Tool Calling Interface

TCI2Com for RS4 and COMPACT*plus*
User's Guide

About the User's Guide

The User's Guide contains information on the use and application of TCI2Com.

All the information contained in the User's Guide, in particular the safety notes, must be carefully observed.

Safety and warning notes are identified by the symbol ⚠.

Notes on important information are identified by the symbol ⓘ.

Leuze electronic GmbH + Co. KG does not accept any liability for damage caused by improper use of its equipment. Knowledge of these instructions is an element of the knowledge required for proper use.

© Reprints and reproduction, in whole or in part, are permitted only with the explicit permission of

Leuze electronic GmbH + Co. KG
Liebigstrasse 4
82256 Fuerstenfeldbruck / Germany
Phone   +49 8141 5350-0
Telefax +49 8141 5350-190
info@leuze.de
www.leuze.com

Contents

1 General

1.1 Basic function

The TCI2Com software interface enables communication via PROFIBUS DP or PROFINET IO between,

- a TCI-enabled engineering system that can call device tools via the respective device tool

- and the device on the PROFIBUS selected in the engineering system

or directly between

- the RS4soft configuration and diagnostics software for RS4 Safety Laser Scanners running on a PC or SafetyLab parametering and diagnostics software for COMPACT*plus*

- *plus*

1.2 Symbols and terms

Symbols used:

⚠	Warning sign. This symbol indicates possible dangers. Please pay especially close attention to these instructions!
ⓘ	Sign indicating important information.

Tabelle 1.2-1 Symbols

Terms used:

DP	Decentralized Periphery. Communication protocol for PROFIBUS in accordance with EN50170, Volume 2.
DPV1	Extension of DP for connection control and administration of read and write jobs of an acyclic master.
DP Master	PROFIBUS participant with master function with PROFIBUS DP for administering the user data traffic with the PROFIBUS DP slaves assigned to it.
DP Slave	PROFIBUS participant with slave function with PROFIBUS DP.
Field PG	SIMATIC programming device.
Device view	User interface with direct access via a PROFIBUS DP plug-in card on a device connected to PROFIBUS via its bus address.
Device tool	Generic term for the RS4soft and SafetyLab software packages.
PNO	PROFIBUS User Organization.
RS4soft	Configuration and diagnostics software for Safety Laser Scanners.
SafetyLab	Parametering and diagnostics software for Safety Light Curtains and Multiple Light Beam Safety Devices.
System view	User interface with indirect access to a device from an engineering system via its communication server.
TCI	Tool Calling Interface. Calling interface between an engineering system and a device software (device tool) defined by the PNO.

Tabelle 1.2-2 Terms

2   System design and possible uses

TCI2Com is a software that serves as a link between a device tool, such as SafetyLab or RS4soft, and another software component, e.g. an engineering system such as STEP7 from version V5.4. For the communication with the device tools, TCI2Com generates a virtual COM port, so that, from the device tool's point of view, for the most part it behaves identical to a physical COM port connection via RS232. Via TCI2Com you perform diagnostics and parameter the devices that are connected to PROFIBUS DP, directly via the bus. It is therefore very easy and convenient to communicate with devices that are installed at hard to access points.

2.1   PROFIBUS DP

In addition to the connection via an engineering system, TCI2Com also supports the direct access to a PROFIBUS DP plug-in card without engineering system. The driver required for this must already be installed before the TCI2Com installation. The operation on PROFIBUS DP is therefore possible in two ways:

- **System view** The corresponding device tool is started via the context menu directly from the engineering system. As an own control interface for TCI2Com is not necessary, TCI2Com is started with minimized window.

