

LinTech

keeps you connected

Bluetooth™ RS232 Mini Adapter

Article Number: 1408/1409



Handbook

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1.Introduction

1.1. GENERAL DESCRIPTION

The Bluetooth RS232 Mini Adapter is a *Bluetooth** adapter for use with the RS232 serial interface and can be connected to any piece of equipment equipped with this interface.

The adapter is fitted with a high performance rechargeable battery so an external power supply is not required. This makes the adapter particularly suitable for use in mobile applications.

No driver installation is required and the adapter functions fully independently of the operating system platform in use.

Whenever a Bluetooth connection is set up between two pieces of equipment, one device is always the Master, and initiates the connection, and the other is the Slave. The new Bluetooth RS232 Mini Adapter can be operated in both Master and in Slave modes, i.e. the Bluetooth RS232 Mini Adapter is able to establish a connection with another Bluetooth device and does not have to wait passively for a request for a connection from an external piece of equipment.

In either case, it is essential that the partner device supports the Bluetooth serial port profile.



The Bluetooth RS232 Adapter is operational in slave mode immediately upon switch-on. An easy-to-use configuration programme is supplied with the adapter with which the user can configure the connection parameters, e.g. the baud rate, of the Bluetooth RS232 Mini Adapter.

For systems which do not operate under the Windows operating system, it is also possible to configure the adapter using AT commands.

The adapter is fitted with a high-performance Li-Ion rechargeable battery. In mobile applications, where such factors as power consumption and operating time are of central importance, an automatic power management function is available, which can be set to switch the device into energy saving mode ("Sniff mode"). This leads to a considerable reduction in the power consumed by the partner device.

A further important feature here is that the adapter only goes into operational mode once a signal is actually present on the serial interface. In other words, the adapter is only activated once the equipment to which the Bluetooth RS232 Mini Adapter is connected has been switched on.

Our experience has shown that a great many demands are placed on Bluetooth solutions. For this reason, the Bluetooth RS232 Mini Adapter has been conceived to be usable together with a large number of solutions.

If the particular application you wish to run can not be implemented using the standard functions described in this handbook, please be sure to see Chapter 6 – Special Functions.

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The Bluetooth RS232 Mini Adapter is a completely new product and displays a whole host of exciting functions. So as to avoid problems, we highly recommend that you read the instructions in this handbook before putting the adapter into operation for the first time.

1.2. PACKAGE CONTENTS

*Bluetooth** RS232 Adapter with standardised (male) RS-232 DSUB-9 plug connector

(Optionally available with DSUB-9 connector [female])

Charging unit

Computer disc, with handbook and configuration software for use with Windows systems

2. Preparing for use

2.1 VIEW OF ADAPTER



Illustration 1 View of Bluetooth RS232 Mini Adapter

2.2. SWITCHING ON

The standard configuration of the LinTech *Bluetooth** RS232 Mini Adapter is as follows:

Baud rate	: 115200 Bit/s
Stop bit	: 1
Parity	: None
Data bits	: 8

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Bluetooth* PIN

: 1234

Plug the adapter into the RS232 interface of the equipment it is to be operated with.

The Bluetooth RS232 Mini Adapter recognises if incoming signals are present at the serial interface, i.e. whether the equipment is switched on or off.

If the equipment is switched on, the Bluetooth RS232 Mini Adapter goes into operating mode, LED 2 flashes rapidly for approx. 3 seconds and then changes to a slowly flashing green.
(For LED sequences, please see the overview in section 6.)

If the device is switched off, the Bluetooth Adapter remains in Standby mode.

Should the RS232 Mini Adapter not switch into operational mode despite being switched on, please charge the battery. (See 2.3)

The Bluetooth Adapter can be operated during the charging process.

2.3. CHARGING THE BATTERY

The Bluetooth RS232 Mini Adapter is fitted with a high performance rechargeable battery so an external power supply is not required. This makes the adapter particularly suitable for use in mobile applications.

The battery must be charged before the adapter is used for the first time.

To charge the battery, please use the battery charger supplied so as to avoid overcharging the battery or causing any technical faults, and connect it to the appropriate socket at the rear of the Bluetooth RS232 Adapter (see Illust.1) .

The status of the charging process is indicated by LED1 on the upper surface of the Bluetooth Adapter (see Illust. 1)

LED 1	Meaning
RED	Battery is charging – charge duration to full capacity for empty battery approx. 2 hours
GREEN	Battery fully charged or RS232 Mini Adapter is being powered via the mains supply
OFF	RS232 Mini Adapter is not connected to the power supply

2.4. FIRST OPERATION

The Bluetooth RS232 Mini Adapter is fitted with a high performance rechargeable battery so an external power supply is not required. This makes the adapter particularly suitable for use in mobile applications. Before using the adapter for the first time, it is recommended that batteries are first charged (see chapter 2.3)

Whenever a Bluetooth connection is set up between two pieces of equipment, one device is always the Master, and initiates the connection, and the other is the Slave. The new Bluetooth RS232 Mini Adapter can be operated in both Master and in Slave modes, i.e. the Bluetooth RS232 Mini Adapter is able to establish a connection with another Bluetooth device and does not have to wait passively for a request for a connection from an external piece of equipment.

It is important that the partner device supports the Bluetooth serial port profile (SPP).

After the initial switch-on, the Bluetooth RS232 Mini Adapter is in standard Slave mode. It is then possible to select between two further modes – **normal operation** and **configuration mode**.

In **normal operation mode**, a data connection to the Bluetooth Adapter is set up, whereas the **configuration mode** is used to set the configuration of the Bluetooth Adapter via the Bluetooth connection or serial interface.

The standard settings of the LinTech *Bluetooth** RS232 Mini Adapter are as follows:

Baud rate	: 115200 Bit/s
Stop bit	: 1
Parity	: None
Data bits	: 8
Bluetooth* PIN	: 1234

Please note that it is essential for the Bluetooth RS232 Mini Adapter to be the Bluetooth slave when the adapter is put into operation for the first time.

To change the configuration via a Bluetooth connection, the adapter must be set to configuration mode and a connection to an external Bluetooth device must exist (please see the relevant section of your handbook).

If you wish to set up a Bluetooth connection from another Bluetooth device to the Bluetooth RS232 Mini Adapter without changing the configuration, please follow the instructions in the subsequent sections.

2.5. COUPLING PROCEDURE FOR CREATING A BLUETOOTH DATA CONNECTION

Setting up a Bluetooth connection requires any Bluetooth master that supports the Bluetooth serial port profile. Please perform the coupling procedure as described in the following.

The first step is to initiate a device search using the *Bluetooth** partner device (integrated *Bluetooth** circuit, USB dongle, PCMCIA card, or similar) in the Bluetooth environment.

Here you should find displayed 'LinTech RS232 MINI', indicating that the Bluetooth RS232 Mini Adapter has been found.

