W&T

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Manual

Mounting and driver installation

Serial PCI Cards

valid for the following PCI cards:

#13621	PCI Card 2x RS232/RS422/RS485
#13421	PCI Card 2x 20mA Current Loop
#13021	PCI Base board 2xTTL module connector

Release 1.00 May 2024

Subject to error and alteration:
Since it is posssible that we make mistakes, you mustn't use any of our statements without verification. Please, inform us of any error or misunderstanding you come about, so we can identify and eliminate it as soon as possible.

Carry out your work on or with W&T products only to the extent that they are described here and after you have completely read and understood the manual or guide. We are not liable for unauthorized repairs or tampering. When in doubt, check first with us or with your dealer.

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1. Legal notices

Warning notice system

This manual contains notices that must be observed for your personal safety as well as to prevent damage to equipment. The notices are emphasized using a warning sign. Depending on the hazard level the warning notices are shown in decreasing severity as follows.

⚠DANGER

Indicates a hazard which results in death or severe injury if no appropriate preventive actions are taken.

⚠WARNING

Indicates a hazard which can result in death or severe injury if no appropriate preventive actions are taken.

⚠CAUTION

Indicates a hazard that can result in slight injury if no appropriate preventive actions are taken.

⚠NOTE

Indicates a hazard which can result in equipment damage if no appropriate preventive actions are taken.

If more than one hazard level pertains, the highest level of warning is always used. If the warning sign is used in a warning notice to warn of personal injury, the same warning notice may have an additional warning of equipment damage appended.

Qualified personnel

The product described in this manual may be installed and placed in operation only by personnel who are qualified for the respective task.

The documentation associated with the respective task must be followed, especially the safety and warning notices contained therein.

Qualified personnel are defined as those who are qualified by their training and experience to recognize risks when handling the described products and to avoid possible hazards.

Disposal

Electronic equipment may not be disposed of with normal waste, but rather must be brought to a proper electrical scrap processing facility.

The complete declarations of conformity for the devices described in the instructions can be found via the respective Internet data sheet page on the W&T homepage at *http://www.wut.de.*

Symbols on the product

Symbol	Explanation
	CE Mark The product conforms to the requirements of the relevant EU Directives.
	UKCA Mark The product conforms to the requirements of the relevant Directives of the United Kingdom and Canada
	WEEE Mark The product may not be disposed of with normal waste, but rather in accordance with local disposal regulations for electrical scrap.

2. Safety notices

General notices

This manual is intended for the installer of the PCI Cards described in the manual and must be read and understood before starting work. The devices are to be installed and put in operation only by qualified personnel.

Intended use

⚠DANGER

The PCI cards from Wiesemann & Theis are serial interface cards designed for connection of external terminals via RS232/RS422/RS485 (#13621) or TTY 20mA technology (#13421) and are connected to the main board of a PC via the PCI interface. Hardware and software installation is done according to the present manual.

Any other use or modification of the described devices is not intended.

Electrical safety

⚠WARNING

Before starting any work, the power supply to the PC must be completely disconnected by taking suitable measures. Make sure that the PC cannot be switched on again accidentally!

The PCI cards may only be operated in PCs with a closed housing, which are located in dry rooms.

The PC extended by the PCI card should not be exposed to high ambient temperatures or direct sunlight. Proximity to all heat sources should be avoided. Please observe the restrictions with regard to the maximum ambient temperature.

Ventilation openings of the PC must be free of any obstacles.

EMC

⚠NOTE

Only shielded cables that comply with the respective interface standard may be used for connection to the serial interfaces.

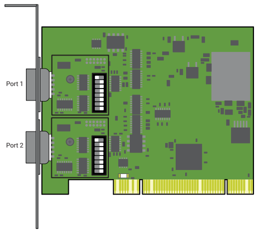
In this case, the PCI cards meet the industrial immunity limits and the stricter emission limits for household and small business. Therefore, there are no EMC-based restrictions with regard to the usability of the devices in these environments.

The complete declaration of conformity for the device described can be found via the Internet data sheet page on the W&T homepage at http://www.wut.de on the respective data sheet page.

3. Product introduction

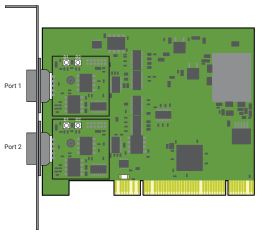
The W&T PCI cards are available in three variants:

#13621 - PCI-Card 2x RS232/RS422/RS485, 1kV isolated



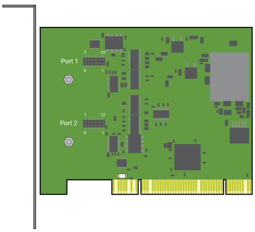
2x COM-Port D-Sub 9 male
each 1kV Isolated
via DIL switch configurable as
RS232/RS422/RS485
data rates 75 ..128.000 baud
Windows driver from XP up to Win.11

#13421 - PCI-Card 2x 20mA, 1kV isolated



2x COM-Port D-Sub 9 male
each 1kV Isolated
20mA Current Loop
Depending on wiring passive or active
Data rates 75 ..19.200 Baud
Windows driver from XP up to Win.11

#13021 - PCI-Card 2x TTL, 1kV isolated



2x COM port as module connector
Socket connector 2x6 2mm
TTL interface for W&T interface modules
#18813 and #18412
each 1kV Isolated
data rates 75 ..128.000 baud
Windows driver from XP up to Win.11

4. Installation of the PCI card

Preparing

⚠Danger

Before starting work, make sure that the PC is disconnected from the power supply.

