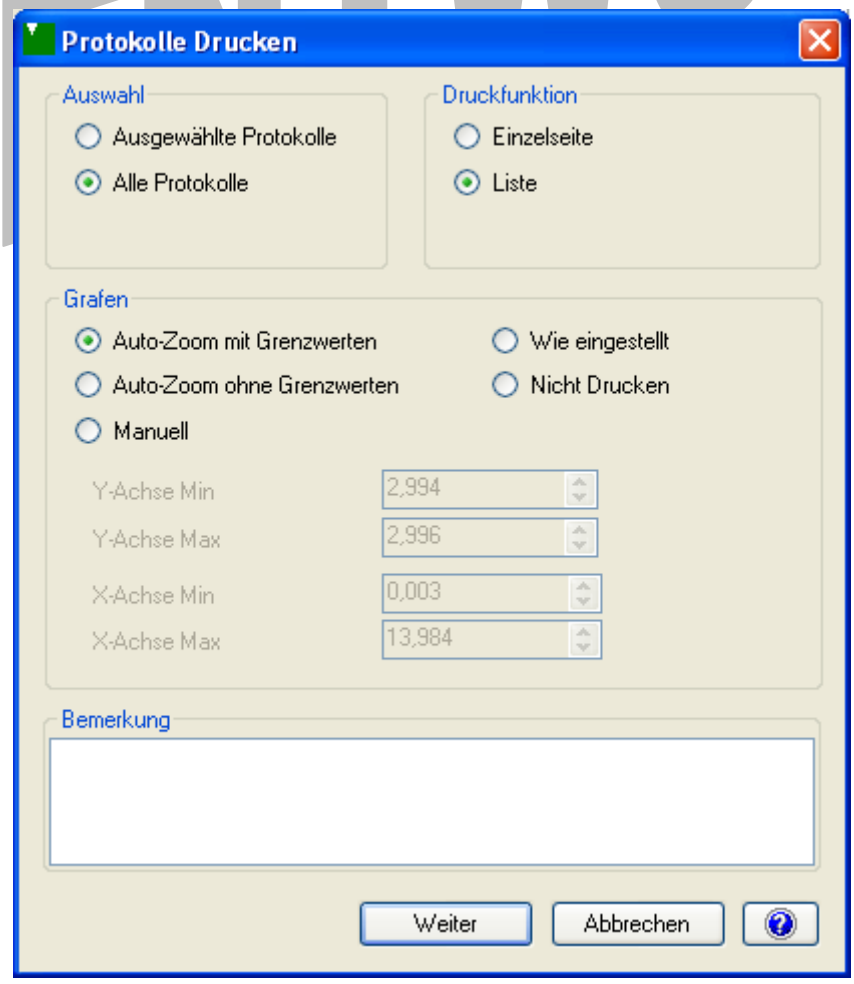
- Specify the path to the required directory for saving the file.
  The default setting is to save the Excel files in the same directory as the measurement reports.
  You can also specify an alternative path here.
- Click on "Next". The data is now converted and saved in the specified directory.

Hinweis:

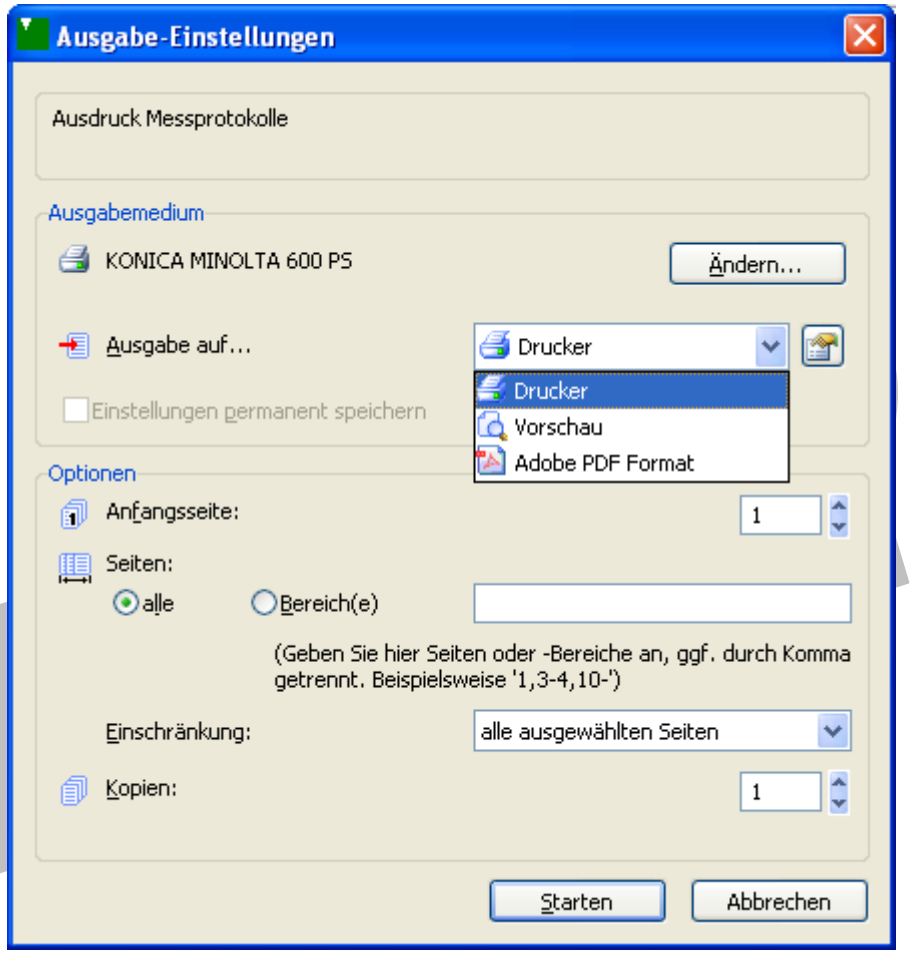
To export measurement reports into XLS format, it is not necessary for Microsoft Excel or an equivalent program to be installed.

