

OPERATION MANUAL

USB Sensor Interface

Model 9206

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The measurement solution.

EU-Konformitätserklärung (nach EN ISO/IEC 17050-1:2010)

EU-Declaration of conformity (in accordance with EN ISO/IEC 17050-1:2010)

Name des Ausstellers: burster präzisionsmesstechnik gmbh & co kg
Issuer's name:

Anschrift des Ausstellers: Talstr. 1-5
Issuer's address: 76593 Gernsbach, Germany

Gegenstand der Erklärung: USB-(Multi)Sensor-Interface
Object of the declaration: USB-(Multi)Sensor-Interface

Modellnummer(n) (Typ): 9206
Model number / type:

Diese Erklärung beinhaltet obengenannte Produkte mit allen Optionen
This declaration covers all options of the above product(s)

Das oben beschriebene Produkt ist konform mit den Anforderungen der folgenden Dokumente:

The object of the declaration described above is in conformity with the requirements of the following documents:

Dokument-Nr. <i>Documents No.</i>	Titel <i>Title</i>	Ausgabe <i>Edition</i>
2011/65/EU	Richtlinie zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten <i>Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment</i>	2011
2014/35/EU	Richtlinie zur Harmonisierung der Rechtsvorschriften der Mitgliedsstaaten über die Bereitstellung elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen auf dem Markt <i>Directive on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits</i>	2014
2014/30/EU	Richtlinie zur Harmonisierung der Rechtsvorschriften der Mitgliedsstaaten über die Elektromagnetische Verträglichkeit <i>Directive on the harmonization of the laws of the Member States relating to electromagnetic compatibility</i>	2014
EN 61010-1	Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte – Teil 1: Allgemeine Anforderungen <i>Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements</i>	2010 + Cor.:2011
EN 61326-1	Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 1: Allgemeine Anforderungen <i>Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements</i>	2013
EN 55011	Industrielle, wissenschaftliche und medizinische Geräte – Funkstörungen – Grenzwerte und Messverfahren <i>Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement</i>	2009

Gernsbach 20.04.2016 i.V. Christian Karius
Ort / place Datum / date Quality Manager

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1 channel In Line (IP67)



USB Multisensor-Interface desktop unit (IP20)



Warning!

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

- Follow all equipment safety procedures.
- Only use the device outside from explosive areas.
- Only use the device when it is undamaged.
- Do not apply more than the rated voltage. See specifications for supported ranges.
- Any repairs that may be needed must be performed only at the manufacturer's premises.



Caution!

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

- Do not use any cleaning agents that contain organic solvents or concentrated inorganic constituents.

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USB Sensor Interface Model 9206

1. Introduction

The model 9206 USB Sensor Interface is intended for the acquisition and processing of sensor signals.

The model 9206 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 model 9206 USB Sensor Interface is ideally suited to measuring mechanical variables such as force, torque, pressure, acceleration, displacement 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 1200 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, XP, 7, 8 and 10.

1.1 Normal use

The model 9206 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 model 9206 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 model 9206 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

1.2 Customer services

1.2.1 Customer services

If you need to ask about repairs or repair progress, please telephone our Service department on +49 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.

1.2.2 Contact details for technical queries

If you have any questions relating to the model 9206 USB Sensor Interface, please contact your representative or go directly to burster präzisionsmesstechnik gmbh & co. kg.

Head office:

burster präzisionsmesstechnik gmbh & co kg
Talstraße 1 – 5
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Telefon: (+49) 07224 – 645 – 0
Fax: (+49) 07224 – 645 – 88
E-Mail: info@burster.com

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1.2.3 Factory warranty

burster praezisionsmesstechnik 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.

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

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

1.3 About this manual

This equipment manual contains important information on the operation, installation and configuration of the model 9206 USB Sensor Interface.

1.4 Important note

Note that the model 9206 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.

Note the specific requirements that must be observed for applications in a explosive area (EExi, ...).

The model 9206 USB Sensor Interface comes with ferrite beads as standard for protection against EMC interference.

2. Preparation

2.1 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 model 9206 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.

2.2 Deliverables

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

- 1 model 9206 USB Sensor Interface
- 1 CD-ROM containing configuration and analysis software DigiVision (DV)
- 1 manual

2.3 Installation / Fixing

The in-line USB Sensor Interface in tubular housing (model 9206) can be fixed in place using standard hose clips or cable ties.

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2.3.1 Opening the 9206 tubular housing



Caution!

Risk of damage!

Before opening the tubular housing always undo both PG cable glands.

Before opening or closing the tubular housing, isolate the 9206 from the power supply.

For the in-line 9206 model, all controls and connections are located inside the tubular housing.

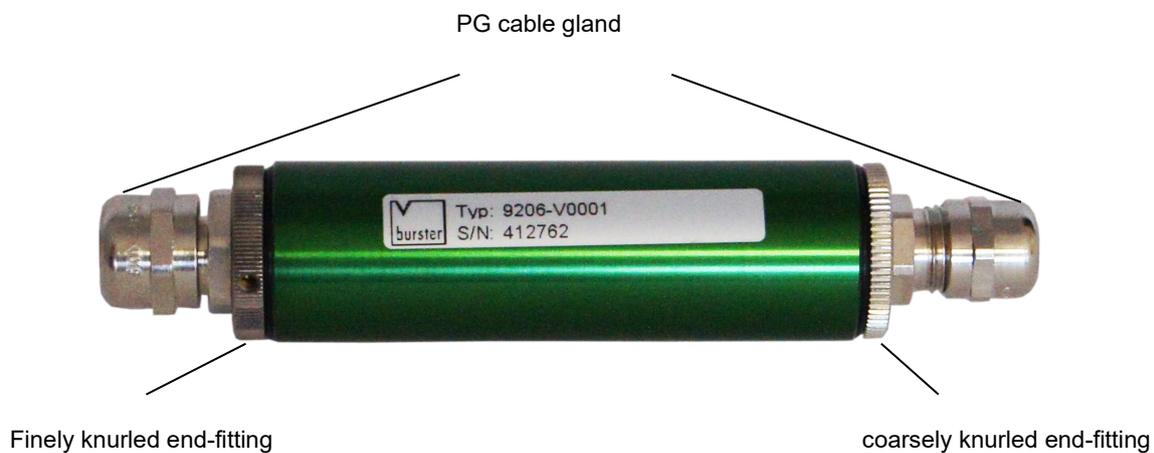


Diagram 1: One of the end fittings is coarsely knurled.

How to open the tubular housing

- Undo the PG cable glands at both ends of the tubular housing.
By doing this you reduce the risk of damaging the connection cable when opening the housing.
- Unscrew the coarsely knurled end fitting from the housing.
The end fittings on the housing are connected to the rest of the housing via a threaded fitting.
- Now carefully slide the end fitting away from the housing.
- Unscrew the housing from the finely knurled end fitting.
- Slide the housing away from the circuit board.

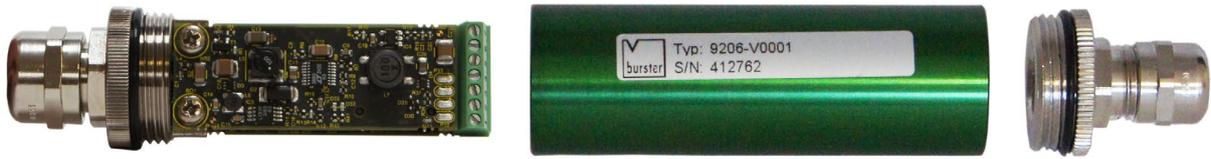


Diagram 2: Once the housing is unscrewed from the end fittings, the circuit board is exposed.

2.4 Degree of protection

The In Line unit of the model 9206 USB Sensor Interface has IP67 degree of protection. The module is therefore protected from the effect of temporary immersion in water and accessing dangerous components using a wire of diameter ≥ 1.0 mm.

The desktop unit has IP20 degree of protection.

2.5 Ambient temperature

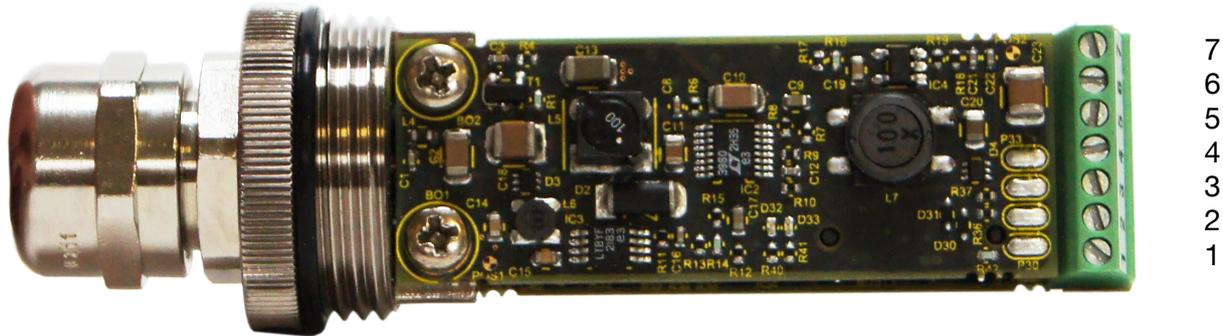
The permitted ambient temperature range for the model 9206 USB Sensor Interface during operation is -20 °C to $+60$ °C.

The device can be stored at temperatures between -40 °C and $+70$ °C.

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2.6 Connection via screw-terminals

The screw terminals located on the circuit board of the 9206 USB Sensor Interface are listed in the figure below.



12-pin plug 9941	9-pin plug 9900-V209	Terminal block in tubular housing	Meaning	Pt100
A	5	4	- excitation	- I
B	4	3	- sensor	+ I
C	1	1	+ excitation / 12 V	
D	2	2	+ sensor	
F	9	6	- measurement signal	-U
G	6	5	+ measurement signal	+U
housing	housing	7	Protective earth/shield	
	8		GND 12 V	
	3		+ 12 V	

Diagram 3: Screw terminals and pin assignments

2.7 Converting the supply voltage to transmitter excitation voltage

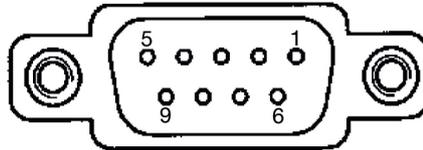
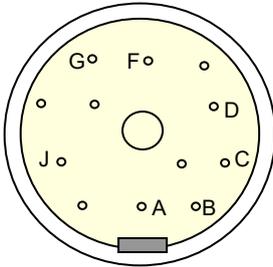


Diagram 4: Solder bridges

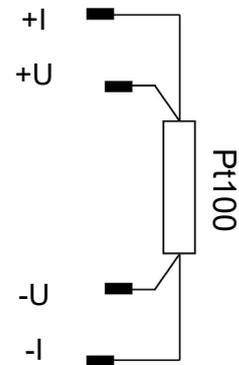
The solder bridges must be closed as shown. Only applies to tubular housing model.

2.8 Connecting sensors via plug-in connectors

2.8.1 Connecting a Pt100 sensor

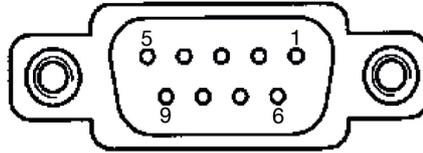
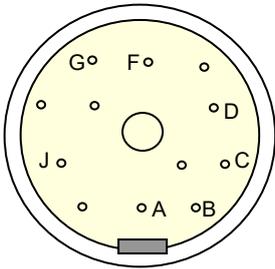


12-pin plug 9941	9-pin plug 9900-V209
B	4
G	6
F	9
A	5

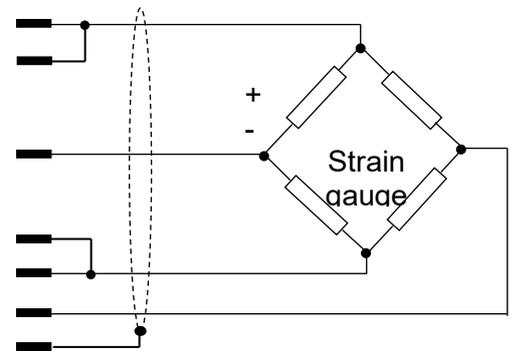


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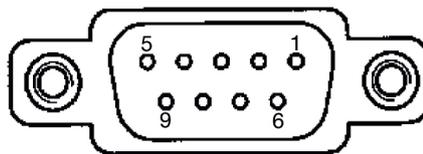
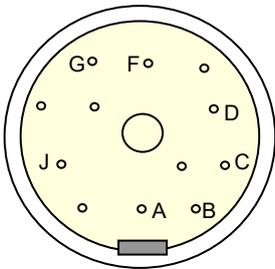
2.8.2 Connecting a strain gauge sensor without sensor leads



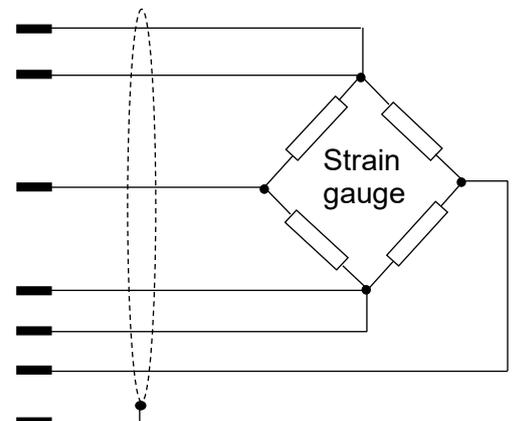
12-pin plug 9941	9-pin plug 9900-V209
C	1
D	2
G	6
B	4
A	5
F	9
housing	housing



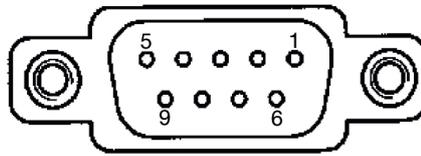
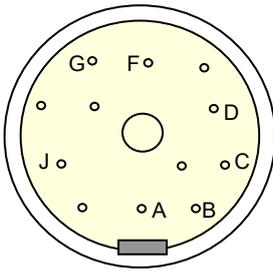
2.8.3 Connecting a strain gauge sensor fitted with sensor leads



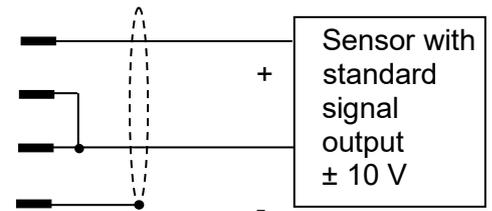
12-pin plug 9941	9-pin plug 9900-V209
C	1
D	2
G	6
B	4
A	5
F	9
housing	housing



2.8.4 Connecting sensors having a normalized signal output

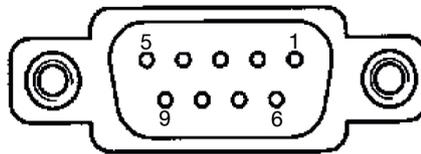
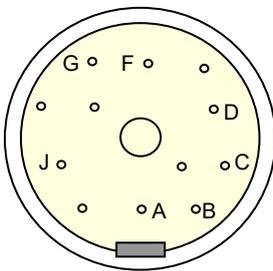


12-pin plug 9941	9-pin plug 9900-V209
G	6
A	5
F	9
housing	housing

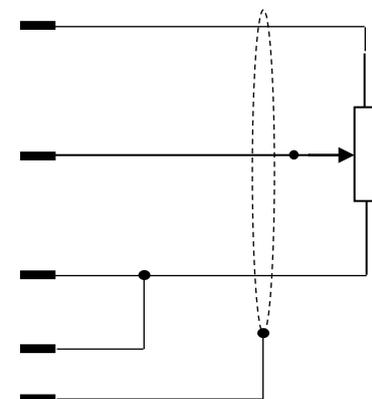


Note: When connecting sensors that require a transmitter excitation voltage, the sensor lines (pins B and D or pins 4 and 2) must not be connected! A bridge between the sensor line and the supply voltage could damage the measuring amplifier.

2.8.5 Connecting potentiometric sensors



12-pin plug 9941	9-pin plug 9900-V209
C	1
G	6
F	9
A	5
housing	housing



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2.9 Indicating elements

2.9.1 Model 9206-V3xxxx

There is an LED light for every measurement channel on the front panel. The following table describes the meaning of the different colours:

Colour	Description
Red	Error
Yellow	Overdrive
Green	Standard operation

Additionally, the following operation states are indicated by the LEDs:

Operation state	Display via LED
Channel identification	All LEDs flash 10 times
Missing channel	All LEDs are off
Power on	Functionality test of LEDs All LEDs light up briefly

2.9.2 Model 9206-V0xxx / 9206-V2xxx

Colour	Description
Orange	Lights permanently
Yellow green	Flashes in the rhythm of the sampling rate

3. Preparation for use

3.1 System requirements

Operating system:	Windows 2003, Windows XP, Windows 7, Windows 8
Processor:	min. Pentium 1200 MHz, recommended Pentium 2,0 GHz
Graphics:	min. VGA 800 x 600, min. 256 colors
Memory:	min. 256 MB RAM (Win XP), min. 512 MB (Win 2003, Win 7)
Hard disk:	approx. 500 MByte available
Input devices:	MS-compatible mouse, standard keyboard
Font setting:	Small fonts

3.2 Software installation

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 installation wizard by double-clicking on "setup.exe".

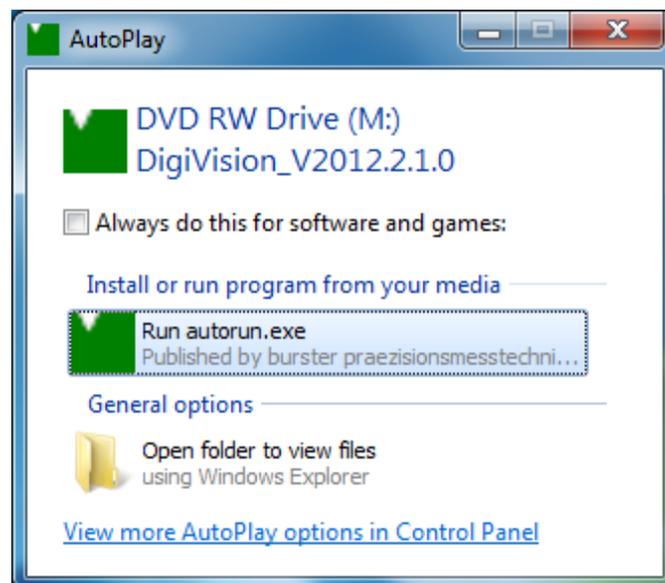


Diagram 5: Installing DV, autorun.exe

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Diagram 6: Installing DV, startup screen

- Double-click to choose a language and start installation:

If Microsoft .NET Framework 4.0 is not already installed on the PC, it is installed automatically.

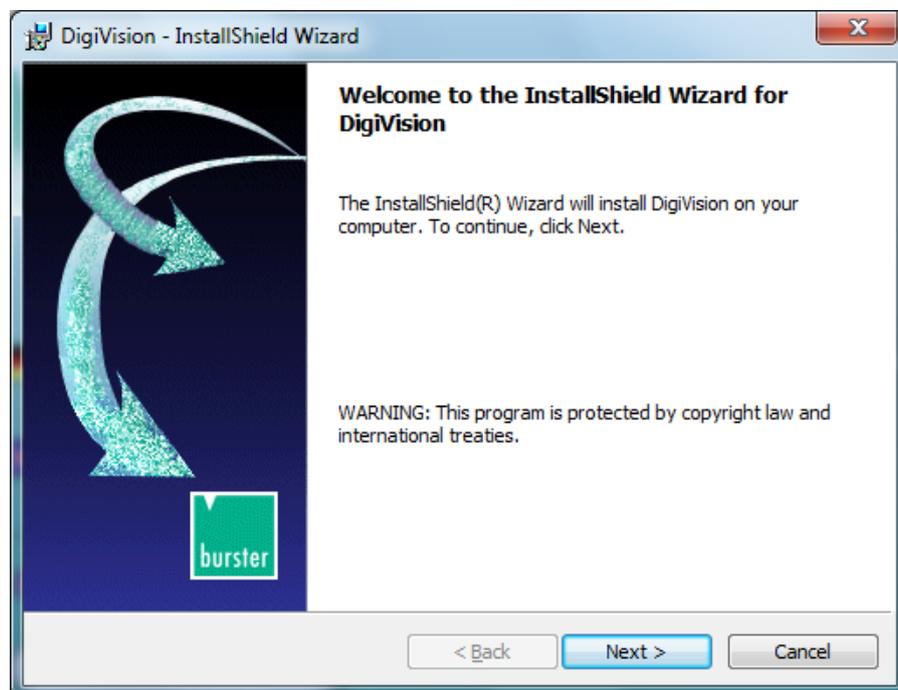


Diagram 7: Installing DV, welcome

- Click on button "Next".