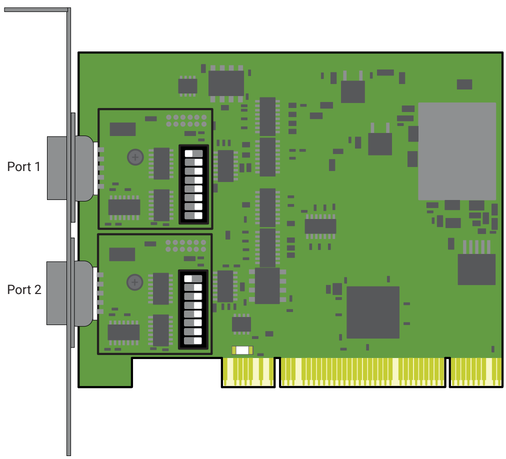
Open the PC housing following the manual belonging to the PC.

Select a free PCI slot and remove the blind plate belonging to the slot from the PC case so that there is an opening for the slot bracket belonging to the PCI card.

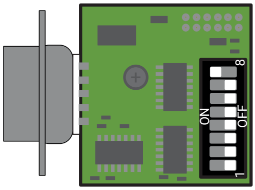
Setting the DIL switches

(only #13621 and #13021 with module #18813)

For PCI cards of type #13621 and #13021 with module #18813 the required physical interface standard should be set via the DIL switches on the serial modules before installation in the PC.



RS232



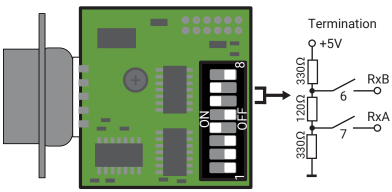
Standard RS232 mode

Operating mode	1	2	3	4	5	6	7	8
RS232	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
RS422, RS485 4 wire bus master DTR handshake	OFF	OFF	OFF	ON	OFF	*	*	OFF
RS422, RS485 4 wire bus master RTS handshake	OFF	OFF	OFF	OFF	ON	*	*	OFF
RS485 4 wire / 2 wire with echo DTR control	OFF	OFF	ON	ON	OFF	*	*	OFF
RRS485 4 wire / 2 wire no echo DTR control	ON	OFF	ON	ON	OFF	*	*	OFF
RS485 4 wire / 2 wire with echo RTS control	OFF	OFF	ON	OFF	ON	*	*	OFF
RS485 4 wire / 2 wire no echo RTS control	ON	OFF	ON	OFF	ON	*	*	OFF
RS485 4 wire / 2 wire with echo automatic control	OFF	ON	OFF	ON	OFF	*	*	OFF
RS485 4 wire / 2 wire no echo automatic control	ON	ON	OFF	ON	OFF	*	*	OFF

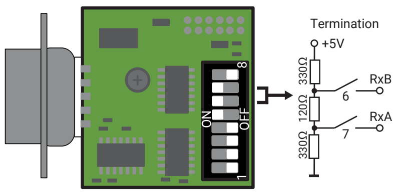
* Switch 6 + 7 switch on the termination at RS422/485

RS422 / RS485, 4 wire bus master

DTR handshake



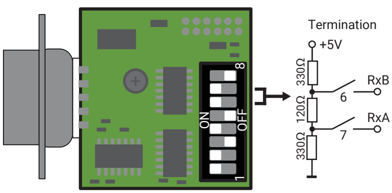
RTS handshake



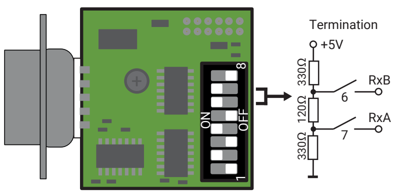
Full duplex, no tri state mode on RS485 (bus driver permanent active)

RS485, automatic control

4 wire half duplex/ 2 wire no Echo



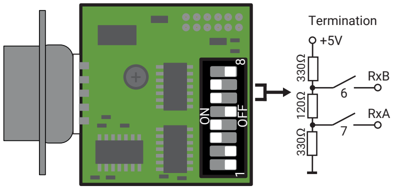
4 wire full duplex / 2 wire with echo



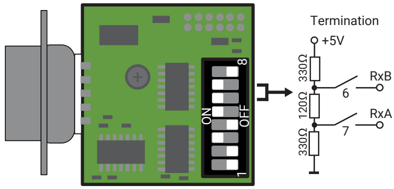
Tri state mode, bus drivers are automatically turned on while sending.

RS485, 4 wire / 2 wire with echo

DTR control



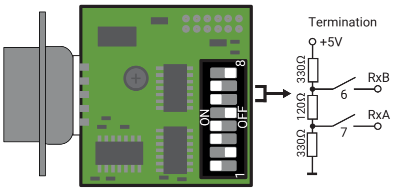
RTS control



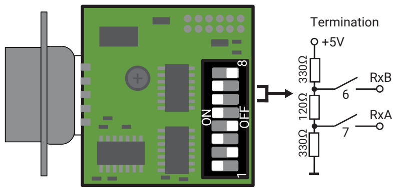
Tri state mode, bus drivers are switched on when sending via DTR or RTS. RS485 full dulex at 4-wire operation because permanent data reception.

RS485, 4 wire / 2 wire no echo

DTR control



RTS control



Tri state mode, bus drivers are switched on when sending via DTR or RTS. RS485 half-dulex since data reception is suppressed during transmission.

Placing the PCI card

When all settings have been made, the PCI card can be plugged into a free PCI slot.

Make sure that the card does not jam when plugged in.

Depending on the PC case, the slot plate of the PCI card must be screwed to the case for safe operation, or the existing fixture must be used to fix the card.