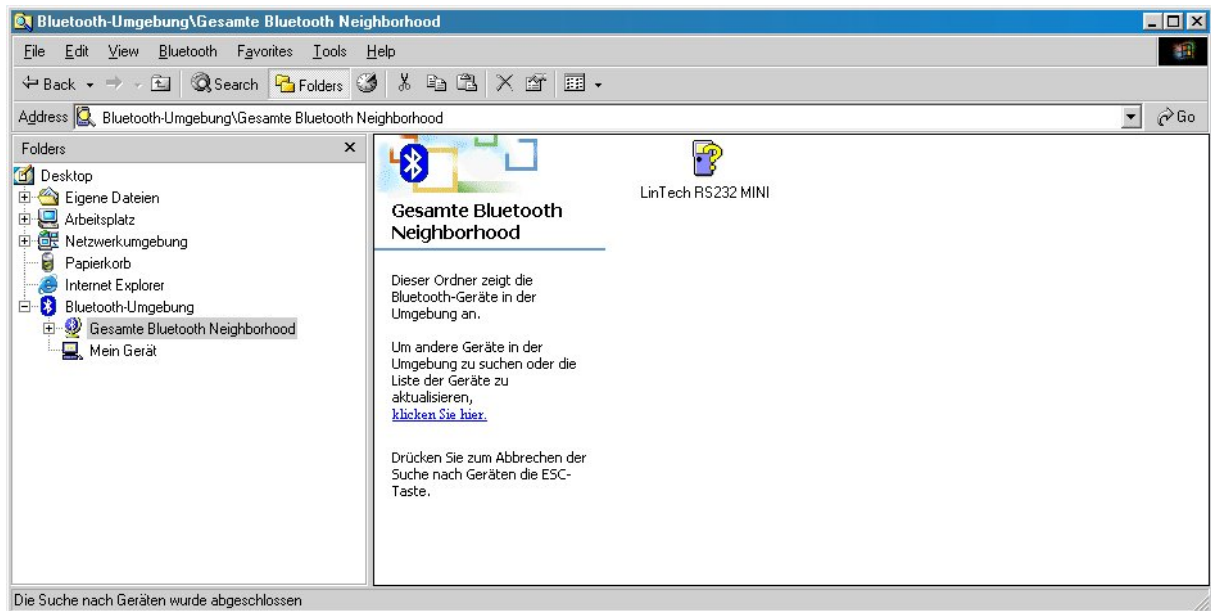


Illustration 2 Searching for a device using the Bluetooth Manager

Now initiate the coupling procedure. Please follow the instructions in the manual of the Bluetooth device that you are operating with the adapter.

The standard-PIN/ Bluetooth key for the Bluetooth RS232 Mini Adapter is **1234**.

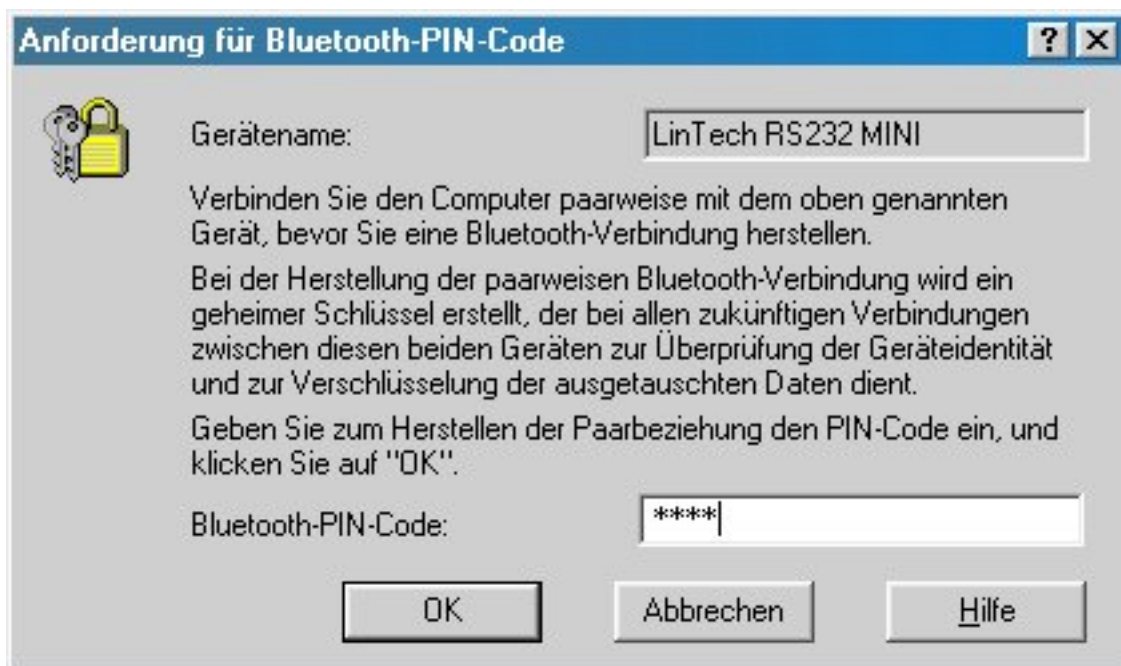


Illustration 3 Requesting Bluetooth PIN code

Once the coupling procedure has been completed, the Bluetooth RS232 Mini Adapter offers you a serial facility, called COM-HARDWARE, which you can use to connect the serial interface of the Bluetooth RS232 Mini Adapter with that of your equipment

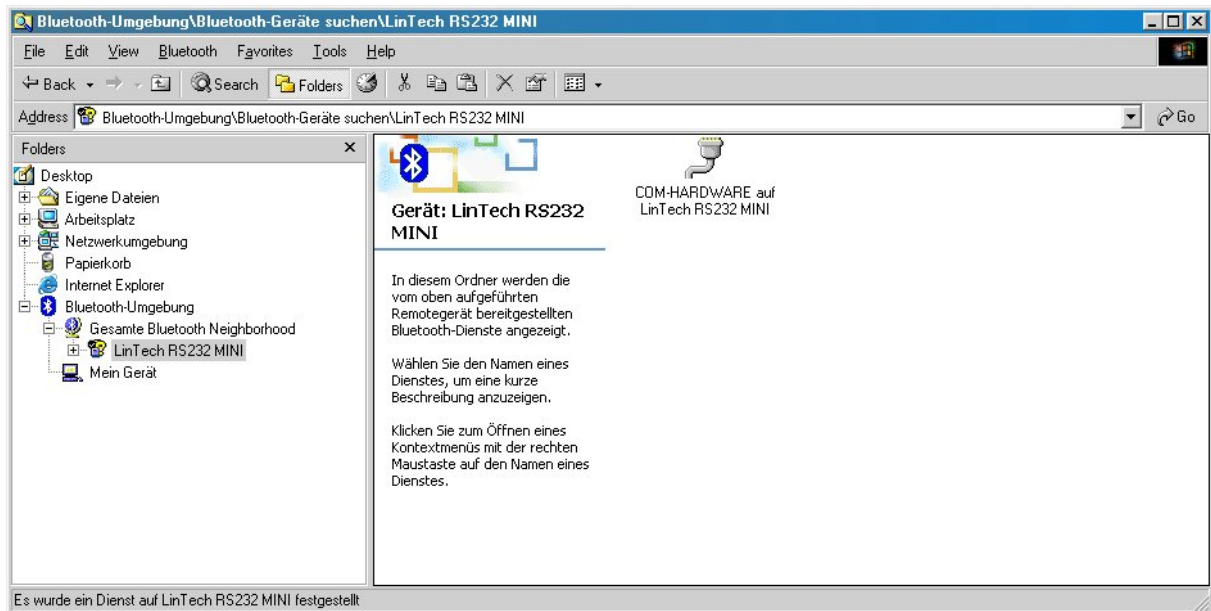


Illustration 4 Searching for device with the service-ID: COM-HARDWARE

2.6. SETTING UP A CONNECTION

For information on how to establish a connection using a serial facility, please consult the instructions supplied with your Bluetooth equipment.

In most cases, the Bluetooth environment provides you with virtual COM ports. The *Bluetooth** Serial Port Profile must be allotted to one of these COM ports. It is via this COM port that you communicate with the Bluetooth RS232 Mini Adapter .

3. Configuration

Configuration of the Bluetooth RS232 Mini Adapter can be performed either via an existing Bluetooth connection or directly, by connecting it to a the serial interface of a PC.

Before performing the configuration, the Bluetooth Mini Adapter must be put into configuration mode (see chapter 3.2)

3.1. STANDARD SETTINGS

The standard settings of the LinTech *Bluetooth** RS232 Mini Adapter are as follows:

Baud rate	: 115200 Bit/s
Stop bit	: 1
Parity	: None
Data bits	: 8
Bluetooth* PIN	: 1234

An easy to use Windows programme is provided with which you can configure standard settings and also access other features (such as activating SNIFF mode, connection properties, security settings etc.) either via an existing Bluetooth connection or via the serial interface of the adapter (see chapters 3.2-3.4).

For all those applications for which no Windows application is available, it is possible to perform the configuration by means of AT commands using any available terminal programme (chapter 3.5).