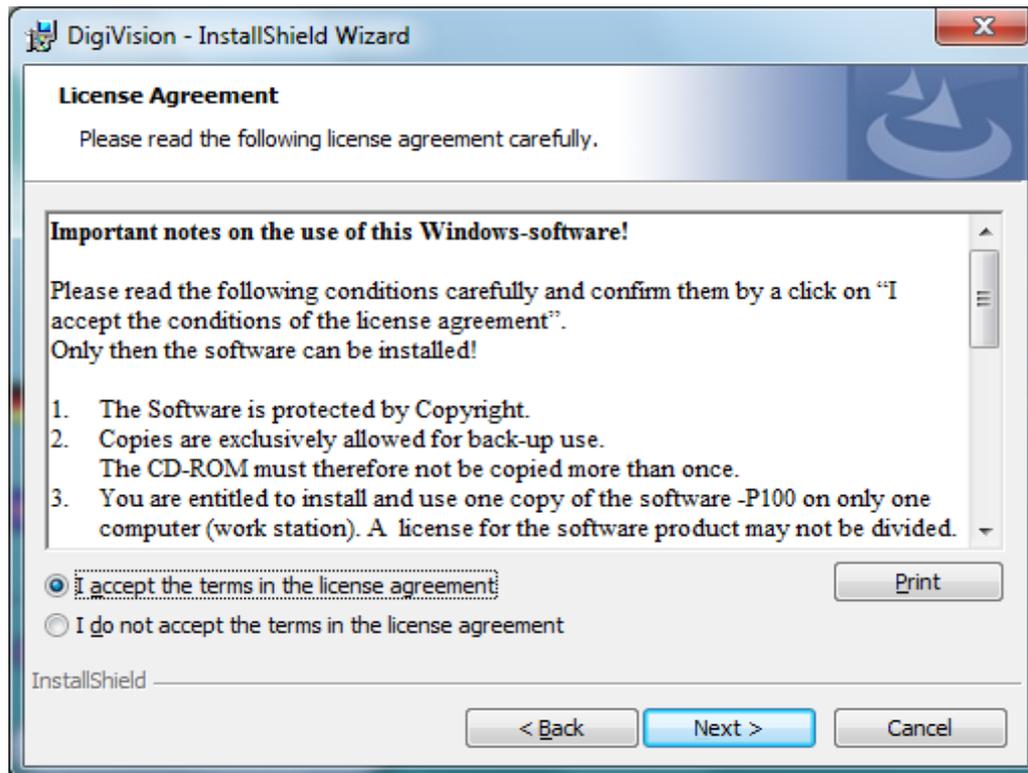


Diagram 8: Installing DV, license agreement

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

The installation will terminate if you don't accept the license agreement.

This window lists 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".

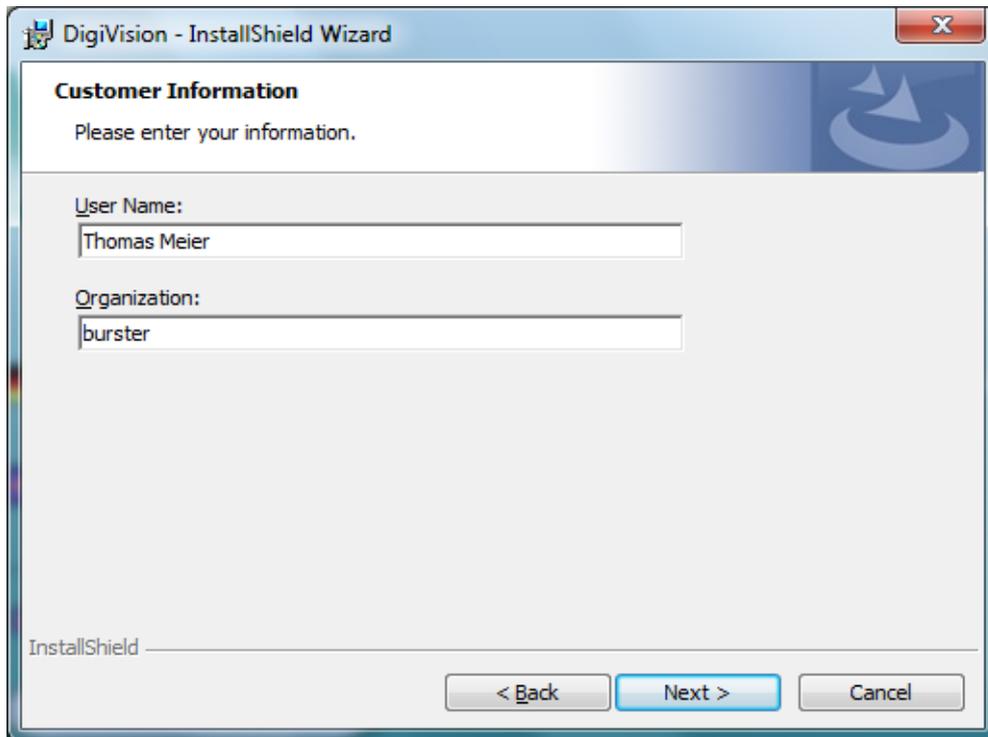


Diagram 9: Installing DV, user information

- Insert the username and the company or organization.
- Specify to whom the application will be installed.
- Confirm with “Next”.

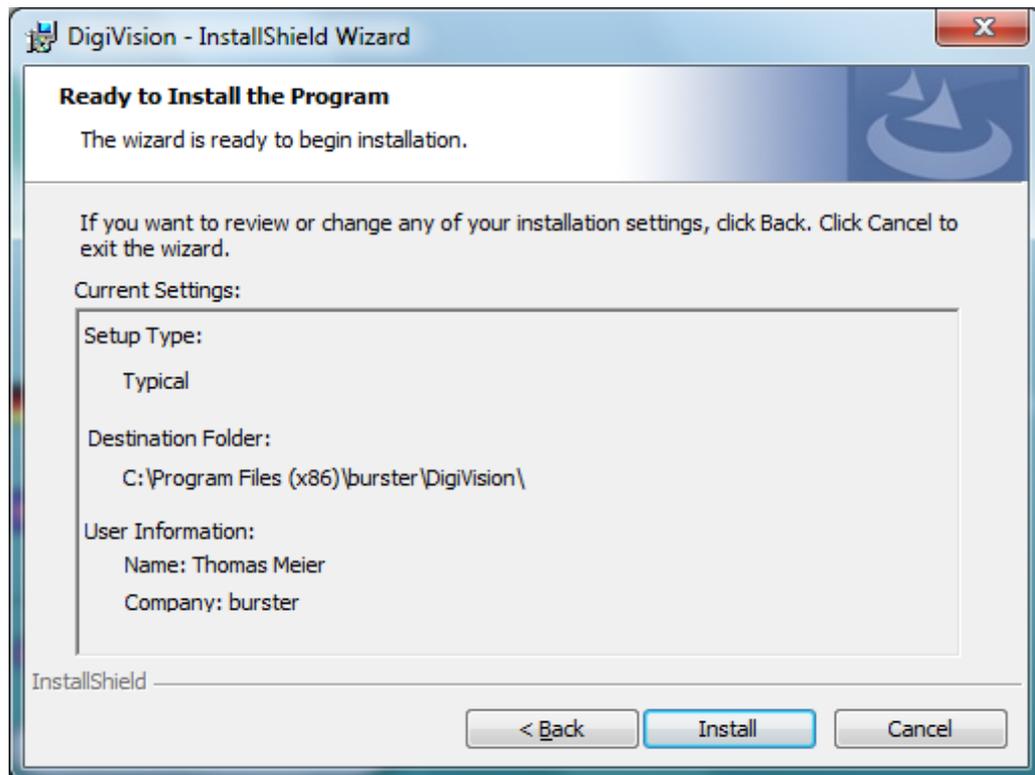


Diagram 10: Installing DV, installation path

- **Make a note of the installation path.** The sensor driver is located in a subdirectory. You will need to know this path later when you install the driver.

- Click on button "Install".

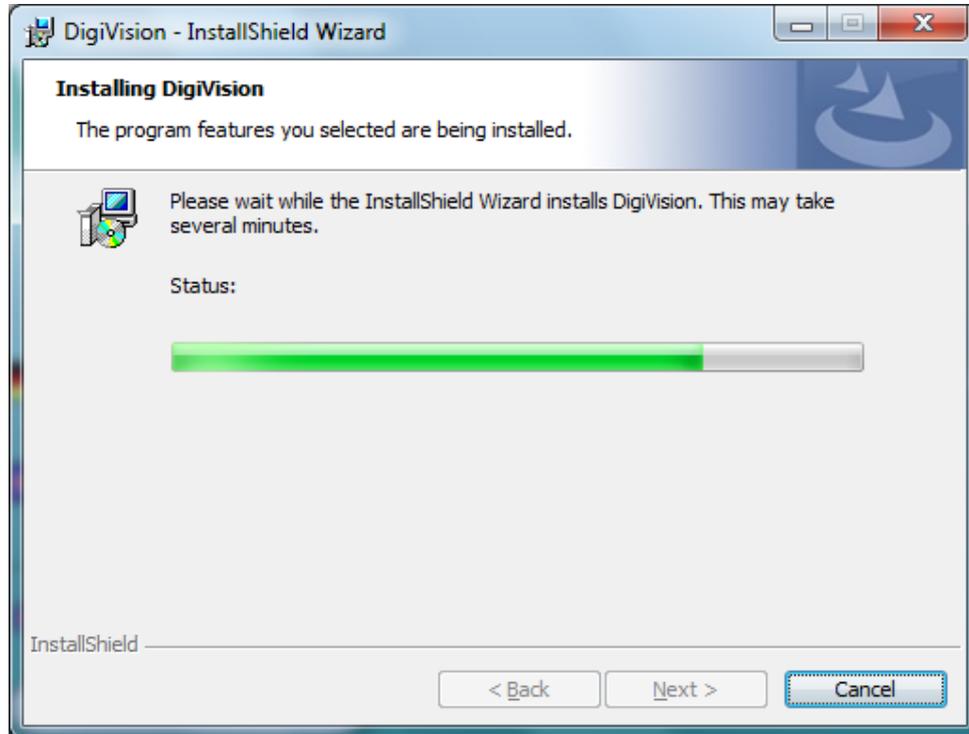


Diagram 11: Installing DV, installation running

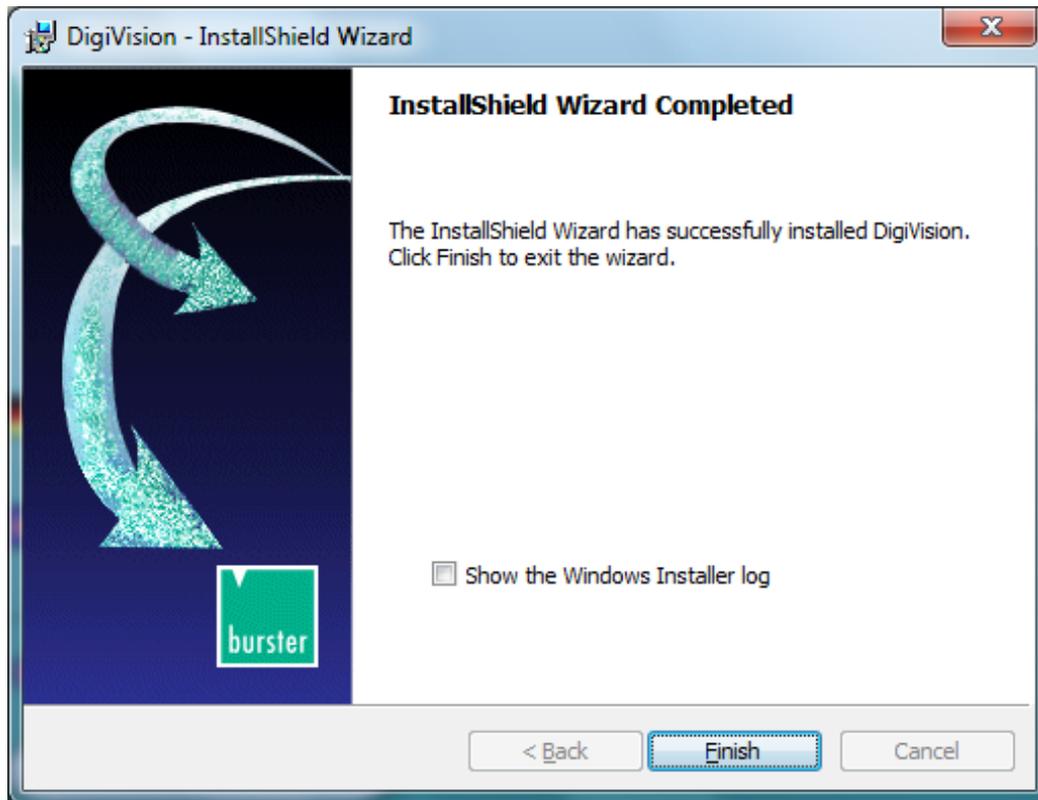


Diagram 12: Installing DV, finish installation

The DigiVision configuration and analysis software is fully installed on your system.

- Click on "Finish" to close the installation wizard.

3.3 Driver installation

This guide describes how to install the drivers under Windows 7. The installation procedure under other operating systems is effectively the same.

Note:

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 model 9206 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.

Open the Device Manager.

(Go to Start → Control Panel → Hardware → Device Manager).

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- In Device Manager, select the sensor's interface.

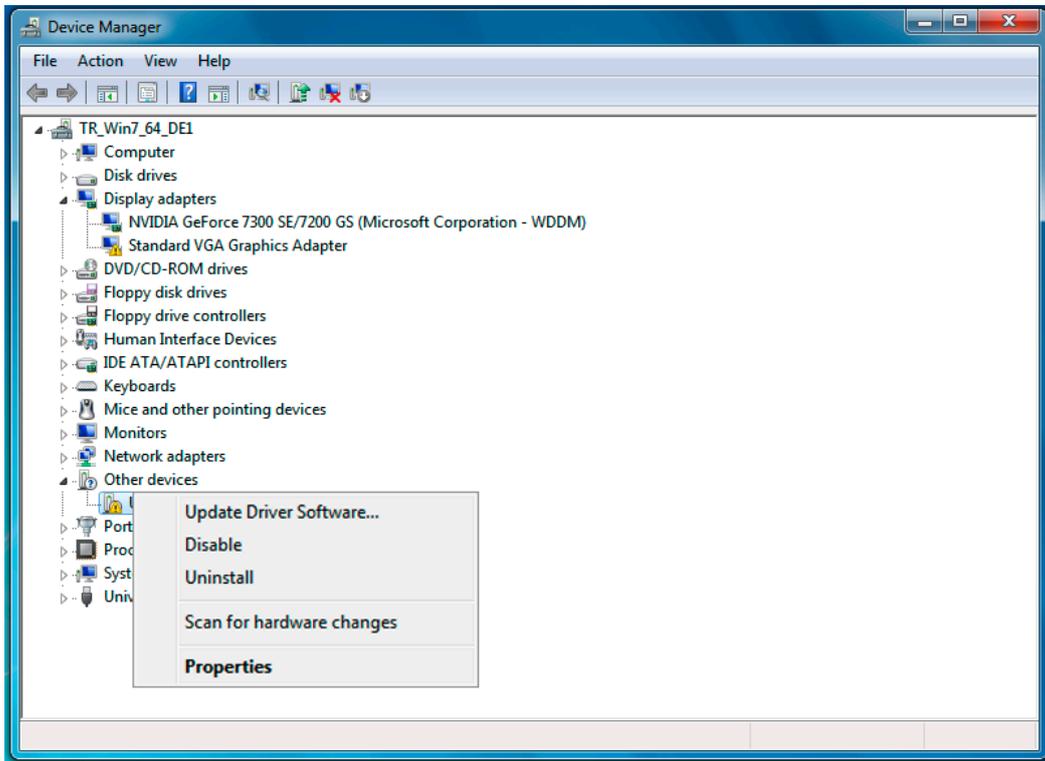


Diagram 13: Installing driver software, Device Manager

- Select "Update Driver Software..."

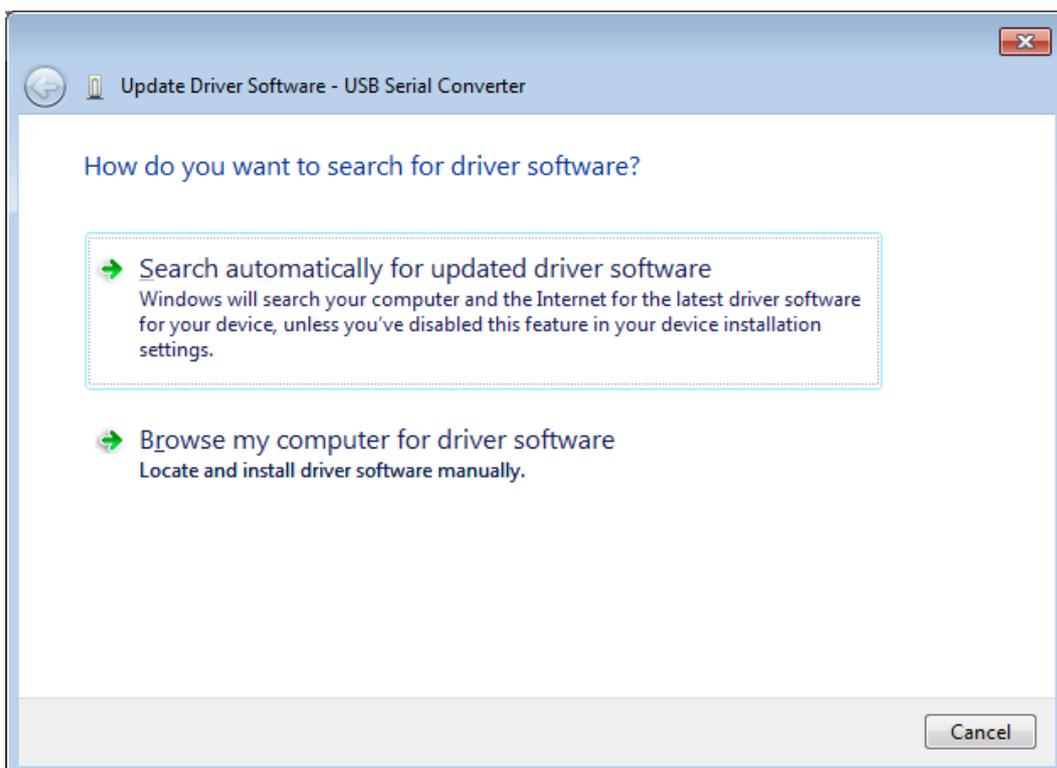


Diagram 14: Installing driver software, select type of search

- Select “Browse my computer for driver software“

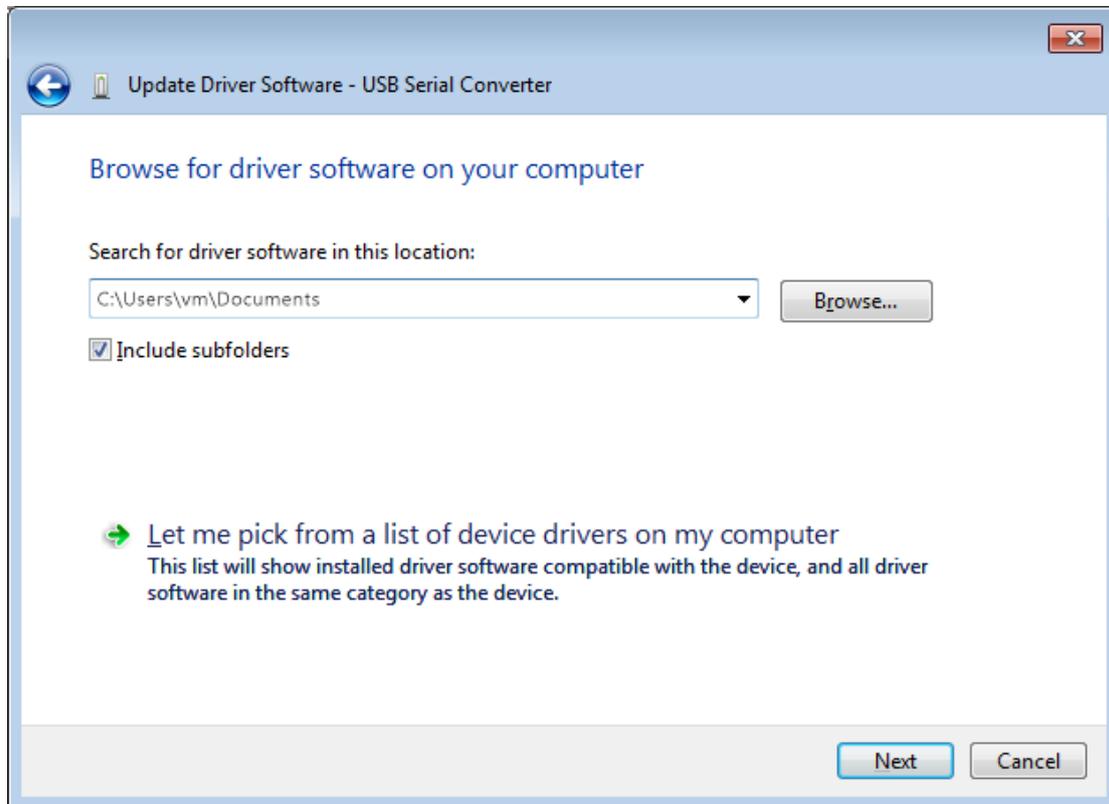


Diagram 15: Installing driver software, search path

- Specify the path to the driver installation files. After installing the DigiVision configuration and analysis software, the driver installation files are located in the folder you specified when installing DigiVision.
- You can use the “Browse” button to select the correct directory.