- **Device view** An engineering system is not necessary as TCI2Com is started with its own window. The device tools of the safety sensors operated on this PROFIBUS DP are called from this window.
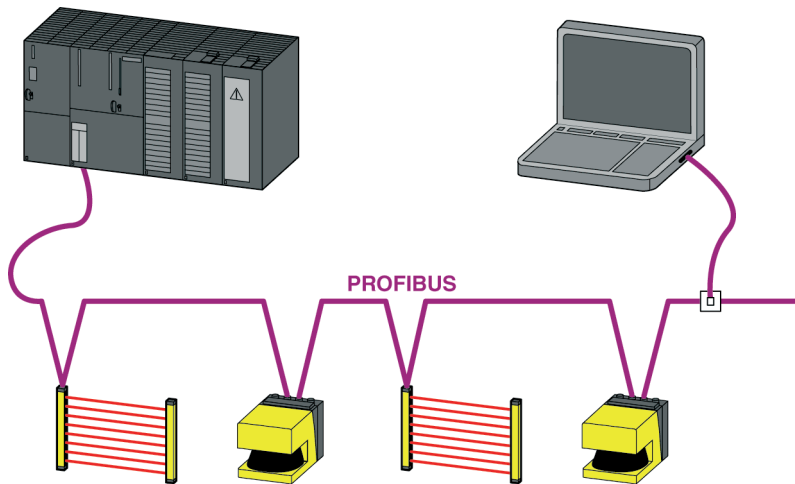
Abb 2.1-1   TCI2Com in device and system view on PROFIBUS DP

2.2 PROFINET IO

The access to PROFINET IO is only possible via an engineering system with TCI interface, such as STEP7 from version V5.4. Only the **system view** is supported for PROFINET IO. Access is possible to devices that are connected to a lower-level PROFIBUS DP if the CPU used supports the "Data record gateway" function and therefore supports the routing from PROFINET to PROFIBUS.

Abb 2.2-1   TCI2Com in PROFINET IO system view

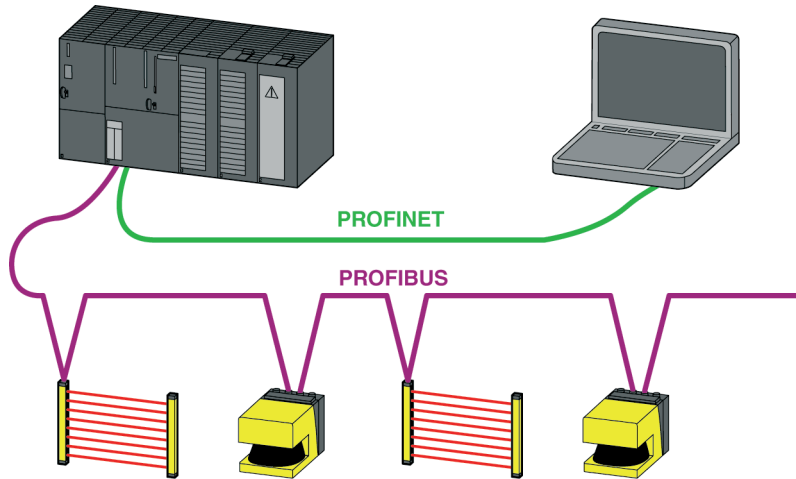# 3   Functions

TCI2Com's main function is to establish a transparent communication connection between two independent software modules.

On the one hand this is,

- an engineering system with TCI support such as STEP7 from version V5.4 or

- a communication driver for the direct access to PROFIBUS DP via a PROFIBUS plug-in card,

and on the other hand,

- the RS4soft configuration and diagnostics software for RS4/PROFIsafe Safety Laser Scanners and

- the SafetyLab parameering and diagnostics software for COMPACT*plus*/PROFIsafe Safety Light Curtains and Multiple Light Beam Safety Devices.

After a communication connection has been set up, TCI2Com monitors the data traffic and displays the number of telegrams sent/received to/from the engineering system or PROFIBUS as alive signal per device. As the communication is performed via PROFIBUS DP and, if required, additionally via PROFINET, a slight communication delay can occur compared with a direct serial connection, depending on the bus load. A quantitative conclusion in this respect cannot be provided because of the different PROFIBUS baud rates and the load on the network, which depends on the system.