Before starting up the PC with the installed card, the PC housing should be closed again.

5. Pinout and wiring

#13621 - PCI Card 2x RS232/RS422/RS485, 1kV isolated

The two serial ports of the card are led out as D-Sub 9 connectors. As a result, the connection cables must be equipped with D-Sub 9 sockets.

Tip: If you want to avoid soldering work with cables permanently installed on site, you can use the W&T D-Sub 9 socket with screw terminals type #11905.

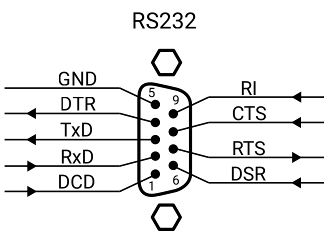
To reach a maximum of interference immunity, shielded cables should be used in any case.

The pinout of the wiring depends on which interface standard the board was configured to via DIL switches.

RS232 (DTE pinout)

In this operating mode, one data input, one data output, four status or handshake inputs and two status or handshake outputs are available.

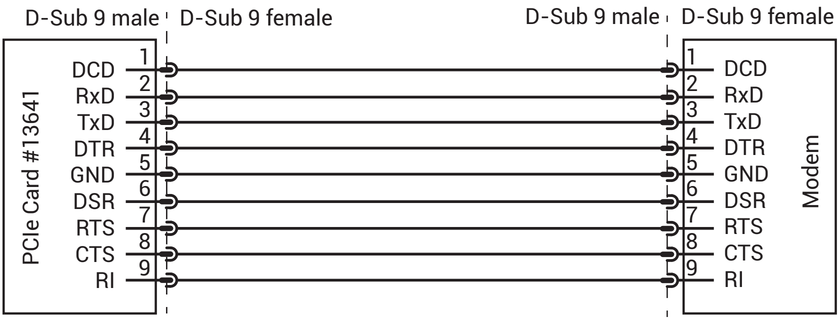
Pinout



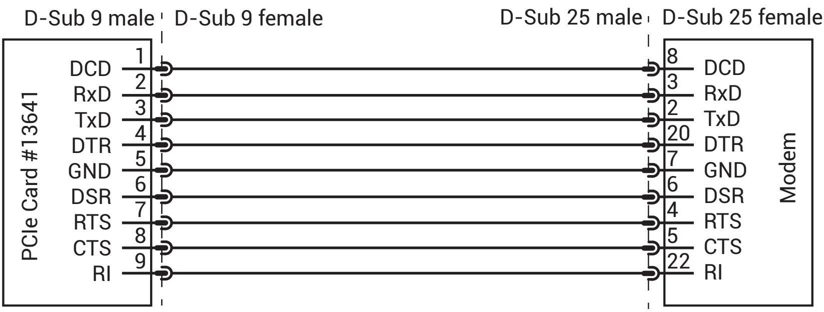
Pin	Signal	Function
1	DCD	Input
2	RxD	Input
3	TxD	Output
4	DTR	Output
5	GND	Signal GND
6	DSR	Input
7	RTS	Output
8	CTS	Input
9	RI	Input

Wiring examples

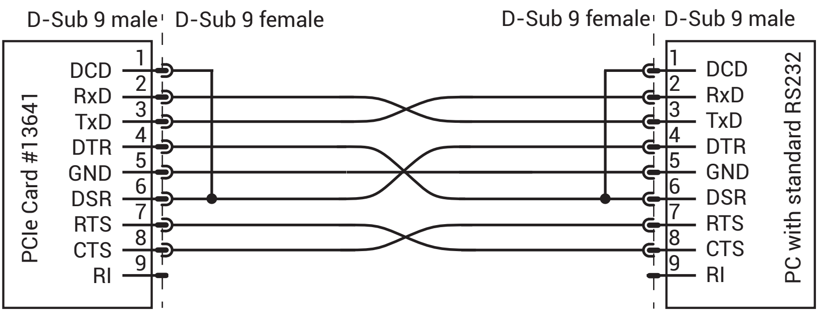
RS232 connection to a modem with 9-pin connector



RS232 connection to a modem with 25-pin connector

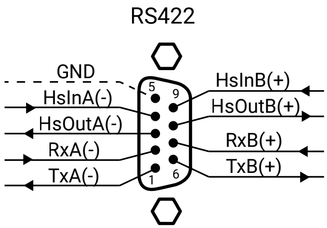


RS232 connection between two PCs with 9-pin connectors



RS422

Pinout

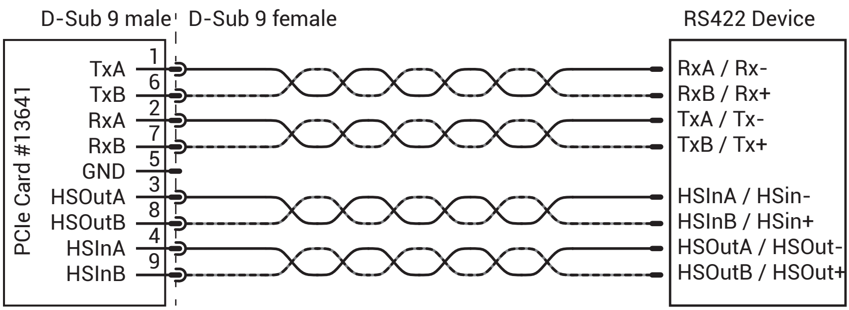


Pin	Signal	Function
1	TxA (-)	Output
2	RxA (-)	Input
3	Handshake Out A (-)	Output
4	Handshake In A (-)	Input
5	GND	Signal GND
6	TxB (+)	Output
7	RxB (+)	Input
8	Handshake Out B (+)	Output
9	Handshake In B (+)	Input

