

INSIDEM2M[®]

— SMART MACHINES —

SerialSwitch Network

Installation-Guide

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1 Version History

Revision	Date	Author
1.4	26.10.2010	INSIDE M2M GmbH
1.5	17.03.2011	INSIDE M2M GmbH

2 SerialSwitch Network: introduction

The software SerialSwitch Network and the associated M2MGate-compatible GPRS-terminals allow you to set up a serial tunnel through a wireless GPRS data service between user devices in the field and a central application software (customer application). SerialSwitch Network consists of the following components:

SerialSwitch DeviceServer Communication-Gate on the GPRS-terminal. Note: this component is already installed on the delivered GPRS-Terminal.

SerialSwitch Server Software on the server to be connected

SerialSwitch ConfigurationCenter Software for easy configuration of the bidirectional tunnel

GPRS Configurator Software for easy configuration of the GPRS-terminal

SerialSwitch Client Optional software-component which enables to provide the a serial tunnel outside the SerialSwitch server

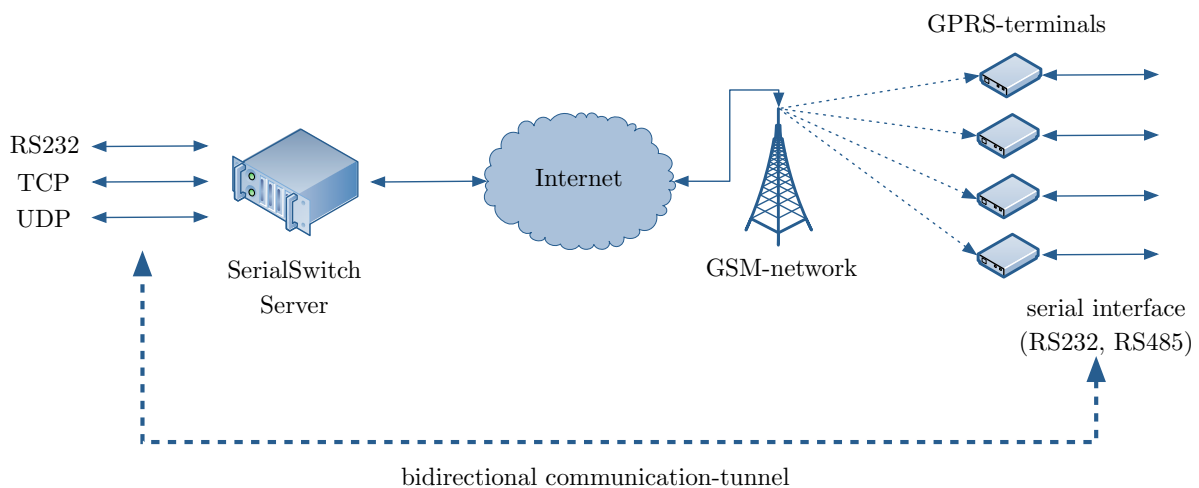


Figure 1: concept (without SerialSwitch Client)

The SerialSwitch Server is installed on a Microsoft Windows System with an internet connection. This system must be reachable from the internet via a public static IP address, a DNS entry or a dynDNS entry.

As soon as the GPRS-Terminal, which is delivered with the installed software SerialSwitch DeviceServer, will be switched on, it automatically establishes a permanent wireless connection to the SerialSwitch Server. This server transfers all data received from the GPRS-terminal to virtual COM ports or TCP/UDP. In turn, data sent from the customer application, will be transferred by the SerialSwitch Server to the GPRS-terminal, which is connected via serial interface to the field device.

The configuration of the SerialSwitch Server specifies which GPRS-terminal receives which data from the customer application. This is done by assigning each GPRS-terminal to a different virtual COM-port or TCP/UDP port.

2.1 SerialSwitch Server: schematic diagram

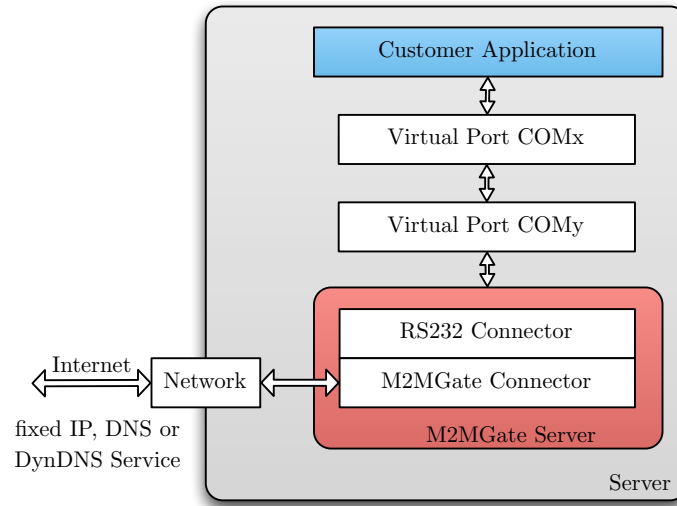


Figure 2: schematic diagram of the SerialSwitch Server with communication via virtual COM-ports

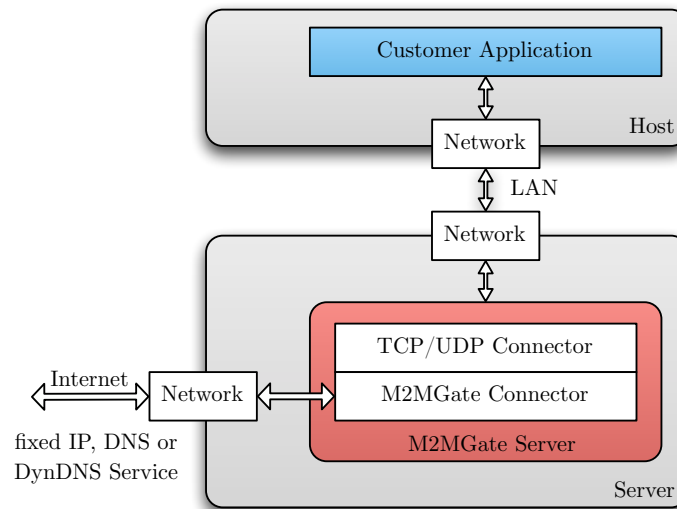


Figure 3: schematic diagram of the SerialSwitch Server with communication via TCP or UDP