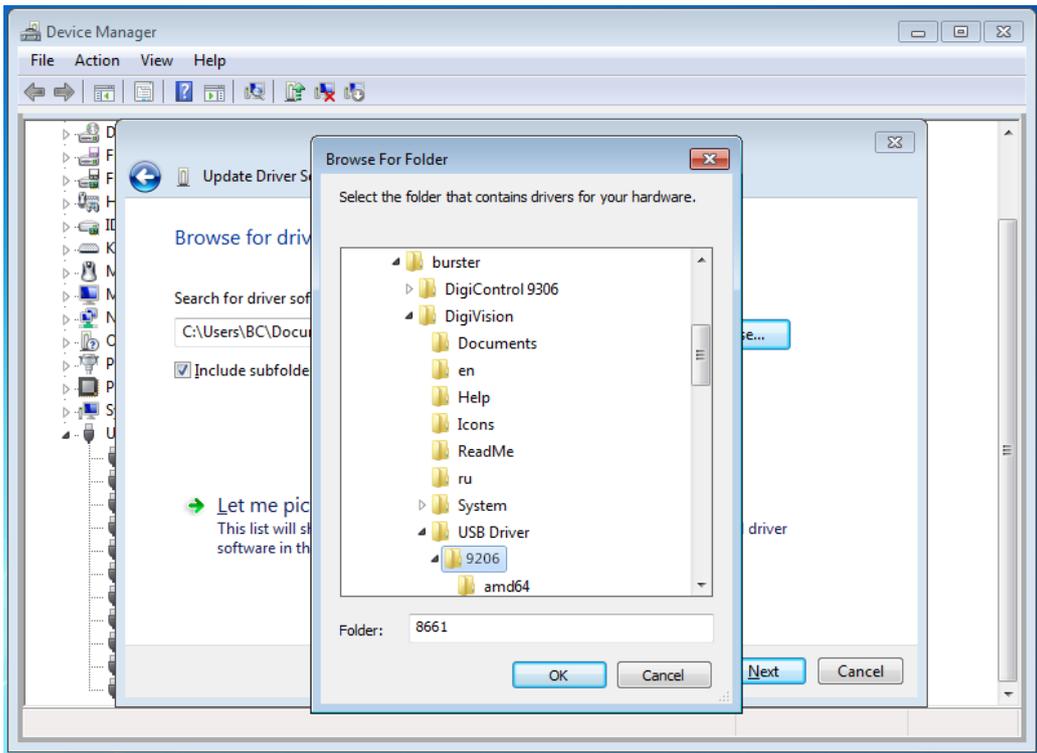


Diagram 16: Installing driver software, select folder with driver

- Confirm with "OK".

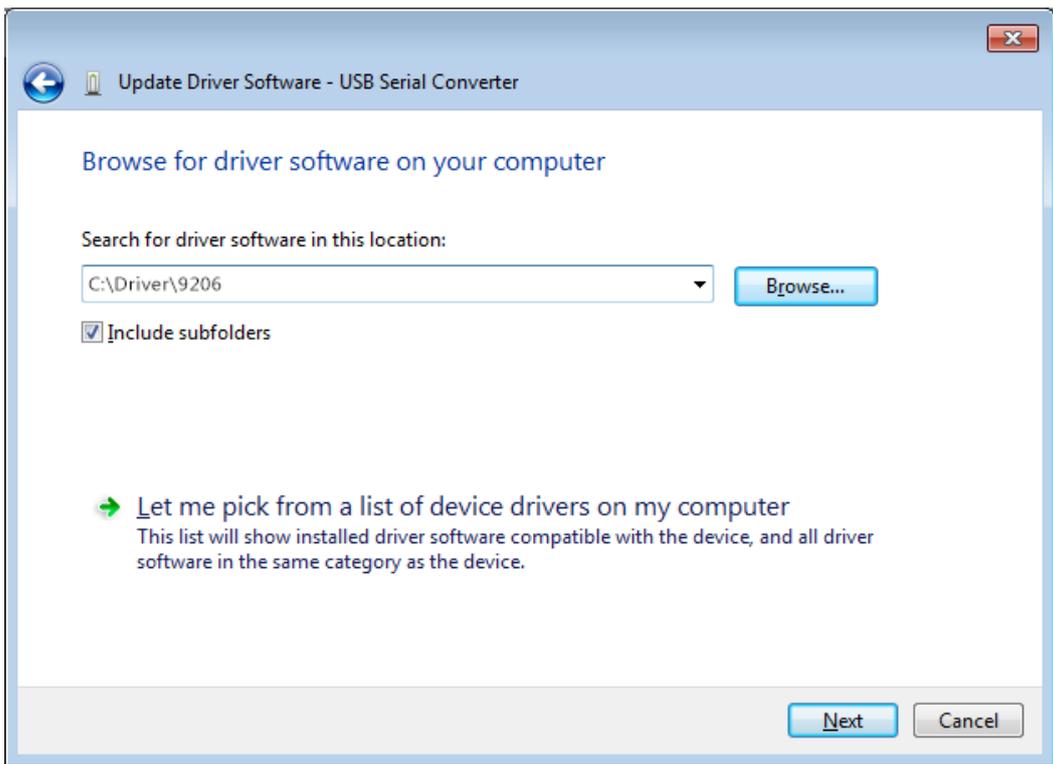


Diagram 17: Installing driver software, confirm path

- Confirm with “Next”.

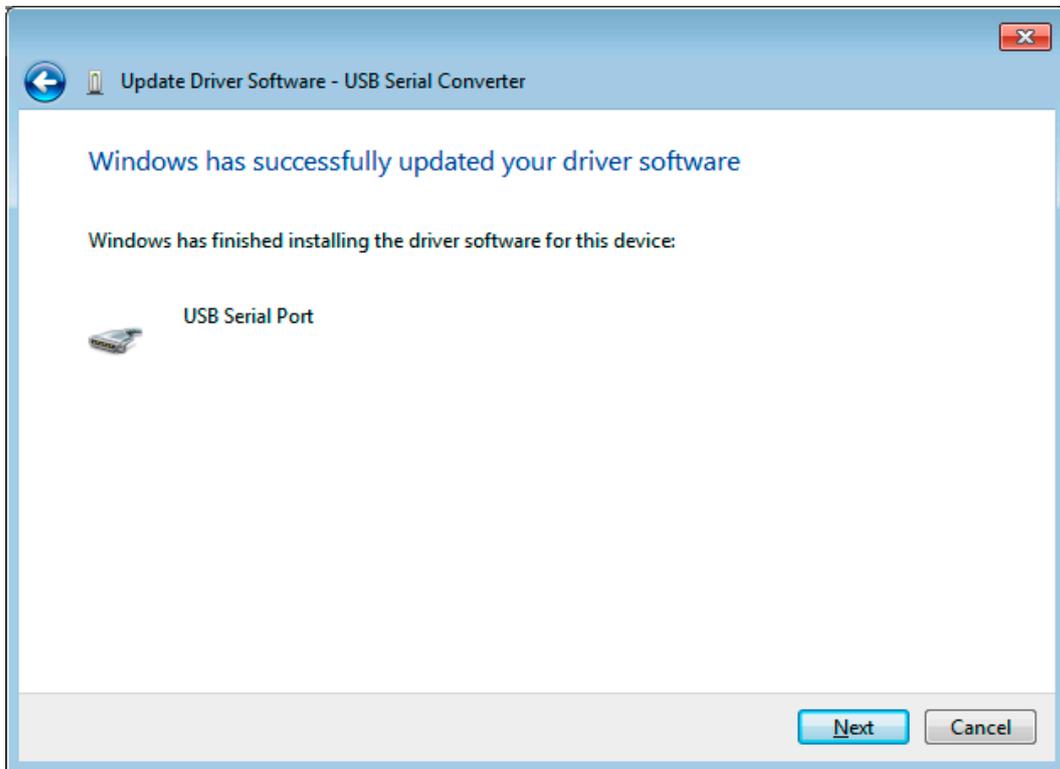


Diagram 18: Installing driver software, installation successful

The operating system now confirms that the driver for the model 9206 USB Sensor Interface has been installed successfully.

USB Sensor Interface Model 9206

The installation procedure for the virtual COM port then starts.

Open the Device Manager again.

(Go to Start → Control Panel → Hardware → Device Manager).

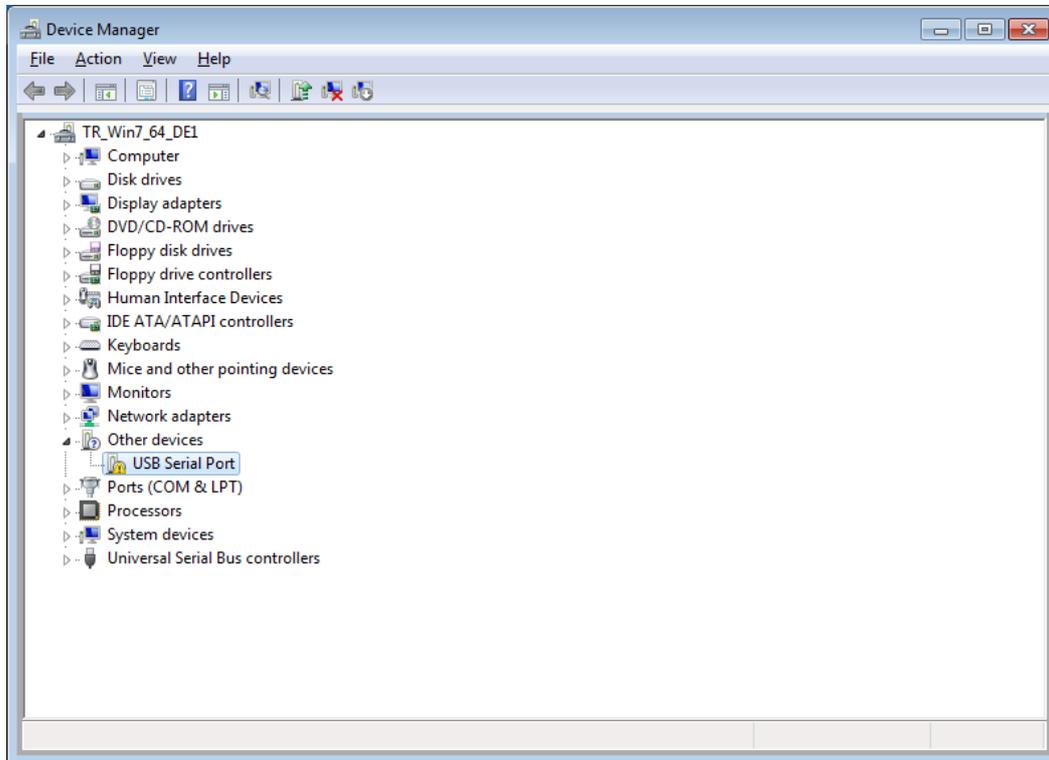


Diagram 19: Port installation, Device Manager

Right-click on USB Serial Port and select Update Driver Software...

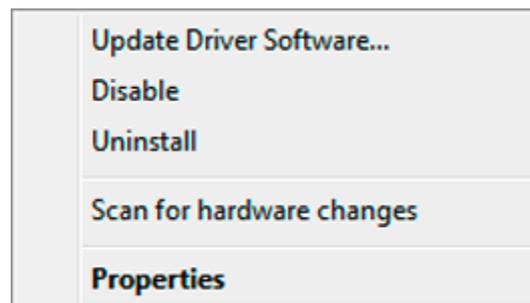


Diagram 20: Port installation, updating the port driver

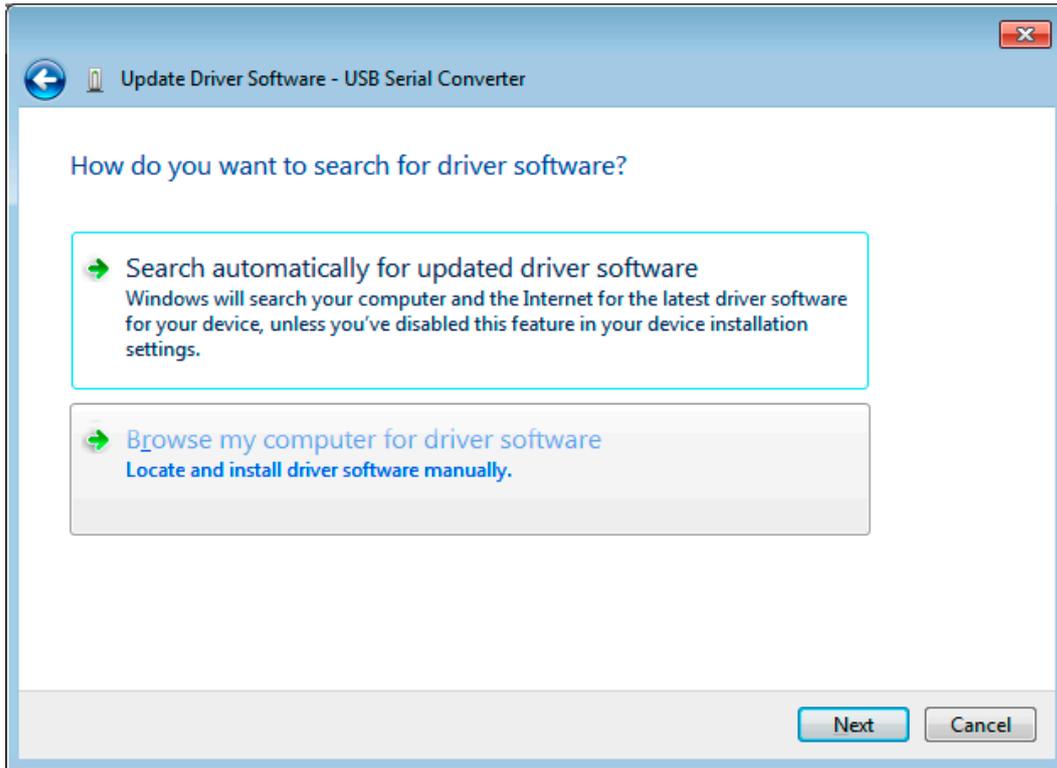


Diagram 21: Installing port driver, install driver, select type of search

- Select "Browse my computer for driver software".

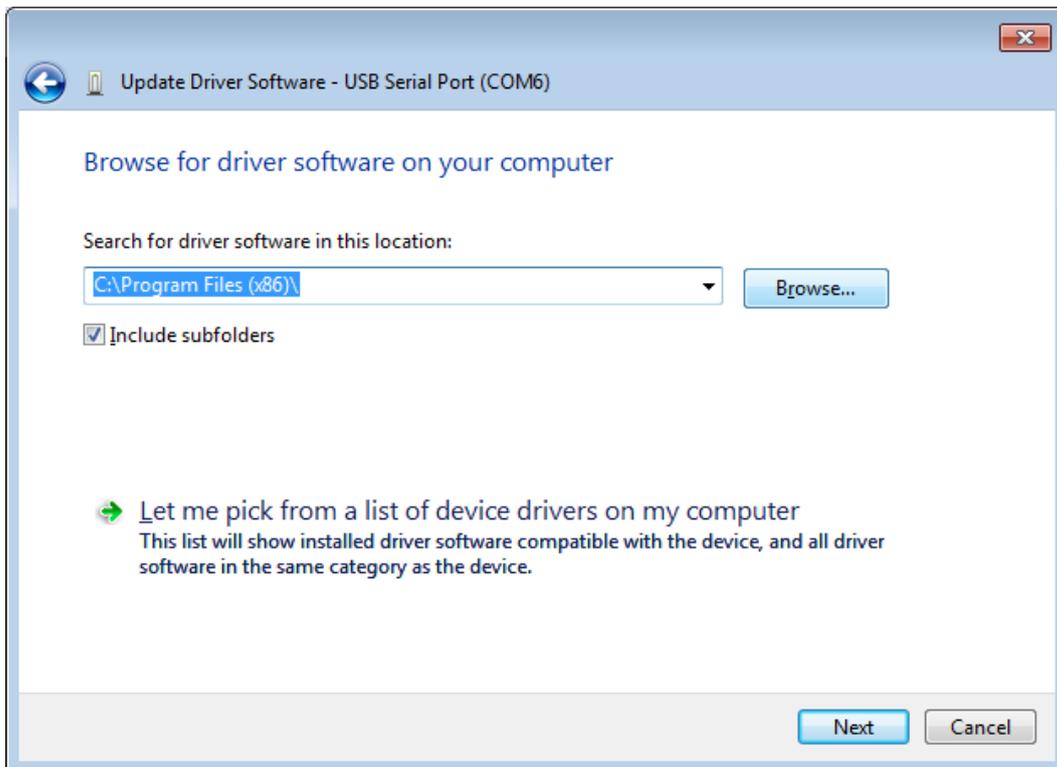


Diagram 22: Installing port driver, search path

USB Sensor Interface Model 9206

- Enter the same file path you specified in the first part of the installation procedure.
- Confirm with “Next”.

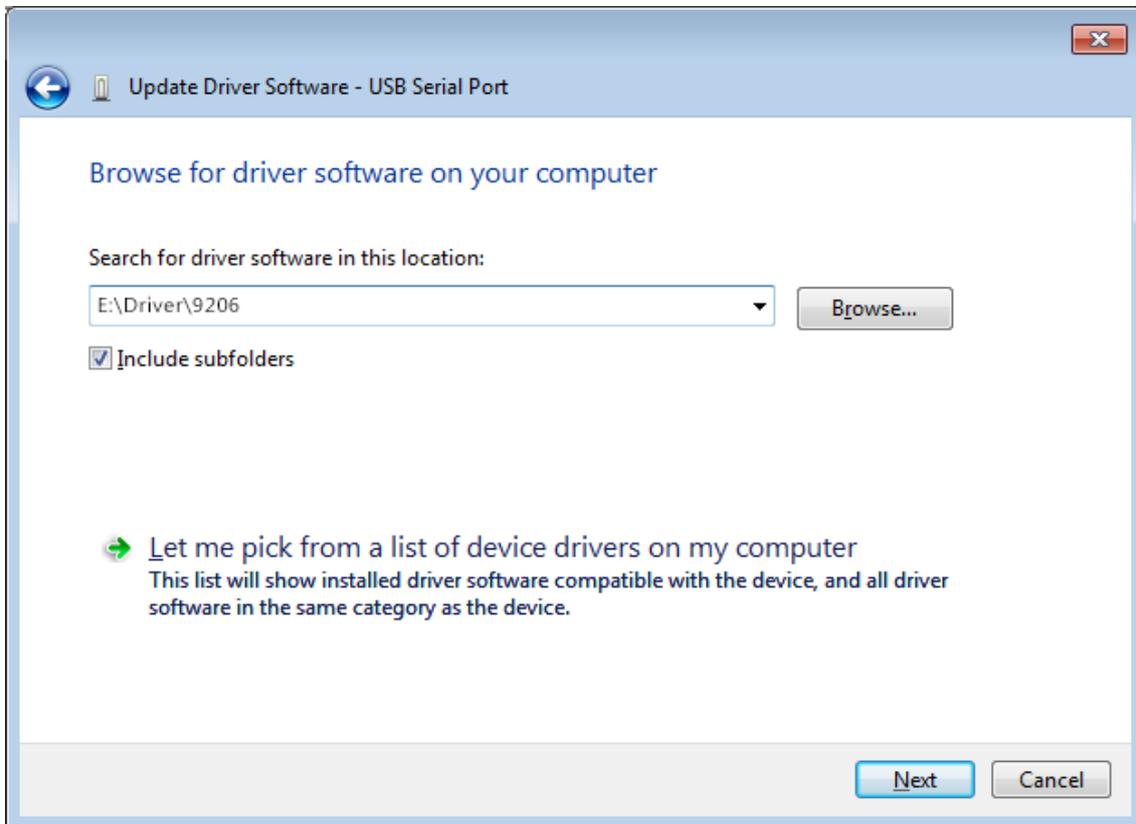


Diagram 23: Installing port driver, confirm path

- Confirm with “Next”.