For configuration purposes, the LinTech RS232 Mini Adapter provides you with a special *Bluetooth** configuration programme. In other words, in addition to its normal operational mode, it is possible to use the Bluetooth adapter for configuration purposes and for changing from one operational mode into this configuration mode.

It is not necessary to remove the Bluetooth adapter from the device with which you are operating it before performing the configuration.

For information on how to switch between the two modes, please see the following section.

3.2. CHANGING BETWEEN CONFIGURATION MODE AND NORMAL OPERATION

Press the button on the rear side of the Bluetooth Adapter briefly (see Illust. 1).
LED2 will then flash continuously for about two seconds, following which LED2 flashes slowly in green for 3 seconds before changing to red.

***When LED2 flashes slowly in red, it means that the adapter is currently in configuration mode.
The serial Bluetooth service COM-CONFIG is now available.***

If you press the button again for a short time, the Bluetooth adapter will return to normal operation.
(LED2 again flashes continuously, after which LED2 flashes slowly in green).

***When LED2 flashes slowly in green, it means that the adapter is currently in normal operational mode.
The serial Bluetooth service COM-HARDWARE is now available.***

3.3. CONNECTING TO THE CONFIGURATION SERVICE

To be able to configure the Bluetooth RS232 Mini Adapter via Bluetooth, it is first necessary connect the Bluetooth partner device (Master) with the Bluetooth RS232 Mini Adapter connection service.
To do this, a service determination procedure must be carried out in the Bluetooth manager of the Bluetooth partner device. The Bluetooth RS232 Mini Adapter offers the COM-CONFIG service.

Connect up to this configuration service.

For information on performing this step, please consult the instruction manual supplied with your Bluetooth partner device.

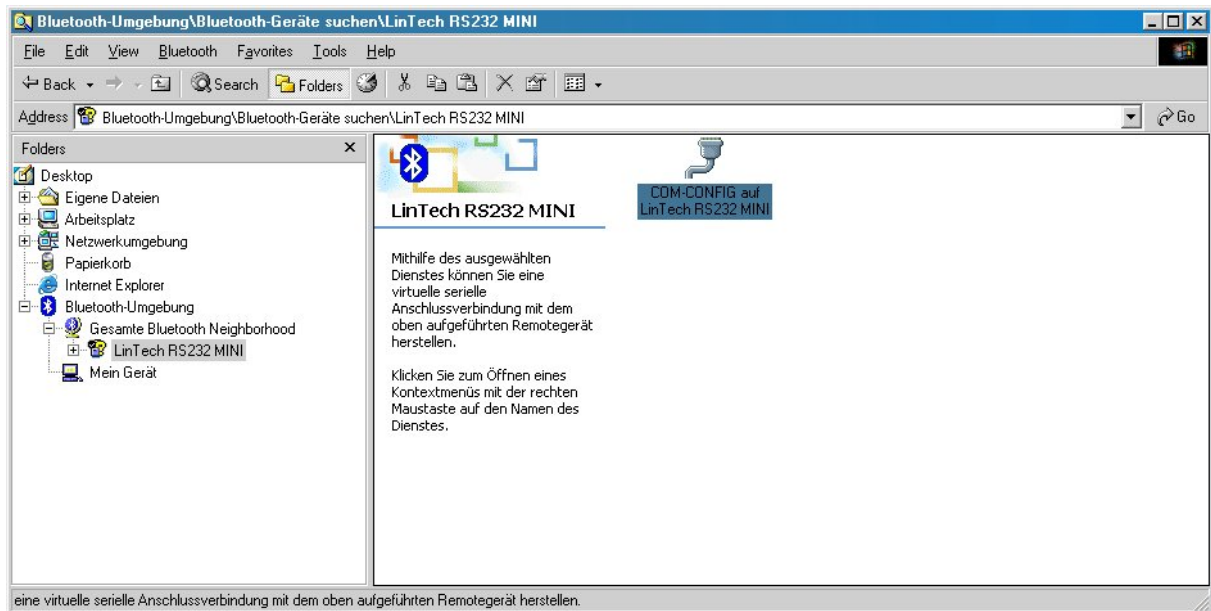


Illustration 5 Searching for a device with the COM-CONFIG service-ID:

3.4 Connecting with the serial interface of the adapter – Configuration via a physical serial interface

After switching the Bluetooth RS232 Mini Adapter into configuration mode (chapter 3.2), plug the adapter into the serial interface of a PC.

3.5. CONFIGURATION USING THE LINTECH 1408/1409 CONFIGTOOL CONFIGURATION PROGRAMME

The LinTech RS232 Mini ConfigTool is an easy to use Windows configuration programme, with the aid of which you can perform all the settings required for the Bluetooth Rs232 Mini Adapter easily and clearly. Please copy the programme from the disc supplied to a folder on your hard disc, and start the programme from the hard disc.

Before using the ConfigTool configuration programme, it is necessary that a Bluetooth connection exists to the Bluetooth RS232 Mini Adapter which uses the configuration service of the Bluetooth RS232 Mini Adapter.

Should this connection not exist, please perform the steps described in the previous two sections.

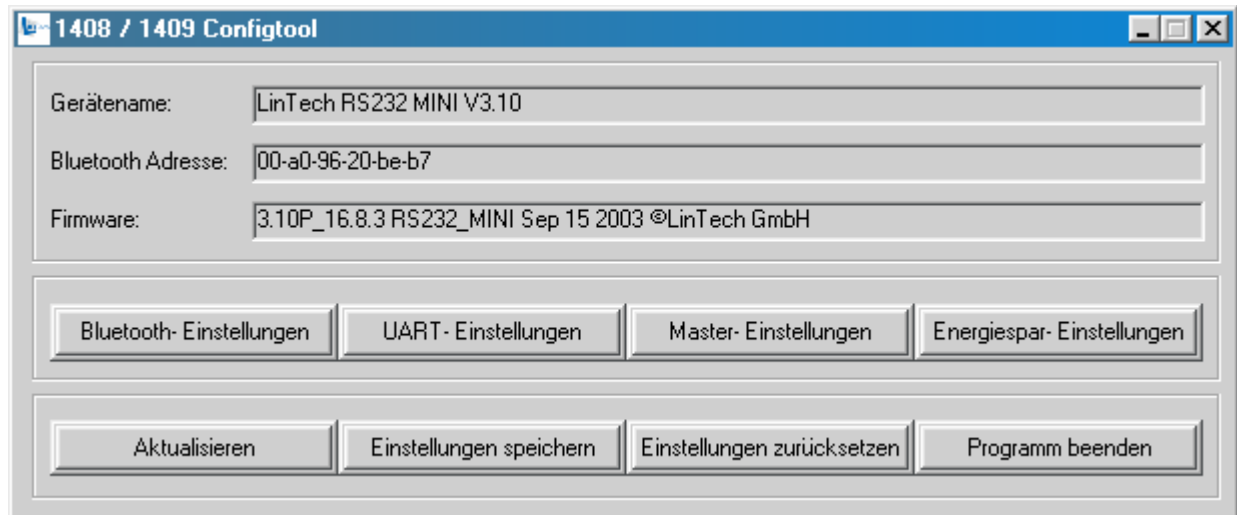


Illustration 6 User interface of the ConfigTool configuration programme



Illustration 7 ConfigTool configuration programme - Selecting ComPort/language

- Connection to COM - Port:** COM - Port connected to the COM-CONFIG configuration service of the Bluetooth RS232 Mini Adapter; enter COM-PORT and press Connect
Or
 COM port which is connected to the serial interface of the Bluetooth RS232 Mini Adapter.
- Connect:** Create connection to Bluetooth RS232 Mini Adapter using the set COM - Port
- Language:** Select dialogue language (German or English)
- Finish** End the Configtool programme