3.1   System view

A TCI-enabled engineering system such as STEP7 displays the hardware configuration of the automation system in its HW Config program section. The optical safety sensors connected to the PROFIBUS as bus slave are identified here by their icon defined via the GSD. TCI2Com is started via the context menu of the device icons, which in turn calls the device tool that is suitable for the sensor and is subsequently minimized in the task bar. The communication server (CS) for PROFIBUS DP and PROFINET IO provided by the engineering system is used for the communication with the device, so that the operator doesn't have to worry about the administration of the communication with the devices in either the device tool or in TCI2Com, e.g. addressing and routing, but rather simply uses the infrastructure provided by the engineering system.
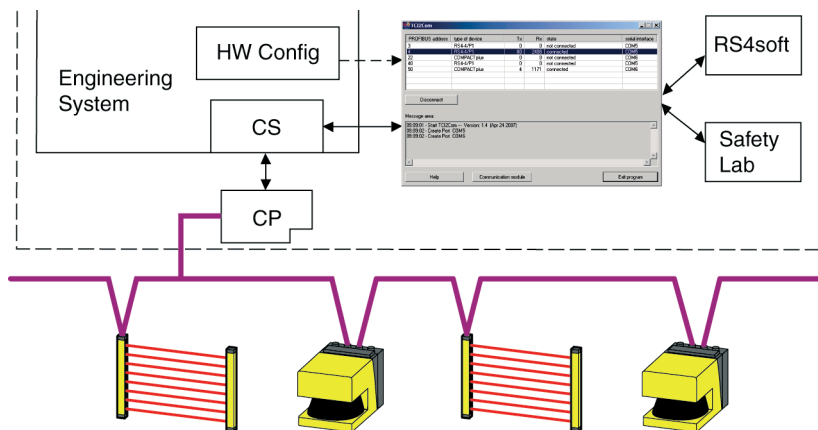

Abb 3.1-2   TCI2Com operating principle system view

3.2 Device view

In the standalone mode TCI2Com provides the option of a direct connection without engineering system to the safety sensors connected to PROFIBUS DP. An engineering system communication server therefore cannot be used here, but the access to the bus via a communication card in the PC and its communication driver is provided instead. Access from any connection point on PROFIBUS DP to every Laser Scanner and every Light Curtain on the bus is consequently possible. Both, the sensor and the device tool, react here in the same way as with access via a serial interface. The TCI2Com software interface works on the PROFIBUS as class 2 master and makes acyclic requests for the necessary data from the device.
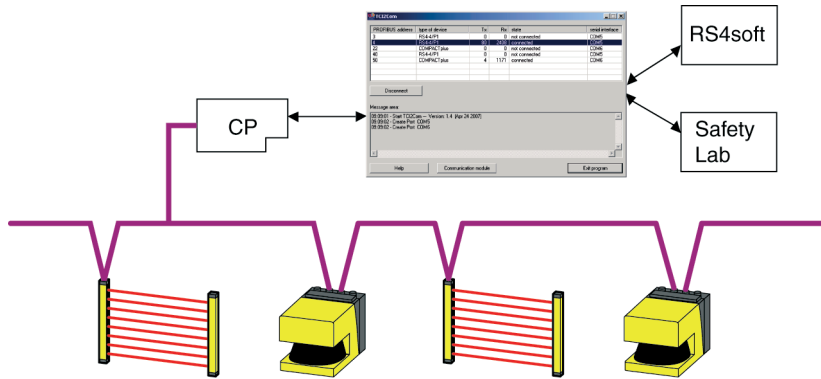

Abb 3.2-1   TCI2Com operating principle device view

4 Installation

4.1 System requirements

4.1.1 Hardware (PC)

TCI2Com can be installed on all PCs with:

- Pentium® class Intel® processor (and compatible models).
- At least 64 MB random access memory (RAM).
- CD drive and hard disk with at least 5 MB free memory.