The operating system confirms the installation of the virtual COM port.

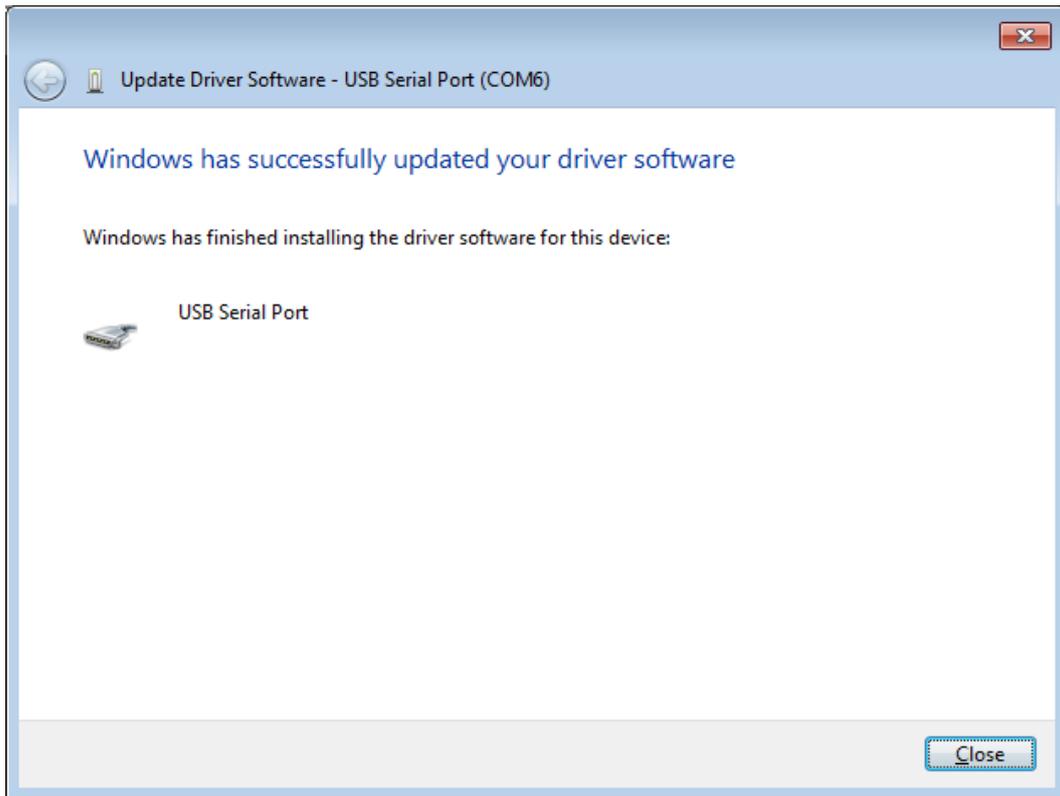


Diagram 24: Installing port driver, installation successful

- Click on "Finish" to close the window.

USB Sensor Interface Model 9206

3.4 Software licensing for 9206-P100/P200 multi-channel operation

The multi-channel version, which you can always order subsequently, provides a graphical display facility for up to eight model 9206 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 9206 equipment series in DigiVision, follow the steps below:

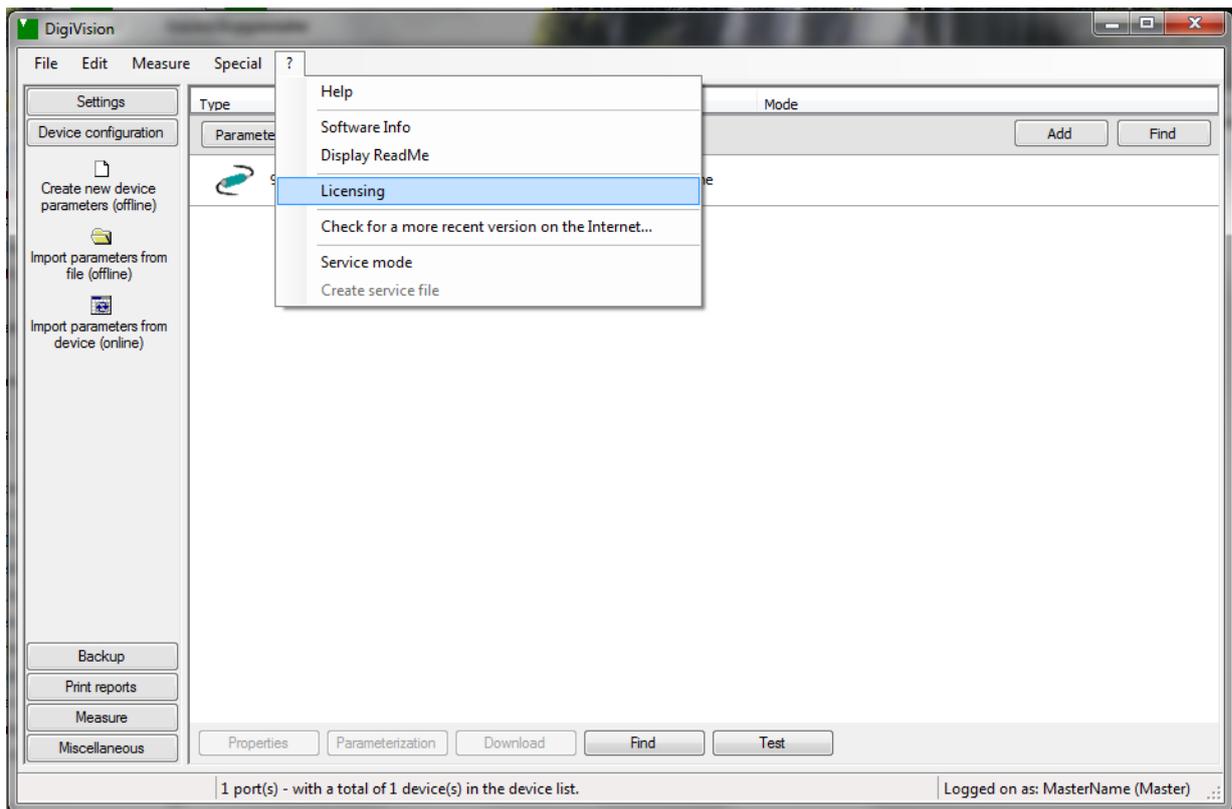


Diagram 25: DV, software licensing

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

This could look like this:

12345-12345-12345-12345

Note:

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

- Click on "Next".

If the license code has been entered correctly then the corresponding device model is enabled.

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

4. Initial operation

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 24 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 model 9206 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 internal 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 model 9206 USB Sensor Interface is 2.5 VA or 30 VA.

4.3 Adjustment using PC software 9206-P001/P100/P200

The PC configuration program "9206-P001/P100/P200" (P100/P200 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 "9206-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.
- Link measurements from the measurement channels.

USB Sensor Interface Model 9206

4.4 Device list

You can use the device finder facility to get the computer to detect automatically the model 9206 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.

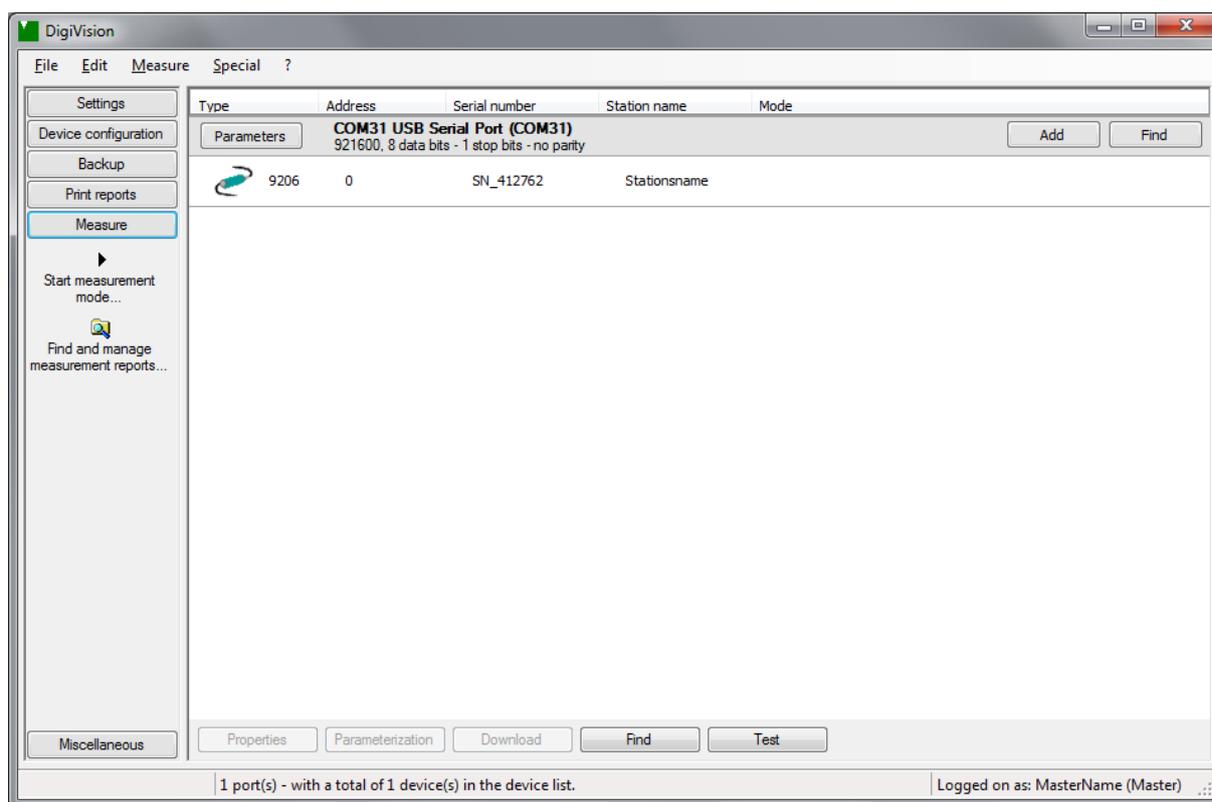


Diagram 26: DV, device list

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.

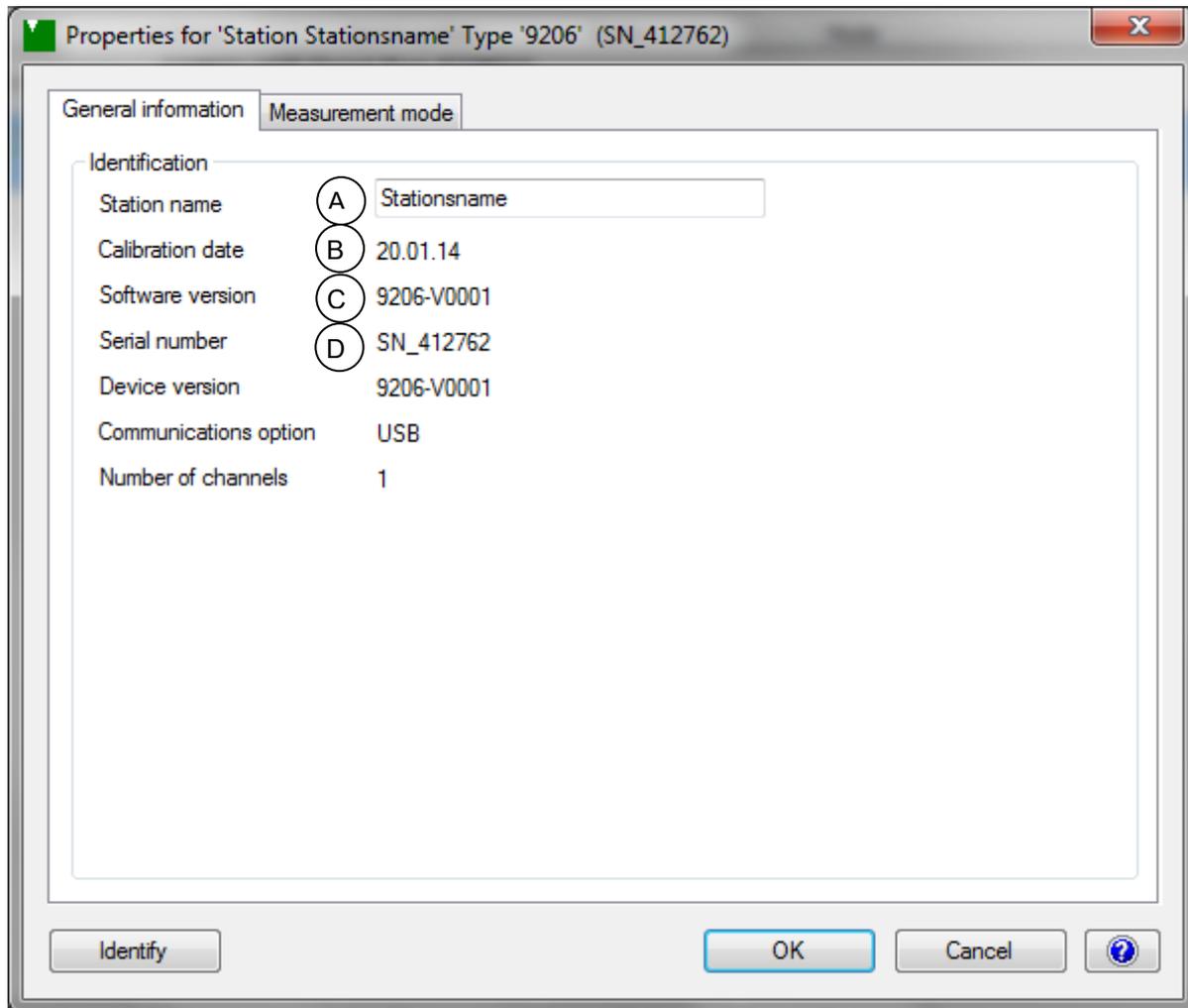


Diagram 27: DV, general information

Device name (A)

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

Calibration date (B)

The calibration date is updated with the date and time whenever new data is transferred to the model 9206 USB Sensor Interface.

Software version (C)

Shows the current software version in the model 9206 USB Sensor Interface.

Serial number (D)

This field displays the serial number of the model 9206 USB Sensor Interface currently connected.

USB Sensor Interface Model 9206

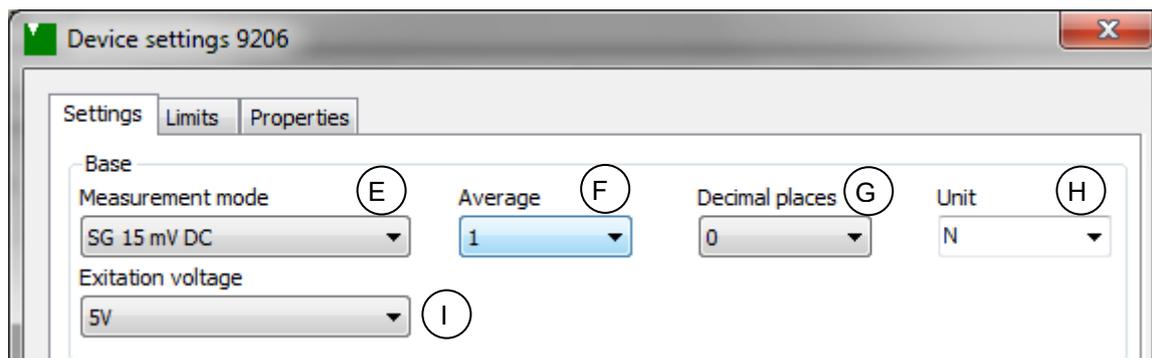


Diagram 28: DV, device settings

Measurement input (E)

In order to be able to use 100 % of the measurement range of the connected sensor, the selected input range must be the \geq the sensor sensitivity.

The following input measurement ranges are possible:

- 15 mV
- 30 mV
- 250 mV
- Potentiometer 5V
- +/-10V

Mean value (F)

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 (G)

The setting for decimal places refers to the measured value. The number of decimal places can range from 0 to 6. 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 (H)

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 adjustment area of the software is described in the following sections.

Sensor excitation voltage 1

The following sensor excitation voltages are possible:

- 2.5 V
- 5 V

The correct value for the sensor excitation voltage is listed on the datasheet or the test certificate.

USB Sensor Interface Model 9206

5. Adjustment of strain gauge sensors

5.1 General information

The model 9206 USB Sensor Interface can be calibrated by a choice of methods.

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

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

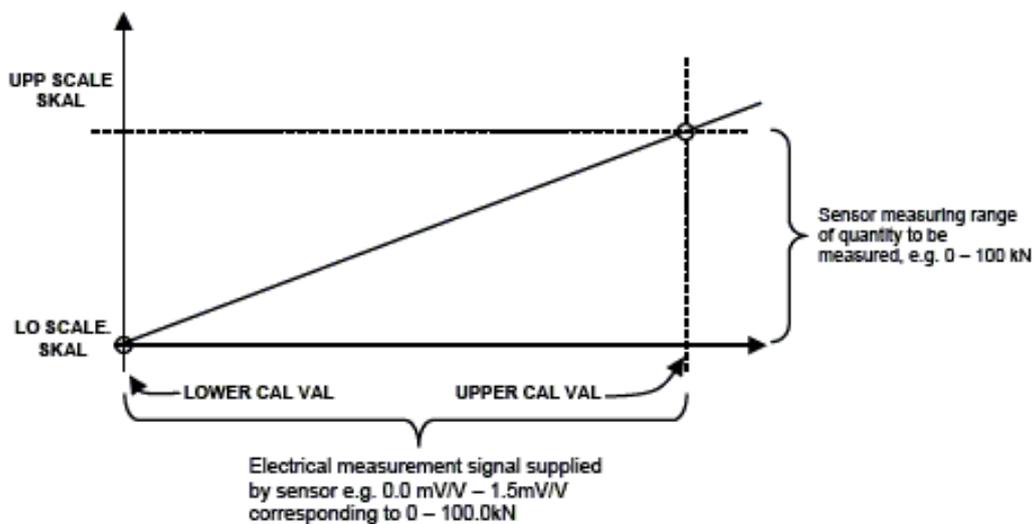


Diagram 29: Sensor characteristic curve

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 \leftrightarrow Lower calibration value

Upper scale value \leftrightarrow 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 \rightarrow Upper scale value

Zero signal \rightarrow Zero point, zero signal without assembly parts, lower calibration value

Rated output \rightarrow Output signal at rated load, sensitivity in preferential measurement direction, upper calibration value

5.2 Types of connection

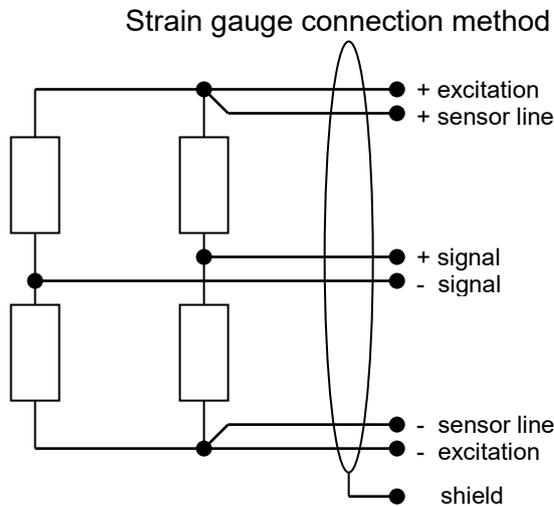


Diagram 30: Strain gauge connection method

Note:

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

4-wire connection method

In most applications, however, the 4-wire connection is quite adequate. In this case, the sensor lines are not connected.

6-wire connection method

This connection should be used to achieve the best possible measurement accuracy with strain gauges, because it avoids the complex effect of resistances, such as the internal excitation lines and connecting elements in the Sensor Profibus Module, on the behavior of the measuring chain. In this arrangement, the measuring lead contains additional “sensor lines” that detect the excitation voltage at the sensor input and feed this information back to the instrument.

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

This method involves a two-stage online teach-in of sensor data to the model 9206 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 model 9206 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 model 9206 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, $F = 0 \text{ N}$ **(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. 0.0765).

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 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 100 N.

- Then apply a known reference load to the load cell e.g. $F = 100 \text{ N}$ **(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 (0.0765 in our example) to the rated output of the sensor. This value appears in the sensor test certificate (e.g. 1.1802). Type in the corrected value ($(1.1802 * 5 \text{ V}) + 0.0765 = 5.977500$) as the upper calibration value **(D)**.