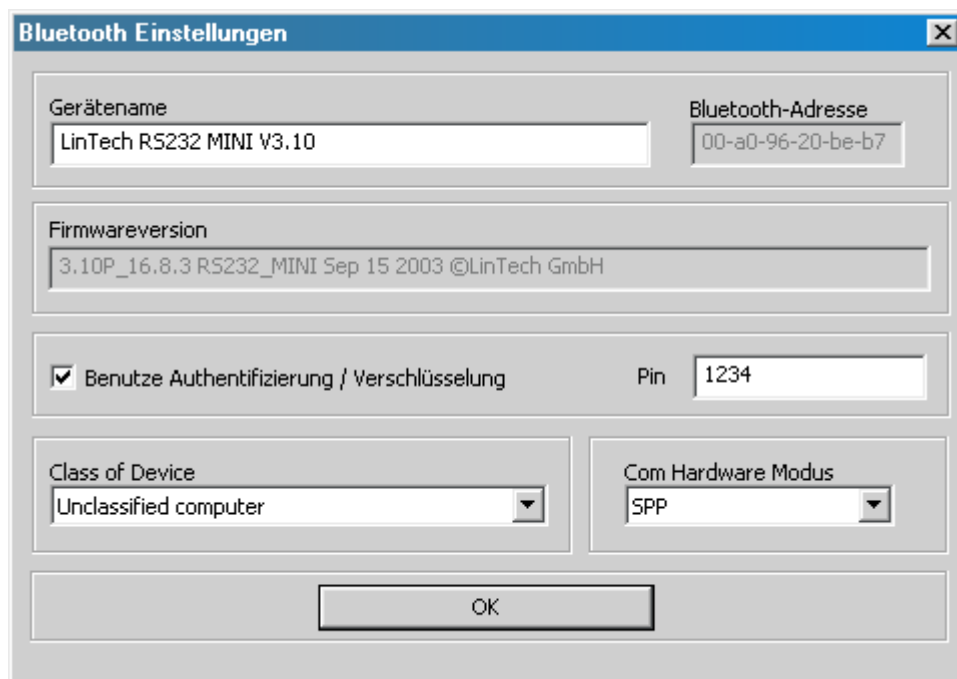


Illustration 8 ConfigTool configuration programme – device properties/encryption

- Device name:** Input device name (Max. length 30 characters)
- Firmware:** Displays current firmware version

Bluetooth Address:	Displays Bluetooth Address of RS232 Mini Adapter
Com Hardware Mode:	Selection of COM-hardware mode. SPP: Service class is Serial Port DUN: Service class is Dial-up Networking <i>Note:</i> The DUN service class can be useful when operating the RS232 Mini Adapter with a modem. Some devices require the use of this service class to be able to create a connection with the internet (e.g. IPAQ with PDAs)
Class of Device	Selection of device class according to <i>Bluetooth</i> * specification
Authentication / encryption in use	Before the authentication/encryption selection can be made, the user is required to enter the PIN, following which the data will be transmitted using encryption. If not selected, the connection is set up without the PIN and the data is transmitted without encryption.
PIN	Use this field to enter your selected PIN for use with the authentication/encryption function.

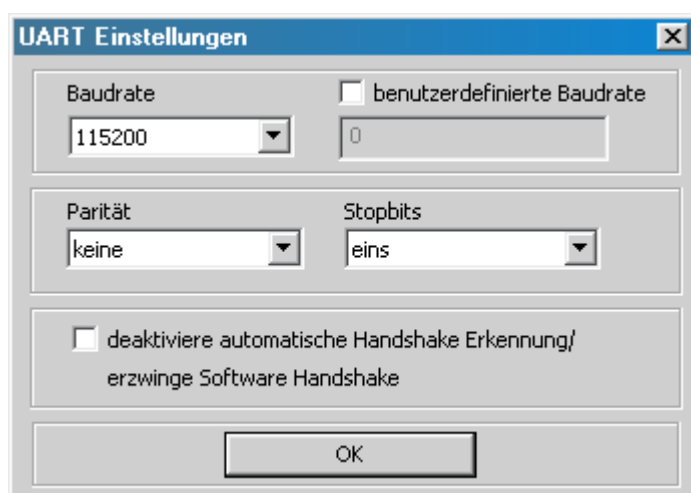


Illustration 9 ConfigTool configuration programme – connection parameters

Baud rate	Selecting baud rate The baud rate defines the speed at which the device is able to communicate. It states the number of times per second that the signal level changes during a connection. It is only equal to one bit per second when the respective signal contains one bit of transmitted data Modems, for instance, must operate at the same bit rate in order for them to be able to communicate with each other.
User-defined baud rate	It is possible to programme a user-defined baud rate, which can differ from the baud rates stated in the standard settings <i>Please note:</i> Technical operating conditions may require that inputted baud rate values are rounded down.

Parity

Selecting parity for error correction

The parity test involves the addition of a parity bit, the purpose of which is to maintain either an even or odd number of bits within a data packet that are set to 1, according to requirements. The receiver adds 1 to the number of bits it receives and then either accepts that data packet or rejects it, depending on whether or not the sum corresponds with the parity bit.

Setting

Purpose

Even	The parity bit is set to either 0 or 1 so as to obtain an even number of bits set to 1.
Odd	The parity bit is set to either 0 or 1 so as to obtain an odd number of bits set to 1.
None	No parity bit transmitted.

Stop bits

Selecting number of stop bits

Stop bits form the framework of the data packages in asynchronous communication. This data informs the receiver that a byte has been transmitted. Modern asynchronous protocols require a maximum of one stop bit.

Deactivate automatic handshake / force software handshake

Automatic handshake recognition is deactivated when this box is checked. The handshake channels are no longer evaluated.

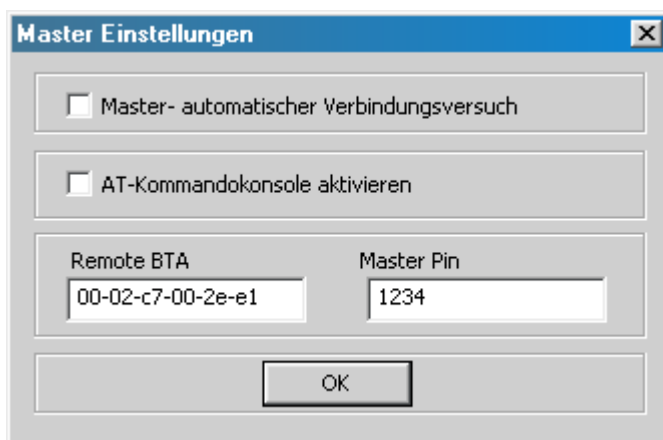


Illustration 10 ConfigTool configuration programme – Changing between Master and Slave modes

Master – Automatic connection

When selected, continuous attempts are made to set up a connection to the partner device.

This can be of use when the RS232 Mini Adapter is required to re-establish a connection that has been interrupted due to excessive distance.
(only available in Master mode)

Foreign device address

Input address of the device to which a connection is to be established.
(only available in Master mode)

Foreign device PIN

Input-PIN of the device to which a connection is to be established

(necessary in the event that the authentication mode of the Bluetooth partner device is activated.
(only available in Master mode)

Activate AT command panel

Activates the command panel for Master mode. For details, see chapter 5, 'Special Functions'.