If TCI2Com is to be operated in the device view the PC requires a **compatible PROFIBUS DP extension card**. The SIMATIC NET® software associated with this must be installed separately. This software is generally supplied with the extension card, or is already pre-installed on a field PG. The SIMATIC NET access path must be set so that TCI2Com finds the access to the SIMATIC NET module. The access point of the application **CP_L2_1** to **CP_L2_4** of the interface module installed in the computer must be assigned for this in the "Set PG/PC Interface" dialog box of the SIMATIC NET programming interface.

Abb 4.1-1   TCI2Com operating principle device view
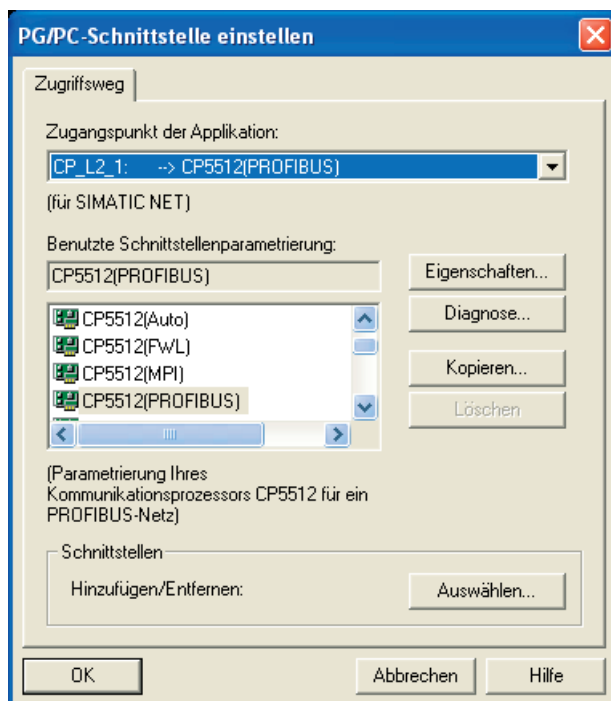
4.1.2 Software (PC)

The following operating systems are supported:

- Microsoft Windows 2000 ®
- Microsoft Windows XP ®.

Restrictions can occur with the SIMATIC NET® modules used in the device view. An entry is generated in the Windows start menu of the device tools, RS4soft and SafetyLab, when TCI2Com is installed, with which this software interface can be started.

4.1.3 PROFIBUS DP

The pre-installed and used SIMATIC NET DPC2® programming interface supports the SIMATIC NET® modules CP5511, CP5512, CP5611, CP5611 A2, CP5613, CP5614 and integrated CP5611 modules. The direct access to this interface is only necessary with operation in the device view.

ⓘ The cyclic PROFIsafe data traffic must run properly or be switched off (because, for example, no class 1 master CPU is connected to PROFIBUS) so that the acyclic data transmission to RS4/PROFIsafe can be set up.

4.1.4 PROFINET IO

If TCI2Com is operated in the system view, access is also possible via PROFINET, if the installed communication server of the engineering system supports this. If a routing is performed beyond the network boundaries the hardware (CPU, CP, etc) must support "Data record gateway".

4.2 Installing TCI2Com

Insert the CD ROM with RS4soft or SafetyLab into the corresponding drive. Please install the device tools RS4soft and SafetyLab first (if this hasn't already been done). Then start "Setup.exe" in the ..\TCI2Com sub-directory and follow the installation instructions. Administration rights on the PC are necessary for the installation! After the PC has been rebooted the installation is complete and the program can be started.

4.3 Languages

TCI2Com supports German and English.

Languages – System view

When TCI2Com is called up the engineering system transfers a language ID in accordance with ISO 639-1. This determines the language TCI2Com is started in. If TCI2Com does not support this language, the program is started by default in English. As TCI2Com only supports English and German, it is only started in German with the German STEP7, otherwise it is started in English.