USB Sensor Interface Model 9206

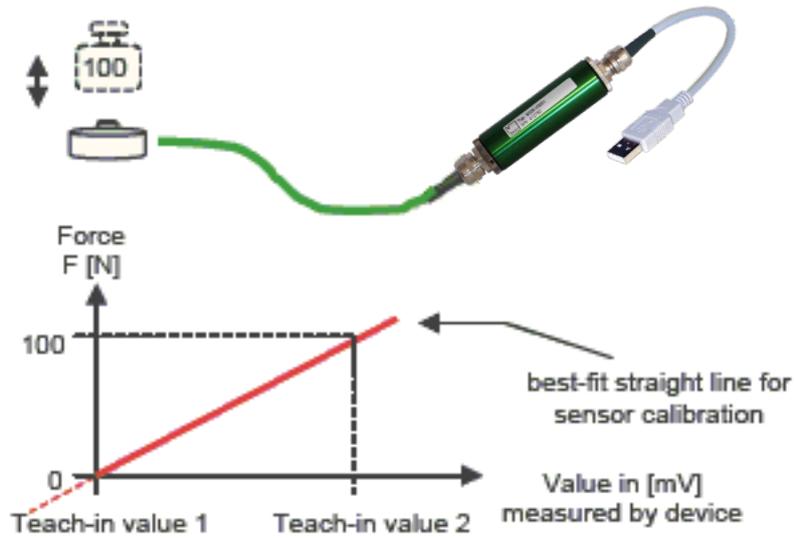
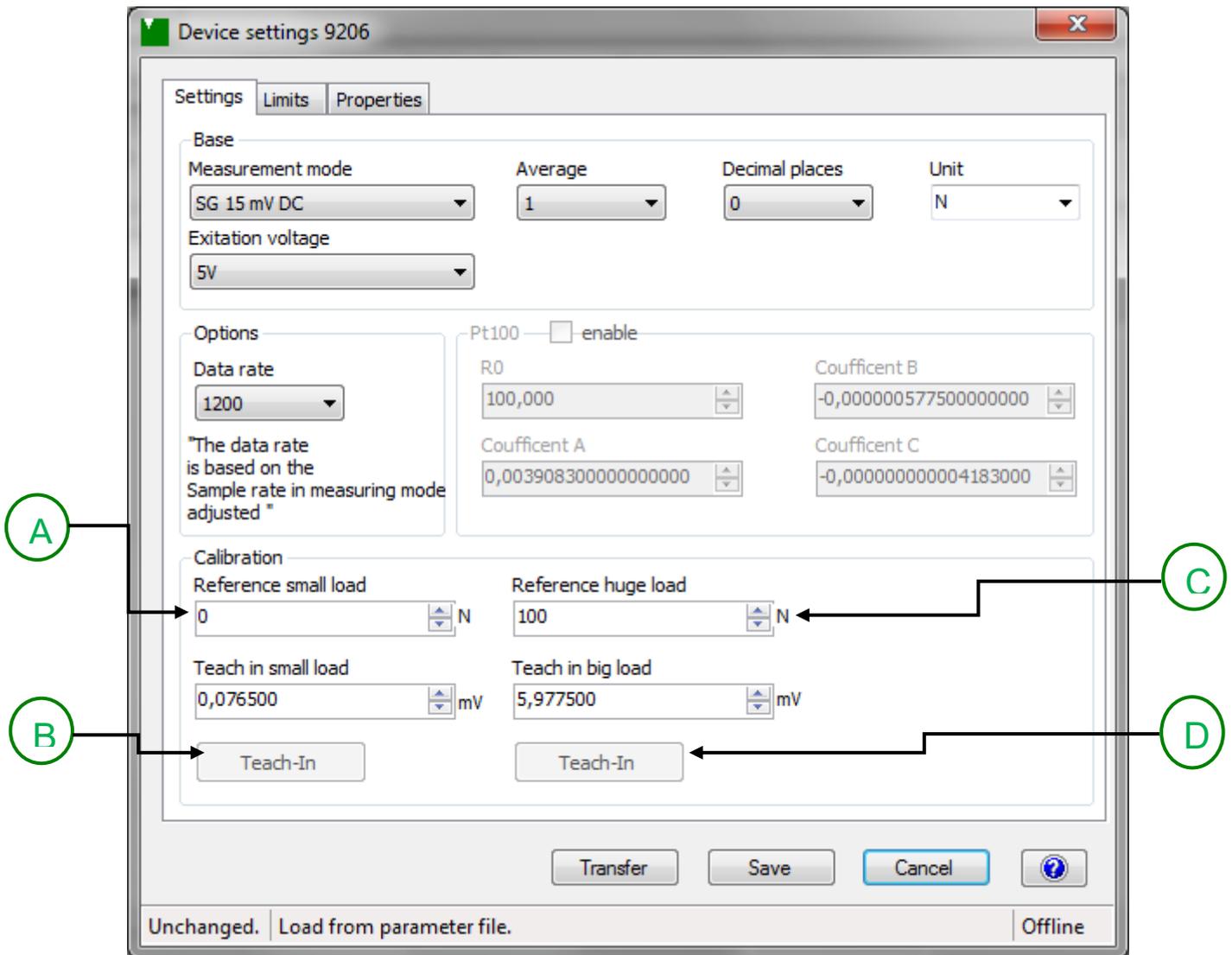


Diagram 31: Sensor characteristic curve

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



Device settings 9206

Settings Limits Properties

Base

Measurement mode: SG 15 mV DC

Average: 1

Decimal places: 0

Unit: N

Excitation voltage: 5V

Options

Data rate: 1200

Pt100: enable

R0: 100,000

Coefficient B: -0,000000577500000000

Coefficient A: 0,003908300000000000

Coefficient C: -0,0000000000004183000

Calibration

Reference small load: 0 N

Reference huge load: 100 N

Teach in small load: 0,076500 mV

Teach in big load: 5,977500 mV

Teach-In

Teach-In

Transfer Save Cancel ?

Unchanged. Load from parameter file. Offline

Diagram 32: DV, device settings 9206

5.4 Adjustment using the sensor test and calibration certificate

This method involves using the test and calibration certificate to enter the sensor data directly in the model 9206 USB Sensor Interface. All necessary adjustment data can be found from the sensor test certificate.

Prüf- und Kalibrierprotokoll Test- and Calibration Certificate

**Ultraminiatur-Kraftsensor
Ultraminiature - Load Cell**

Typ	/ Type	: 8416-5100
Serien-Nr.	/ Serial no.	: 377166
Qualitätsprüfungen	/ Quality Inspections	
Nennkraft	/ Nominal Force	$F_{nom} : 0 \dots 100 \text{ N}$ ①
Fehlergrenzen (Zusammengesetzter Fehler) Summe der Fehler aus Linearitätsabweichung, Relative Umkehrspanne und Reproduzierbarkeit	/ Accuracy (Combined value) / Combined value for nonlinearity, / repeatability and hysteresis.	$f_{comb} : \leq \pm 0,7 \% \text{ v.E. / FS}$
Kalibriert in	/ Calibration for	: Druckrichtung / Compression
Maximale Gebrauchskraft	/ Maximum Force, Operating	$F_G : 150 \% \text{ v.E. / FS}$
Referenzspeisespannung	/ Reference Excitation	$U_{ref} : 5,0 \text{ V}$
Ausgangssignal (Kennwert) Ausgangssignal beim Messbereichsendwert bei tariertem Nullpunkt	/ Output signal (Sensitivity) / Output signal at measuring range / with balanced zero.	$C : 1,1802 \text{ mV/V}$ ②
Nullsignal ohne Einbauteile	/ Zero Output / without fitting parts	$S_0 : 0,0153 \text{ mV/V}$ ③
Eingangswiderstand	/ Input Impedance	$R_e : 357,31 \Omega$
Ausgangswiderstand	/ Output Impedance	$R_a : 357,44 \Omega$
Isolationswiderstand	/ Insulation Resistance	$R_{is} : \geq 30 \text{ M}\Omega @ 45 \text{ V}$
Kalibriersprung (bei unbelastetem Aufnehmer)	/ Shunt Cal Factor (without any load)	$C_{shunt} : 0,8959 \text{ mV/V}$
Kalibrierwiderstand Ein Kalibrierwiderstand R_{shunt} , zwischen -Speisung und -Ausgangssignal, erzeugt bei tariertem Nullpunkt, den angegebenen Kalibriersprung C_{shunt} .	/ Calibration Resistor (Shunt) / A Calibration Resistor R_{shunt} connected / across -excitation and -output produce / this Shunt Cal Factor C_{shunt} / with balanced Zero Output.	$R_{shunt} : 100 \text{ k}\Omega$
Validiert nach Prüfanweisung	/ Validated according to Inspection Instruction	: 1174

Die Rückführbarkeit der verwendeten Sekundärnormale auf nationale bzw. internationale Normale, entsprechend der Normenreihe DIN EN ISO 9000 ff, ist über Kalibrier- oder Eichschein gewährt. 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.**

Anschlussbelegung: 4-Leiter unverstärkt	Belegung / mode	Steckertyp / Connector model					
Wiring Code: 4-Wire unamplified			99004	99007	9941	9900-	9900-
Signal	/ Signal	Farbe / Color			C/D	V209	V280
+ Speisung	/ Excitation	weiß / white	—	—	1/2	8	20
- Speisung	/ Excitation	braun / brown	—	—	A/B	4/5	1
+ Ausgangssignal	/ Output	gelb / yellow	—	—	G	6	11
- Ausgangssignal	/ Output	grün / green	—	—	F	9	12
Schirm	/ Shield	blank / not isolated	—	—		13	3
						91615	9900-
						V506	V106

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.

Raumtemperatur / Ambient temperature: 22 °C ± 2 K Rel. Feuchte / Relative humidity: 50 % ± 20 %

Prüfdatum / Test Date : 15.11.13 Prüfer / Inspector : O. Bender

Diagram 33: Test- and Calibration Certificate, Ultraminiature-load cell

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

② Rated output + (③ zero signal without assembly parts) = upper calibration value

USB Sensor Interface Model 9206

The method of "Adjustment using the sensor test and calibration certificate" is a two-point calibration of the sensor data for the model 9206 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 model 9206 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 model 9206 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.
- Set the zero point, $F = 0 \text{ N}$ **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. 0.0765).

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 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 (0.0765 in our example) to the rated output of the sensor.

This value appears in the sensor test certificate (e.g. 1.1802). Type in the corrected value $((1.1802 * 5 \text{ V}) + 0.0765 = 5.977500)$ as the upper calibration value **D**.

- Now transfer these sensor parameters.

To do this click on the "Transfer" button.

You can also save them in a file.

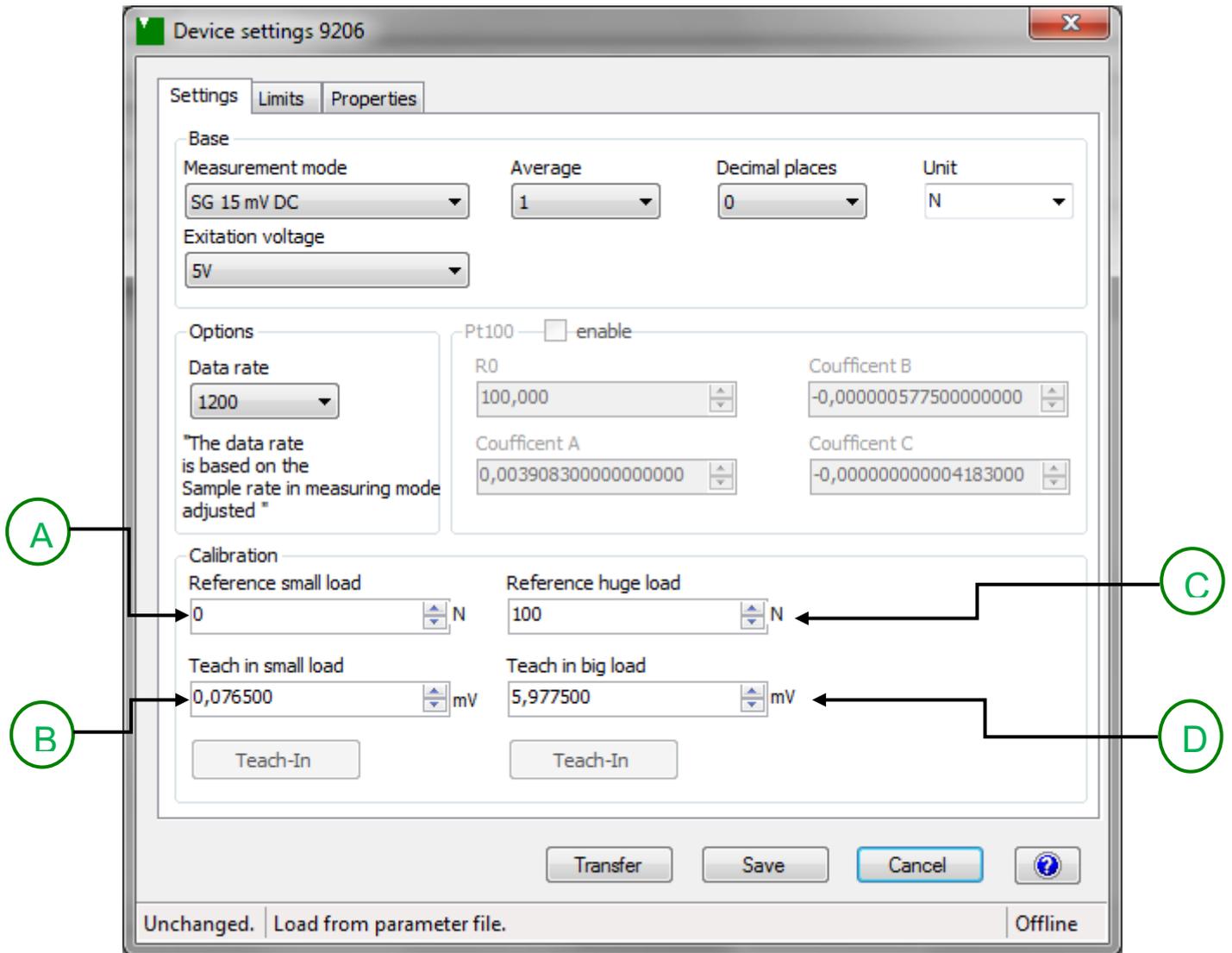


Diagram 34: DV, device settings 9206

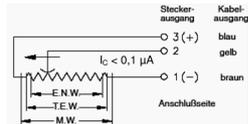
USB Sensor Interface Model 9206

6. Adjustment of potentiometric displacement sensors

Adjustment 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 adjusted gage block have proved to be the most straightforward and practical way of adjusting systems that measure displacement and length (such as potentiometric displacement 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. : **8713300389**

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 Eichscheinie 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
Wiring Code:	9991
Signal / Signal	Farbe / Color
+ Speisung / Excitation	blau / blue 3
- Speisung / Signal / Excitation	braun / brown 1
+ Ausgangssignal / Output	gelb / yellow 2

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

Datum / Date : **06.08.13**

Protokoll erstellt durch / Certificate written by : **C. Adams**

Teilgruppe: 871X Prüfvariante: 417 Protokollnr: 727 Infonr: 1 Druckdatum: 05.12.13 09:02:11 Anwender:jf

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Diagram 35: Test- and Calibration Certificate, Potentiometric displacement sensor

6.1 Connection

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

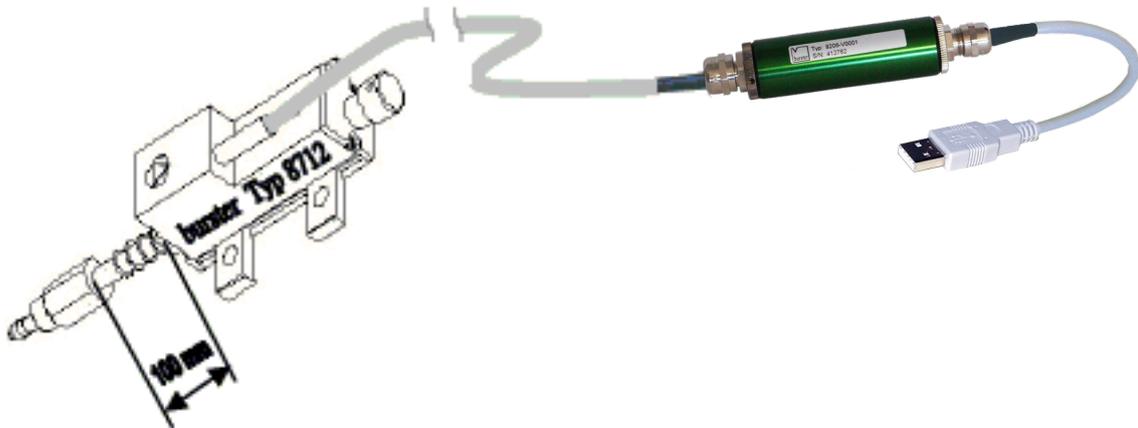


Diagram 36: Physical connection

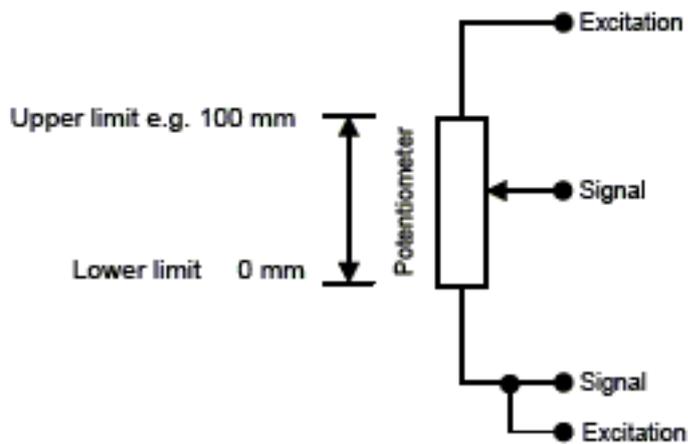


Diagram 37: Circuit diagram

USB Sensor Interface Model 9206

6.2 Adjustment of a potentiometer by the teach-in method

This method involves a two-stage online teach-in of sensor data to the model 9206 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 model 9206 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 model 9206 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:

Displacement measurement using the example of a potentiometric displacement sensor model 8712-100:

Set the displacement 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.
- 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.

- Now transfer these sensor parameters.
To do this click on the "Transfer" button.
You can also save them in a file.

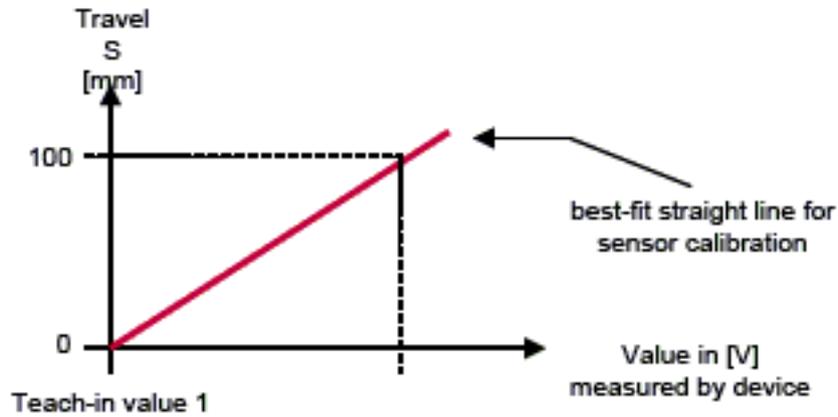


Diagram 38: Sensor characteristic curve

Device settings 9206

Settings Limits Properties

Base

Measurement mode: Potentiometer

Average: 1

Decimal places: 0.00

Unit: mm

Excitation voltage: 5V

Options

Data rate: 1200

Pt100: enable

R0: 100,000

Coefficient B: -0,000000577500000000

Coefficient A: 0,003908300000000000

Coefficient C: -0,000000000004183000

*The data rate is based on the Sample rate in measuring mode adjusted *

Calibration

Reference small load: 0,00 mm

Reference huge load: 100,00 mm

Teach in small load: 0,000100 v

Teach in big load: 5,000100 v

Teach-In

Teach-In

Transfer Save Cancel

Unchanged. Load from parameter file. Offline

A: Points to the 'Settings' tab.

B: Points to the 'Teach-In' button for the small load.

C: Points to the 'Reference huge load' input field.

D: Points to the 'Teach-In' button for the big load.

Diagram 39: DV, device settings 9206

USB Sensor Interface Model 9206

6.3 Sensor excitation voltage

The maximum applicable sensor excitation voltage for the potentiometric displacement sensors is given in the test and calibration certificate. To enable practical measurements, choose the terminal with the 5 V excitation voltage. The maximum measurement signal output from potentiometers to the model 9206 USB Sensor Interface is always the excitation voltage.