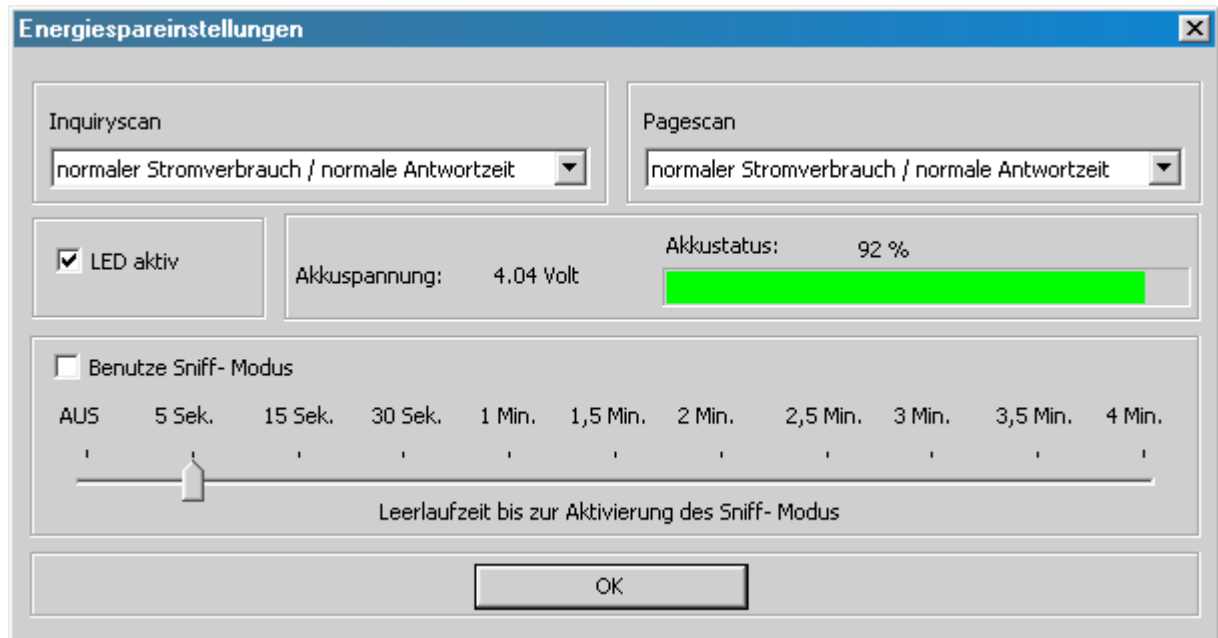


Illustration 11 ConfigTool configuration programme - energy consumption settings

LED active

When not selected, LED2 is switched off.
(to reduce power consumption)

Inquiry Scan

When selected, the interval can be varied with respect to the power consumption and response time of the device.

When operating in Slave mode and Inquiry Scan has been switched off, the Bluetooth RS232 Mini Adapter is invisible to other Bluetooth devices, since it no longer reacts to enquiries from other devices.

Page Scan

Selected to control the reaction time to a connection request.
The interval can be varied with respect to the power consumption and response time of the device.

Use Sniff mode When selected and the SNIFF is activated, communication is reduced to the so-called SNIFF slots. As a result, the Bluetooth RS232 Mini Adapter consumes less energy.

Please note that activation of the SNIFF mode results in a reduction in data flow and an increase in latency time.

Idle time preceding operation of Sniff mode This is a sliding control used to regulate the interval after which the device switches into the energy-saving SNIFF mode, when no data is being transmitted. As soon as further data is transmitted, the R232 Mini Adapter changes to active operational mode.

Note:

When the sliding control is set to OFF, the device no longer alternates between active and Sniff modes. If the Use Sniff Mode switch is activated, the RS232 Mini Adapter is always in Sniff mode.

Battery status and voltage Displays battery voltage and capacity in percent.

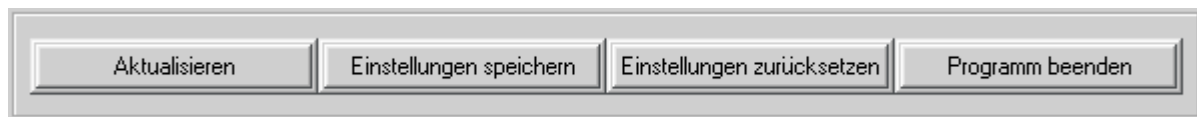


Illustration 12 ConfigTool configuration programme – save settings

Update Output data and settings currently saved in the adapter to the display

Save settings Save changes to inputted settings and values

Revert to standard settings Return all settings to standard values.
The adapter will restart in Slave mode, normal operation

End programme Ends the configuration programme

3.6. CONFIGURATION USING AT COMMANDS

An additional method of configuring the Bluetooth RS232 Mini Adapter for setting the connection parameters is to use AT commands.

This option is provided due to the fact that not all environments use Windows as an operating system. All that is required on your RS232 Bluetooth Mini Adapter partner device, or the PC to which the adapter is directly connected, is a terminal programme, (e.g. Hyperterminal).

If you wish to configure the Bluetooth RS232 Mini Adapter via a Bluetooth connection, the Bluetooth device must be connected to the Bluetooth RS232 Mini Adapter configuration service programme.

It is also possible to configure the adapter using AT commands by connecting directly to the serial interface of a PC.

Either way, the Bluetooth RS232 Mini Adapter must be set to configuration mode. For instructions on how to switch from normal mode to configuration mode please see chapter 3.2.

Start the Terminal programme.

Connect the Terminal programme to the Com port to which the COM-CONFIG service of the R232 Mini Adapter is connected.

Select the following settings: baud rate 115200 Bit/s, 8 data bits, 1 stop bit, 1 start bit and no parity.

Once the connection has been successfully established, the terminal programme window will display a list of available AT commands.

Should this listing not be displayed, please enter **<ATi2>** followed by **<ENTER>**. This will effect a repeat display of the available commands.

A list of all the available commands is also contained in the following section. The respective commands are entered in the terminal window; no echo is produced when the characters are inputted. After inputting a command, it is always necessary to press **<ENTER>**.

Any changes made are implemented immediately and saved in the RS232 Mini Adapter.

3.6. SHORT LIST OF AT COMMANDS

Whenever a Bluetooth connection is set up between two pieces of equipment, one device is always the Master, and initiates the connection, and the other is the Slave. The new Bluetooth RS232 Mini Adapter can be operated in both Master and in Slave modes, i.e. the Bluetooth RS232 Mini Adapter is able to establish a connection with another Bluetooth device and does not have to wait passively for a request for a connection from an external piece of equipment.

The AT commands in the following table indicate whether they are suitable for use in Master or Slave mode or, in the case of general AT commands (e.g. when reading firmware version information), if both modes are applicable.

Command:	Meaning	Application examples
ATi1❶❷	Read and display firmware version of adapter	ATi1
ATi2❶❷	Display available AT commands	ATi2
AT+RALL❶❷	Read all settings	AT+RALL
AT+REST❶❷	Reset <i>Bluetooth</i> * Mini Adapter to standard settings	AT+RESET
AT+RLBN❶❷	Read and display <i>Bluetooth</i> *	AT+RLBN
AT+CLBN❶❷	Change <i>Bluetooth</i> * device name	AT+CLBN=New Name • Device name is changed to New Name
AT+RBTS❶❷	Read and display security level (authentication and encoding of data) of the RS232 Mini Adapter	AT+RBTS

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AT+UBTS ❶❷	Fix security level (authentication and encoding of data) of the RS232 Mini Adapter	AT+UBTS=1 - Security switched on AT+UBTS=0 - Security switched off
AT+RPIN ❶	Read and display PIN	AT+RPIN
AT+CPIN ❶	Change PIN	AT+CPIN=1234abcd PIN changed to 1234abcd
AT+RCOD ❶❷	Read and display device class	AT+RCOD
AT+CCOD ❶❷	Change device classes or display available device classes	AT+CCOD=? - Available device classes are displayed AT+CCOD=0a - Device class changed to 'Desktop workstation'
AT+RUST ❶❷	Read and display UART settings	AT+RUST
AT+UART ❶❷	Change UART settings or display available UART settings	AT+UART=? - Available UART settings are displayed AT+UART=601 - UART settings changed (Baud rate: 38400 / 1 Stop bit / Parity odd)
AT+RUSB ❶❷	Read and display 'special' baud rate settings	AT+RUSB Read value of calculated (AT+SUSB=?) baud rate
AT+SUSB ❶❷	Set 'special' baud rate	AT+SUSB=? - Display Help AT+SUSB=09d - Set 'special' baud rate to 38400 - AT+UART=b00 used for adopting settings - Baud rate set to (38400 / Sto pbit=1 / Parity = none)
AT+RSWH ❶❷	Read Handshake settings	AT+RSWH To determine whether automatic handshake recognition is deactivated or not
AT+FSWH ❶❷	Set Handshake settings	AT+FSWH=1 - Automatic handshake recognition deactivated – software handshake forced AT+FSWH=0 - Automatic handshake recognition activated
AT+RBDA ❶❷	Read and display local <i>Bluetooth</i> * address	AT+RBDA
AT+RRBT ❷	Read and display remote <i>Bluetooth</i> * address	AT+RRBT <i>Bluetooth</i>* address of coupled device is read and displayed
AT+SRBT ❷	Set remote <i>Bluetooth</i> * address	AT+SRBT=? - Display Help AT+SRBT=0050cd150292 - The address 0050cd150292 is set - RS232 Mini Adapter attempts to create a connection to this address when changing into Master mode
AT+RPMA ❷	Read and display PIN for “MASTER” mode	AT+RPMA PIN used in attempt to initiate coupling

