

BlueRS+E BlueRS+I

Bluetooth Serial Adapter

User manual

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1 Introduction

We are very pleased to see that you have bought a Stollmann product and would like to express our appreciation.

This documentation is valid for the following models of the BlueRS+E/I product family

- **BlueRS+E** Serial port adapter in a housing with internal antenna
- **BlueRS+I** Serial port adapter module to plug into other hardware with local antenna
- Software version V1.011 or later

1.1 Product description

The BlueRS+E/I is a Bluetooth adapter with the following functions.

- The BlueRS+E/I connect devices with a **serial port** to any Bluetooth link. It gives access to other devices situated in the same Bluetooth area (piconet).
- Data can be transmitted with the rates from 2400 up to 230400 baud.
- The connected serial device can drive the BlueRS+E/I by using
 - asynchronous AT commands
 - automatic connection setup
 - accept incoming Bluetooth links.
- The configuration of the BlueRS+E/I can be performed via the serial interface (local) or via the Bluetooth link (remote).

The following profiles are supported:

- One serial profile for transparent data communication through the Bluetooth link.
- A second serial profile for management access from another Bluetooth device using a Bluetooth link.

1.2 Safety

The BlueRS+E/I is conform to the European safety requirements IEC 60 950. Please use only the delivered power supply or an original replacement from Stollmann.

The homologation for the Bluetooth compatibility tests according the Bluetooth standard V1.1 has been started.

2 Installation

2.1 Contents

This packet contains the following items:

- Bluetooth serial adapter BlueRS+E or BlueRS+I
- Mains plug power supply adapter for BlueRS+E
- This user manual

2.2 Installation procedure

BlueRS+E:

To start using the BlueRS+E, please follow these steps:

- Plug the BlueRS+E to the serial port (COM-port) of serial terminal equipment.
- Connect the power supply to the BlueRS+E.
- The green LED on the BlueRS+E will come on to indicate that the device has been powered up. After some seconds the green LED will start blinking to indicate power saving mode.
- Optionally: Configure the BlueRS+E Bluetooth interface if needed. Configuration is required especially if you want to automatically connect to another Bluetooth device (set up the remote Bluetooth address).

The BlueRS+E is now ready for use with Bluetooth links, please refer to the next chapter for the configuration to use the terminal equipment together with the BlueRS+E.

BlueRS+I:

To use the BlueRS+I you need a mainboard with a fitting connector to plug in the BlueRS+I. Please refer to the technical details how to build such a connector.

The following chapters about using and configuring the BlueRS+E and BlueRS+I are identical for both products.

3 Using the BlueRS+E and BlueRS+I

Before using the BlueRS+E/I the address of another Bluetooth device has to be selected - if not predefined by factory – that shall be the communication partner in the Bluetooth link.

The compatible devices can be scanned using the configuration command "bdinq". From that list one Bluetooth device has to be selected.

If you are using an automatic connecting mode the Bluetooth address has to be entered and stored using the configuration command "brad" (see BlueRS+E/I Configurator activation on page 24).

In addition to the selected Bluetooth address a PIN may be setup, if a restricted mode connection has to be setup (command "bpin" and "brestr"). This PIN has to be identical to the PIN used in the remote Bluetooth device

You can select different operation modes for the BlueRS+E/I. These operating modes are used to control Bluetooth links and to configure the BlueRS+E/I.

Supported operating modes for Bluetooth link control:

- Automatic connecting after Power up.
- Automatic connecting controlled by control line DTR.
- Automatic accepting of incoming connections.
- Connection control using the asynchronous mode for devices that need the AT command set.

You can configure the BlueRS+E/I in the following ways:

- By using BlueRS+E/I Configuration commands entered by the locally connected PC.
- By using the AT command set entered by the locally connected PC.
- By using BlueRS+E/I Configuration commands entered via the Bluetooth link (remote configuration).

3.1 Automatic connection establishment

Automatic connection establishment is available in the following modes:

- An automatic connection will be initiated when control line DTR is on.
- An automatic connection will be initiated independent of any status line – automatically after power up and initialization.
- No connection establishment initiated by this module. Bluetooth connection requests from other Bluetooth devices will be automatically accepted (if compatible).

To enable automatic call you have to set BlueRS+E/I Configuration parameter "*cmds*" to 6, 8 or 12 (see below).

An established connection will be indicated by a status line (default: DCD). See also configuration commands "*cdcd*" and "*cdtr*".

If a connection cannot be established successfully an automatic retry will be started. The duration of trying to establish the connection and the pause for next retry can be configured.

The Bluetooth device to be accessed is taken from the parameter "*brad*", it has to be set up to the Bluetooth device address of the remote Bluetooth device. Additionally the server channel has to be set up if not fitting to the default (1), see parameter *brsch*.

<i>cmds</i> 6	Automatic connection establishment when DTR is ON.
<i>cmds</i> 8	Automatic connection establishment independent of any status line.
<i>cmds</i> 12	No connection establishment initiated by this module.
<i>cato</i> <i>n</i>	call abort of a not successful call after <i>n</i> seconds. <i>n</i> = {3..255}, default: 15 seconds.
<i>capa</i> <i>n</i>	call pause for <i>n</i> seconds before next call attempt. <i>n</i> = 0: no call retry. <i>n</i> = {0..255}, default: 3 seconds.