Languages – Device view

The language that TCI2Com is started in depends on the selected language in the RS4soft and SafetyLab device tools in this order. If German is selected in RS4soft, then the TCI2Com user interface also appears in German. With all other language settings TCI2Com is started with the English interface. If RS4soft is not installed, then this query is made with SafetyLab.

5 User interface

On starting TCI2Com determines which COM interface >= COM5 is not yet available on the computer. The next two possible interfaces are then used automatically for the virtual serial interfaces to RS4soft and SafetyLab.

Only one connection to an RS4 Safety Laser Scanner and to a COMPACT*plus* Light Curtain or Multiple Light Beam Safety Device is possible at any time.

When TCI2Com is closed the generated virtual interfaces are removed again.

⚠ An on-site check of the values set on the safety application is also absolutely necessary when setting parameters in the safety devices via PROFIBUS, or PROFINET.

5.1 System view

Calling the corresponding device tools in the system view is performed from an engineering system with tool calling interface (TCI). In STEP 7 HW Konfig the call up is made via the context menu of the device, which has already been provided with the required parameters with the program start. Connection of the RS4/PROFIsafe and COMPACT*plus*/PROFIsafe field devices is performed with the help of the communication server (CS), which is provided by the engineering system. With this standardized communication interface TCI2Com can set up acyclic connections with the field devices via PROFIBUS or PROFINET. The TCI2Com user interface is not visible by default as it is not required for the device selection, and therefore is minimized with the device tool start. After clicking the corresponding button in the task bar the user interface is shown as in the device view.
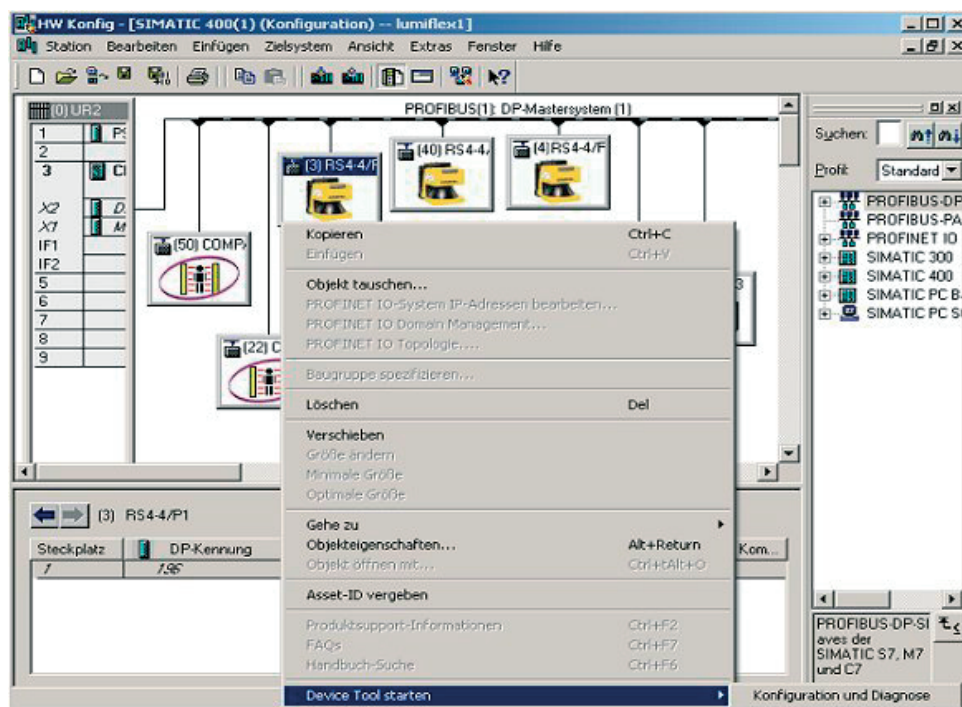

Abb 5.1-1   System view - Device tool via context menu

ⓘ In the SIMATIC Manager the communication interface must be set to PROFIBUS/PROFINET if routing is not supported by the CPU. PC and PG must then be connected directly to PROFIBUS.