AT+CPMA ②	Set PIN for "MASTER" mode	AT+CPMA=1234abcd PIN changed to 1234abcd
AT+RCMC ②	Read connection characteristics of "MASTER"	AT+RCMC Connection attempt initiated either automatically or by user by button push following interruption to connection
AT+SCMC ②	Set connection characteristics of "MASTER"	AT+SCMC=1 - Automatic reconnection attempt following interruption to connection AT+SCMC=0 - Connection attempt can be initiated by user by button push
AT+RPSC ①	Read and display Page Scan characteristics	AT+RPSC
AT+SPSC ①	Set Page Scan characteristics	AT+SPSC=? - Display Help AT+SPSC=1 - Lowest energy consumption/slowest response to connection attempts
AT+RISC ①	Read and display Inquiry Scan characteristics	AT+RISC
AT+SISC ①	Set Inquiry Scan characteristics	AT+SISC=? - Display Help AT+SISC=0 - Device does not respond to device search when in normal SLAVE mode operation
AT+RLPW ① ②	Read and display Sniff settings (energy saving mode)	AT+RLPW
AT+ULPW ① ②	Set Sniff settings (energy saving mode)	AT+ULPW=1 - Sniff switched on AT+ULPW=0 - Sniff switched off
AT+RSNI ① ②	Read and display idle time for Sniff attempt	AT+RSNI Time following which device enters into Sniff mode when no data is being transmitted
AT+SSNI ① ②	Set idle time for Sniff attempt	AT+SSNI=00 - No attempt is made to change between Sniff and active modes when energy saving mode is selected (AT+ULPW=1) AT+SSNI=0F - Device attempts to enter Sniff mode after 15 seconds idle time.
AT+RLED ① ②	Read and display LED settings	AT+RLED
AT+SLED ① ②	Set LED settings	AT+SLED=0 - LED2 (Status LED) is switched off AT+SLED=1 - LED2 (Status LED) is switched on

AT+RBAV❶❷	Read battery voltage	AT+RBAV
AT+RSEV❶	Read and display COM-HARDWARE service class	AT+RSEV
AT+SSEV❶	Set COM-HARDWARE service class	AT+SSEV=0 • Service class is SPP (Serial Port Profile) AT+SSEV=1 • Service class is DUN (Dial-up Networking)
AT+RCON❷	Determine whether AT command interpreter for Master mode is activated	AT+RCON
AT+MCON❷	Activate special functions – Chapter 5	AT+MCON=1 • Activate AT command interpreter on the RS232 interface AT+MCON=0 • Deactivate AT command interpreter on the RS232 interface

4. MASTER and SLAVE operating modes

4.1. GENERAL EXPLANATION

A Bluetooth connection between 2 or several devices always constitutes a Master-Slave connection. The Master device is always the one that initialises the connection, i.e. the one that begins the device search, locates Bluetooth equipment and initiates the Pairing procedure.

The standard setting is for the Bluetooth RS232 Mini Adapter to operate in Slave mode immediately after switch-on, which means that it awaits a request from the partner device to establish a connection.

There are many cases, however, in which it is necessary for the RS232 Mini Adapter itself to establish a connection, for instance, if the connection is interrupted for any reason. It is also generally more effective to initiate a connection from a central recording instrument to the partner devices, when the former is used to control the calibration of equipment or machines or for everyday data recording from such equipment.

The LinTech RS232 Mini Adapter can also be connected as a Master, which means that the Bluetooth RS232 Mini Adapter is able to initiate a connection.

4.2 SETTING UP A CONNECTION FROM THE ADAPTER AS MASTER TO A KNOWN PARTNER DEVICE

This implies connection to a partner device with which the Bluetooth RS232 Mini Adapter has already been connected:

The LinTech RS232 Mini Adapter has already been operational in slave mode with a Bluetooth partner device and you now require that the RS232 Mini Adapter itself establishes the connection to this equipment.

All that you need to do is to change the Bluetooth RS232 Mini Adapter from Slave to Master mode, since in this case the partner device is already known. **For more information, see section 4.4. Changing between Master and Slave modes**

4.3. SETTING UP A CONNECTION AS MASTER TO AN UNKNOWN PARTNER DEVICE

The Bluetooth RS232 Mini Adapter can be programmed so that in future, it sets up a connection to an unknown, user-selected Bluetooth partner device.

Conditions:

You must know the address of the Bluetooth partner device, with which you wish to establish the connection.

The partner device must support the Serial Port Profile according to *Bluetooth** Specifications 1.1.

In this case, you must first of all switch the Bluetooth RS232 Mini Adapter into configuration mode set up a connection with the configuration service from any Bluetooth partner device and perform the settings for the connection to the future Bluetooth partner device (see also sections 3.2 – 3.6).

Please note:

If the RS232 Mini Adapter is in Master mode, it will by default attempt to establish the connection using the PIN 1234.

If the future partner device requests a PIN for the connection, this can also be entered using the configuration programme.

4.4. CHANGING BETWEEN MASTER AND SLAVE MODES

Press the button at the rear of the Bluetooth RS232 Adapter to change easily between Master and Slave modes.

Press the button continuously for about 15 seconds. This is then followed by an LED sequence (red – green – orange) lasting about 2 seconds.

THEN:

The R232 Mini Adapter restarts and flashes red for approx. 3 seconds – the adapter is now in Master mode and it will attempt to create a connection to the partner device.

OR:

The R232 Mini Adapter restarts and flashes green for approx. 3 seconds – the adapter is now in slave mode and will accept any incoming connections.

4.5. NOTES REGARDING SETTING UP CONNECTION AS MASTER IN THE EVENT THAT THE PARTNER DEVICE DOES NOT REACT

When the RS232 Mini Adapter is configured as the Master, it will automatically attempt to create a connection to the configured or known partner device.

If this connection fails, there may be several reasons. If the partner device is not switched on, the RS232 Mini Adapter changes to 'Master idle' mode.

The LED2 then lights up orange.

A new attempt at creating the connection can be initiated by pressing the button.

Note: The LinTech RS232 Mini Adapter can be configured to perform continual attempts at connecting to the partner device. This setting is recommended when the RS232 Mini Adapter is required to re-establish a connection which has broken down due to excessive distance.

To do this, you can use either the LinTech R232 Mini Configtool or the respective AT command.

(AT+SCMC=1)

4.6. SETTING UP MASTER CONNECTION

To terminate an existing connection, press the button on the adapter briefly. To re-establish the connection, simply press the button again.

5. Special functions

5.1. Active device search and coupling with other Bluetooth equipment

The functionality of the Bluetooth RS232 Mini Adapter means that it can be used in variety of system environments and projects.

In the previous sections of this handbook, it was described how the adapter operates in standard mode as a Slave with all Bluetooth partner devices that support the Serial Port Profile and how the Bluetooth Adapter can be configured to automatically set up a connection to other Bluetooth equipment, in the so called Master mode.

The requirement in all cases for operating in Master mode was that the partner device is known.

However, now there is a special function available, with which the Bluetooth RS232 Mini Adapter can also perform an active device search for other Bluetooth devices and to set up a connection to these.

The advantage of this special function is that it is controlled by use of AT commands (in a manner similar to modem control). This means that, unlike other standard available Bluetooth adapters, the LinTech Bluetooth RS232 Mini Adapter can be operated using equipment/PCs that run with a different operating system to Windows.