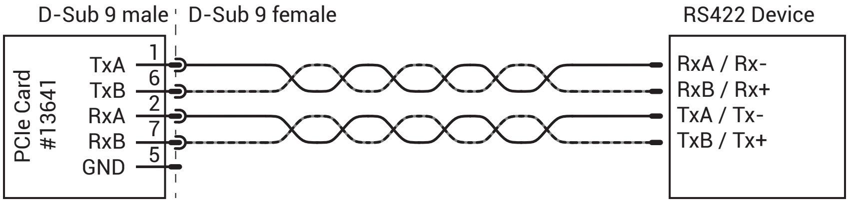
With RS422, each signal is transmitted over its own pair of wires (A and B), with the data information encoded in the voltage difference between the two wires. For maximum transmission reliability, suitable twisted pair cable with low capacitance should be used.

Wiring examples

RS422 connection with hardware handshake

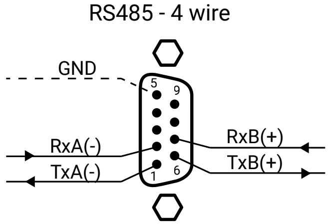


RS422 connetion no handshake



RS485 4 wire #13621 as bus master

Pinout

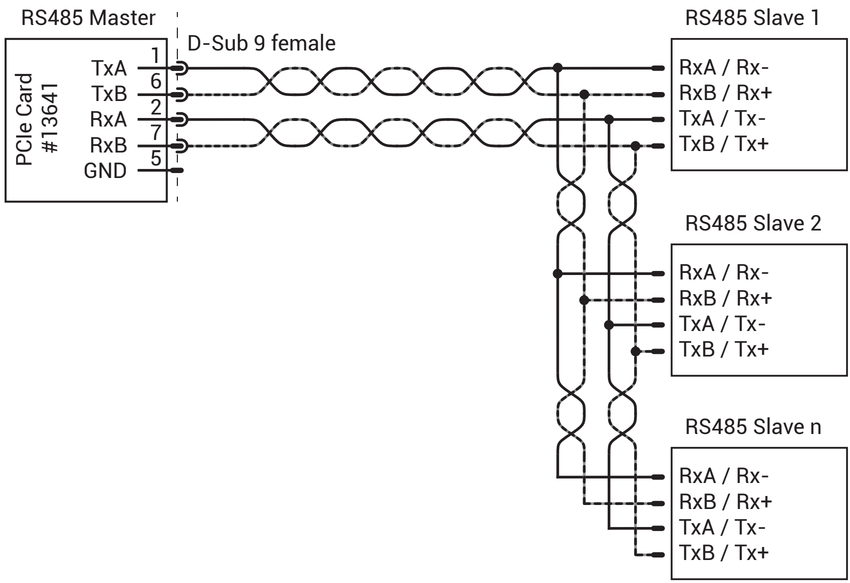


Pin	Signal	Function
1	TxA (-)	Output
2	RxA (-)	Input
5	GND	Signal GND
6	TxB (+)	Output
7	RxB (+)	Input

With RS485, the transmit and receive signals are each transmitted via a separate pair of wires (A and B), with the data information encoded in the voltage difference between the two wires. For maximum transmission reliability, suitable twisted pair cable with low capacitance should be used.

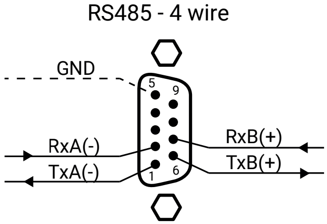
Wiring example

RS485 4-wire bus connection when PCI card acts as master



RS485 4 wire #13621 as slave

Pinout

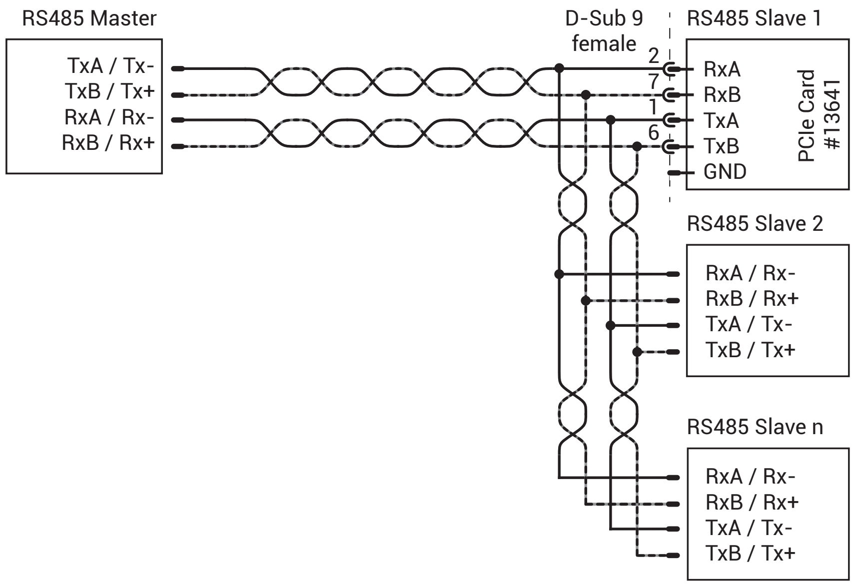


Pin	Signal	Function
1	TxA (-)	Output
2	RxA (-)	Input
5	GND	Signal GND
6	TxB (+)	Output
7	RxB (+)	Input

With RS485, the transmit and receive signals are each transmitted via a separate pair of wires (A and B), with the data information encoded in the voltage difference between the two wires. For maximum transmission reliability, suitable twisted pair cable with low capacitance should be used.