Hint: The configuration command "*idle*" can be used, to automatically disconnect after a predefined time without data transmission.

3.2 AT command set for BlueRS+E/I

All parameter can be changed by using an extended AT command set described in this chapter.

Please check if the factory setting will fit with your environment. The factory setting is described (highlighted) in the parameter list below.

If you want another configuration as set in the factory default setting, please do the following steps:

- Plug the BlueRS+E to the COM-Port of a PC.
- Connect the power supply to the mains socket.
- Start a terminal emulation on your PC; please verify that the baudrate setting of the terminal emulation fits those of the BlueRS+E.
- Set up the parameter of the BlueRS+E from the terminal emulation and save the parameter using the AT command set.

Example:

To change the access mode to restricted please enter the following commands:

ATBRESTR=1**<↵> (set restricted mode to ON)

AT&W<↵> (store the new configuration)

- Leave your terminal emulation and start your application program.

With the exception of the command **A/** (Repeat command) all commands begin with the prefix **AT** and are terminated with <↵>. Corrections in a command line are done with <BACKSPACE>. A command line has a maximum of 80 characters. The command line is automatically cancelled by longer input. Blanks are ignored; capital/small letters are not significant.

The parameter settings of the BlueRS+E obtained when using the AT commands can be permanently stored (AT&W) and are not lost by resetting or by leaving the AT command mode.

To enter the AT command mode during an active data connection you must use the following sequence ("Escape sequence"):

At least 1 sec pause <+><+><+> 1 sec pause.

The time gap between all three plus signs may not exceed 1 sec.

The escape sequence is transmitted transparent to the remote device.

Supported commands:

A/ Repeat last command line

This command repeats the commands of the last entered command line.

Note: No prefix **AT** is required.

A/

A Accept incoming call

Using this command you can accept an incoming call, if automatic call acceptance is not set (Register S0 = 0). An incoming call is always displayed by the message "RING" or the code "2", also if automatic call acceptance is selected.

Must be the last command in an AT command line.

CONF Enter BlueRS+E/I Configurator

Enters directly into the BlueRS+E/I Configurator, the configuration prompt "#" will be displayed. Leave the BlueRS+E/I Configurator with the command "quit" (or "exit" or "go").

ATCONF

&C DCD control

This command selects the behavior of the DCD control line from the BlueRS+E/I.

AT&C	BlueRS+E/I control line DCD is always ON
AT&C1	DCD ON indicates Bluetooth connection is established (default)
AT&C2	DCD line follows DTR
AT&C4	DCD follows remote DCD

D Initiate Bluetooth link

This command addresses a Bluetooth device directly through its address or name.

If a connection to a Bluetooth device requiring the restricted mode the pin has to be set up using command AT**BPIN.

ATD <brad>|dx

brad: called Bluetooth remote device address (12 digits)

dx: references called Bluetooth remote device service number in bdlst (d1..d9).

This command must be the last command in an AT command line.
Any character input while the RS+ is dialing will cancel the dialing procedure.

Examples:

ATD 0080371443AB	Connect to Bluetooth device 0080371443AB
ATD d1	Connect to 1 st Bluetooth device in <i>bdlist</i> (server channel number defined in <i>brsch</i>)

Note:

The remote Bluetooth device has to be determined before issuing this link request. This can be done in the following ways:

- Get it manually by reading from the sticker of the remote Bluetooth device.
- Inquire the address and service by using the commands AT**BDINQ and AT**BDLIST.
- Give the BlueRS+E/I about 10 seconds after reset to initialize before issuing the first command.

&D DTR control

This command selects the behavior of the BlueRS+E/I, when the DTE control line DTR changes from ON to OFF.

AT&D	DTE control line DTR setting is ignored
AT&D2	DTE control line DTR is evaluated: dropping the DTR line by the DTE will disconnect an existing Bluetooth link. An incoming call will be accepted only with DTR active.
AT&D4	DTE control line DTR is partly evaluated: <ul style="list-style-type: none"> - dropping the DTR line by the DTE will disconnect an existing Bluetooth link (default). - An incoming call will be accepted independent of DTR status.

E Local echo

This command selects the local echo in command mode.

ATE	No local echo
ATE1	Local echo on in command phase (default)

&F Load factory defaults

Factory default will be loaded. (For storing in non volatile memory please use the command AT&W).

AT&F	setup all parameter concerning data port.
------	---

Q Suppress results

With this command result codes or messages can be suppressed.

ATQ Returns status - codes after command input (default)
ATQ1 No result codes are returned

&R CTS control

This command selects the behavior of the CTS control line from the BlueRS+E/I.

AT&R BlueRS+E/I control line CTS is following all changes of RTS
AT&R1 CTS is always ON (default)

S Display and set internal S register

ATSnn? Show actual values (decimal) of selected register *nn*
ATSnn=xxx Set selected register *nn* to the decimal value *xxx*.
 See S register definitions on page 20.

&S DSR control

This command selects the behavior of the DSR control line from the BlueRS+E/I.

AT&S BlueRS+E/I control line DSR is always ON (default)
AT&S1 DSR ON indicates Bluetooth link is established

V Result format

ATV Result is presented as numbers (followed by <↵>)
ATV1 Result is presented as text (default)

&V Display configuration

AT&V Displays the actual configuration of AT command setting
AT&V1 Displays the actual configuration of extended AT command setting

W Extended result codes

ATW Result is presented without extended result codes.