2.2 SerialSwitch DeviceServer: schematic diagram of the GPRS-terminal

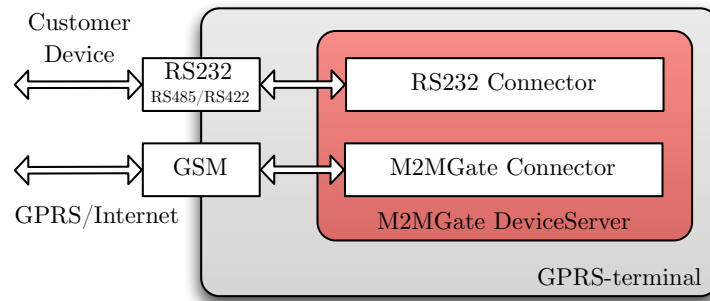


Figure 4: schematic diagram of the GPRS-terminal

2.3 Enhanced architecture with the component SerialSwitch Client

The SerialSwitch Client component enables to move the communication-tunnel, which redirects to the GPRS-terminals, from the SerialSwitch Server to another machine. Unlike the SerialSwitch server the SerialSwitch Client does not require a static IP-address or a fixed DNS/DynDNS name.

This enables to use the communication-tunnel in an arbitrary environment which is equipped with an internet connection while the SerialSwitch Server is located in a remote datacenter (for example). Figure 5 illustrates the enhanced architecture which results from using the SerialSwitch Client-component.

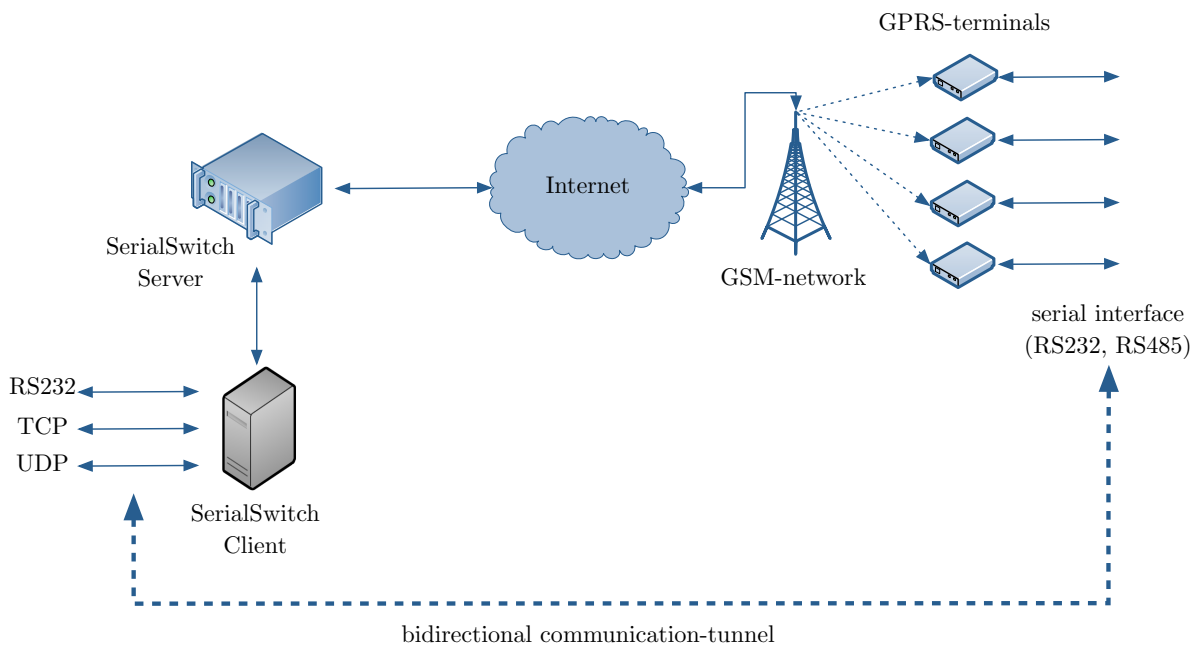


Figure 5: enhanced architecture (SerialSwitch Client included)

3 Installation

The following sections describe how to install the software and configure the connection between the GPRS-terminal and the server. The system requirements belong to every software component.

System requirements:

- Operating System Windows XP, Windows Server 2003, Windows 7, CPU x86 with minimum 1 GHz
- Java Runtime Environment version 6 or higher (<http://java.sun.com>)
- Hard Disk Drive Space 3 MB
- System Memory Min. 256 MB RAM
- Ethernet interface, which is connected to your local network
- Serial Interface (RS232) or USB-to-Serial Adapter (for initial configuration of the GPRS-terminals)

3.1 GPRS Configurator

Execute the installation file called GPRSConfigurator_Installer.exe. The installation program creates the following program group in the PC's start menu: :

/INSIDE M2M/GPRSConfigurator

The configuration of the GPRS-terminals with the GPRS Configurator will be described in section 4.1.

3.2 SerialSwitch Server

Execute the installation file called SerialSwitchServer_Installer.exe. The installation program creates the following program group in the PC's start menu:

/INSIDE M2M/SerialSwitchServer

At this point, no further settings are necessary. The configuration of the server will be carried out later (as described in section. 4.2).



The computer on which the SerialSwitch Server will be installed must be reachable through the internet. In case of using a firewall or a router, they must be configured in a way, that a TCP-port from the Internet will be forwarded to this server. Via this port the GPRS-terminals establish a connection to the server. The default-number for this TCP port is 10325. For a connection of the SerialSwitch ConfigurationCenter the default for the TCP-port is 10327. If you want to reach this interface also via Internet, this port has to be forwarded at the firewall.

3.3 SerialSwitch ConfigurationCenter

Execute the installation file called SerialSwitchCC_Setup.exe. The installation program creates the following program group in the PC's start menu:

/INSIDE M2M/SerialSwitchCC

The usage of the SerialSwitch ConfigurationCenter will be described in section 4.4.