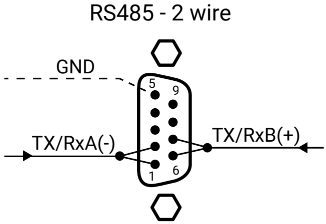
Wiring example

RS485 4-wire bus connection when PCI card acts as slave



RS485 2 wire

Pinout

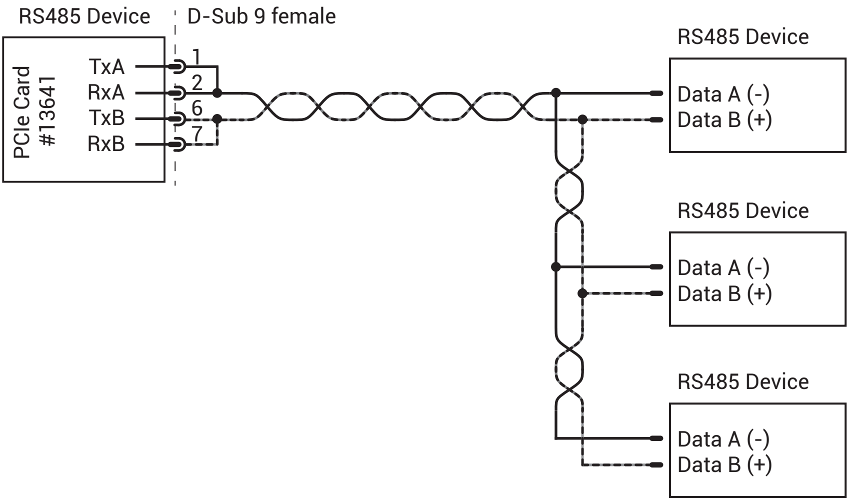


Pin	Signal	Function
1	TxA (-)	Output
2	RxA (-)	Input
5	GND	Signal GND
6	TxB (+)	Output
7	RxB (+)	Input

With RS485 2-wire, the bus signal is transmitted via a pair of wires (A and B), with the data information encoded in the voltage difference between the two wires. For maximum transmission reliability, suitable twisted pair cable with low capacitance should be used.

Wiring example

RS485 2 wire bus connection



#13421 - PCI Card 2x 20mA Current Loop

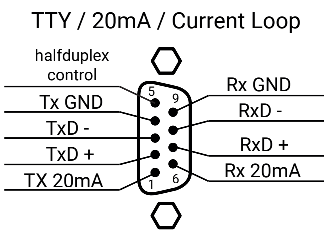
The two serial ports of the card are led out as D-Sub 9 connectors. As a result, the connection cables must be equipped with D-Sub 9 sockets.

Tip: If you want to avoid soldering work with cables that are fixed on site, you can use the W&T D-Sub 9 socket with screw terminals type #11905.

To achieve maximum immunity to interference, shielded cable should be used in all cases.

The pinout of the wiring depends on whether the 20mA interface on the data input or output is to work actively or passively.

Pinout

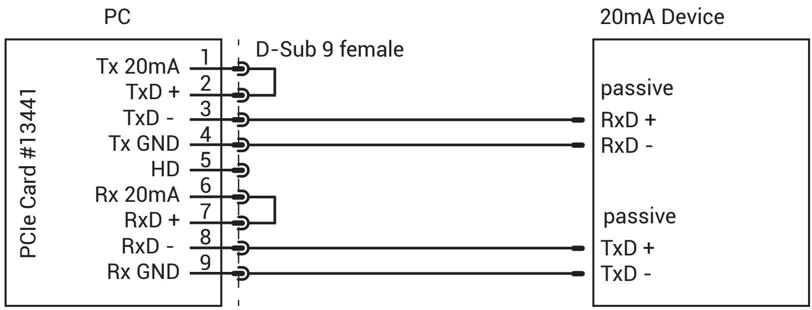


Pin	Signal	Funktion
1	Tx active supply	+20mA
2	Data Out + (TxD +)	Output
3	Data Out - (TxD -)	Output
4	GND	Signal GND
5	half duplex	control
6	Rx active supply	+20mA
7	Data In + (RxD +)	Input
8	Data In - (RxD -)	Input
9	GND	Signal GND

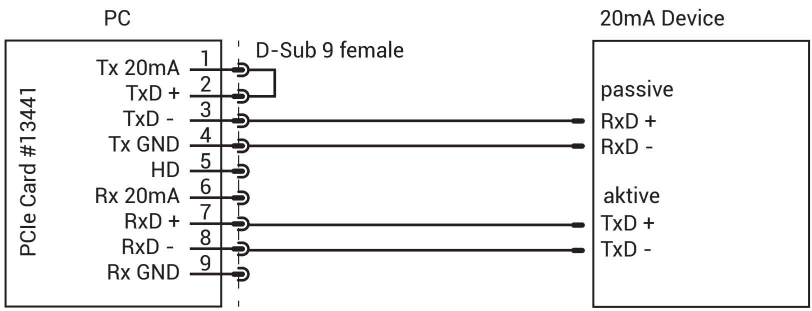
The 20mA interfaces of the PCI card provide one 20mA current source each for the transmit and receive channel (pin 1 and pin 6.) for active operation.

Via a ground level at pin 5 of the SUB-D connector, the 20mA interface can be set to half-duplex mode, in which echo suppression of the transmitted signals takes place.