Close TCI2Com

If TCI2Com was started from the engineering system, then it is closed in the minimized status automatically after approx. 1 minute if there is no active connection between a device tool and the communication server of the engineering system. This is the case when neither RS4soft nor SafetyLab are running, i.e. when both device tools have been closed by the user.

The program can also be closed after maximizing the window by clicking on the **Close** button. If a device tool is still open and therefore the virtual serial interface used is still occupied, then the connection is interrupted and the device tool is closed.

5.2 Device view

With direct TCI2Com start its user interface appears in the default window size. After the start TCI2Com automatically scans the PROFIBUS to which the PC must be connected via a PROFIBUS network card. This can take several seconds, depending on the setup and configuration of the bus system. All compatible Laser Scanners and Light Curtains with their own PROFIsafe connection are listed in a table with their bus address. The communication between TCI2Com and the COMPACT*plus*/PROFIsafe or RS4/PROFIsafe is performed via PROFIBUS with the acyclic data traffic (master class 2).

PROFIBUS address	type of device	Tx	Rx	state	serial interface
3	RS4-4/P1	0	0	not connected	COM5
4	RS4-4/P1	0	0	not connected	COM5
22	COMPACTplus	0	0	not connected	COM6
40	RS4-4/P1	0	0	not connected	COM5
50	COMPACTplus	1	60	not connected	COM6

Connect

Message area:

```
09:09:01 - Start TCI2Com --- Version: 1.4 (Apr 24 2007)
09:09:02 - Create Port  COM5
09:09:02 - Create Port  COM6
```

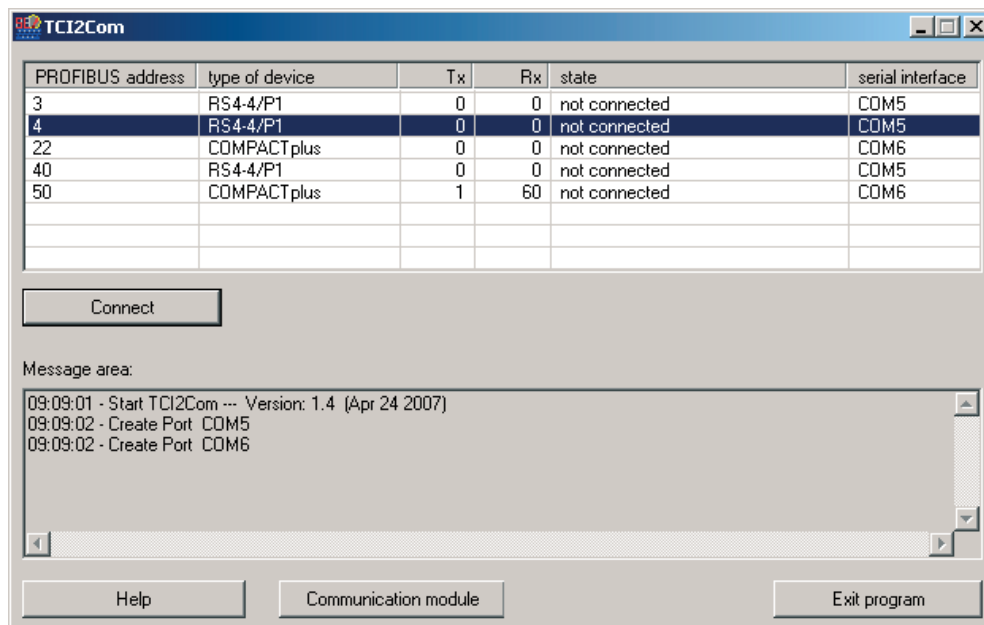Help   Communication module   Exit program

Abb 5.2-1   Device view before starting a device tool

A device is selected by clicking on a line. A click on the "Connect" button starts the corresponding device tool, "RS4soft" or "SafetyLab"; the text on the button changes to "Disconnect". The number of sent and received telegrams is shown in the "Tx" and "Rx" columns.