3.4 Virtual COM ports

The program com0com (null-modem emulator) is used to create interconnected, virtual COM port pairs. They are used by the SerialSwitch Server to establish a communication channel between your Windows-application and the field device, which is connected to the GPRS terminal via an RS232 interface. Thus the installation of com0com is only necessary if you want to use COM ports for data exchange.



If SerialSwitch Client will be used (see section 2.3), com0com has to be installed on the PC, on which the SerialSwitch will be installed.

If SerialSwitch Network will be used without SerialSwitch Client, com0com has to be installed on the PC, on which SerialSwitch Server will be installed.

If you have several data-channels and are using several GPRS-terminals, you need to create a separate pair of virtual COM-ports for each terminal.

Run the setup program to install com0com. In the Found New Hardware Wizard (search for software updates) choose „No, not this time“ and in the following dialog box choose „Install the software automatically“. The Found New Hardware Wizard is repeated each time you create a new pair of ports.

com0com starts the main dialog box automatically and initially creates the port pair CNCA0 and CNCB0. Please rename the ports to COMx and COMz, where x and z are digits (COM26 and COM27 in the example below) and click Apply. Renaming the ports can take a few seconds. The assignment of the virtual COM ports is done later with the system configuration program „SerialSwitchCC“. In this example, COM26 will be assigned to the GPRS- terminal and the customer application must use COM27 to communicate with the GPRS-terminal through the port pair.

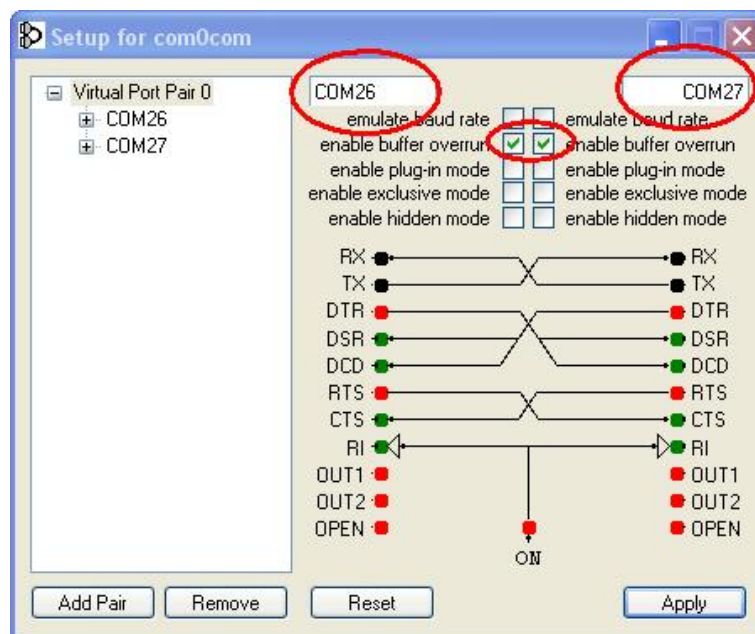


Figure 6: com0com configuration

The two checkboxes „enable buffer overrun“ should always be enabled. To check whether the COM-ports have been correctly created, open the Windows Device Manager with 'Start/Control Panel/System/Device Manager'. A new device group for the com0com serial port emulator should be visible.

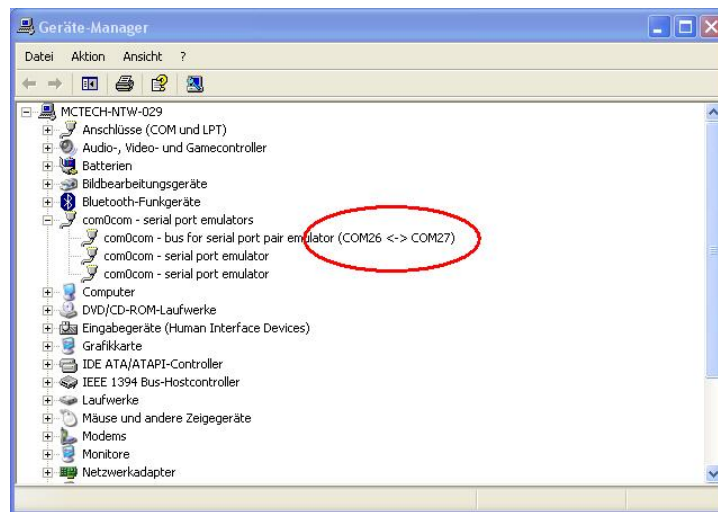


Figure 7: Devicemanager and virtuelle COM-Ports

3.5 SerialSwitch Client

The installation of the SerialSwitch Client is optional. Please check prior the installation if you really need to install this component (see section 2.3).

Execute the installation file called SerialSwitchClient_Installer.exe. The installation program creates the following program group in the PC's start menu: :

/INSIDE M2M/SerialSwitchClient

At this point, no further settings are necessary. The configuration of the SerialSwitch Client will be carried out later (as described in section 4.3)

4 Configuration

4.1 GPRS-terminal

To carry out initial configuration of the GPRS terminal, start the configuration program with:

/Start/Alle Programme/INSIDEM2M/GPRSConfigurator

Connect the GPRS-terminal directly to the PC through its COM port (either directly to a COM port on the PC or using a USB-to-COM converter). Do not connect the power supply until later.

Then choose „Menu/Connect“ in the GPRS Configurator and select the PC's COM port you have chosen to use (COM4 in the following figure). Then connect the GPRS-Terminal to its power supply. When it powers up, it sends a short message to the GPRS Configurator, which then reads out the terminal parameters.



Important: if the GPRS-Terminal is already powered up before you connect it to the PC's COM port, it is no longer able to communicate with the program GPRS Configurator because it is already switched to transparent data mode and will ignore all configuration commands.