For instance, the LinTech RS232 Mini Adapter is able to initiate a device search, perform a coupling procedure and connect to the device thus located.

All that you require on your PC or other equipment, to which the RS232 Mini Adapter is connected, is a terminal programme (e.g. Hyperterminal), with the aid of which you can control the device search and connection setup using AT commands.

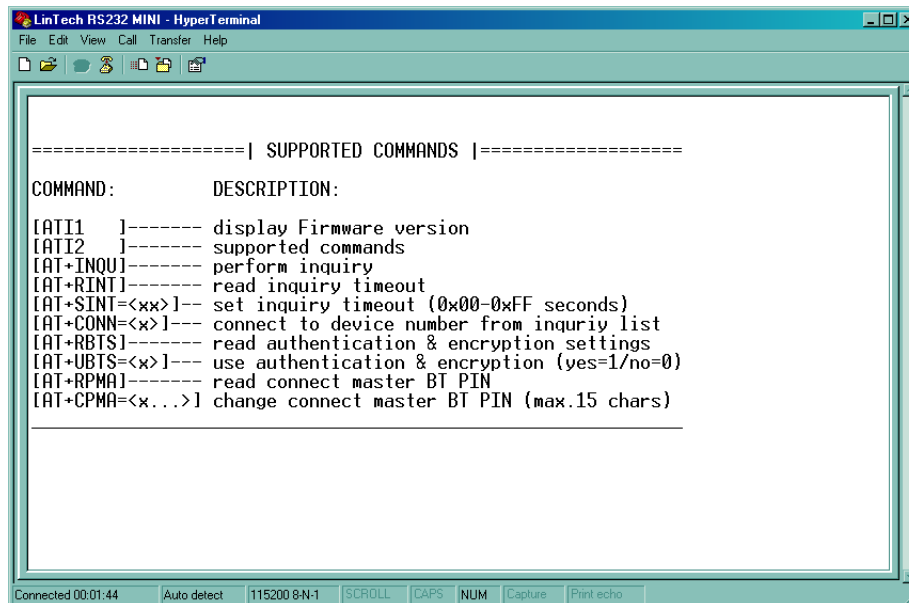
This special function must first be activated in slave and configuration modes using the AT command interpreter or the ConfigTool (AT+MCON=1)

To do this, the RS232 Mini Adapter must be in Master mode (see section 4.4: Changing between Master and Slave operating modes).

The RS232 Mini Adapter must be connected to the physical serial interface of a PC and the terminal programme must be opened via its COM-Port. The connection parameters (baud rate, stop bit, etc. ...) correspond to the settings in the RS232 Mini Adapter.

5.1.1 AVAILABLE COMMANDS

To display the available commands, enter **<ati2>** in the console of the terminal programme.



```
LinTech RS232 MINI - HyperTerminal
File Edit View Call Transfer Help

=====| SUPPORTED COMMANDS |=====

COMMAND:      DESCRIPTION:
[ATI1  ]----- display Firmware version
[ATI2  ]----- supported commands
[AT+INQU]----- perform inquiry
[AT+RINT]----- read inquiry timeout
[AT+SINT=<xx>]-- set inquiry timeout (0x00-0xFF seconds)
[AT+CONN=<x>]--- connect to device number from inquiry list
[AT+RBTS]----- read authentication & encryption settings
[AT+UBTS=<x>]--- use authentication & encryption (yes=1/no=0)
[AT+RPMA]----- read connect master BT PIN
[AT+CPMA=<x...>] change connect master BT PIN (max.15 chars)

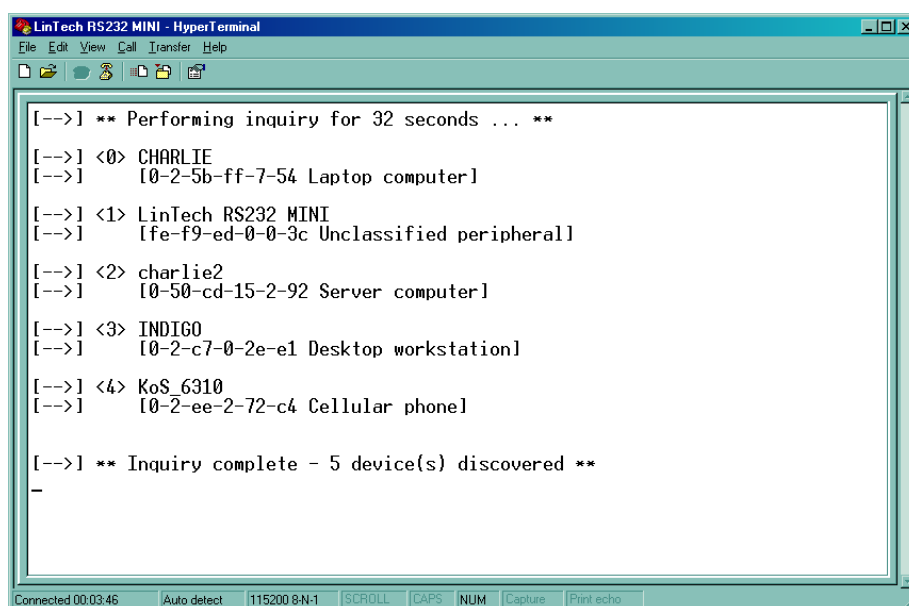
Connected 00:01:44  Auto detect  115200 8-N-1  [SCROLL] [CAPS] [NUM] [Capture] [Print echo]
```

Illustration 13 Special function – AT commands for setting up a BT connection

5.1.2. INITIATING DEVICE SEARCH

To initiate a device search, enter **<at+inqu>**. The length of the device search can be changed using the **<at+sint=xx>** command

Please wait until the device search has ended before entering any further commands.



```
LinTech RS232 MINI - HyperTerminal
File Edit View Call Transfer Help

[-->] ** Performing inquiry for 32 seconds ... **
[-->] <0> CHARLIE
[-->]      [0-2-5b-ff-7-54 Laptop computer]
[-->] <1> LinTech RS232 MINI
[-->]      [fe-f9-ed-0-0-3c Unclassified peripheral]
[-->] <2> charlie2
[-->]      [0-50-cd-15-2-92 Server computer]
[-->] <3> INDIGO
[-->]      [0-2-c7-0-2e-e1 Desktop workstation]
[-->] <4> KoS_6310
[-->]      [0-2-ee-2-72-c4 Cellular phone]

[-->] ** Inquiry complete - 5 device(s) discovered **
-

Connected 00:03:46  Auto detect  115200 8-N-1  [SCROLL] [CAPS] [NUM] [Capture] [Print echo]
```

Illustration 14 Special functions – initiating device search

5.1.3. SETTING UP A CONNECTION USING DEVICE LIST

Should the device with which you seek to establish a connection require a certain PIN, you can change this using the **<at+cpma=xx...>** command.

With the command **<at+conn=x>** you can establish a connection to a device contained in the list of found devices.

For example, if you enter **<at+conn=2>** and attempt will be made to connect to 'charlie2'.

5.4. SHORT LIST OF AT COMMANDS

Command	Meaning	Application examples
ATI1❶❷	Read and display firmware version of adapter	ATI1
ATI2❶❷	Display available AT commands	ATI2
AT+RBTS❶❷	Read and display security level (authentication and encoding of data) of the RS232 Mini Adapter	AT+RBTS
AT+UBTS❶❷	Fix security level (authentication and encoding of data) of the RS232 Mini Adapter	AT+UBTS=1 • Security switched on AT+UBTS=0 • Security switched off
AT+RPMA❶	Read and display PIN for Master operating mode	AT+RPMA • PIN used to initiate coupling attempt
AT+CPMA❶	Set PIN for Master operating mode	AT+CPMA=1234abcd • PIN changed to 1234abcd
AT+INQU❷	Initiate device search	AT+INQU • Device search initiated
AT+RINT❷	Read and display device detection period	AT+RINT
AT+SINT❷	Change device detection period	AT+SINT=0F • Device detection period set to 15 seconds
AT+CONN❷	Create connection to device in the device detection list	AT+CONN=2 • An attempt is made to create a connection to Device 2 from the list of device search results (AT+INQU)

5.2 BLUETOOTH CABLE REPLACEMENT USING TWO RS232 MINI ADAPTERS

If you have two RS232 Mini Adapters, you can use them together in place of a set of cables.