After the device tool is started the connection to another device of the same kind on the bus can be "switched-over", without having to leave TCI2Com. The existing connection is disconnected first for this via the "Disconnect" button and a new connection is then set up after selection of the other device. While SafetyLab is closed and re-started here, RS4soft remains open and loads the data of the now selected device after the connection has been accepted.
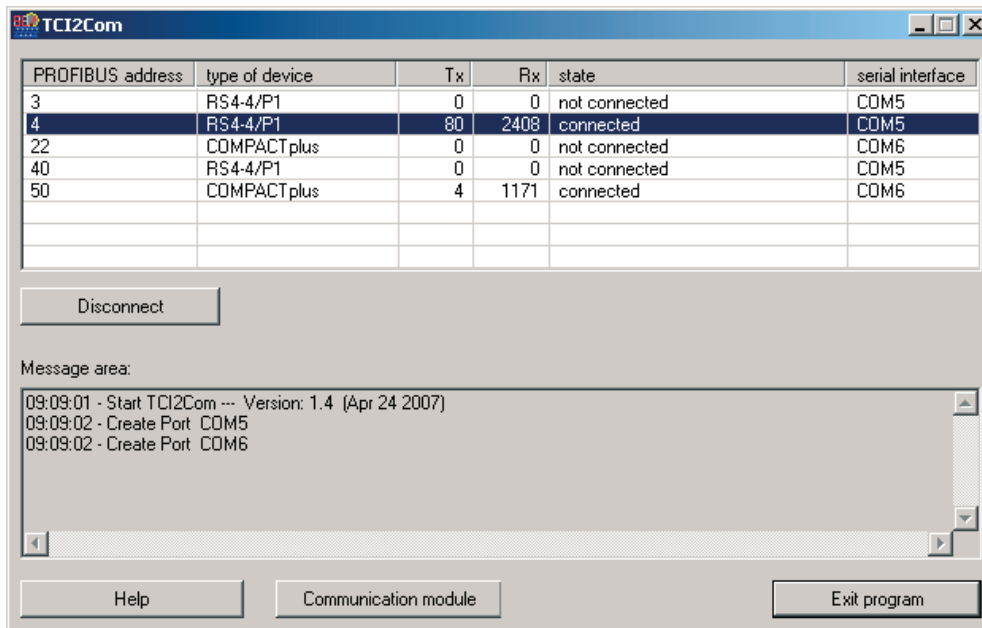
Abb 5.2-2   Device view after starting a device tool

5.3   Messages

A Windows® message box appears with errors that are caused by a direct user action (e.g. mouse click). These error messages are also displayed parallel in the "Messages" text field, where further operator errors and inconsistencies are signalled. If these messages affect PROFIBUS DP, then the associated codes are also shown in hexadecimal display in accordance with DPC2.

5.4   Function keys

F1 – Calls up the help function beside the "Help" button.

F4 – If this function key is pressed when there is a connection to an RS4, then PROFIBUS-specific data of the PROFIsafe adapter is determined and displayed in the "Messages" windows. Notes:

• The display of the PROFIsafe status data is only first possible from firmware version V1.16.

• The PROFIBUS diagnostics can only be retrieved every 3 seconds, max.

• Diagnostics should not be retrieved during the transfer of configuration data and status information or with a scanner reset.

Detailed information for the PROFIBUS communication of a COMPACT*plus*/PROFIsafe is shown in the SafetyLab diagnostics window "PROFIBUS", and therefore will not be supported by TCI2Com.

F6 – Calls up the dialog box for selecting the communication module in the device view beside the "Communication modules" button.

5.5   Close TCI2Com

TCI2Com is closed by clicking on the **Close** button. If a device tool is still open and a virtual serial interface is therefore occupied, then this is displayed with a message.