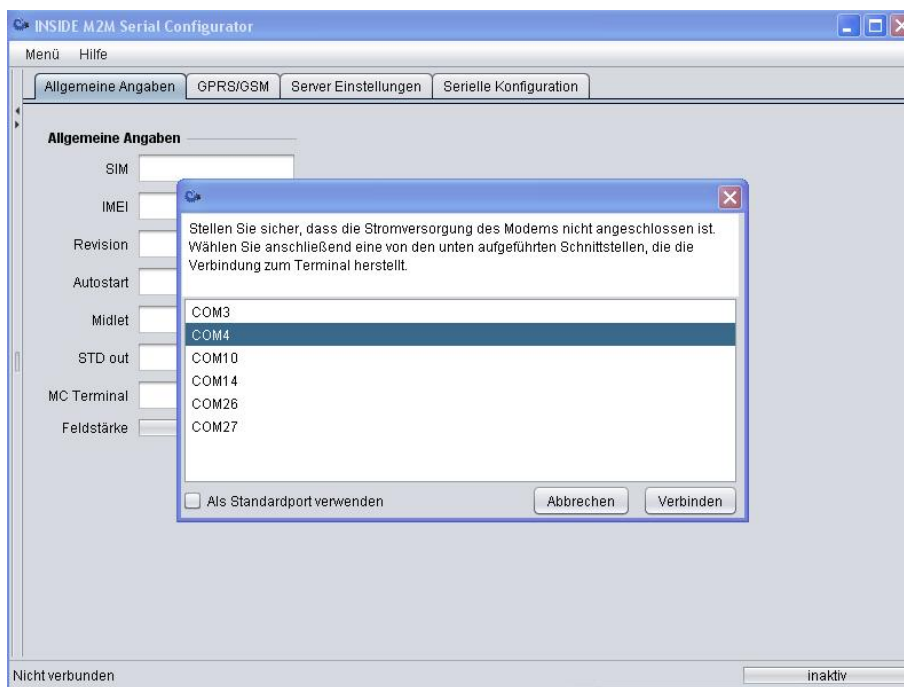


Figure 8: Choosing the COM port

4.1.1 General information

If the GPRS-terminal is correctly detected, the general information parameters of the terminal are shown. You should also check that the displayed IMEI-number (international mobile station equipment identify, unique GPRS-device ID) matches the number on the label of the terminal. You will need the IMEI number for later configuration steps in section 4.4.

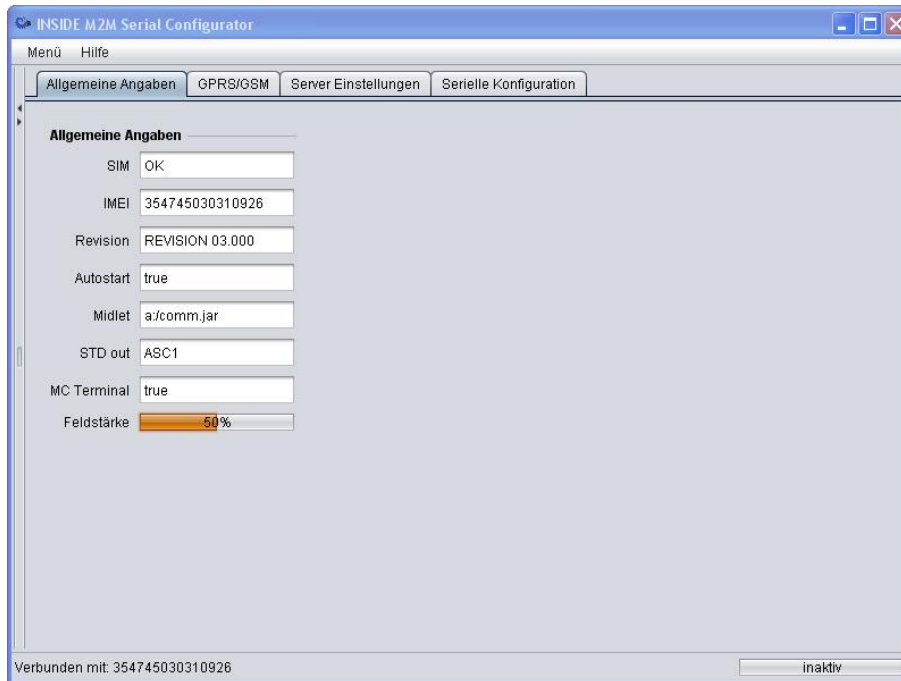


Figure 9: Overview of the terminal parameters



The signal strength-bar shows the reception quality of the GSM-signal at the current location. When you install the terminal in the field, it is an important indication of whether the supplied GSM-antenna is sufficiently sensitive or the location of the antennae needs to be changed. The signal strength should always be above 70%, otherwise the percentage of transmission errors can be too high.

4.1.2 GPRS-configuration

The GPRS-tab is used to configure the access data for your wireless provider and SIM card. If your provider supplied you with a special access point name (APN) and password for use with the SIM card, click **Benutzerdefiniert** and enter the supplied information. Otherwise, choose **Automatisch** to use the standard values for your provider.



The settings you make are not automatically transferred to the GPRS terminal, you must click „Save to device“ each time you make a change. This also applies to the other tabs of the GPRS Configurator.

You should now click the button **APN Test** to check that the settings are correct. This causes the GPRS- terminal to make a connection to your provider through the wireless network. Information about a successful connection is shown in the panel **GSM information** at the bottom of the screen. If the connection was successful, you can now proceed to the **Server Settings** tab.