ATW1 Result is presented with extended result codes, Result messages include error causes.

&W Store active configuration

The active configuration will be stored in non volatile memory.
AT&W

Z Load stored settings

The active configuration will be reset to the stored configuration.
Must be the last command in an AT command line.
ATZ

****DBITS** Number of data bits x asynchronous chars (7,8)

under development

Number of data bits x for asynchronous character (7, default: 8).
AT**DBITS=x

****PRTY** Set parity of asynchronous characters

under development

This command selects the parity for asynchronous characters.

0: no parity; **1**: even parity; **2**: odd parity

ATPRTY=0**No parity (default)

ATPRTY=1** Odd parity

ATPRTY=2** Even parity

3.2.1 Bluetooth specific AT commands

Setting up special Bluetooth parameter:

****BACCTAB** Show pairing information

To show the pairing information (setup due to a successful restricted connection) within the BlueRS+E/I you have to issue the command "AT**BACCTAB".

Example: at**bacctab

Response: 1: used: YES BD: 00803714ECA4 name:
 OK

****BDEL** Delete pairing information

To delete the pairing information (setup due to a successful restricted connection) within the BlueRS+E/I you have to issue the command "AT**BDEL 1". The paired Bluetooth device can be read out by the command "AT**BACCTAB".

Example: at**bdel 1

Response: OK

****BDINQ** Inquire Bluetooth devices

With this request the automatic scan of all discoverable Bluetooth devices will be initiated.

As a result the creation of the list *bdlist* will be initiated. The list can be read out using the command at**bdlist. If the Inquiry-scan has not been terminated while issuing the command at**bdlist, the BlueRS+E/I will return "inquiry active".

The entries contain the Bluetooth device address, the Bluetooth device names and available services (profiles).

The creation of this list may take up to 20 seconds due to the reaction time of the accessible Bluetooth devices; a maximum of 9 Bluetooth devices can be listed.

When issuing the command "at**bdinq 1" the inquiry scan will only request the Bluetooth addresses, name and service inquiry will not be performed. The maximum waiting time for responses of the Bluetooth devices is limited by a time defined with the command "at**binqtim".

Example: at**bdinq request Bluetooth devices with name and service.

Response: OK

at**bdinq 1 request Bluetooth device addresses only

Response: OK

****BDLIST** Show inquired Bluetooth devices

With this request the list of found Bluetooth devices will be returned, the entries show the Bluetooth device address and the Bluetooth device name requested by the command *at**bdinq*. For every Bluetooth device in addition the available services (profiles) will be shown.

These entries can be accessed by the selector *d1...dn* to address the Bluetooth device and the selectors *s1...sn* to address the Bluetooth devices service channel.

Example: *at**bdlist*

Responses: *d1*: <bradr1>, <bname1>
 s1: <service1>, <server channel>, <bsname1>
 s2: <service2>, <server channel>, <bsname2>
 d2: <badr2>, <bname2>
 s1: <service1>, <server channel>, <bsname3>
 OK

or

inquire active ; if the search initiated by *at**bdinq*
 OK ; is still active

or

list empty ; no Bluetooth device found
 OK

brad found Bluetooth remote device address (12 digits)
bname found Bluetooth remote device name
service coding of service type
server channel used channel number for service type

****BINQTIM** Timeout for Inquiry Scan

With this command the Inquiry Scan time will be limited to the configured value (default: 8 = 10 seconds). See also command *at**bdinq*.

Example: *at**binqtim=n* set maximum wait time to *n* * 1.25 seconds
 *at**binqtim=2* set maximum wait time to 2.5 seconds

****BNAME** BlueRS+E/I own device name

This command defines the device name. *bname* is shown on a remote Bluetooth terminal device during a Service Discovery sequence It is a string

constant according to V.250.

Example: at**bname show own device name
 at**bname=<rs+name> set own device name to *rs+name*

****BPSM** Set scanning capability

This parameter controls the scanning capabilities and the reaction to paging and/or inquiry requests.

If set to 0 all paging/inquiry requests from other Bluetooth devices will be ignored, the RF receive part of the BlueRS+I is disabled.

Combined with parameter *pwd* an effective power consumption handling can be achieved.

Possible values are:

- 0 : Page scan and Inquiry scan are disabled (the BlueRS+I is not connectable and not discoverable)
- 1 : Inquiry scan is enabled (the BlueRS+I is discoverable, but not connectable)
- 2 : Page scan is enabled (the BlueRS+I is connectable, but not discoverable)
- 3 : Page scan and Inquiry scan are enabled (the BlueRS+I is connectable and discoverable, default)

Example: at**bpsm=2 Enable Page scan, but do not answer on inquiry requests.

****BPSRM** Set the Page Scan Repetition Mode

This parameter allows the modification of the Page Scan Repetition Mode of the BlueRS+E/I.

Possible values according to the Bluetooth Baseband Specification are:

- 0 : R0 - continuous scan
- 1 : R1 - 1,28 sec's interval 11,25 ms window (default)
- 2 : R2 - 2,56 sec's interval 11,25 ms window

Continuous scan decreases the connect time down to about 200 ms:

- R0: about 200 ms
- R1: about 2,2 sec
- R2: about 3,5 sec

The BPSRM should be set to the same value for the scanning and the paging device.

