

Manual

RS232 Universal Serial Buffer 4 MByte



Release
Model

1.1
88642

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The W&T RS232 Universal Serial Buffer, Model 88642 described on the following pages is a highly versatile device which can be used to buffer store virtually any kind of serial data.

The buffer has a total of 4 MB of non-volatile memory, so that the stored data are not lost even in the event of a power failure.

Both buffer interfaces can be configured independently of each other, so that converting the baud rate, data format and handshake procedure is no problem.

Additional information about W&T products and new developments can be found at <http://www.wut.de> or in the e-mail updates sent to members of the W&T Interface Club, which you can sign up for on the W&T homepage.

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RS232 Universal Serial Buffer, Model 88642

The W&T RS232 Universal Serial Buffer 88642 allows you to store serial data, and features a flash memory with a capacity of 4 MB. Thanks to its various operating modes this universal device can be used

- to speed up output by buffering print or plot data
- for reliable storage of fee and conversation data information in telephone systems
- as a portable buffer with RS232 port for transporting machine data
- for converting formats between non-compatible serial terminal devices

and replaces all W&T Buffer models whose use was limited to specialized applications.

Supply voltage

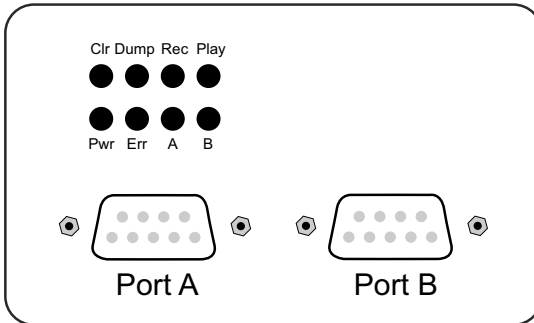
The supply voltage for the Buffer is provided by an integrated switched-mode power supply. This features a variable input voltage range and allows the Buffer to be powered using the AC adapter provided or alternately by any AC or DC voltage between 12 and 24V. The supply connection is reverse polarity protected and is made using the included plug-in screw terminal.

Important: When powering the T-switch externally you must ensure that the supply voltage used is potential-free. Voltage sources with a ground reference can damage the Buffer and/or the connected serial devices. We therefore recommend using the power supply included in the scope of delivery.



Mechanical features and enclosure

The Buffer comes with two 9-pin RS232 ports and is integrated into a 45mm wide plastic housing for mounting on standard rails conformal with DIN EN 50022-35.



Configuring the serial ports and Buffer operating modes requires opening the housing of the device. For this purpose it is advantageous to screw a SUB-D plug with body to one port on the Buffer and use the attached plug to assist in pulling off the housing cover.



Wiring assignments

The RS232 port A of the buffer is implemented as a SUB-D female connector with DCE pin functions, and port B as a SUB-D male connector with DTE pin functions. This design ensures that the buffer can be wired into the majority of applications with standard 1:1 cables. In addition, this pin configuration make installation and startup easier, since the data transfer can be tested first without involving the buffer by simply connecting the cables together.

The pinout for the individual ports can be found in the following tables.

RS232 input Port A with DCE pin functions:

Pin#	Function	Signal	Direction
1	always "on"	DCD	output
2	data out	RxD	output
3	data in	TxD	input
4	handshake in	DTR	input
5	signal GND	GND	GND
6	always "on"	DSR	output
7	not connected	RTS	input
8	handshake out	CTS	output
9	always "off"	RI	output

RS232 output Port B with DTE pin functions:

Pin#	Function	Signal	Direction
1	not connected	DCD	input
2	data in	RxD	input
3	data out	TxD	output
4	handshake out	DTR	output
5	signal GND	GND	GND
6	not connected	DSR	input
7	always "on"	RTS	output
8	handshake in	CTS	input
9	not connected	RI	input

Display and control elements

The Buffer has four LEDs, with the green „Power“ LED indicating the presence of correct supply voltage. The LEDs marked „A“ and „B“ have different functions depending on the operating mode; these functions are described in the sections for the respective operating modes. The LED marked „Error“ indicates the presence of parity or framing errors in running data traffic and can only be cleared explicitly by pressing the „Clear“ key.

The „Clear“ key resets the Buffer and deletes all internal data and error memories. Holding down the Clear key longer resets not only the write and read pointers of the buffer, but also physically deletes the memory contents.