6.4 Connection

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

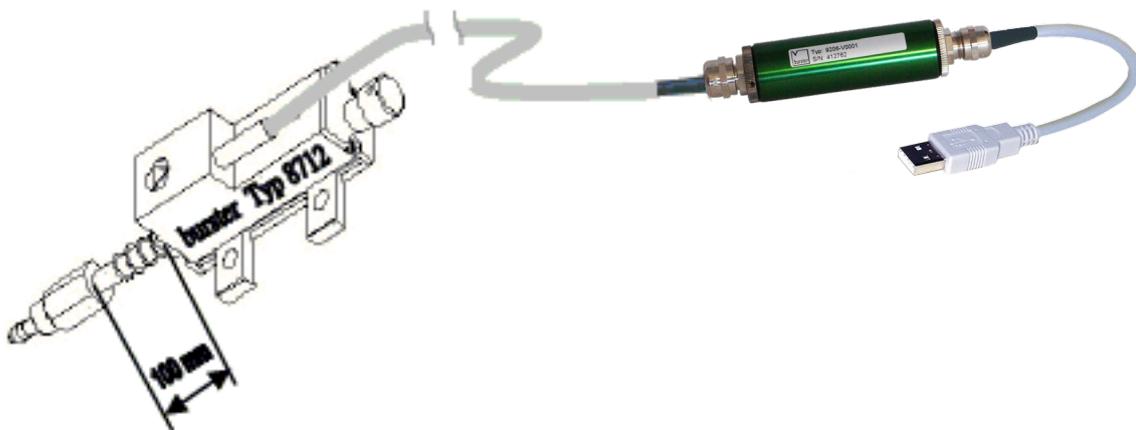


Diagram 40: Physical connection

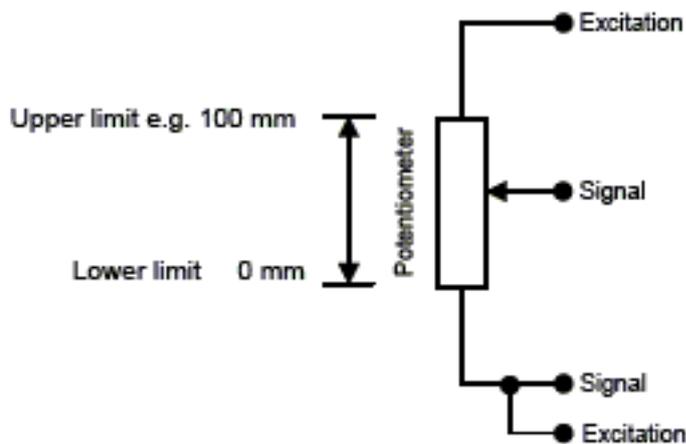


Diagram 41: Circuit diagram

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

Adjustment 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

DC/DC - Wegsensor
DC/DC Displacement Transducer

Typ / Type : **8740-5002**
 Serien-Nr. / Serial no. : **415605**

Qualitätsprüfungen / **Quality Inspections**

Messweg / Measurement Range L_{nom} : **0 ... 2 mm**
 Linearität (LINEARE REGRESSION) / Linearity (best fit straight line) f_{lin} : **≤ ± 0,25 % v.E. / FS**
max. Abweichung von der besten Geraden in Prozent des Messbereiches. / Linearity is defined as max. deviation from ideal straight line as % of FS.
 (DIN 32876 T1 und VDI/VDE/DGQ 2618 Blatt 26)

Speisespannung / Excitation Voltage U_{ref} : **9 ... 28 V_{DC}**
 Ausgangsspannungsbereich / Output voltage range U_a : **0 ... 5 V_{DC}**
Ausgangssignal bei Nennmessweg / Output signal at measuring range

Den mechanischen Nullpunkt findet man, indem der Signalumformer auf die minimale Restspannung justiert wird. / The mechanical zero point is found by adjusting the transducer to minimum residual voltage.

Isolationswiderstand / Insulation resistance R_{is} : **≥ 30 MΩ @ 45 V_{DC}**
 Validiert nach Prüfanweisung / Validated according to Inspection Instruction : **2130**

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.

Verwendete Normale / **Standards employed**

Prüfmittel-Nr. Equipment-No.	Typ Type	Hersteller Manufacturer	bestätigende Stelle Confirming dept.	Kalibrierzeichen Calibration mark	Kalibrierdatum Date of Calibration
773-P5017-14	5017	PREMA	DKD-K-02101	6227	16.12.10
795-MF100-01	MFP100.01	Feinmess Suhl	D-K-15131-01-00	000253	02.08.11

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:				Belegung / mode						
Wiring Code:				Steckertyp / Connector model						
Signal	Signal	Farbe	Color	99004	9941	9900-V209	9952	91615	9900-V506	9900-V106
+ Speisung	/ Excitation	braun	/ brown	—	C/D	1/2	1	20	5	11
⊥ Masse	/ GND	weiß	/ white	—	A/B/F	4/5	3	3	6/3	9
+ Ausgangssignal	/ Output	grün	/ green	—	G	6	2	1	2	13
Shield	/ Shield	blank	/ not isolated	—	Gehäuse/case	Gehäuse/case	7	3	6	9

Raumtemperatur / Ambient temperature: 22 °C ± 2 K Rel. Feuchte / Relative humidity: 50 % ± 20 %
 Prüfdatum / Test Date : **23.11.13** Prüfer / Inspector : **J. Seidt**

Teilgruppe: 8740 Prüfvariante: 2130 Protokollnr: 1263 Infor: 2 Druckdatum: 05.12.13 09:05:56 Anwender: jf
 burster präzisionsmeßtechnik gmbh und co kg Talstr. 1-5 D-76593 Gernsbach (Postfach 1432 D-76587 Gernsbach) Tel. 07224/645-0 Fax. 07224/645-88
<http://www.burster.de> <http://www.burster.com> e-mail: info@burster.de

Diagram 42: Test- and Calibration Certificate, DC/DC displacement transducer

USB Sensor Interface Model 9206

7.1 Connection

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

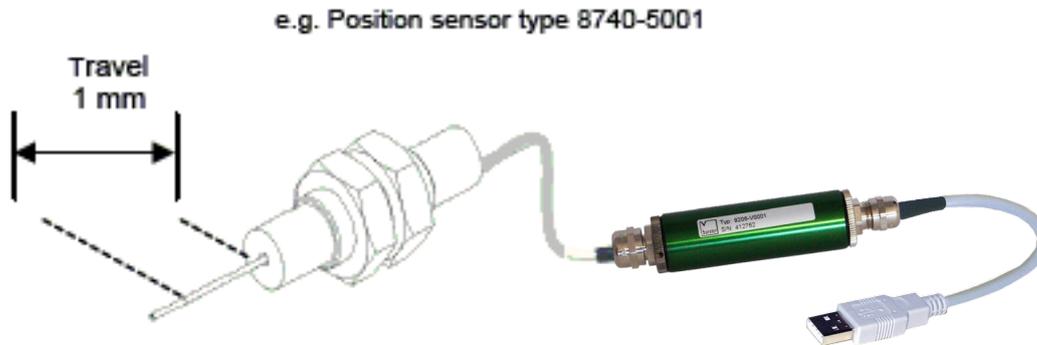


Diagram 43: Physical connection

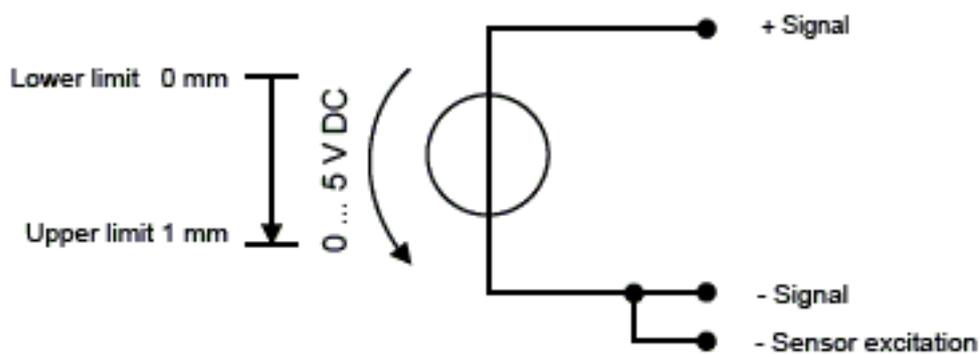


Diagram 44: Circuit diagram

7.2 Sensor excitation voltage

The model 9206 USB Sensor Interface provides excitation voltages for sensors and transmitters.

Please note:

A maximum current of 80 mA Bei der Versorgungsspannung von 12 V darf maximal ein Strom von 80 mA fließen.

7.3 Input range

The measurement signal from the transmitter to be connected, or the standard signal, must lie in the specified range of ± 10 V.

7.4 Adjustment 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 model 9206 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 model 9206 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 model 9206 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:

Displacement measurement using the example of a inductive displacement sensor type 8740-5001.

Set the displacement sensor to the zero displacement (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.

- 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. 1.00 mm.

- Move the sliding shaft using a calibrated gage block to $S = 1.00$ 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.

- Now transfer these sensor parameters.

To do this click on the "Transfer" button.

You can also save them in a file.

USB Sensor Interface Model 9206

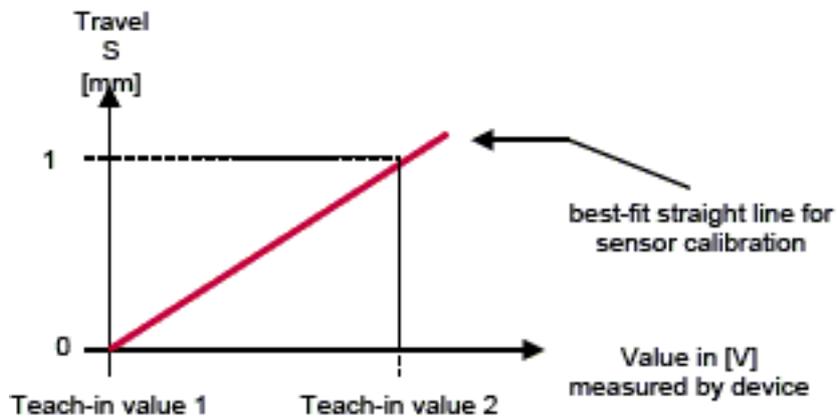


Diagram 45: Sensor characteristic curve

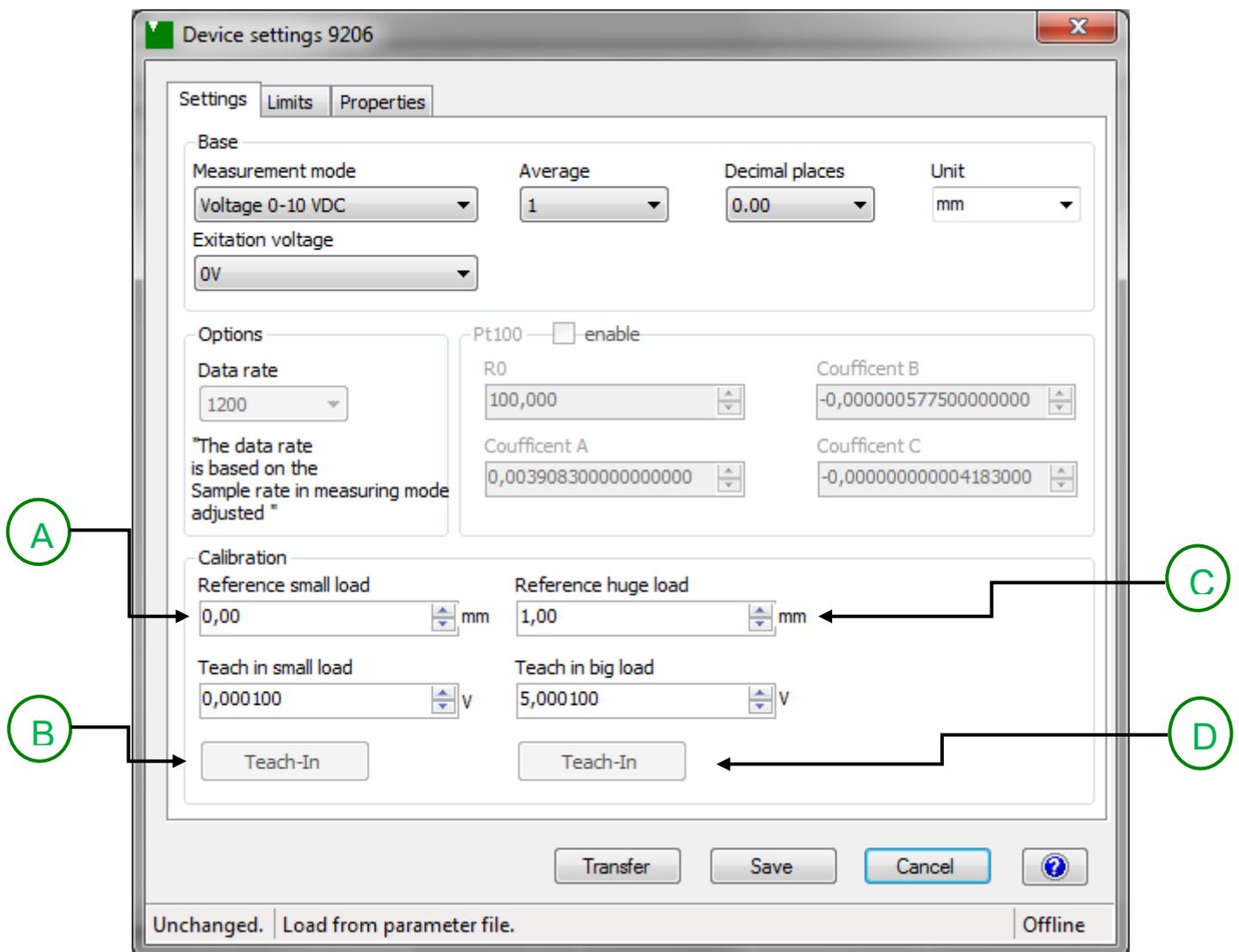


Diagram 46: DV, device settings 9206

7.5 Adjustment using the sensor test certificate

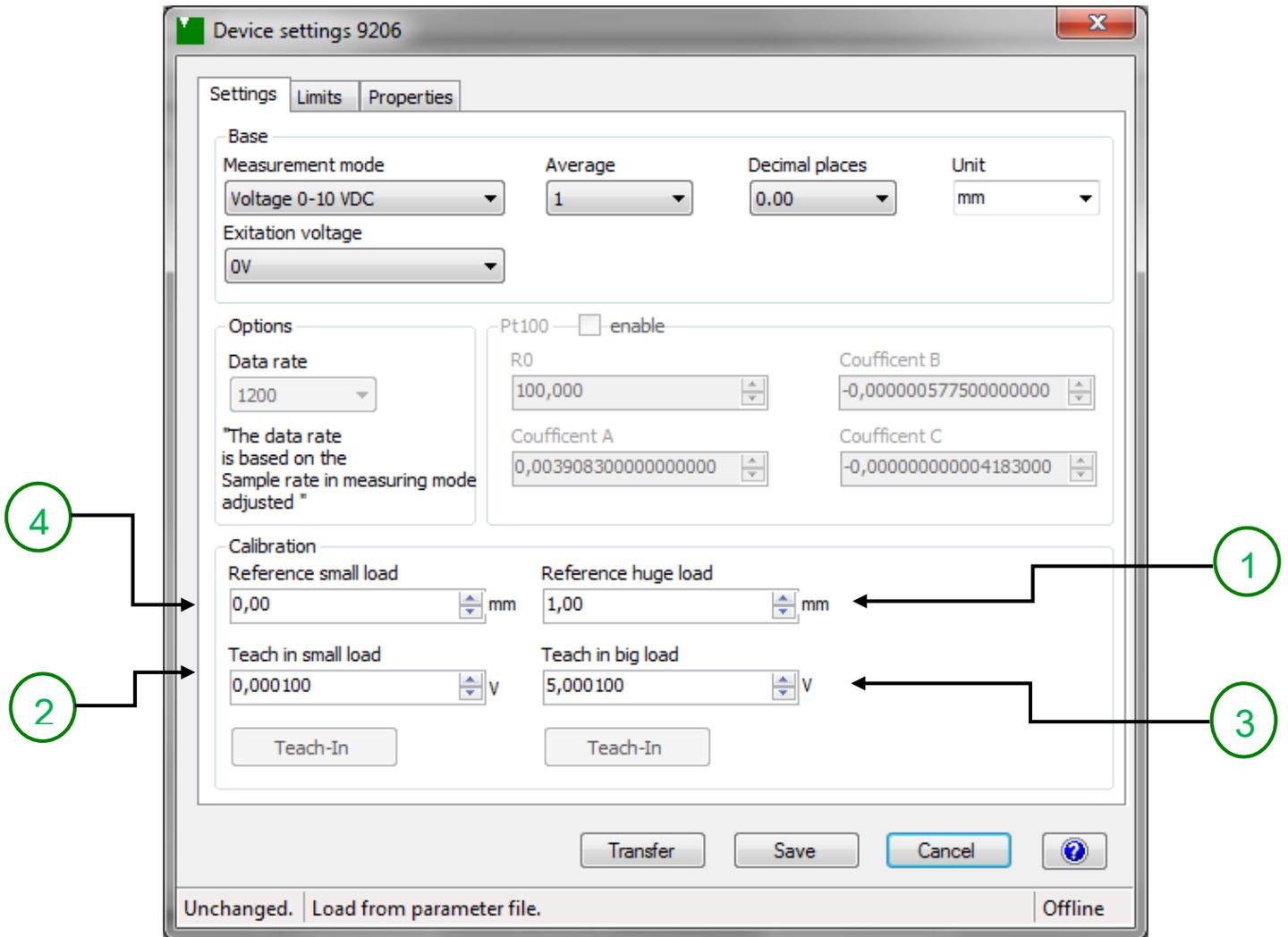


Diagram 47: DV, device settings 9206

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 adjustment was performed as follows:

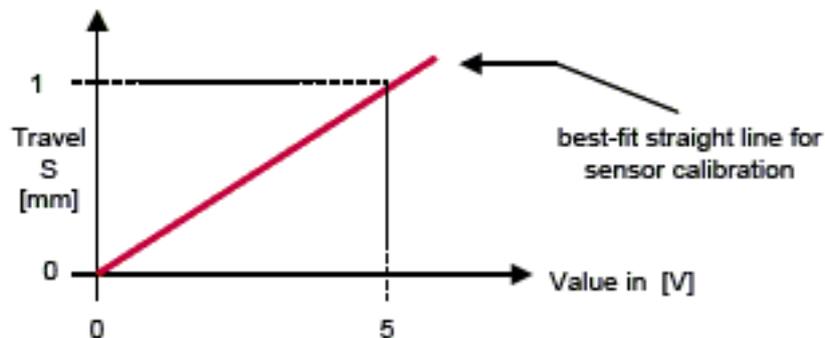


Diagram 48: Sensor characteristic curve

USB Sensor Interface Model 9206

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

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

7.6 Adjustment of Pt100 sensors

The 9206 USB Sensor Interface includes a Pt100 linearization facility using standard values for uncalibrated sensors or specific values for calibrated sensors.

- Manual input of specific coefficients of a Pt100s sensor for linearization in accordance with ITS 90 / EN 60751 $R_0 = 100$ Ohms and an Alpha value of 3.851:

A Pt100 sensor must be calibrated at 3 or 4 points in order to be able to calculate the coefficients A, B and C and to determine the resistance at 0°C.

- Values only in the positive region:

Make measurements at 0°C and two positive temperature values e.g. 100°C and 200°C. Use the value pairs of temperature and corresponding resistance values to obtain R_0 , A and B. Use the standard value for coefficient C.

- Values in the positive and negative region:

See above, except in this case a measurement is needed in the negative region e.g. -50°C in order to calculate the specific coefficient C.