Example: `at**bpsrm=0` Set Page Scan Repetition Mode to R0 – continuous.

Note: Setting the page scan repetition mode to continuous scan increases the power consumption significant (additional current of about 45 mA).

****BRAD** Bluetooth Device Remote Address

With this command you can setup the Bluetooth address of the other Bluetooth device, that should be connected using an automatic link setup.

Example:

`AT**BRAD=0080371443AB`

****BRNAME** Displays connected device name

This command displays the device name of the connected Bluetooth device. This value is can not be changed.

Example: `at**brname` show connected device name

****BRSCH** Set remote Bluetooth server channel

Set up server channel of the remote Bluetooth module, to which the Bluetooth link shall be established.

The own server channel number is fixed to 1, only used for accepting Bluetooth links.

Remote management between BlueRS+E/I is achieved using the server channel 30.

default: **1**

Example: `at**brsch=1`

****BSNAME** BlueRS+E/I service name

Defines the service name of the BlueRS+E/I. "*bsname*" is shown on a remote Bluetooth terminal device during a Service Discovery sequence.

Example: `at**bsname`

`at**bsname=<rs+srvname>`

set own device name to *rs+srvname*
default: "BlueRS+E/I serial port"

Note:

To activate a new name for discoveries you have to make a power off/on cycle.

****BRESTR** Set restricted mode

Control the restricted mode for exchanging the Pin (Passkey). When set to 1 the setting of parameter bpin will be used to verify a pin with the requesting Bluetooth device.

The pins of two bluetooth devices have to set to the same value, if one of these devices allows only restricted connections. If a restricted connection has been established one time between two Bluetooth devices these devices know each other and are called as "paired" (see command "AT**BACCTAB" for information about the paired Bluetooth device).

After a pairing has taken place Bluetooth links can be established between these paired devices independent of the setting of the restricted mode!

To delete the pairing information within the BlueRS+E/I you have to issue the command "AT**BDEL 1" .

****BPIN** Bluetooth device Pin (Passkey)

Set the Pin for establishing a connection in the restricted mode by the command "AT**BPIN=<old_pin>,<newpin>".

This Pin is always checked if

- the BlueRS+E/I is set to restricted mode
- the BlueRS+E/I is not set to restricted mode and the other Bluetooth device is set to restricted mode.

The Pin has a fixed length of 4 digits, factory default: **0000**.

To reset the Pin to factory default please use the command AT&F1 (all parameter will be set to factory default).

Example: at**bpin=0000,1234 set Pin to 1234 (old Pin was 0000)

Note: After a pairing has taken place (Pin successful exchanged) Bluetooth links can be established between these paired devices independent of the setting of the restricted mode and the Pin!

****BOAD** Bluetooth Device Own Address

With this command you can read out the own Bluetooth device address. This value is can not be changed.

- S7** Wait time for Carrier (sec) (default = 30 sec)
S9 Enable PNP functionality for Windows95 (default=1, enabled)
S91 **0**: default
1: all unknown AT commands will be answered with OK.
2: Windows 2000 compatibility: some AT commands will be answered with OK, unknown AT commands will be answered with OK.

3.2.3 AT result codes

Result codes (numerical and verbose):

Code	Text	Meaning
0	OK	Command completed
1	CONNECT <radr>	Connection established
2	RING <radr>	Indicates an incoming call (Link request received)
3	NO CARRIER <berr>	No synchronization (<i>berr</i> = BT error cause)
4	ERROR	Illegal command or error that can not be indicated otherwise
6	NO DIALTONE <berr>	No access to Bluetooth? network (<i>berr</i> = BT error)
7	BUSY <berr>	Number engaged (<i>berr</i> = BT error cause)
8	NO ANSWER <berr>	No connection; addressed Bluetooth device can not be reached (<i>berr</i> = BT error cause)

Error cause display:

< *berr* > = Bluetooth release (error) cause, hexadecimal

Example: NO CARRIER <0104>

In AT command mode, error cause display (does not belong to the AT command standard) can be turned on by issuing the command ATW1 (default). The shown error causes use the coding defined by the Bluetooth definition (see page 33).

3.3 Table for coding Bluetooth services

List of Bluetooth services (profiles):

Code	Text	Meaning
1101	SerialPort	Serial port, serial data link without any restriction
1102	LANAccessUsingPPP	Lan Access with PPP protocol
1103	DialupNetworking	Dial Up Networking to establish switched connections to the ISDN or PSTN
1104	IrMCSync	
1105	OBEXObjectPush	OBEX Object Push
1106	OBEXFileTransfer	OBEX Filetransfer
1107	IrMCSyncCommand	
1108	<i>Headset</i>	<i>Headset access via Bluetooth</i>
1109	Cordless Telephony	
1100	Intercom	
1111	Fax	Fax
1112	<i>HeadsetAudioGateway</i>	<i>Headset Gateway for audio signals</i>
1113	WAP	
1114	WAP_CLIENT	

3.4 Power down modes

This chapter is valid for the BlueRS+I only.

To reduce power consumption of the BlueRS+I power down modes can be activated automatically by the BlueRS+I (controlled by parameter settings).

If no Bluetooth connection is established, the following states are implemented; the activation of these states can be controlled by the parameter *bpsm* and *pwd*.

3.4.1 Deep Sleep state

The Bluetooth RF is completely deactivated; no paging requests from other Bluetooth devices will be recognized. Only rising control line DTR will activate the BlueRS+I and may initiate a Bluetooth link dependent on other parameters.