Pressing the „Dump“ key when the device is turned on outputs the current setting of the Buffer on whichever serial port has been selected using the DIL switches.

Additional information about this function can be found in the section Diagnostic functions > Setting-dump on page 48.

Life expectancy of the flash memory

In contrast to RAM-based memory, flash memory has the virtue of being non-volatile – an advantage which however comes at the expense of limited useful life. To help you estimate the life expectancy of the device we have prepared a more detailed look at these memory chips:

The buffer uses flash chips having a typical life expectancy of 1,000,000 write cycles per memory cell. Since the buffer is organized as a ring memory, the memory cells are generally written in succession.

Assuming the buffer is operated at the maximum baud rate and continuous data throughput, 11,520 characters will be written to memory every second. Under these conditions each memory cell is rewritten every 364 seconds, resulting in a life expectancy for the flash memory of around 11 years.

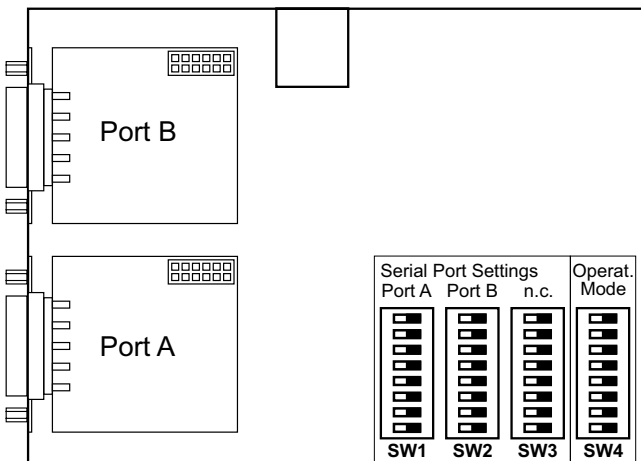
The above worst-case scenario *maximum baud rate with continuous data throughput over a time of 24h per day* is of course more theoretical than practical. Even at a speed of 19.200 kBaud the life expectancy rises to around 70 years with the buffer still being sent data around the clock.

Configuring the serial ports

Both ports of the Universal Serial Buffer can be configured for transmission rate, data format and handshake procedure completely independently of each other. This feature allows you to connect the Buffer to terminal devices which use different serial data formats.

The modular construction of the Buffers allows you to incorporate other interface modules to convert the interface type within the device. Especially when larger quantities are involved changing over the Buffer with other interface modules represents an economical alternative to the external converters otherwise commonly used. Please contact us with any requirements for special versions of the Buffer.

You set the serial parameters using two DIL switch banks SW1 and SW2 inside the device. The position and arrangement of the DIL switch banks with respect to the corresponding port can be seen in the following sketch.



Serial format

Baud rate, number of data bits and any parity bit which may be used can be configured separately for each port on the Buffer, so that the format can be adapted to any connected terminal device.

Handshake procedure

The two serial ports of the Buffer can be set to hardware handshake or XON/XOFF handshake independently of each other. Operating the Buffer with no handshake is not recommended.

When the Buffer is nearly filled with data, an XOFF code (13H) is output on the corresponding port and for the next received character the hardware handshake output is set to 'Block' (negative level). Once the buffer has been emptied again, an XON code (11H) is output and the hardware handshake output is set to 'Enable' (positive level).

If the T-switch receives an XOFF code or detects a block level (negative level) on the hardware handshake input, it stops sending data on the corresponding port no later than one byte after this state is detected. If the T-switch receives an XON code or detects an enable level (positive level) on the hardware handshake input, it resumes sending data.

The XON and XOFF codes are used only for the handshake; these codes are not data and are also not allowed to be contained in the user data. If a hardware handshake is used however and the T-switch is correspondingly configured, the XON and XOFF codes are treated as normal data.

When hardware handshake inputs are open or improperly wired, the T-switch may send no data on the affected port. If you use only software handshake and configure the T-switch accordingly, this problem will of course not occur.