- For uncalibrated sensors, use the standard coefficients specified in DIN EN 60751:

- $A = 3.9083 \times 10^{-3}$
- $B = -5.775 \times 10^{-7}$
- $C = -4.183 \times 10^{-12}$
- $R_0 = 100$ Ohm

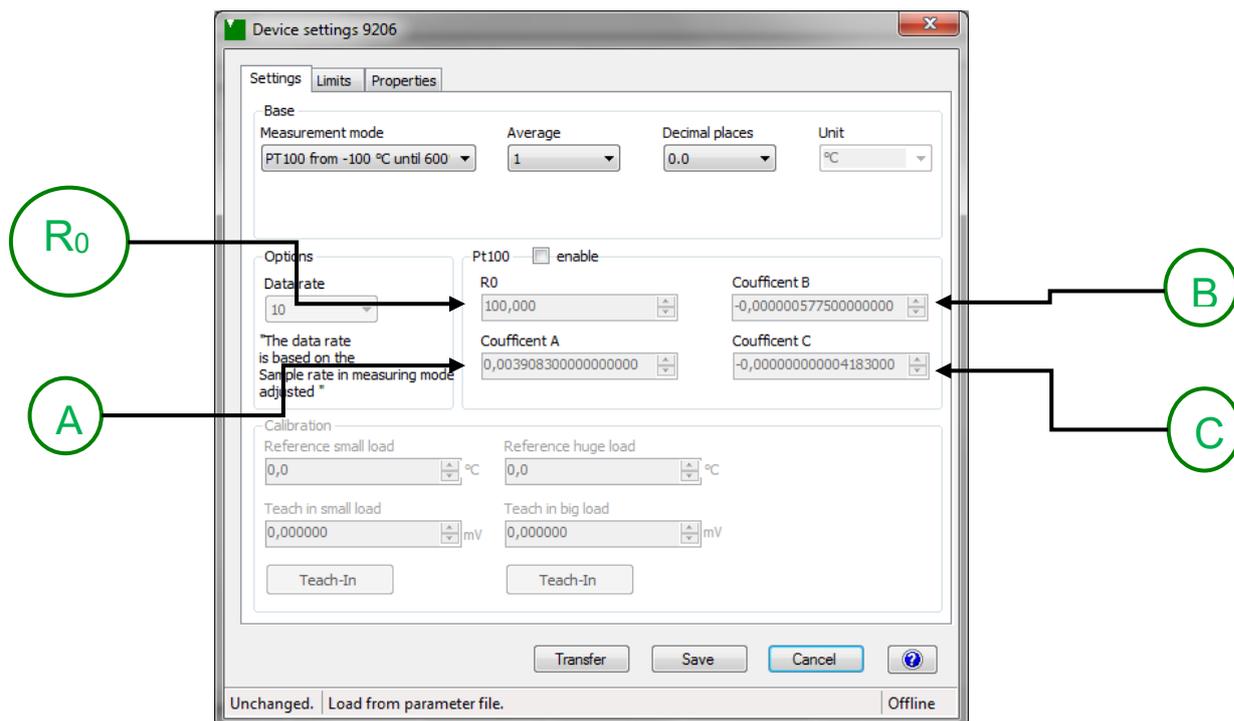


Diagram 49: DV, device settings 9206

8. Measurement mode

8.1 Device detection

Device detection is possible in the licensed version of the software.

Depending on the installation situation, DigiVision may already recognize the sensor or it may need to find it. If the sensor is not displayed, run the device detection process.

- Open DigiVision.
- Go to file > Find devices...

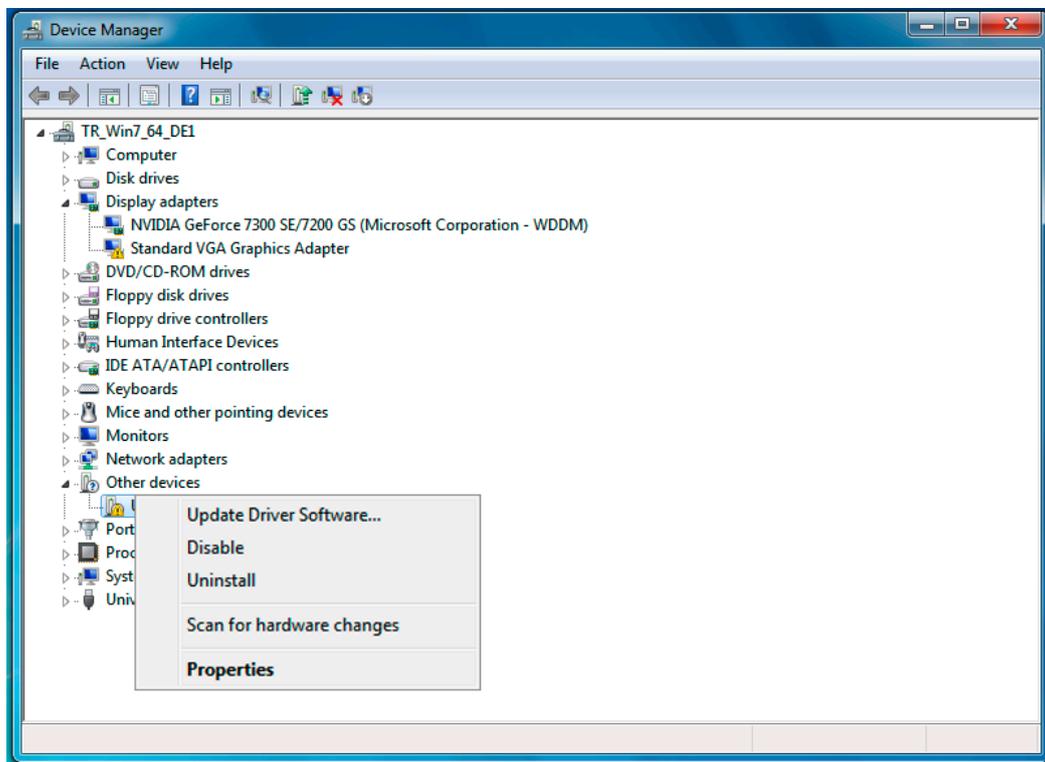


Diagram 50: DV device detection, menu, find devices

USB Sensor Interface Model 9206

8.2 Operation

Note:

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

8.3 Measurement screen

8.3.1 Display

The measurement curve is displayed in a line graph of the 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. The measurement channels can be shown and hidden individually.

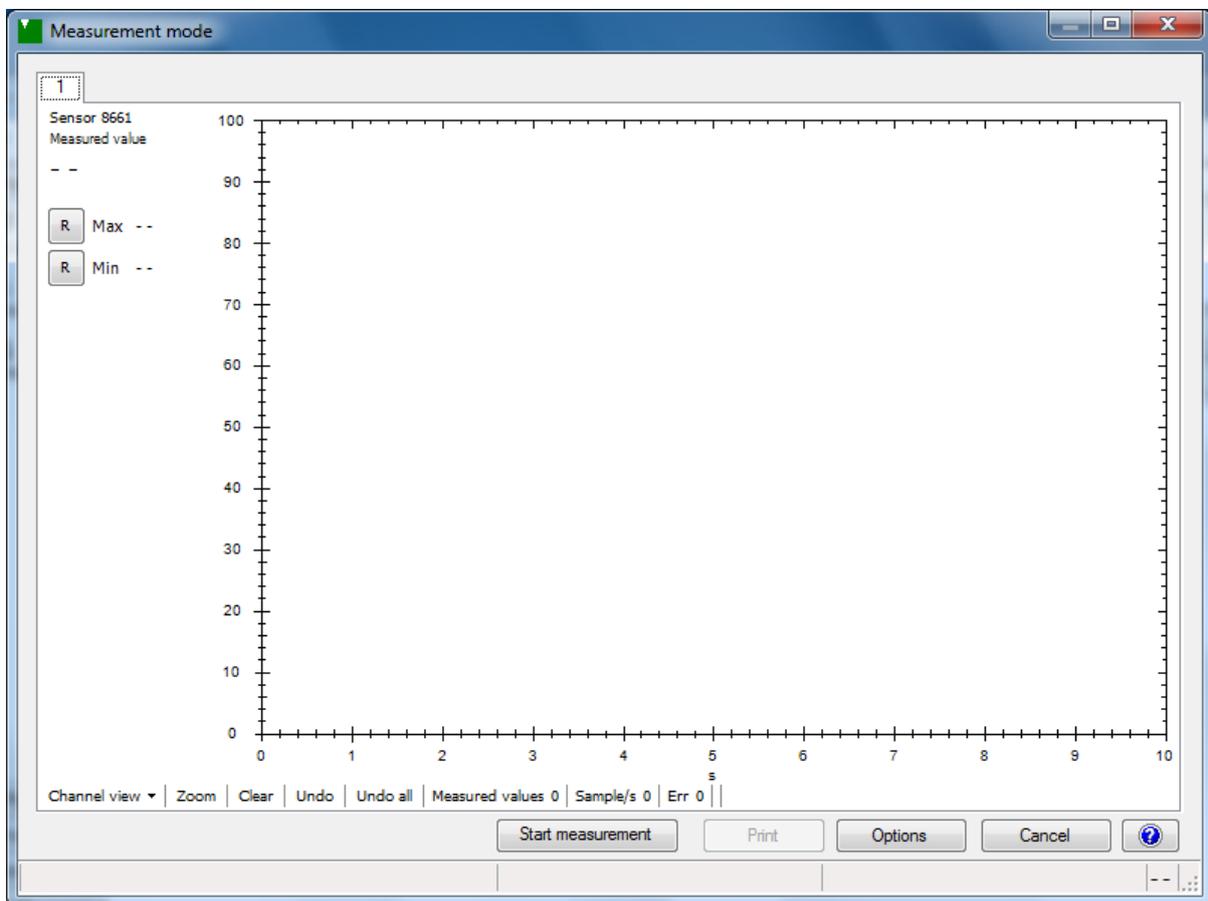


Diagram 51: DV, standard version 9206-P001

The standard version of 9206-P001 is supplied with the sensor.



Diagram 52: DV, licensed version 9206-P100

The paid version of 9206-P100 can display up to 16 measurement channels.

8.3.2 Tare function

To zero the display and the measurement curve:

- 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.

To de-activate the tare function

- Press the button again.

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

USB Sensor Interface Model 9206

8.4 Options

Note:

The information given here is summarized and is intended as a guide when using the device for the first time. 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 9206-P001 version, a USB Sensor Interface is assigned measurement channel 1. In the 9206-P100/P200 version, channels 1 to 32 are assigned. The channel settings can be changed in measurement mode using the "Options" button.

8.5 Basic configuration

In the basic configuration window you can specify how many channels you wish to display.

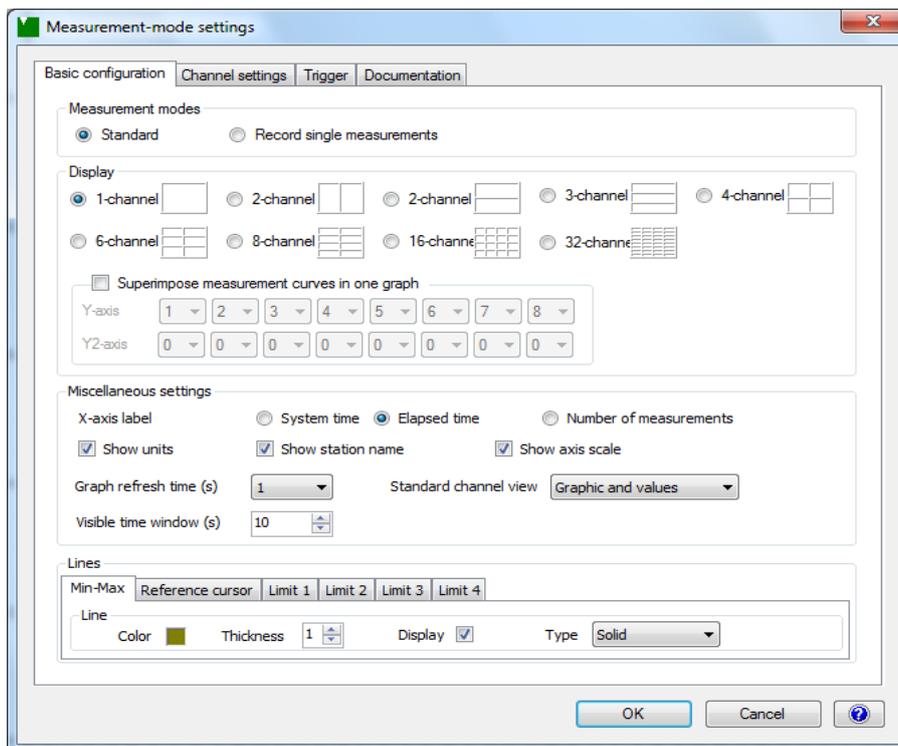


Diagram 53: DV, basic configuration

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

8.6 Channel settings

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

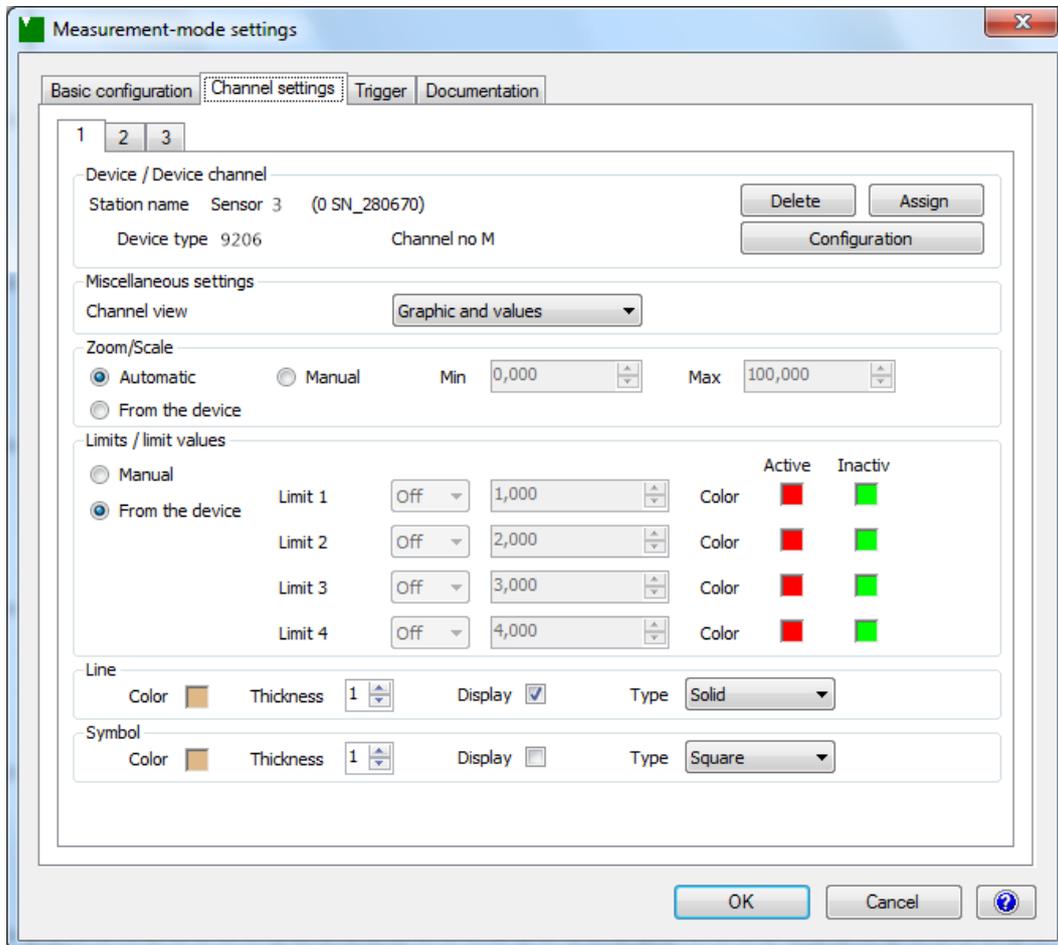


Diagram 54: DV, channel settings

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 be also specified here.

These settings must be made separately for each channel.

USB Sensor Interface Model 9206

8.7 Selecting the measurement rate

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

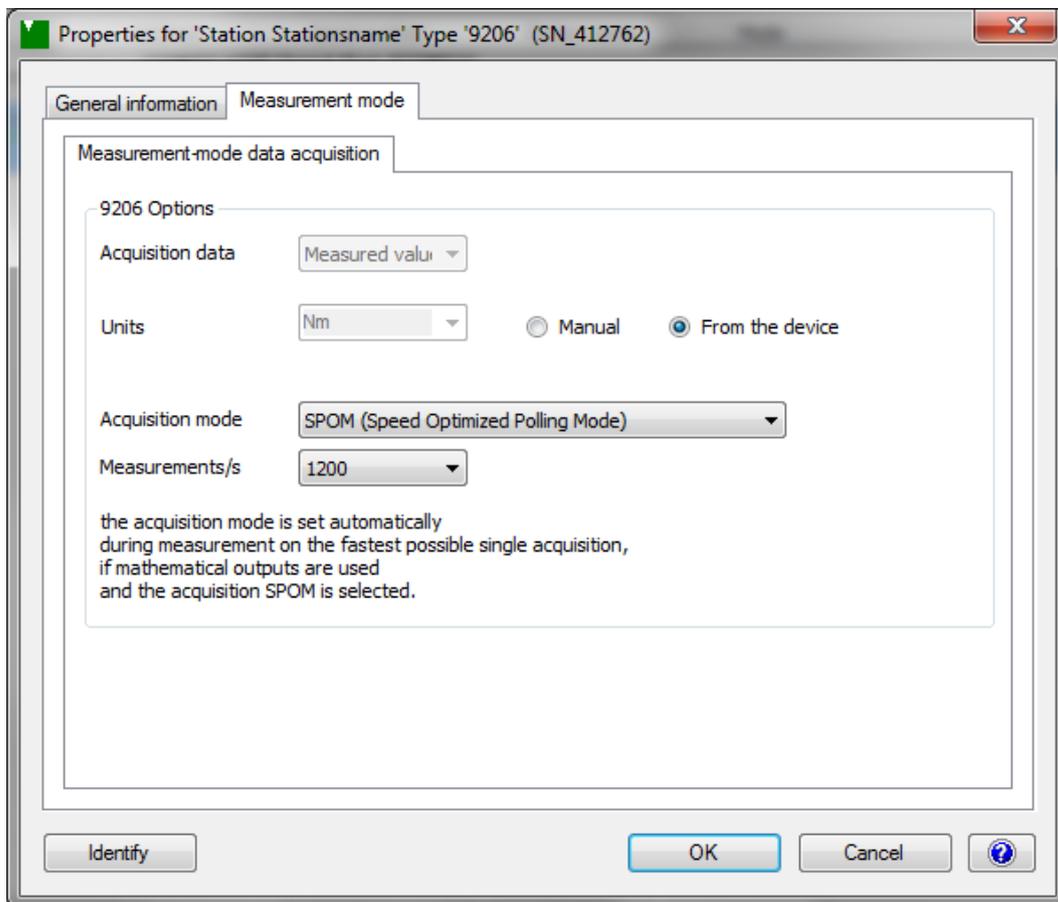


Diagram 55: DV, selecting the measurement rate

The following acquisition modes are available:

- Normal

Measurement rates between 0.1 and 20 measurements per second are possible here.

- SOPM – Speed Optimized Polling Mode

With the 9206-P001, up to 200 measurements per second are possible,

with the 9206-P100/-P200, up to 1200 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".

8.8 Trigger

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

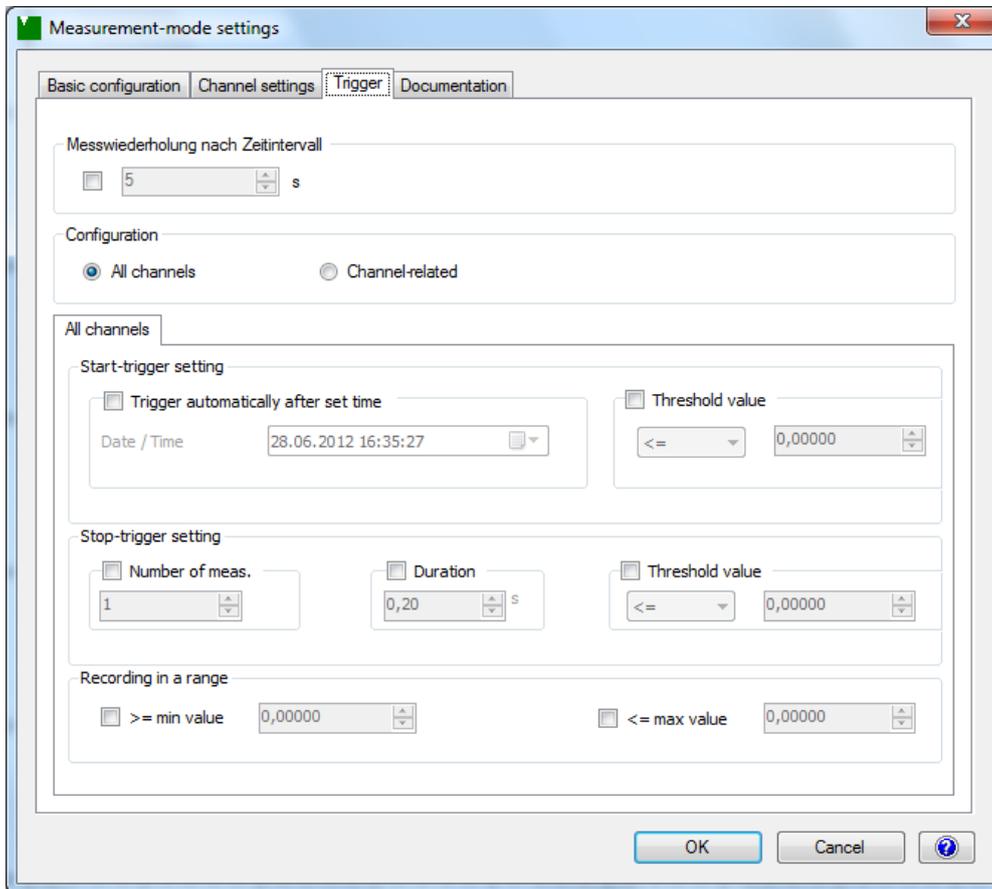


Diagram 56: DV, Trigger

Repeat measurement after time interval

This setting specifies a time interval after which a repeat measurement takes place following the end of a measurement process. For all channels or channel-related.