Example:

```

cmds=8      establish BT-Link after rising DTR
pwd=1       enable power down mode
bpsm=0      disable paging modes in power down

```

Note: In Deep Sleep state the AT command set is not active, CTS line is low.

3.4.2 Power down state

The Bluetooth RF is activated every 1.25 seconds, paging requests from other Bluetooth devices will be recognized after that intervals and accepted if allowed. Additionally rising control line DTR will activate the BlueRS+I and may initiate a Bluetooth link dependent on other parameters.

Example1:

cmds=8	establish BT-Link after rising DTR
cdtr=2	DTR controlled BT-Link
pwd=1	enable power down mode
bpsm=2	enable paging mode in power down

Example2:

cmds=12	accept BT-Link
cdtr=4	accept BT-Link independent of DTR status
pwd=1	enable power down mode
bpsm=2	enable paging mode in power down (inquiry will not be answered)

Note: In Power down state the AT command set is not active, CTS line is low.

3.4.3 Idle state

No power down mode activated.

All functionality is available immediately including connection control using AT command set.

Example:

cmds=0	establish BT-Link using AT command or accept incoming BT-Links
cdtr=4	accept BT-Link independent of DTR status
pwd=0	disable power down mode
bpsm=3	enable paging and inquiry modes

3.5 Power consumption

The following values are approximate power consumption values in the different states for the BlueRS+E and BlueRS+I:

Power Current Consumption

Condition	BlueRS+E	BlueRS+I
Deep sleep	n. a.	~ 0.7 mA
Power down average	n. a.	~ 2.5 mA
Idle, all functions available, no Bluetooth link	~ 45 mA	~ 22 mA
Bluetooth connected, no data traffic, (Master / Slave)	~ 47 / 58 mA	~ 24 / 35 mA
Bluetooth connected, data traffic 115 kbit/s	~ 70 mA	~ 46 mA

Please note, that power consumption is additionally dependent on the interfacing of the serial interface and status lines (output load).

4 BlueRS+E/I Configurator command set

The settings of the BlueRS+E/I for the serial interface and the Bluetooth interface are called configuration. The BlueRS+E/I is delivered with a set of pre-set values. In the following section it will be shown how, by using the configuration commands, you can examine the configuration of the BlueRS+E/I and if necessary change it. The values can be stored in non volatile memory; this means they'll remain unchanged even if the power supply is disconnected.

You can configure the BlueRS+E/I in the following ways:

- By using BlueRS+E/I Configurator commands entered by a locally connected PC.
- By using the AT command set entered by a locally connected PC.
- By using BlueRS+E/I Configurator commands entered via the Bluetooth link (remote configuration).

The BlueRS+E/I Configurator can be entered in the following ways:

- By using a special command from the asynchronous dialup command interface (AT: "ATCONF").
- Remote via a Bluetooth connection from another Bluetooth device.
- By the escape sequence in power up phase if enabled (rsttim>10, rstmsg=1).

4.1 Configuring the BlueRS+E after power on

- Connect the PC's com-port to the DTE interface of the BlueRS+E.
- Start a terminal emulation program (i.e. Hyper-Terminal) with the following settings: 9600 Baud, 8 databits, No Parity (**8N1**)
- Connect the BlueRS+E to the mains by the mains plug adaptor
- Wait until LED 2 starts blinking (after about 5 sec, see config cmd "rsttim") and the message to enter the config-sequence is displayed:
"+++ Press <CR>,<CR>,<ESC>,<ESC> to enter BlueRS+Configurator
+++"
- Type in quickly within 2 seconds after the message appears: <RET> <RET> <ESC> <ESC>, to call up the BlueRS+Configurator.
- The BlueRS+Configurator acknowledges by giving a welcome string and a "#" as the prompt character. Now you can work with the BlueRS+Configurator by using the configuration commands (see page 26).
- Setup the parameter for the BlueRS+E from your terminal program and store them.

Example:

To **set** the baudrate to 9600 baud, please enter the following commands:

```
br=4<↵>    (set baudrate to 9600 baud)
save<↵>    (store the new configuration)
```

quit<↵> (leave the BlueRS+Configurator and activate the new value settings)

Hint: The active set of parameters can be displayed on screen by the BlueRS+Configurator with the command "**show**<↵>".

- Leave the terminal program and start your application.

Now you can use the BlueRS+E with the new set of parameters by running the needed PC program.

4.2 Configuring the BlueRS+E/I with AT commands

To execute one BlueRS+Configuration command *cmd* out of the AT command mode you have to issue the command: "at***cmd*".

To call up the BlueRS+Configurator please use the command "atconf".

You can leave the BlueRS+Configurator by the command "quit" (or „exit“ or „go“).

4.3 Remote Configuration using the BlueRS+Configurator commands

The BlueRS+E/I to be configured is referred here as "*remote* BlueRS+E/I".

The BlueRS+E/I to configure is referred as "*local* BlueRS+E/I".

Please make sure that the *remote* BlueRS+E/I to be configured at the other end is powered up.

- Connect the PC's com-port to the DTE interface of the *local* BlueRS+E/I.
- Connect the power supply to the mains socket.
- Start a terminal emulation program (i.e. HyperTerminal)
- Configure the *local* BlueRS+E/I with the special service channel 30 (brsch=30).
- Set up a Bluetooth-Link to the *remote* BlueRS+E/I to be configured by using the command: ATD<*brad*><↵>.