Setting the format - DIL switches

The DIL switch banks SW1, SW2 and SW3 have the same scope of functions for all three ports: the individual switches determine the transmission speed, the number of data bits, the parity and the handshake procedure of the respective port. The function of the individual switches can be seen in the following tables:

handshake	S1
hardware handshake	off
software handshake	ON

data bit	S6
7 data bit	off
8 data bit	ON

parity	S7	S8
no parity	X	off
odd parity	off	ON
even parity	ON	ON

baudrate	S2	S3	S4	S5
150 Baud	off	off	off	off
300 Baud	ON	off	off	off
600 Baud	off	ON	off	off
1200 Baud	ON	ON	off	off
2400 Baud	off	off	ON	off
4800 Baud	ON	off	ON	off
9600 Baud	off	ON	ON	off
19200 Baud	ON	ON	ON	off
38400 Baud	off	off	off	ON
57600 Baud	ON	off	off	ON
64000 Baud	off	ON	off	ON
76800 Baud	ON	ON	off	ON
115200 Baud	off	off	ON	ON

Modes

The RS232 Universal Serial Buffer 88642 offers three operating modes which are described below:

Standard Serial Buffer

In this mode the RS232 Universal Serial Buffer serves as a fast buffer storage device for serial data between an RS232 data sender and an RS232 receiver using the first-in/first-out principle:

The data leave the output of the buffer in exactly the same order in which they were written to the buffer by the computer. Pressing the „Play“ key in this mode performs another output of the entire buffer contents, whereas pressing „Clear“ deletes the buffer contents.

For practical use of the copy function using the „Play“ button, actuate the „Clear“ button before recording the data. Please be sure that the capacity limit of the buffer is not exceeded during the data transfer. The memory is configured as a ring buffer, so that in case of memory overflow the oldest data are overwritten, resulting in unpredictable copy results if the capacity is exceeded.

The LED marked „A“ indicates that the buffer is receiving current data from the terminal device on Port A, and LED „B“ indicates data output on Port B.

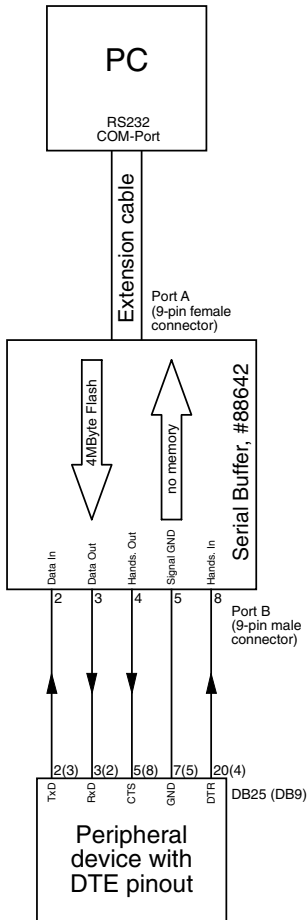
The Buffer operates bi-directionally with a maximum transmission speed of 115.200 baud and allows the input and output ports to be configured separately with respect to transmission speed, data format and handshake procedure. In the direction of the receiver the entire memory contents of the Buffer is available. This memory is reserved for buffering the data from the computer to the peripheral device. The reverse direction does not use a memory.

The ability to configure both Buffer ports separately means you can run at a significantly higher speed on the computer side than the peripheral device allows. This enables you to drastically increase efficiency of the Buffer in the application.

It is also possible to use the Buffer as a converter between two RS232 devices whose transmission parameters or handshake procedure are not compatible with each other.

Connection example for Serial Buffer mode

Inserting the RS232 Universal Serial Buffer between PC and printer or plotter with hardware handshake:



Fee data buffer Mode

In this mode the RS232 Universal Serial Buffer is used for buffering call and fee data between a telephone system and the processing PC.

In contrast to the standard serial buffer mode, the output interface of the Buffer is essentially blocked after power-on, so that incoming data are not lost when the buffer is reset. The interface to the PC must be explicitly enabled using control sequences and then blocked again after reading out the data.

The use of flash memory chips means that the buffer contents is retained even after loss of power. However, integrity of the data is not ensured for information reaching the buffer while the supply voltage is in the process of collapsing. For critical applications we therefore strongly recommend using the UPS of the telephone system to back the buffer.

After a power loss you may use the control sequence 1Bh 0Fh 0Dh to read out the entire contents of the buffer whenever desired, so that the data stored in the unit can be retrieved with no problem. Executing this function however resets the write pointer of the buffer to the beginning of the memory, so that this option should only be used with care in normal operation.