8.4.4 Print reports

Once you have selected the reports you require in the Archive viewer, you can print the measurement reports by clicking on the "Print " button. Follow the steps below:

- Select the required report by left-clicking on it. If you wish to select more than one report, hold down the "CTRL" key on your keyboard at the same time.
- Click on the "Print" button.
- 

- Now select how you want the reports printed.
- Click on "Next". The Output settings window opens.



- Now specify how you want the data to be output. You have the option to choose a printer, print preview or output as a PDF document.
- Click on the "Start" button. The data is now output in the specified form.

9. Maintenance and customer service

9.1 9.1 Maintenance

The type 9205 USB Sensor Interface requires no maintenance by the user. Any repairs that may be needed must be performed only at the manufacturer's premises.

9.2 9.2 Cleaning

Please do not use any cleaning agents that contain organic solvents or concentrated inorganic constituents.

9.3 9.3 Customer service

For repair queries only please phone our Service department on +49 (0)7224-645-606; for queries about repair progress please contact us on +49 (0)7224-645-53. Please have your serial number ready for such enquiries. This information is essential in order to find out the technical status of the device and hence provide help quickly. The serial number is shown on the type plate.

9.4 9.4 Contact details for technical queries

If you have any questions relating to the type 9205 USB Sensor Interface, please contact your representative or go directly to burster präzisionsmesstechnik gmbh & co. kg, head office in Gernsbach. Phone 07224-654-0.

9.5 9.5 Factory warranty

burster präzisionsmesstechnik gmbh & co kg provides a manufacturer's warranty for a period of 24 months after delivery.

Any repairs required during this time will be made without charge. If the device needs to be returned for repairs, please note the following requirements for packing and shipping: if you have a problem with the device, please attach a note to the case summarizing the fault.

Damage caused by improper use of the device is not covered by the warranty.

The technical data can change at any time without notification. We also state explicitly that we do not accept liability for consequential damage.

10. Technical data

Input signal		
Strain gage	Bridge resistor: Excitation: Excitation current: Connection type: Input impedance: Full-bridge strain gage:	350Ω to 5kΩ 4 V 20mA 4-wire 200GΩ 0mV/V...±3mV/V
Potentiometer	Terminal resistance: Excitation current: Excitation	1kΩ to 5kΩ max. 80mA 4V/12V
Voltage	Reference signal: Input impedance:	0V to ±5V 1.3MΩ
General data		
Supply voltage Measuring error Temperature drift Power consumption Ambient temperature Storage temperature Electromagnetic compatibility	Via USB port < 0.05% of full scale < 13.3 ppm/K approx. 0.2 VA 0 to + 50°C -10 to + 70°C complies with EMC Directive 89/336/EEC	
Enclosure		
Enclosure type Degree of protection Material Dimensions (ØxL) Weight Installation method Supply voltage Sensor connection	In-line package IP65 Aluminum 25 x 115 mm approx. 0.2 kg Fixed using screw clip Via USB port PG7 cable gland	Desktop case IP20 Plastic 290 x 210 x 80 mm 1.5 Kg Stands on feet 5 V via external mains adapter 9-pin miniature sub-D
Signal processing		
A/D conversion Measurement rate Resolution	Up to 16 bits up to 2500 measurements/s 15 bits	

11. Accessories and options

Accessories	Order code
Configuration and analysis software	***type 9205-P001***
License code for multi-channel version	***Type 9205-P100***
Adapter cable, 12-pin socket	***Type 99540-000C-0090005***
Adapter cable, 9-pin socket	***Type 99609-000C-0090005***
Voltage transformer for connecting a PT100 sensor with a temperature range of 0-300°C	***4176-V920***

Options

Calibration of a complete measuring chain This service includes calibration of the type 9205 USB Sensor Interface for the sensor ordered with it or for the sensor data provided by the customer (e.g. rated output or sensor test certificate).	***Type 9205-ABG***
Desktop model	***9205-V3xxxx***
Type 9205 USB Sensor Interface for strain-gage sensors	***9205-V003***
Expansion board for desktop model	***9205-V004***
Type 9205 USB Sensor Interface for potentiometric or DC/DC sensors	
Expansion board for desktop model	***9205-V33344***
Example order code for a 9205 in the desktop model having 4 channels, 2 x strain-gage, 2 x process value.	