The called BlueRS+Configurator acknowledges by requesting the remote password. Please enter the correct password (default: no password, just return). Now you can work with the BlueRS+Configurator by using the BlueRS+Configurator commands (see page 24).

- Configure the parameter for the *remote* BlueRS+E/I from your terminal program and store them (if wanted). (See page 26).

Hint: The active set of parameters can be displayed on screen by the BlueRS+Configurator with the command "**show**<↵>".

If necessary the *remote* BlueRS+E/I can be reset using the command

"reset<↵>".

- Hang up the Bluetooth connection by leaving the BlueRS+Configurator using the command **quit**.
Leave your terminal program. After the next reset the changes will be active.
- Restore the server channel to the desired value, default to 1 (brsch=1).

Now the configured *remote* BlueRS+E/I with the new set of parameters can be used by running the needed PC program.

4.4 List of BlueRS+Configurator commands

The BlueRS+Configurator commands typed in must have the correct syntax and be complete, including all blanks. Capital/small letter use is not important. The entry is not case sensitive.

The bolded values are factory defaults. The usage is:

[?]<command>[=parameter]

Example to **set** the baudrate to 9600 baud:

br=4

Example to **show** the selected baudrate:

br

Example to **show all** selectable baudrates:

?br

To get an overview about the commands of your BlueRS+E/I some major commands here as a preview:

show	show the usually used parameter
showall	show all changeable parameter
quit	leave BlueRS+Configurator
help	show all available commands
defa 1	setup factory default parameter set
save	store parameter non volatile

at.sx

AT command parameter set

AT command set only:

Handle AT specific settings.

Show and change AT S registers by entering the new value.

at.s0 show setting of S0-Register

at.s0=1 set Register S0 to 1

boad Bluetooth Device Own Address

With this command you can read out the own Bluetooth device address.
(read only)

Example:
boad

bpin Bluetooth device Pin (Passkey)

Set the Pin for setting up a connection in restricted mode.

br **baudrate asynchronous**

Selection of the asynchronous baudrate for the DTE interface

2: 2400 bit/s

3: 4800 bit/s

4: 9600 bit/s

5: 19200 bit/s

6: 38400 bit/s

7: 57600 bit/s

8: 115200 bit/s (default)

9: 230400 bit/s

brad Bluetooth Device Remote Address

With this command you can setup the Bluetooth address of the other Bluetooth device, that should be connected using an automatic link setup.

Example:
brad=0080371443AB

brestr Set restricted mode

Enable and disable the restricted mode with exchanging the Pin (Passkey).

cato **call timeout to abort**

Time to abort a call if not successful connected after *n* seconds.

Incoming calls will be accepted independent of DTR status;
DTR drop disconnects an active connection.

cmds	command set	(note 1)
-------------	--------------------	-----------------

Command set for connection control

- 0:** AT command set (default)
- 6:** Automatic connection establishment when DTR is ON.
- 8:** Automatic connection establishment independent of any status line.
- 12:** No connection establishment initiated by this module.

Note: For details see the appropriate chapters.

cri	RI control
------------	-------------------

RI control

- 0** : RI is set with an incoming Bluetooth link request (default)
 - 1** : RI follows remote RI line status
-

defa	default settings
-------------	-------------------------

Sets up factory default parameter setting.

- defa 0: setup all parameter concerning data port
 - defa 1: setup all parameter to factory defaults including Bluetooth parameter.
-

dbits	asynchronous databits
--------------	------------------------------

Number of data bits asynchronous chars (default: 8) 7,8

Note: To use other data formats than 10 bit (8N1, 7E1, 7O1) you have to set br to fixed speed.

flc	flowcontrol
------------	--------------------

Flowcontrol to DTE

- 0** : No flowcontrol
- 3** : Hardware flowcontrol RTS/CTS (default)

flash **load new firmware**

This commands loads new firmware into the BlueRS+E/I. The actual firmware will be overwritten.

The firmware will be stored into the used part of the flash memory. While uploading the following checks will be performed:

- File transfer protocol is XMODEM1K
- An overall firmware checksum is used.
- The firmware type written in the module header of the firmware must be compatible to the hardware- and allowed firmware type (stored inside the Bootloader).

This command is available only via the local serial port.

idle **Idle data timeout**

Timer to disconnect the Bluetooth link after inactivity on the serial line (sec).

0: inactive (default)

1..n: delay time to disconnect in seconds (1..255).

load **Load stored parameter setting**

All parameters stored in non volatile ram will be loaded.

prty **asynchronous parity**

under development

Parity of asynchronous character (default: no parity)

0 : No parity; **1** : Odd parity; **2** : Even parity

quit, exit, go **activate parameter changes**

Activates the actual parameter settings and leave the BlueRS+Configurator (without storing the parameter in non volatile memory).

reset **reset BlueRS+E/I**

Resets the whole functionality of the BlueRS+E/I by a forced hardware reset (like Power off / on).

Refer also to parameter rsttim.

<cmd>? **more information for one command**

Displays the allowed values for one selected command *<cmd>*

?? **help**

Displays help texts for all commands

Notes:

5 Diagnostic and error messages

5.1 Error messages from AT command set

When the extended result messages are selected using the command ATW1 Bluetooth error codes are displayed in addition to the standard AT result messages. Bluetooth error codes are always coded as <xxxx>. The meaning can be taken from the following tables Bluetooth error codes (see page 33).