5.2.1. Requirements

Configure the adapters as described in chapter 4 - Configuration.

Please note that the PIN and the external devices must be of equal PIN. Also for the adapters, the PIN and external devices must be of equal PIN.

5.2.2 Coupling and creating connection

The adapters must be switched off and not connected to any equipment.

Press the button of the first adapter and plug the power connector into the socket on the adapter. LED2 will light up red to indicate that the adapter is now in coupling mode for cable replacement. Now release the button..

Perform the same procedure with the second adapter.

When LED2 has lit up red on both adapters, plug the adapters into each other.

If you have two adapters with one plug or socket you have to use a zero modem cable.

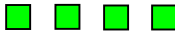
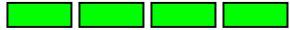
The IDs are now exchanged, which can take up to 30 seconds. When this procedure is complete, the slave will be reactivated, followed by the master. The master will now attempt to create an automatic connection to the slave.

Once the connection has been successfully made (LED alternates between red and green flashes), you can separate the adapters.

The connection parameters are stored and you can now use both adapters.

6. Meaning of LED2

6.1. SLAVE MODE

LED2 Sequence	Meaning
LED flashes green for approx. 3 seconds 	RS232 Mini Adapter begins Slave mode operation
LED flashes green slowly 	RS232 Mini Adapter is in normal operating mode – COM-HARDWARE service is active. Incoming connections are accepted.
LED flashes red slowly 	RS232 Mini Adapter is in Configuration mode – COM-CONFIG service is active. Incoming connections are accepted.
LED alternates rapidly between red and green 	A connection has been successfully established. Sniff mode is not active.
LED alternates slowly between red and green 	A connection exists. Sniff mode is active.
LED alternates for approx. 2 seconds between red, green and orange 	The RS232 Mini Adapter button has been pressed. Press briefly to change between Normal mode and Configuration mode. OR: Press continuously to change between Slave and Master mode.

6.2. MASTER MODE

LED2 Sequence	Meaning
LED flashes red for approx. 3 seconds 	RS232 Mini Adapter begins Master mode operation
LED flashes green slowly 	RS232 Mini Adapter is attempting to set up a connection to the partner device.
LED alternates rapidly between red and green 	A connection has been successfully established. Sniff mode is not active.
LED alternates slowly between red and green 	A connection exists. Sniff mode is active
LED lights up orange 	Connection attempt failed. Press button to repeat connection attempt. <i>Note: The device can be set in Configuration mode to automatically repeat connection attempt.</i>
LED alternates between red, green and orange, for approx. 2 seconds. 	Press continuously to change between Slave and Master mode.

6.3. SPECIAL FUNCTIONS

LED2 Sequence	Meaning
LED lights up red 	RS232 Mini Adapter is in coupling mode for cable replacement
LED lights up green 	RS232 Mini Adapter is now in firmware download mode

7. Firmware update

7.1. UPTODATE – SOFTWARE UPDATE TOOL FOR LINTECH BLUETOOTH DEVICES

To download the latest firmware version into the RS232 Mini Adapter, use the **UpToDate** – software update tool for LinTech Bluetooth devices, supplied with the product.

UpToDate supports the following operating systems:

MS Windows NT4.0

MS Windows 2000

MS Windows XP

Before using UpToDate to upgrade your firmware, please consult the operating instructions supplied with the programme.

UpToDate functions via the serial interface of the PC with which you wish to connect the Bluetooth RS232 Adapter for the firmware update.

Before using **UpToDate**, ensure that the Bluetooth adapter is in Download mode, otherwise a firmware update will not be possible.

To set the Bluetooth RS232 Mini Adapter in Download mode, please see the following.

7.2. SWITCHING THE BLUETOOTH ADAPTER INTO FIRMWARE DOWNLOAD MODE

The adapter must be switched off and must not be connected to any equipment.

Press and hold the button and plug the power supply into the adapter. Keep the button held down. LED 2 will now light up red – keep the button pressed down until the LED changes to green.

The RS232 Mini Adapter is now in firmware download mode.

For all further information, please consult the instruction to the UpToDate software update tool for the Lintech Bluetooth Adapter.

***As long as the Bluetooth RS232 Mini Adapter is in firmware download mode, LED2 is off.
Please note also that the Bluetooth RS232 Mini Adapter must be connected via the charger unit as long as the adapter is in this mode.***

8. Overview of technical data

Transmission frequencies	2.402 GHz to 2.480 GHz
Range	Up to 30 m
Bluetooth* Interface:	Supported <i>Bluetooth*</i> profiles: Generic Access Profile Serial Port Profile
Serial interface:	Transmission power: (class 2) max. 4dBm RS-232 DSUB-9 plug connector Baud rate: 1200 Bit/s - 230400 Bit/s
Battery:	Lithium-Ion rechargeable battery, 3.7V/540mAh Standby time up to 10,000 hours Operating time up to 30 hours (115.2 kBit/s) Charge time: < 2 h
LED1:	Status display for battery
LED2:	Status display for RS232 Mini Adapter
Casing:	ABS casing black, dimensions 80x40x18 mm Weight including antenna and battery: 62 grams
Operating temperature:	-20 - +60°C
Charging temperature:	0 – +45 °C
Storage temperature:	-20 - +45°C

9. Agency and Regulatory Body Approvals

Bluetooth product operating in 2.4GHz band for Home and use.

8.1. Exposure to Radio Frequency Radiation

The radiated output power of the BT RS232 Mini Adaptor 1408/1409 are far below the FCC, Industry Canada and European Union radio frequency exposure limits. Nevertheless, the wireless radio shall be used in such a manner that the potential for human contact during normal operation is minimized. The internal wireless radio operates within guidelines found in radio frequency safety standards and recommendations which reflect the consensus of the scientific community.

The level of emitted energy emitted is far less than the electromagnetic energy emitted by wireless devices such as mobile phones. However, the use of wireless radios may be restricted in some situations or environments, such as aboard airplanes. If you are unsure of restrictions, you are encouraged to ask for authorization before turning on the wireless radio.

The FCC, Industry Canada and European Union have set a general guideline of 20 cm (8 inches) separation between the device and the body. This device should be used more than 20 cm (8 inches) from the body when wireless devices are on.

8.2. FCC Part 15 Radio Frequency Interference Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on. The user is encouraged to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet that is on a circuit different from the receiver.
- Consult the dealer or an experienced radio/TV technician for help.

Caution:

Pursuant to Part 15.21 of the FCC Rules for intentional or unintentional radiators, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

8.3. Industry Canada ICES-003 Emission Compliance Statement

This Class B digital apparatus meets the requirement of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du règlement sur le matériel brouiller du Canada.

8.4. European Radio Approval Information

The BT RS232 Mini Adaptor 1408/1409 are low power, wireless communication devices, operating in the 2.4 GHz band, intended for home or office use. The power output of this device is well below the RF exposure limits as set by the European Commission through the R&TTE directive.

The BT RS232 Mini Adaptor 1408/1409 can be operated in the following European Union and European Economic Area countries:

Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

8.5. Europe – EU Declaration of Conformity

This device complies with the R&TTE Directive 1999/5/EC, and the following standards:

EN 301 489-1 EN 301 489-17	Electromagnetic compatibility and radio spectrum matters(EMR); Electromagnetic compatibility (EMC) standard for radio equipment and services.
ETS 300 328-1: ETS 300 328-2:	Electromagnetic compatibility and radio spectrum matters (EMR); Wideband transmission systems; Data transmission equipment operating in the 2.4 GHz ISM band and using spread spectrum modulation technique.

Low voltage Directive (Safety) 73/23/EEC as per:

EN 60950	Safety of information Technology Equipment
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8.6. Rest of World

Country restrictions apply for home and office use.