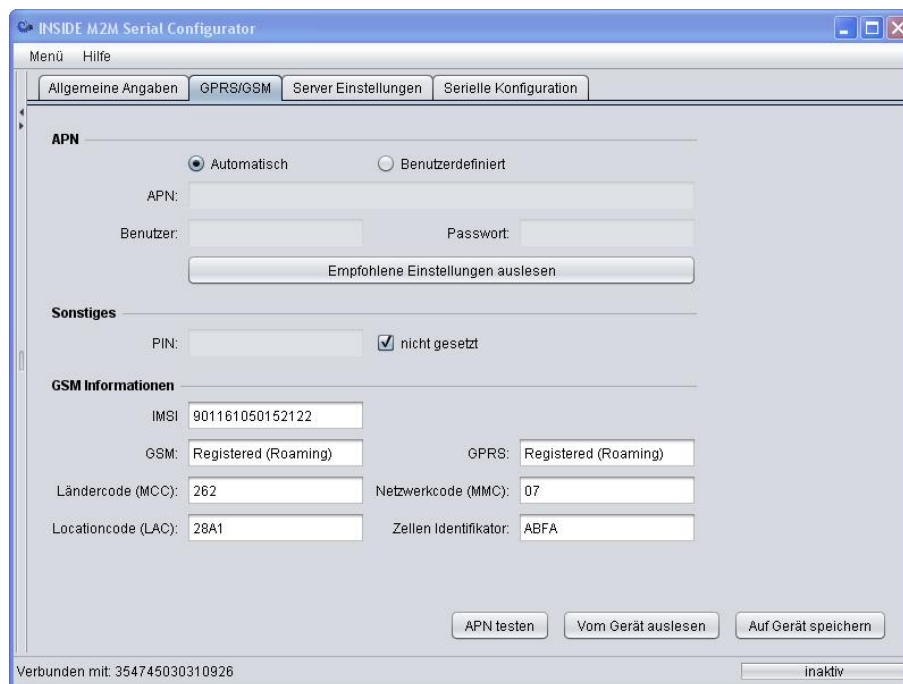


Figure 10: Provider and SIM card parameters

4.1.3 Server settings

This tab is used to specify the internet address of the SerialSwitch Server and the TCP-port to use for data transfer. You can specify either an IP address or a domain name (if a DNS entry is available). If the internet connection for your local network uses a DSL (broadband) router, it is likely that the IP-address of your router will change at regular intervals (e.g. daily). Free of charge internet services such as DynDNS.org allow you to assign the dynamic (changing) IP-address of your router to a fixed domain name of your choice. To do this, set up a an account with an appropriate service such as www.dyndns.org and choose a suitable domain name (e.g. test.dyndns.com). Then specify the chosen domain name in the Host Address-field.

Now click „Test server connection“ to test the connection between the GPRS-Terminal and the SerialSwitch Server. You already tested earlier with the „APN-Test“ that the GPRS terminal can access the Internet (see section 4.1.2). This additional test makes sure that your SerialSwitch Server can be reached.



This test does not establish a connection to the customer application but only to the M2M Gate Connector of the SerialSwitch Server (see Fig. 2)

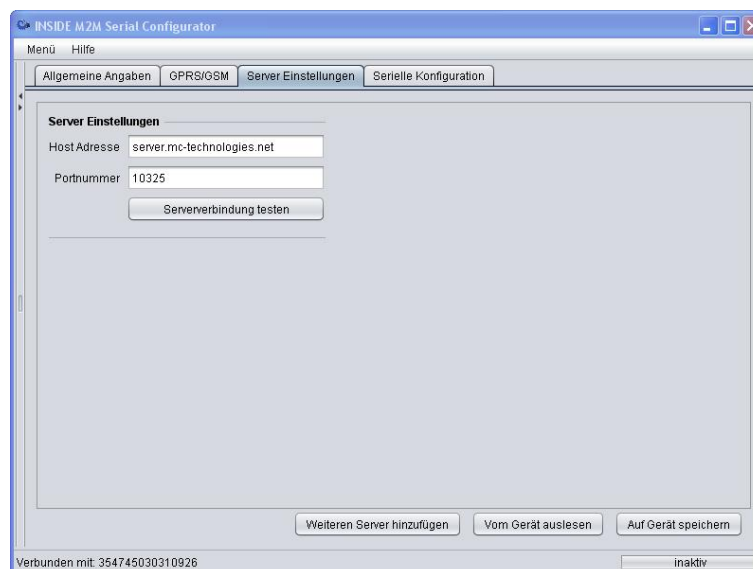


Figure 11: Server connection parameters

4.1.4 Configuration of the serial interface (RS232)

This tab is used to configure the RS232 interface between the GPRS-terminal and your field device. The appropriate settings for baud rate, framing scheme and hardware flow control should be described in the manual for your field device. The initial configuration of the GPRS-terminal is now finished. It is also possible to configure the serial interface of the GPRS-terminal remotely with the SerialSwitch ConfigurationCenter (see section 4.4).

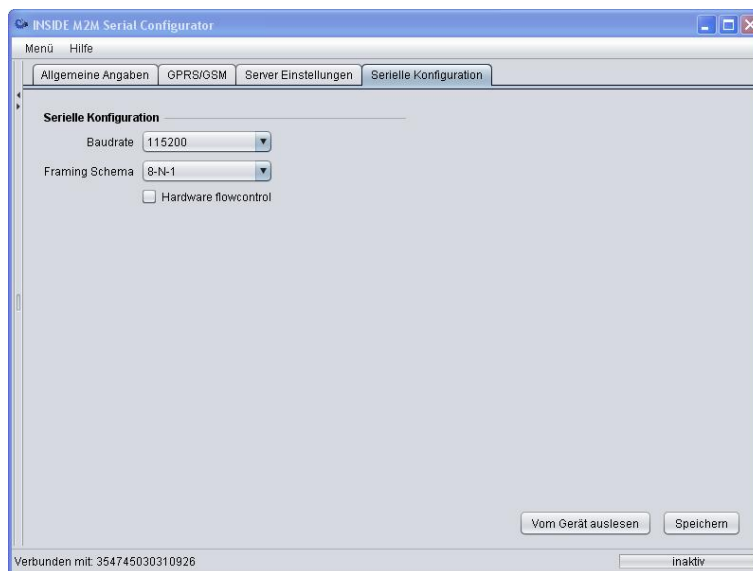


Figure 12: Serielle Konfiguration

4.2 SerialSwitch Server-configuration

Make sure that the server has not been started when you carry out the basic configuration. The basic configuration is carried out by editing the configuration file as described below. The SerialSwitch Server reads the configuration file when it starts. If you make any changes while it is already running, it must be stopped and restarted for the changes to apply. The SerialSwitch Server is installed as Windows NT service and is automatically started by the operating system when the PC is booted even if no Windows user is logged in. If necessary, you can stop the server with "Start/All Programs/INSIDE M2M SerialSwitchServer/ Stop SerialSwitchServer".

The server configuration file is located in the directory:

/Program Files/INSIDEM2M/SerialSwitchServer/conf.

The file name is SerialSwitchConfig.txt. The following settings can be configured in this file:

DevicePort and ClientPort Range: 1-65535 „DevicePort“ is the TCP Port for exchanging user data between the SerialSwitch Server and the GPRS-terminal (default 10325). „ClientPort“ is the TCP Port for exchanging configuration data between the SerialSwitch Server and the SerialSwitch Configuration Center (default 10327).