Start-trigger setting:

This defines the start condition.

Stop-trigger setting:

Likewise, this defines the stop condition.

Recording in a range:

This setting lets you define a range in which measurement is performed.

8.9 Documentation

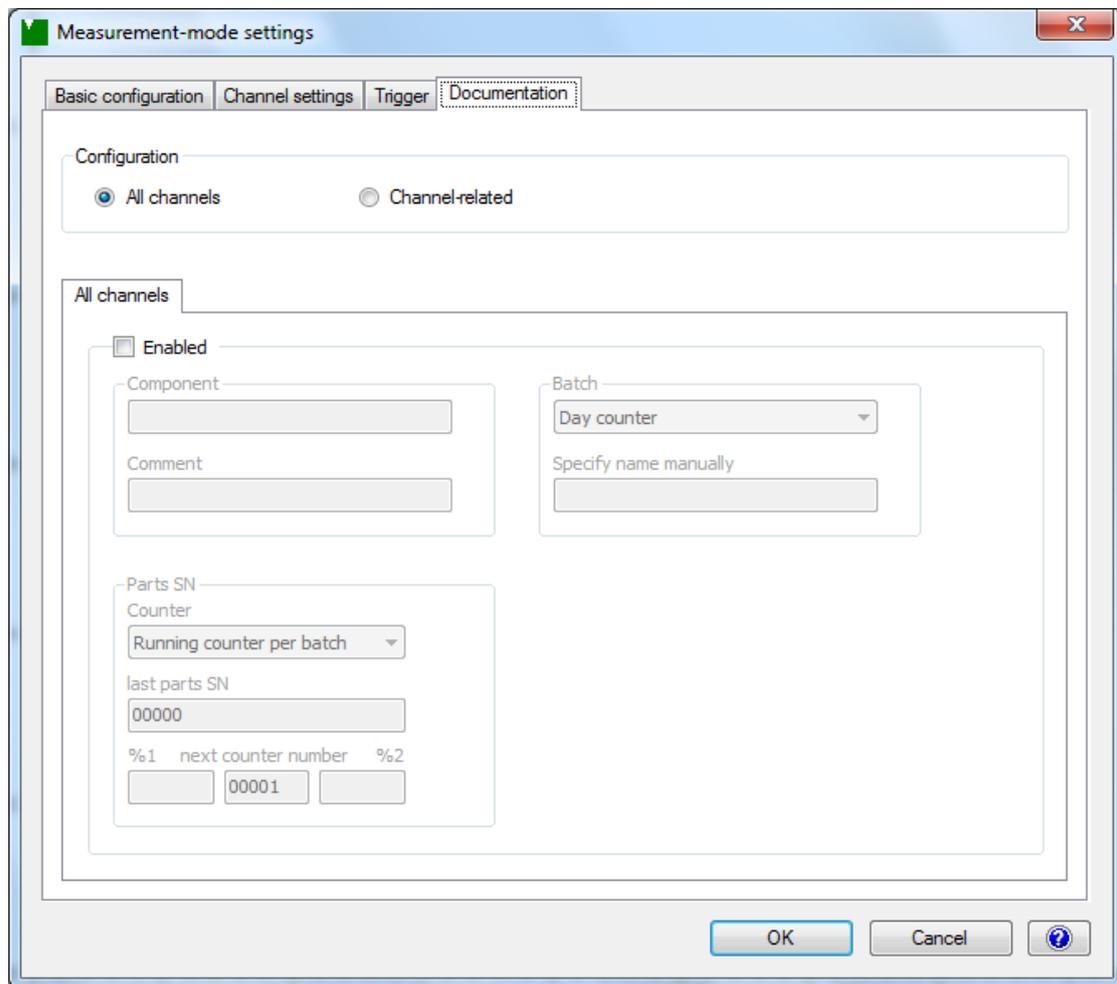


Diagram 57: DV, documentation

Various documentation settings are available here.

8.10 Measurement reports

Note:

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".

8.10.1 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.

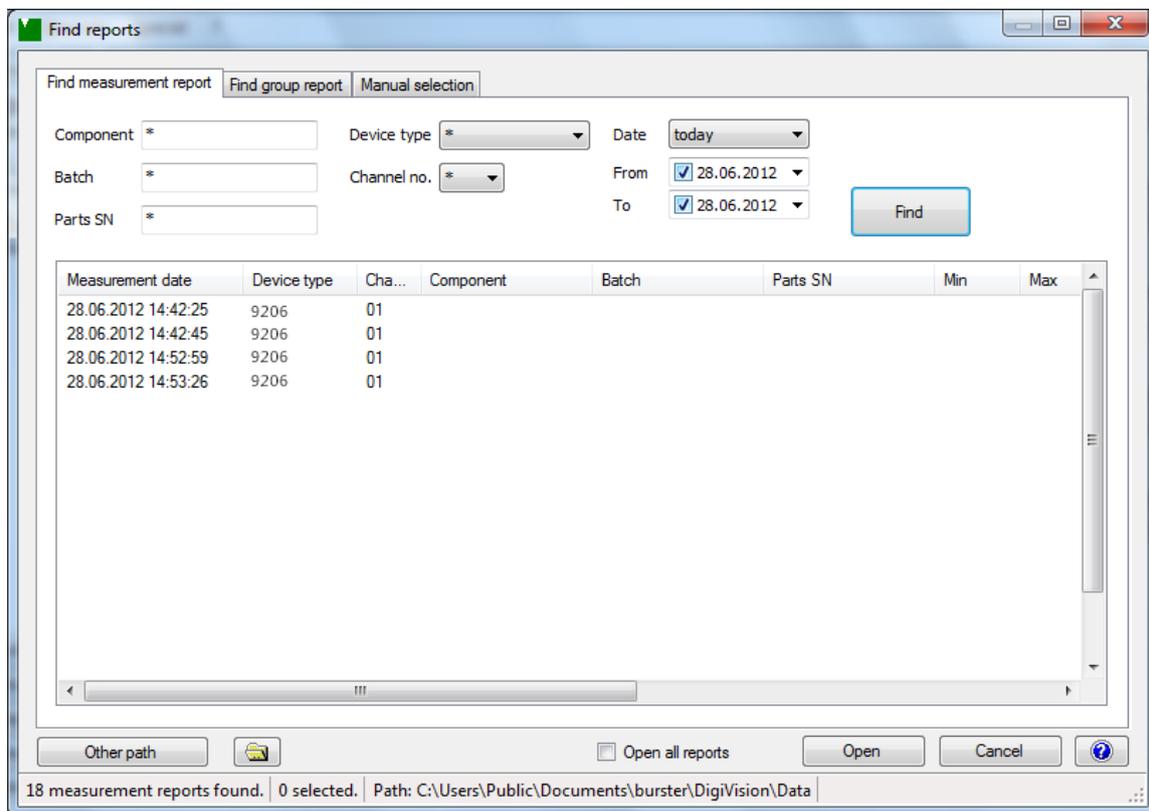


Diagram 58: DV, measurement report finder

USB Sensor Interface Model 9206

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".

8.11 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.

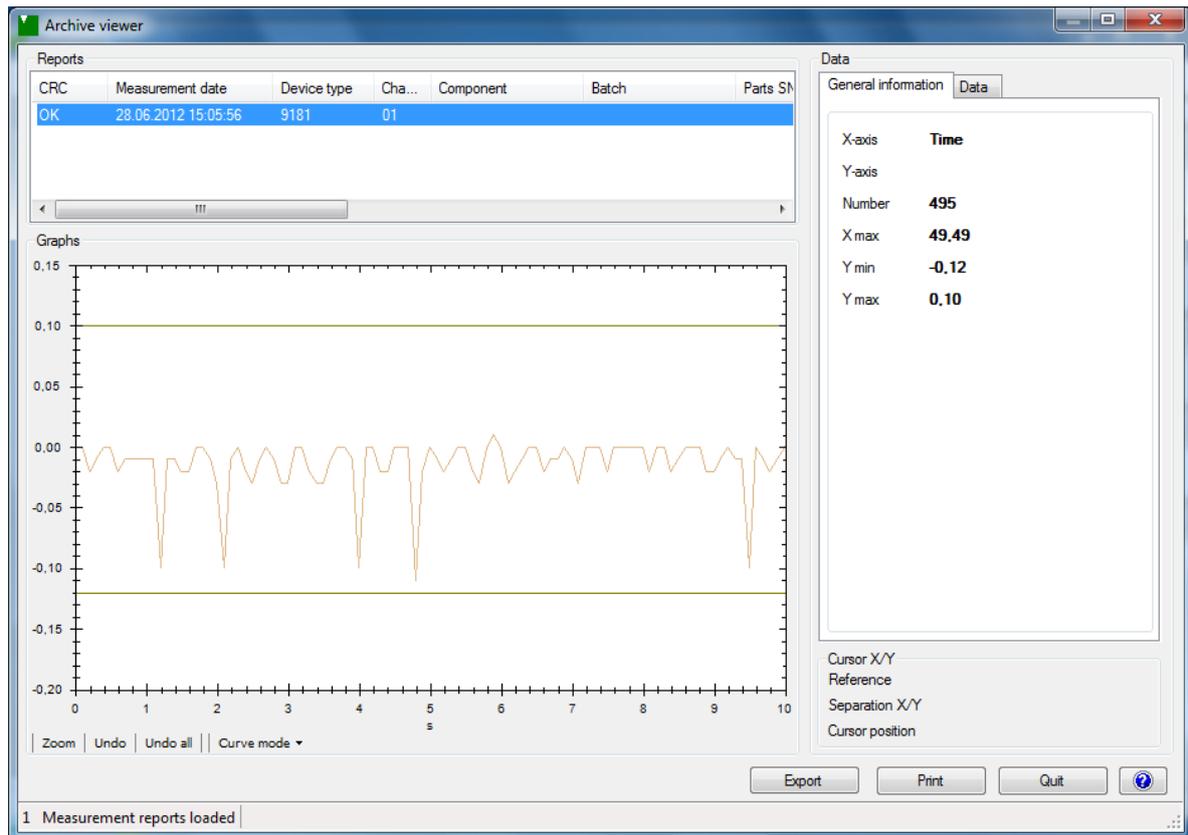


Diagram 59: DV, Archive viewer

View each measurement report individually

- Left-click on the required report.

Group together several measurement reports in order to superimpose the measurement curves

- Select the required reports 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.

USB Sensor Interface Model 9206

8.12 Exporting reports to Excel

Note:

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

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.

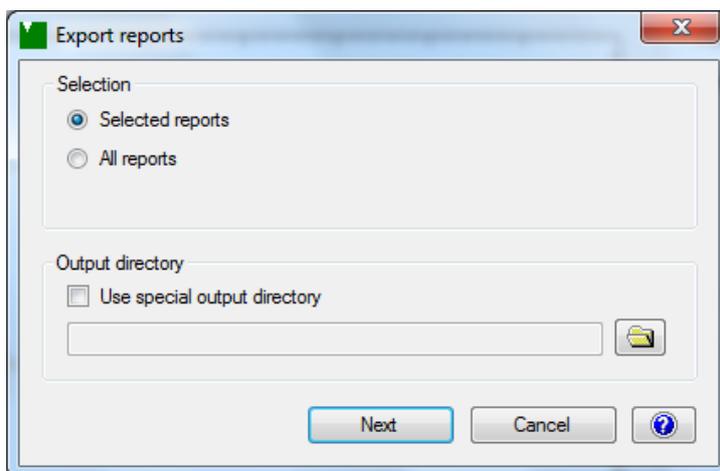


Diagram 60: DV, exporting reports

- Click on "Next".
 - The data is now converted and saved in the specified directory.

8.12.1 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.

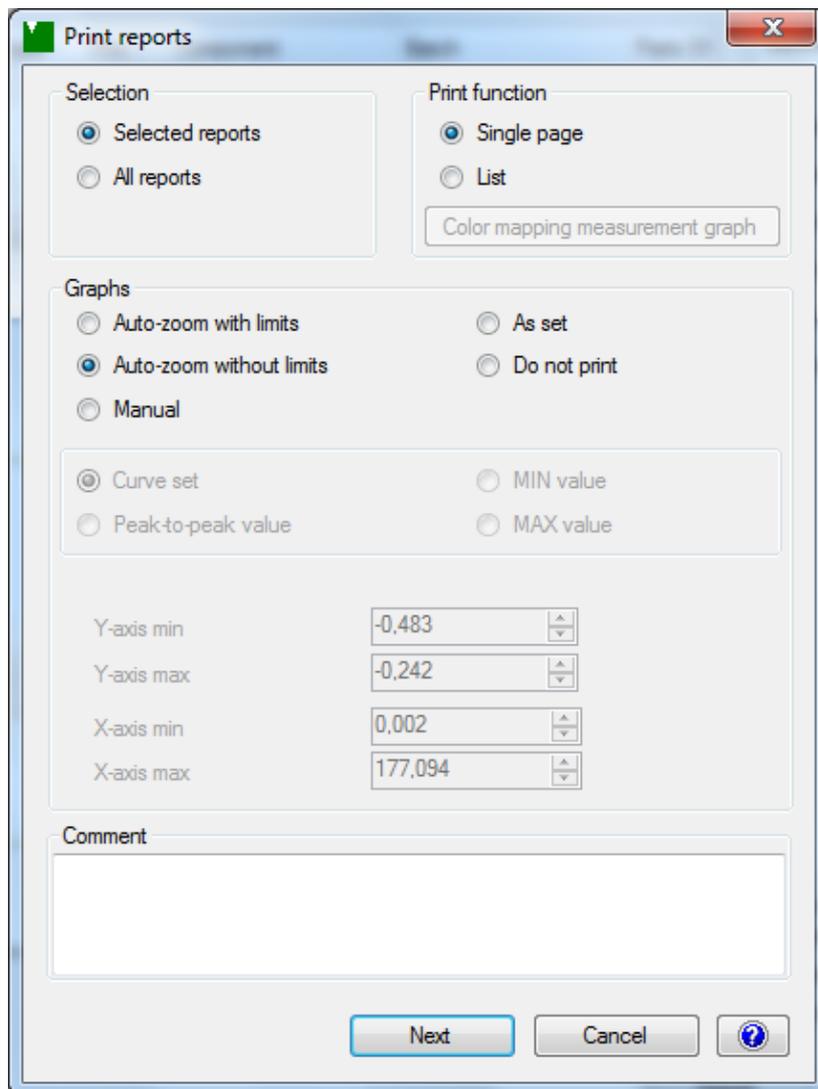


Diagram 61: DV, print reports

- Now select how you want the reports printed.
- Click on "Next".

The Output settings window opens.

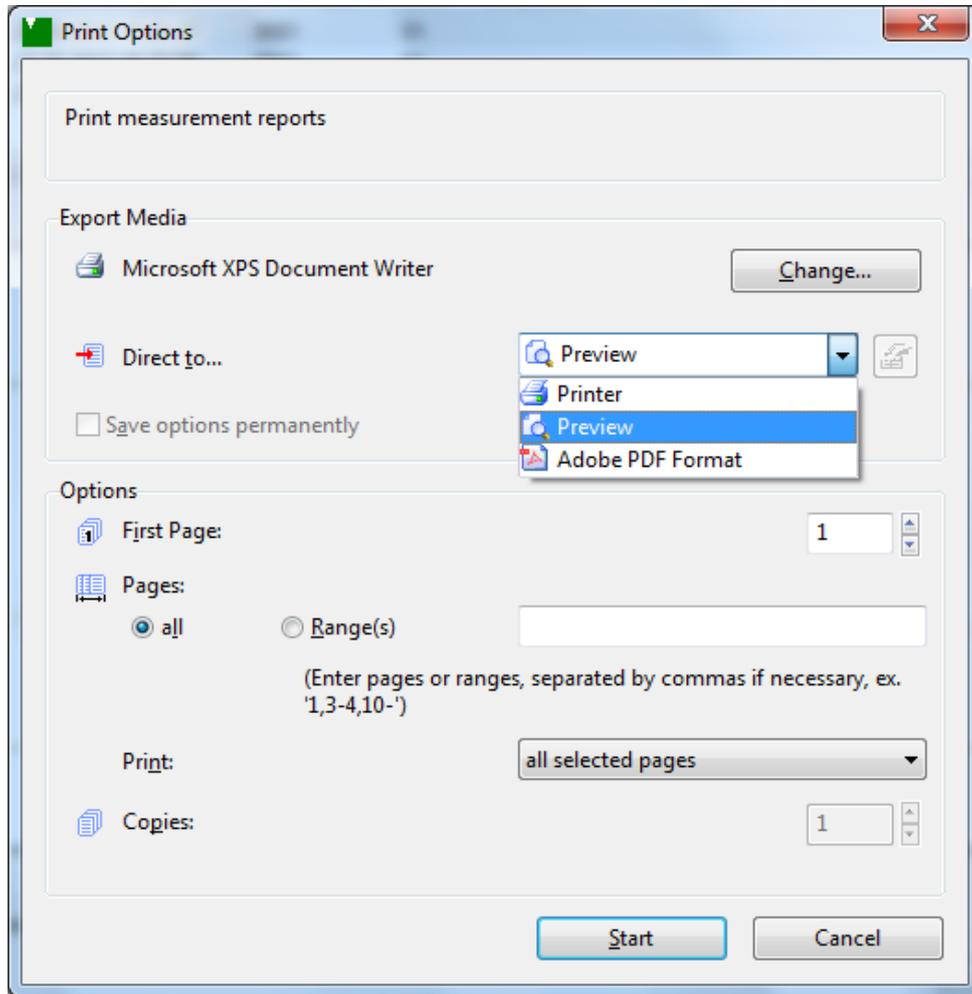


Diagram 62: DV reports, print options

- 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 Maintenance

The model 9206 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 Cleaning

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

9.3 Disposal

	<p>Battery disposal As an end user, you are required by law (battery ordinance) to return all used batteries and rechargeable batteries; the disposal through household waste is prohibited. By buying the herein described device you are concerned by this law. Please dispose of your batteries and rechargeable batteries correctly. Hand them to waste disposal sites either at your premises or at our company or at any place where batteries/rechargeable batteries are sold.</p> <p>Equipment Disposal Please fulfill your legal obligations and dispose of unserviceable equipment in accordance with applicable legal requirements. Thus you contribute to environmental protection.</p>
--	---

USB Sensor Interface Model 9206

10. Technical data

Only values that include tolerances or limits are data covered by the warranty. Values that do not include tolerances are provided for information and do not come under the warranty.

Input signal		
Strain gage	Bridge resistor (full-bridge):	350 Ω - 5 k Ω
	Excitation:	2.5 V oder 5 V
	Excitation current:	max. 45 mA
	Connection type:	6 wire
	Input impedance:	200 G Ω
	Full-bridge strain gage	0 mV/V ... \pm 50 mV/V
Potentiometer	Connection type:	3 wire
	Terminal resistance:	1 k Ω ... 5k Ω
	Excitation current:	max. 45 mA
	Excitation:	5 V
Voltage	Reference signal:	0 V... \pm 10 V
	Input impedance:	>1 G Ω
General data		
Measuring error	< 0,05 % of full scale	
Temperature drift	< 20 ppm/K	
Power consumption	approx. 0.2 VA	
Ambient temperature	-20 ... + 60°C	
Storage temperature	-40 ... + 70°C	
Electromagnetic compatibility	complies with EMV Directive 2014/30/EU	
Enclosure		
Enclosure type	In-line-package	Desktop case
Degree of protection	IP67	IP20
Material	Aluminium	Aluminium
Dimensions (\varnothing x L)	25 x 115 mm	290 x 210 x 80 mm
Weight	approx. 0.2 kg	1.5 kg
Installation method	Fixed using screw clip	Stands on feet
Supply voltage	Via USB port 4 V...6 V	via power cable 90...230 VAC / 11...30 VDC
Sensor connection	PG7 cable gland	9-pin miniature sub-D
Signal processing		
A/D conversion	24 bits	
Measurement rate	Up to 1200 measurements/s	
Resolution	24 bits	

11. Accessories and options

Accessories

Configuration and analysis software

Order code

Model 9206-P001

License code for multi-channel version

Model 9206-P100

License key for the multichannel version with mathematical measurement channels, 32 measurement channels

Model 9206-P200

Adapter cable, 12-pin socket

Model 99540-000C-0090005

Adapter cable, 9-pin socket

Model 99609-000C-0090005

Options

Calibration of a complete measuring chain

Model 92-ABG

This service includes calibration of the model 9206 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).