Wiring - PCI card transmit and receive active
wiring example

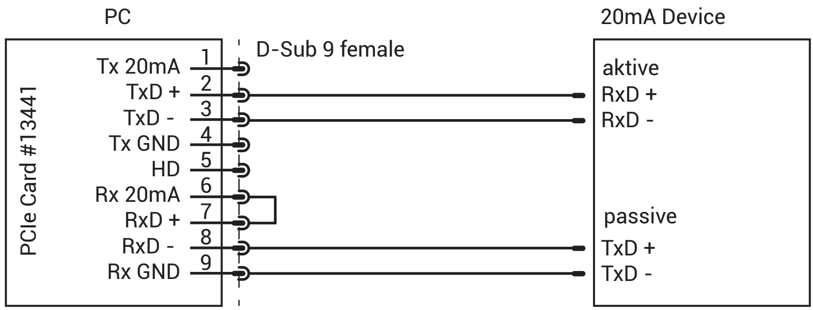


Wiring - PCI card transmit active / receive passive
wiring example



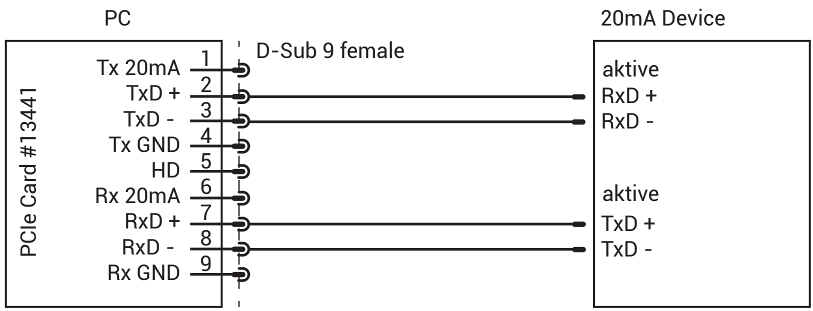
Wiring - PCI card transmit passive / receive active

Wirering example



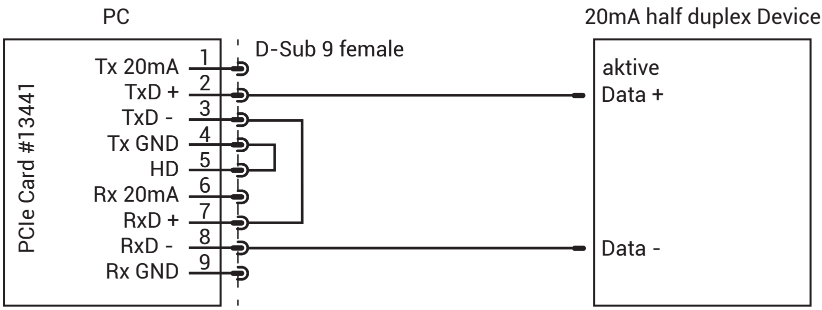
Wiring - PCI card transmit and receive passive

Wirering example



Wiring - PCI card 2 wire half duplex mode passive

Wirering example



The connection between pin 4 and pin 5 switches the interface to half-duplex operation. In this operating mode, data reception is deactivated while data is being sent. After the sending process is completed, the interface can receive data again. This ensures that no echo of the transmitted data is received during transmission.

#13021 - PCI-Base board 2xTTL module connector

The PCI baseboard provides two 12-pin female headers (2x6) in 2mm pitch and thus offers the possibility of a mixed module assembly.

Assembly with serial W&T modules

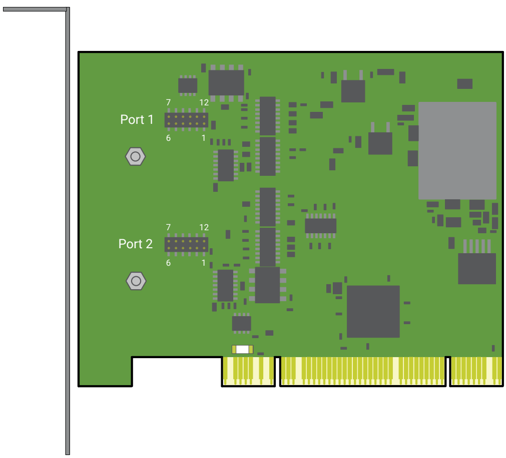
For example, the PCI base board could be equipped with one module #18813 (RS232/RS422/RS485 as installed on #13621) and one module #18412 (20mA as installed on 13421).

Please refer to the previous sections for the resulting cabling variants.

Pinout of the module connector

If required, TTL-compatible components not manufactured by W&T can also be connected to the board.

The 12-pin female connector is assigned as follows:



Pin	Signal	Funktion
1	5V	Vcc
2	RI	Input
3	RxD	Input
4	TxD	Output
5	n.c.	-
6	CTS	Input
7	DTR	Output
8	DSR	Input
9	RTS	Output
10	DCD	Input
11	12V	Vdd
12	GND	GND

6. Driver installation

Windows installation

The PCI card can be installed and operated under all Windows operating systems from Windows XP.

After the PCI card is installed and the PC case is closed again, start the PC normally. If the operating system reports the detection of new hardware and suggests the installation of drivers, cancel the process.