5.2 Bluetooth error codes

Note: error codes marked with (i) are internal errors.

Error cause hexadecimal	Meaning	Translation to AT result codes
0x0000	no error, no explanation	3
0x0001	driver and application version mismatch	3
0x0002	application id provided is not correct	3
0x0003	unknown message code in message	3
0x0004	not enough resources to complete request (out of descriptor etc)	3
0x0005	at least one parameter of the message is wrong	3
0x0006	no adapter plugged in	3
0x0007	too much outstanding messages in downstream direction	6
0x0008	driver is busy, repeat request later	6
0x0009	Error in message transport system (driver not correct installed?)	3
0x0101	(i) HCI_ERR_UNKNOWN_COMMAND	3
0x0102	(i) HCI_ERR_NOCONNECTION	3
0x0103	Bluetooth adapter crashed	3
0x0104/260	Remote Bluetooth device not found (wrong address?, out of range?)	8
0x0105	Authentication error (wrong pin code supplied?)	3
0x0106	(i) HCI_ERR_KEY_MISSING	3
0x0107	(i) HCI_ERR_MEMORY_FULL	3
0x0108/264	lost connection to remote Bluetooth device (out of range)	3
0x0109	max no of connections exceeded	6
0x010a	max no of voice connections exceeded	6
0x010b	(i) HCI_ERR_ACL_CONN_ALREADY_EXISTS	3

0x010c	(i) HCI_ERR_COMMAND_DISALLOWED	3
0x010d	connection attempt by remote side rejected	3
0x010e	connection attempt by remote side rejected	3
0x010f	connection attempt by remote side rejected	3
0x0110	connection attempt by remote side timed out	8
0x0111	(i) HCI_ERR_UNSUPPORTED_PARAM_VALUE	3
0x0112	(i) HCI_ERR_INVALID_HCI_PARAMETER_VALUE	3
0x0113	connection terminated by remote side	3
0x0114	connection terminated by remote side	3
0x0115	connection terminated by remote side	3
0x0116	connection terminated by local side	3
0x0117	(i) HCI_ERR_REPEATED_ATTEMPTS	3
0x0118	authentication rejected by remote side	3
0x0119	incompatible remote Bluetooth adapter	3
0x011a	unspecified error	3
0x011b	(i) HCI_ERR_UNSUPPORTED_LMP_PARAMETER_VAL	3
0x011c	master slave role switch not allowed	3
0x011d	connect lost to remote Bluetooth adapter (link manager)	3
0x011e	(i) HCI_ERR_LMP_ERROR_TRANSACTION_COLLISION	3
0x011f	(i) HCI_ERR_LMP_PDU_NOT_ALLOWED	3
0x0120	attempt to enable encryption failed	3
0x0121	information: unit key used	3
0x0122	(i) quality of service not supported.	3
0x0123	(i) HCI_ERR_INSTANT_PASSED	3
0x0124	(i) unit key not supported	3
0x0164	(i) HCI_ERR_ILLEGAL_HANDLE	3
0x0165	initialization of adapter failed (timeout)	6
0x0166	initialization of adapter failed (synchronization)	6
0x0201	(i) connection went to state pending	3
0x0202	protocol not supported by remote side	3
0x0203	connection refused due to security conditions	3
0x0204	out of resources	3
0x02ee	remote side timed out	3
0x0301	version of remote SDP entity not compatible	3
0x0302	invalid service record handle	3
0x0303	invalid request syntax	3
0x0304	invalid size of pdu	3
0x0305	continuation state is invalid	3
0x0306	not enough resources to complete operation	3
0x0364	client received unhandled SDP opcode	3
0x0365	No answer from server(timeout)	3

0x0366	specified service not found	3
0x0367	Syntax Error in Response from server	3
0x0464	Connection setup was rejected by remote side (DM), i.e. the Pin exchange has failed in restricted mode	3
0x0465	Connection timed out (no response)	8
0x0466	Non Supported Command received (incompatible remote side)	3
0x0467	Illegal parameter	3

Note: error codes marked with (i) are internal errors.

6 Appendix

A1: Technical data BlueRS+E/I

BlueRS+E desktop model serial interface:

Functional: V.24
Electrical: V.28
Mechanical: 9 pin DSUB connector (female)

BlueRS+I module serial interface:

Functional: V.24
Electrical: TTL, 5V compatible
Mechanical: double pin rows P1

Transmission speeds:

DTE: 2400 – 230400 bit/s (asynchronous)

Character representation:

8Bit, no Parity, 1 stop bit
(7Bit even/odd Parity, 1 stop bit, under development)

Character synchronization:

asynchronous

Operating mode:

half duplex or full duplex

Flowcontrol

Hardware (RTS/CTS)

Bluetooth link:

RF part: 0 dBm Radio,
About 10 m (Bluetooth Power Class 2)
Bluetooth Spec: 1.1
Flowcontrol credit based