UserSecret This is the login-password for the configuration tool "SerialSwitch Configuration Center". The default is "comm".

DebugSerial Range: true/false default=true

This parameter activates logging of the data exchange between the GPRS terminal and the SerialSwitch Server. The server log file can be inspected with the Tail program.



If you want to edit the settings in the configuration file, you must use an editor which is suitable for plain text files such as Notepad. Word processing programs such as Microsoft Word may add formatting information to the file which will make it invalid. In this case, the server program will no longer start.

In order to start the SerialSwitch Server, choose in the program-group "INSIDE M2M/ SerialSwitch-Server" "Start SerialSwitchServer".

The SerialSwitch Server normally starts automatically when Windows is started. If necessary, you can check, whether the server has started correctly, as follows: choose „Start/Control Panel/Windows Administrative Tools“ and open the "Services tool".

4.3 SerialSwitch Client-configuration

Note: the installation of the component SerialSwitch Client is optional. As far as you have not installed SerialSwitch Client, no configuration is necessary and you can ignore this section.

Take care, that the software has not been started. The software-component SerialSwitch Client will be installed under Windows as NT-service. That means: SerialSwitch client will be started automatically by the operating system, even if no user is announced under Windows.

In order to stop the SerialSwitch Client-Software, it can be executed **stop SerialSwitchClient** in the program-group *INSIDE M2M/SerialSwitchClient*.

The configuration file SerialSwitchConfig.txt. is filed in the programme-installation list:

/Programme/INSIDEM2M/SerialSwitchClient/conf

The following functions will be configured here:

Used TCP-Port for Configuration Parameter: 1 bis 65535 The „ClientPort“ ist the Interface for the program „SerialSwitch ConfigurationCenter“, Pre-setting is 10327.

Password for authentication UserSecret To combine via the graphic Configurator with the SerialSwitch Client, a password is necessary. The pre-setting is „comm“.

Connecton to SerialSwitch Server To configure the connection to SerialSwitch Server you have to set three parameters.

“SerialSwitchServer.Host” names the IP-address - more precisely: the DNS-name - of the Serial-Switch Server.

“SerialSwitchServer.Port” names the port-number of the SerialSwitch Server and should correspond to the “ClientPort” of the SerialSwitch Server.

With “SerialSwitchServer.Password” the password will be set, that SerialSwitch Client uses for registering at SerialSwitch Server. This should correspond to “UserSecret” of SerialSwitch Server.

Further adjustments “Keepalive.Interval” configures the length of the time-period, after which Serial-Switch Client controls the connectivity with SerialSwitch Server. The default is 180000, the unit is milliseconds. With “Identifier” a sign-chain can be set for the identification of the SerialSwitch. This appears for a better overview in the SerialSwitch Configuration center.



If you want to edit the settings in the configuration file, you must use an editor which is suitable for plain text files such as WordPad Windows. Word processing programs such as Microsoft Word may add formatting information to the file which will make it invalid. In this case, the server-program will no longer start.

In order to start SerialSwitch Client after configuration, choose in the program-group *INSIDE M2M/SerialSwitchClient* **SerialSwitchClient starten**.

The component SerialSwitch Client normally starts automatically when Windows is started. If necessary, you can check, whether the client has started correctly, as follows: choose „Start/Control Panel/Windows Administrative Tools“ and open the “Services tool”:

4.4 SerialSwitch ConfigurationCenter

This program is used to make further configuration settings for the serial tunnel.

You can change configuration parameters, inspect the GPRS-terminal debug log and carry out software updates.

It makes a connection to the SerialSwitch Server or SerialSwitch Client depending on where the communication tunnel should redirect to. This connection uses TCP/IP and thus allows to configure the communication tunnels and manage the GPRS-terminals remotely.

If you configure port forwarding on your router or firewall, configuration can also take place remotely from any PC on the internet.

With the default setting, the connection to the server uses TCP port 10327 (see also Basic configuration of the server on in section 4.2).

4.4.1 Login

After starting the SerialSwitch Configuration Center, establish the connection to the SerialSwitch Server by choosing */Menu/Connect*.

Please enter the following parameters:

Host Specify the IP address or domain name of the SerialSwitch Server or SerialSwitch Client.

Port Specify the TCP Port for communication with the SerialSwitch Server or SerialSwitch Client (default 10327).

Username Specify a name of your choice. It is not necessary for authentication but it is documented in the server log file.

Password Specify the password. The password is specified in the server configuration file (default „comm“). See also Basic configuration of the SerialSwitch Server in section 4.2 or SerialSwitch Client in section 4.3.

The panel on the left shows a list of all GPRS-Terminals which have ever made a connection to the server. Terminals which are not currently connected are marked with „Offline“. The status line at the bottom shows the status of the connection between the SerialSwitch Configuration Center and the server.



Figure 13: One connected GPRS-terminal is the terminal overview

4.4.2 Creating new communication tunnels

To configure a new communication channel, select the required GPRS-Terminal from the list on the left and click the „Add Com Link“ button. Then choose, how the customer software shall be connected to the SerialSwitch Server or SerialSwitch Client (The type of endpoint of the communication tunnel) (see figure 14).

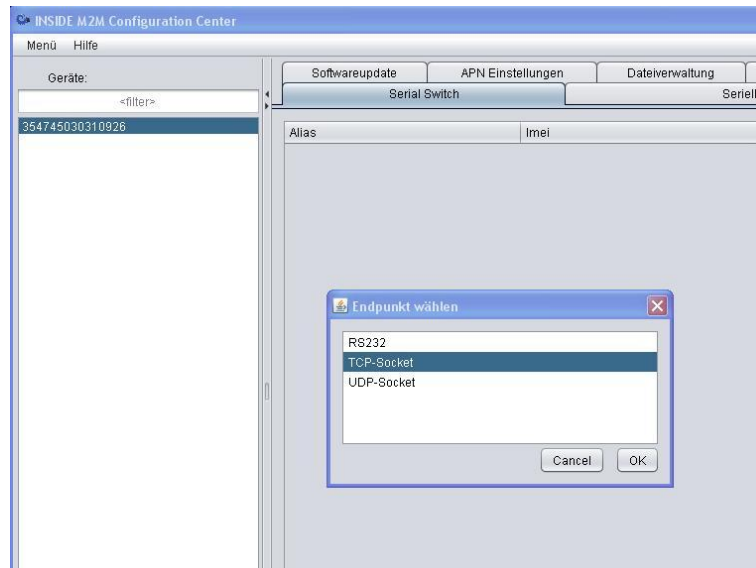


Figure 14: Choosing the communication tunnel type

RS232 endpoint The SerialSwitch Server or SerialSwitch Client will open a virtual serial interface. All data which are received on this serial interface are sent to the selected GPRS-Terminal and vice versa. During configuration, you are shown a list of all COM ports which are available on the SerialSwitch Server or SerialSwitch Client. You must choose one of the virtual COM ports which you created with the com0con program. Taking the example in section 3.4, you should choose COM26 here and configure the application software to use COM27.