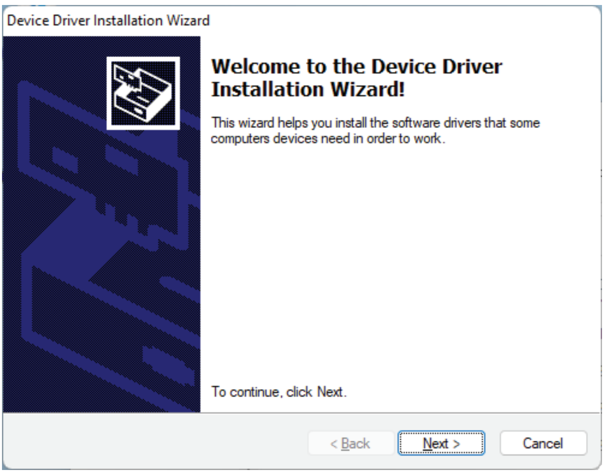
Driver download

When the boot process is complete, enter https://www.wut.de/13621 as the address in the browser and click on the driver link. From here you will be navigated to the driver download.

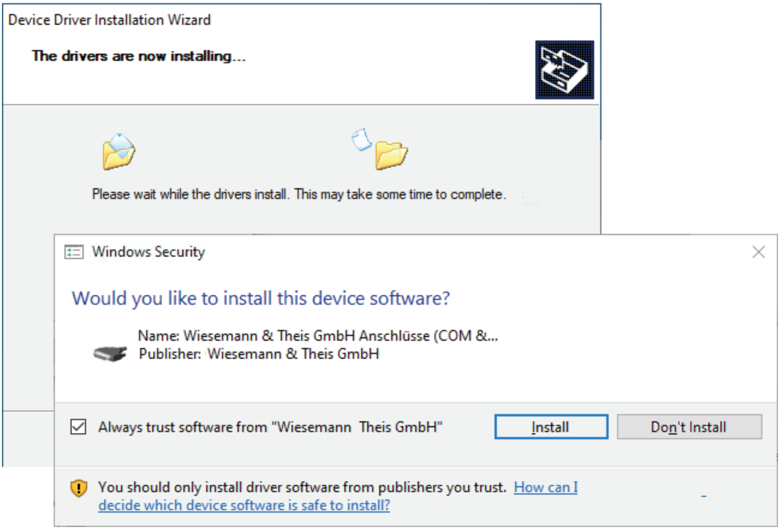
Driver installation

Depending on whether 32-bit Windows or 64-bit Windows is installed, start setup file dpinst32.exe or dpinst64.exe.

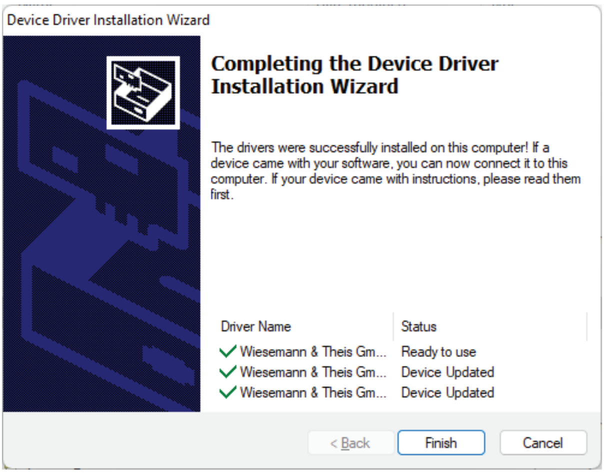
The following message appears:



Confirm with *Next* to start the installation.



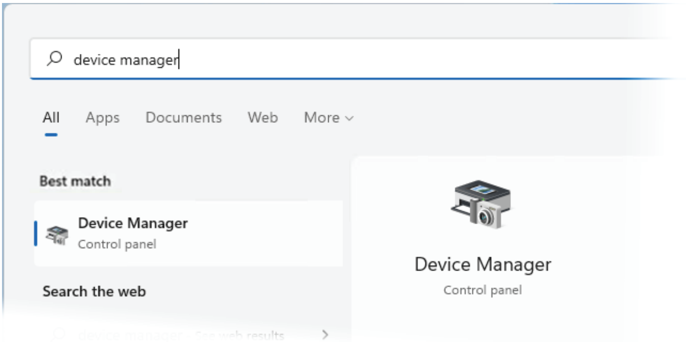
In the following dialog select *Install* - the PCI card or the two serial ports are now added to the system as COM ports.

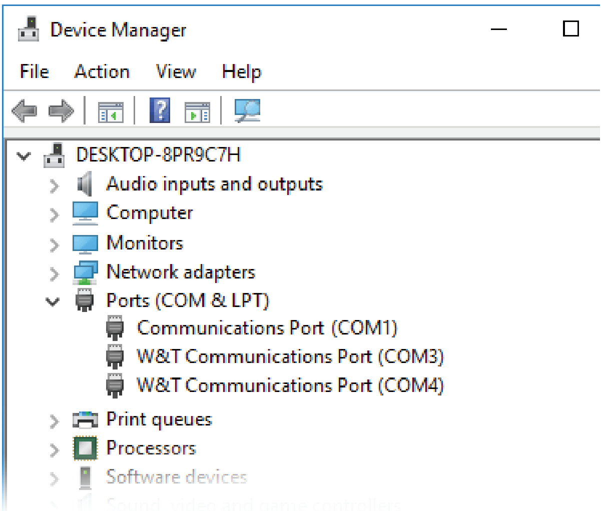


After confirming by clicking the Finish button, the installation is complete.

COM ports in the system

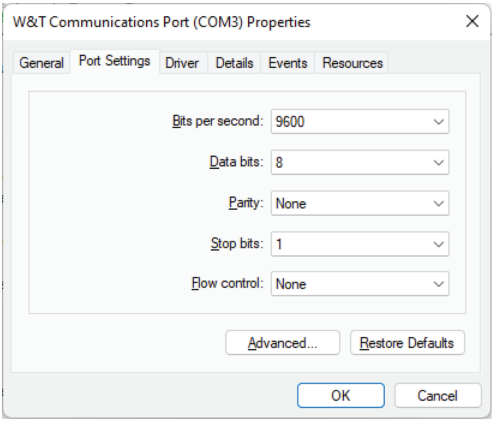
Open the Device Manager to see under which COM numbers the driver has inserted the serial ports into the system.