Bluetooth antenna:

internal or external via coax SMC connector

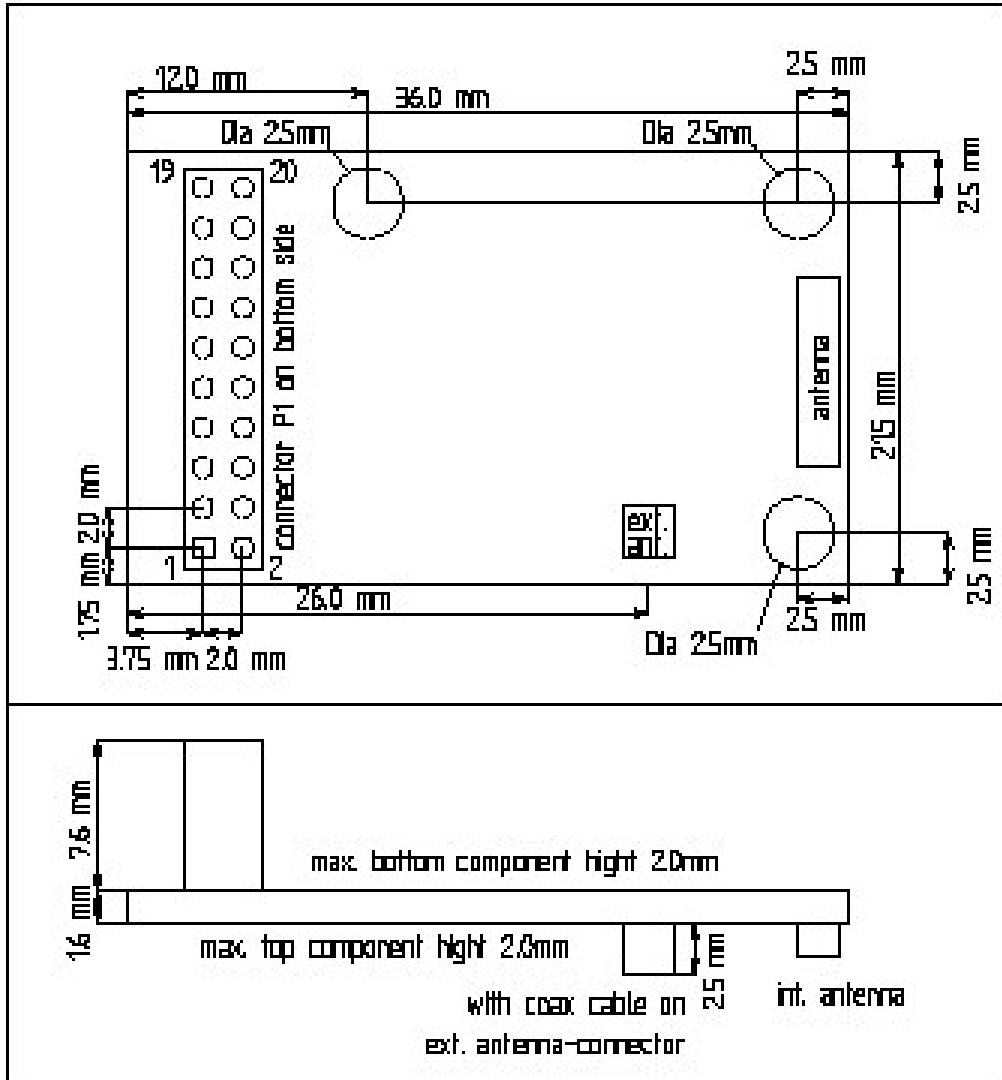
Physical dimensions:

BlueRS+E: casing: 31 x 16 x 65 mm (WxHxD)
BlueRS+I: plug on module: 21,5 x 8 x 36 mm (WxHxD)

Power supply:

BlueRS+E: external power supply 5V DC.
Idle: ca. 1 mA, active: ca. 50 to 70 mA.
BlueRS+I: 5V DC, +-5%, via double pin row P2
Idle: ca. 1 mA, active: ca. 30 to 50 mA.

A2: Mechanical dimensions of the module BlueRS+I



A3: BlueRS+I Serial Interface Connector P1

P1	Signal	Dir.	active	BlueRS+I usage
1	GND	I	-	0V-Power
2	VCC	I	-	+5V / +3.3V DC power supply
3	GND	I	-	GND
4	TXD	I	H	Transmit Data
5	GND	I	-	GND
6	RXD	O	H	Receive Data
7				reserved
8	RTS~	I	L	RTS low active
9				reserved
10	CTS~	O	L	CTS low active
11	RESET~	I	L	RESET low active
12	DTR~	I	L	DTR low active
13				reserved
14	DCD~	O	L	DCD low active
15	RI~	O	L	RI low active
16	DSR~	O	L	DSR low active
17	UA	O	H	User Output 1
18	UE~	I	L	User Input 1
19	UA2	O	H	User Output 2
20	UE2~	I	L	User Input 2

A4: Pin out of the V.24/V.28 interface BlueRS+E desktop models (DSUB 9)

Pin	V.24/V.28			I/O	TEXT
	ITU	DIN	EIA		
1	109	M5	DCD	O	Data carrier detect
2	104	D2	R D	O	Receive data
3	103	D1	T D	I	Transmit data
4	108/1 108/2	S1.1 S1.2	DTR	I	Data terminal ready
5	102	E2	GND	---	Signal ground
6	107	M1	DSR	O	Data set ready
7	105	S2	RTS	I	Request to send
8	106	M2	CTS	O	Clear to send
9	125	M3	RI	O	Ring indicator