TCP Socket endpoint Choose “TCP Socket” if your application software will communicate with the server using TCP/IP. You must then specify the port number. The valid range is 1 to 65456 (Note: the range is limited to 1025 – 65456 if the SerialSwitch Component is running as an unprivileged user). An error message will be shown if the specified port number is invalid or already in use. After specifying a valid port number, the SerialSwitch Server or SerialSwitch Client waits for a TCP-connection on this port.

UDP Socket-Endpoint Choose „UDP Socketif your application software will communicate with the server via UDP. Two choices are available:

In automatic mode, the address of the customer application (port and IP address) is determined automatically from the last received UDP Packet. All data received from the GPRS terminal is sent via UDP to this address. If a packet has not yet been received from the customer application, data received from the terminal is discarded.

In manual mode, you must specify the port number and IP address of the customer application. All data received from the GPRS terminal is sent via UDP to this address.

In both cases, it is necessary to specify the local UDP port. All data received by the SerialSwitch Server or SerialSwitch Client through the local UDP port is sent to the chosen GPRS-terminal.

After configuring the communication tunnel, it is shown in the list.



Please note that you can only create one communication tunnel for each GPRS-Terminal. If a communication tunnel is already created, it must be deleted before you can create a new one for the same terminal.

4.4.3 Deleting the communication-tunnel

Make sure you have chosen the “SerialSwitch”-tab. Click on the tunnel to delete and then click the „Remove mapping“ button. The communication tunnel will be deleted and all connected resources (TCP/UDP port or serial interface) will be released.

4.4.4 Creating aliases

All GSM-devices can be identified by the unique International Mobile Station Equipment Identity (IMEI). (see section 4.1 for more information). If required, the SerialSwitch allows you to assign an alias name to each GPRS terminal which you can use instead of the 15 digit IMEI number. You can assign a name of your choice such as a location or equipment name. This makes it easier to identify terminals which are connected to the SerialSwitch Server.

To assign an alias, right click on the terminal in the Devices list and choose **Create alias**. Specify the required alias name and click **OK**. The alias is shown in the Devices list and also in the list of communication tunnels.

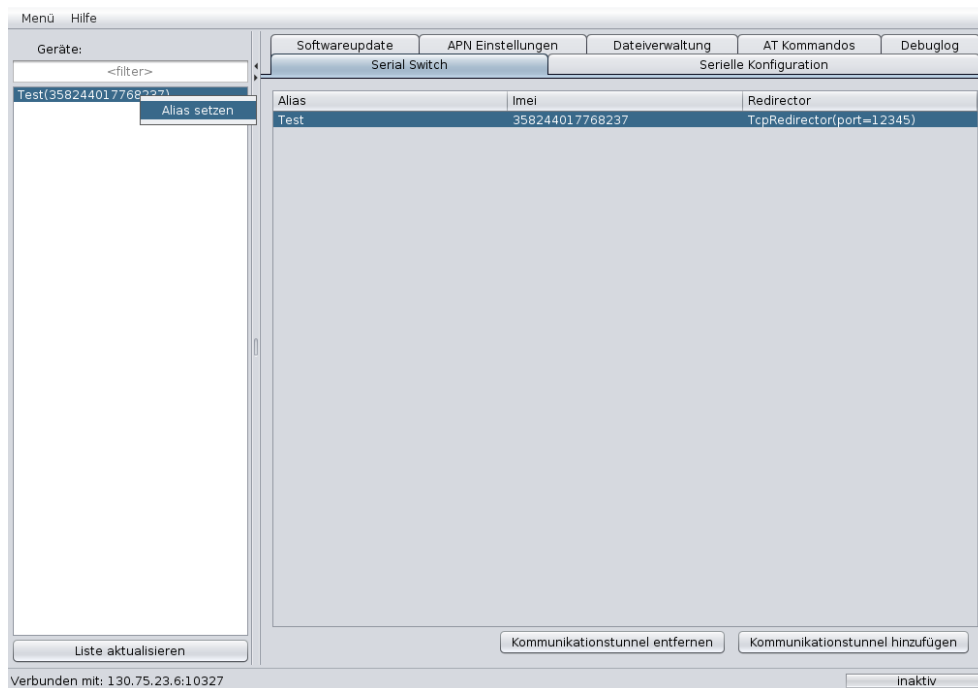


Figure 15: Configure an aliasname

4.4.5 Overview of the program-tabs

The main screen of the configuration center has tabs for various functions (see Fig. 16). Some of the functions are also available in the GPRS Configurator program. They allow you to check or edit the configuration of the remote GPRS terminal. In addition you can read log files and install software updates in the terminals.

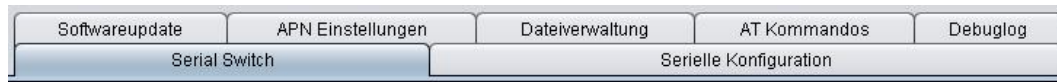


Figure 16: Programmreiter

4.4.5.1 Debug-Log

Each GPRS terminal has non-volatile internal memory for storing debug messages. The message types depend on the applications and include messages. These are e.g.: error messages if the wireless connection is lost, success messages when reading data from the field device, etc.

To read the debug log, choose the required terminal in the Devices list and then click “Fetch log”. If required, you can collect the logs from several terminals simultaneously. To do this, use the Ctrl button to select several terminals in the Devices list.