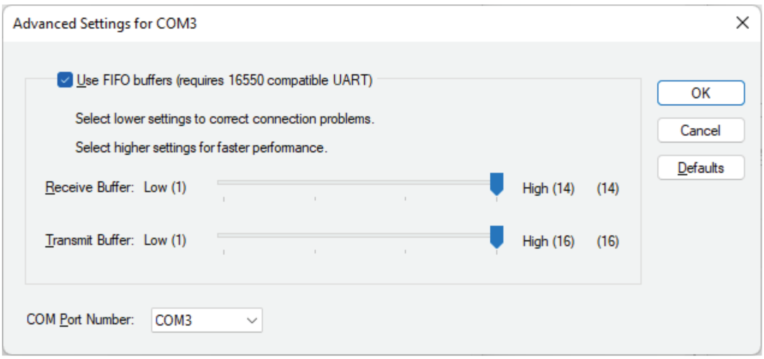


Change COM port numbering

Double-click on the COM port to be changed in the Device Manager to open the properties window. Switch to the *Port Settings* tab here.



The Advanced button takes you to the *Advanced settings* of the COM port. Select the desired COM port number here.



With OK the renumbering becomes effective and the serial interface is addressable under the new number.

Linux installation

Under Linux, the card is automatically recognized after installation during the next boot and mounted as „/dev/ttyS1“, for example.

However, the UART installed on the PCI card supports different crystal frequencies determining the basic clock. To ensure that the data is output with the correct baud rate when the COM port is initialized accordingly, the appropriate divider ratio should be specified for both COM ports.

Usually Linux takes 115200 baud as base for the generation of the baud rates. The base is calculated from the crystal frequency / 16.

The W&T PCI card uses a 14.7456 MHz crystal. The base of the baud generation is therefore (14745600 / 16) = 921‘600.

The Linux tool `setserial` can be used to set the baudbase:

```
setserial <serial port> baud_base 921600
```

Example:

```
setserial /dev/ttyS2 baud_base 921600
```

This step must be performed for both serial ports of the PCI card.

`setserial` does not always belong to every Linux system and may have to be installed later.

7. Technical Data

#13621 - PCI Card 2x RS232/RS422/RS485, 1kV isolated

Connections and electrical characteristics	
System bus:	32 Bit PCI-Bus / 33MHz / Universal Voltage
Serial ports:	2x 9-poliger SUB-D male plug
Operating modes:	settable via DIL switch RS232 DTE pinout RS422 RS485 2/4 wire with handshake control RS485 2/4 wire with handshake control
Baud rates:	75 .. 128.000 Baud
Data format:	any format
UART:	Diodes PI7C8952, Type 16C550
Galvanic isolation:	Isolation voltage min. 1kV DC between PC and the serial ports
Supply voltage:	5V DC, 12V DC by PCI-Bus
Current consumption:	typ. 200mA @5V typ. 100mA @12V

Dimensionen and otherdata	
Dimensions:	134 x 120mm (W x H)
Enclosure rating:	-
Weight:	ca. 105 g
Storage temperature:	-40°C .. 70°C
Operating temperature:	0°C .. 70°C
Permissible humidity:	5..95% RH, non-condensing
Scope of delivery:	PCICard 2x RS232/RS422/RS485, 1kV isolated Quick start manual

#13421 - PCI Card 2x 20mA Current Loop

Connections and electrical characteristics

System bus:	32 Bit PCI-Bus / 33MHz / Universal Voltage
Serial ports:	2x 9-poliger SUB-D male plug
Operating mode:	20mA Current Loop active or passive
Baud rates:	75 .. 19.000 Baud
Data format:	any format
UART:	Diodes PI7C8952, Type 16C550
Galvanic isolation:	Isolation voltage min. 1kV DC between PC and the serial ports
Supply voltage:	5V DC, 12V DC by PCI-Bus
Current consumption:	typ. 200mA @5V typ. 100mA @12V

Dimensionen and otherdata

Dimensions:	134 x 120mm (W x H)
Enclosure rating:	-
Weight:	ca. 105 g
Storage temperature:	-40°C .. 70°C
Operating temperature:	0°C .. 70°C
Permissible humidity:	5..95% RH, non-condensing
Scope of delivery:	PCI Card2x 20mA Current Loop, 1kV isolated Quick start manual

#13021 - PCI-Base board 2xTTL module connector

Connections and electrical characteristics

System bus:	32 Bit PCI-Bus / 33MHz / Universal Voltage
Serial ports:	2x 9-poliger SUB-D male plug
Operating mode::	TTL Module connector for W&T OEM modules
Baud rates::	75 .. 128.000 Baud
Datenformat:	any format
UART:	Diodes PI7C8952, Type 16C550
Galvanic isolation:	Isolation voltage min. 1kV DC between PC and the serial ports
Supply voltage:	5V DC, 12V DC by PCI-Bus
Current consumption:	typ. 200mA @5V typ. 100mA @12V

Dimensionen and otherdata

Dimensions:	134 x 120mm (W x H)
Enclosure rating:	-
Weight:	ca. 105 g
Storage temperature:	-40°C .. 70°C
Operating temperature:	0°C .. 70°C
Permissible humidity:	5..95% RH, non-condensing
Scope of delivery:	PCI Card 2x TTL module connector, 1kV isoliert Quick start manual