4.4.5.2 Software Update

This tab is used to install a firmware update on one of the GPRS terminals when a new version becomes available. The terminal loads the required files via wireless from our update server and then restarts. Proceed as follows:

- Choose the required terminal in the Devices list.
- Click **Read settings**. After a few seconds a URL (Internet address) is shown in the field **Firmware URL**.
- Click **Download firmware information**. The SerialSwitch Configuration Center gets firmware information from the specified URL and shows this in the Firmware Information panel below. The information includes the firmware version which is available on the update server. Now fetch the debug log from the terminal. The debug log shows the version of the firmware currently running on the terminal.
- Click **Perform update** if the firmware version on the update server is newer than the currently installed firmware version. The terminal starts the update process autonomously and then restarts. The update process takes around 5 minutes. Then get a new debug log from the terminal and check the version number to ensure that the update has taken place successfully.



Do not carry out an update unless you have been instructed to do so by our Support Department. If the update does not proceed successfully, it is possible that the old firmware version will no longer run and then the terminal must be sent back to INSIDE M2M Please note that the update process may result in additional data costs from your provider.

5 Hardware

5.1 IMEI-number of the GPRS-terminal

Each GPRS-Terminal has a unique 15 digit serial number, the IMEI. This is shown on the device label (see Fig. 17).

The device ID is shown in the SerialSwitch Configuration Center in the Devices list as soon as the terminal has successfully made a connection to the server for the first time.



Figure 17: device label with IMEI

5.2 Interfaces

5.2.1 Power supply

At a supply voltage of 12V the current rating of the power supply should be at least 1.25A. The typical current consumption with an active GPRS connection is 200-400mA.

However, poor reception conditions can lead to short-term current peaks if the terminal tries to compensate for this by increasing the transmission power.

Pin	Designation	In/Out	Description	Parameter
1	Plus	In	Positive supply voltage	+8-30VDC
2	Reserved, do not use			
3	Reserved, do not use			
4	Reserved, do not use			
5	Reserved, do not use			
6	Minus	In	GND	0VDC

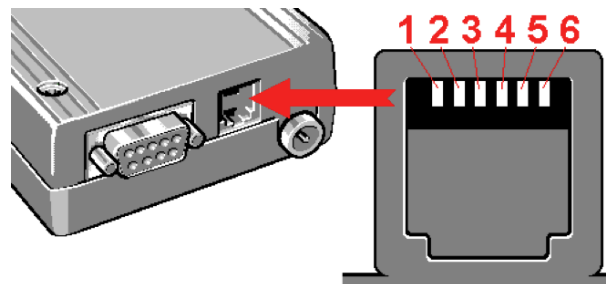


Figure 18: Spannungsversorgung RJ12 Buchse

5.2.2 SIM card-holder

The GPRS terminal must be fitted with a mini SIM card (1.8 Volt or 3 Volt) which is compatible with the GSM 11.12 guidelines. You can use any SIM card tariff that allows you to get access to the mobile internet via GPRS/EDGE networks. It is not necessary to use tariffs with fix public IP services! The SIM card must be inserted as follows in the holder (tray) at the rear of the device:

- Make sure that the terminal has been disconnected from the power supply!

Changing the SIM card with the power supply switched on can damage the SIM card and/or the terminal.

- Press the small button next to the SIM card tray as shown in the figure. This causes the tray to slide out slightly
- Slide out the tray and insert the SIM card.

Make sure the SIM card is inserted the right way round!: One of the corners of the tray is chamfered, and thus the SIM card will only fit correctly one way round.

- Carefully slide the tray back into the terminal. Do not use excessive force and make sure that the tray does not get stuck or tilted!

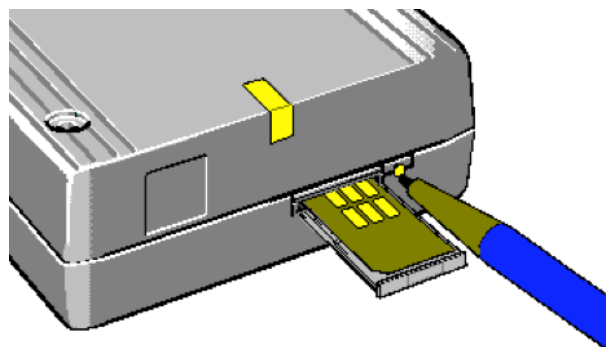


Figure 19: SIM card holder

5.2.3 Antenna-connector (FME)

The GPRS-Terminal is provided with a 50 Ω male FME connector for attaching the external antenna. You should only use a 50 Ω GSM-antenna with a female FME connector.

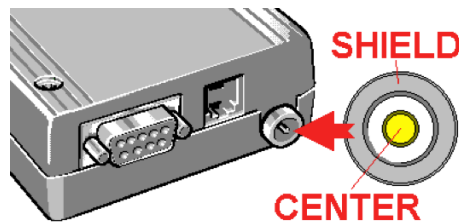


Figure 20: Antenna connector (FME)

5.2.4 RS232-interface

The RS-232 interface is used to connect the terminal to the field device. It is also used to connect the terminal to a PC during initial configuration of the terminal.

- If possible, always use a short RS-232 cable (max. 1.8 m).
- The input voltage must not exceed ± 25 V.
- Avoid short circuits!
- Secure the connector to the socket using the locking screws on the connector.

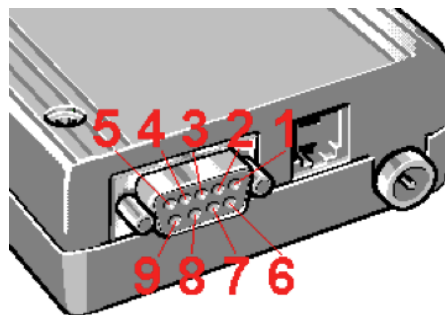


Figure 21: RS-232 interface showing pin numbers

Pin	Designation	In/Out	Description
1	DCD	Out	Data Carrier Detect
2	RxD	Out	Receive Data
3	TxDt	In	Transmit Data
4	DTR	I n	Data Terminal Ready
5	GND		Signalmasse
6	DSR	Out	Data Set Ready
7	RTS	In	Request to Send
8	CTS	Out	Clear to Send
9	RI	Out	Ring Indicator

6 Contact

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