Using the freely available Windows utility downloadable from www.WuT.de, you can read the data out of the buffer from any PC. The utility uses a fixed serial format of 9600 baud, 8 data bits, no parity and hardware handshake, so that the Buffer needs to be configured accordingly. After connecting the Buffer to a COM port on the PC and selecting the port in the utility, you can read out the contents of the Buffer by clicking on the Start button and then save it to a file.

Displaying the Buffer

The red LED marked „A“ shows the state of the memory and indicates any of the following three conditions:

OFF: The memory is empty; there are no call data.

ON: There are call data in the memory. Memory utilization is less than 80% of the available memory capacity.

FLASHING: There are call data in the memory. Memory utilization is over 80% of the available memory capacity.

The LED marked „B“ indicates that the Buffer is receiving data from the telecommunications system through Port B.

Control sequences

Data flow between the Buffer and PC is controlled using code sequences whose function is described in brief on the following pages. The values for all code sequences are given in hexadecimal format.

Start data transmission

The command 1Bh 02h 0Dh enables the output port and outputs all stored data. The flow control for the data is accomplished using the set handshake procedure.

Stop data transmission

The command 1Bh 03h 0Dh blocks the output port. All incoming data are stored. After the Buffer is powered on or after a reset the port to the PC is essentially blocked.

Output memory utilization

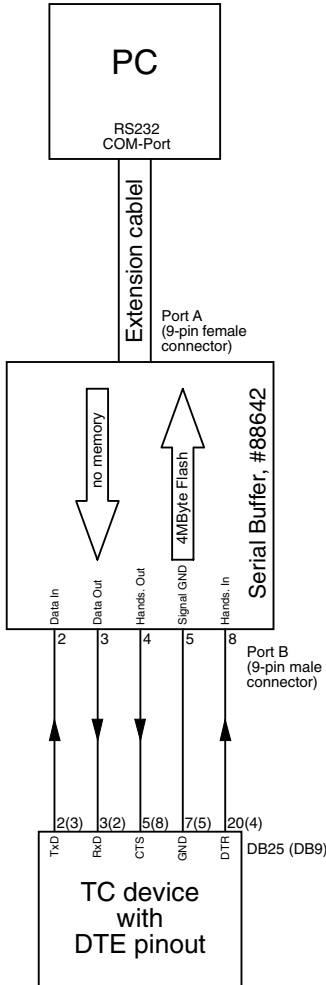
When the output is blocked, you can use the command 1Bh 07h 0Dh to get the memory space used for call data in % of the total memory capacity. The Buffer responds with a 2-byte ASCII string plus a Carriage Return.

Read out the entire contents of the buffer

Using the control sequence 1Bh 0Fh 0Dh the entire contents of the buffer can be read out at the Serial Port A whenever desired.

Wiring example

PC <> telephone system with hardware handshake



Portable Buffer Mode

In this mode the RS232 Universal Serial Buffer can be used as a portable data memory for transferring serial data from a data sender to a receiver with no direct cable connection. In this mode the device acts like the familiar USB memory sticks, except with an RS232 port and with operating keys right on the device. The internal flash memory ensures that the stored data are always available even without a permanent power supply.

The serial data format for *Port A* and *Port B* must be configured to the format of the data sender and receiver before use. For more detailed information, see section *Setting the DIL switches* on page 36.

Record Mode

The keys *Rec* and *Rec and Play* place the Buffer in Record mode, in which all serial data received through Port A are written to the internal flash memory. Pressing the *Rec* key again exits Record mode and recording of data stops.

The total volume of data stored must not exceed the capacity limit of 4 MB. When this limit is reached the data sender is stopped by the handshake protocol and exceeding of the maximum capacity is indicated by flashing of the Error LED.

While the Buffer is being placed in Record mode no data may be sent to the device. Only data that were received after the LED comes on are stored in memory.



Adding

If the *Rec* key is held down until the red *LED A* begins to illuminate continuously (hold-down time approx. 2 seconds), the data received then are attached to any existing memory contents. Holding the *Rec* button down for shorter times is ignored.

Receipt of data is indicated by flashing of *LED A*.

Overwriting

If the *Rec* and *Play* buttons are pressed at the same time until the red *LED A* begins to illuminate continuously (hold-down time approx. 2 seconds), any existing memory contents is deleted and replaced completely by the newly received data. Holding the *Rec* button down for shorter times is ignored.

Receipt of data is indicated by flashing of *LED A*.

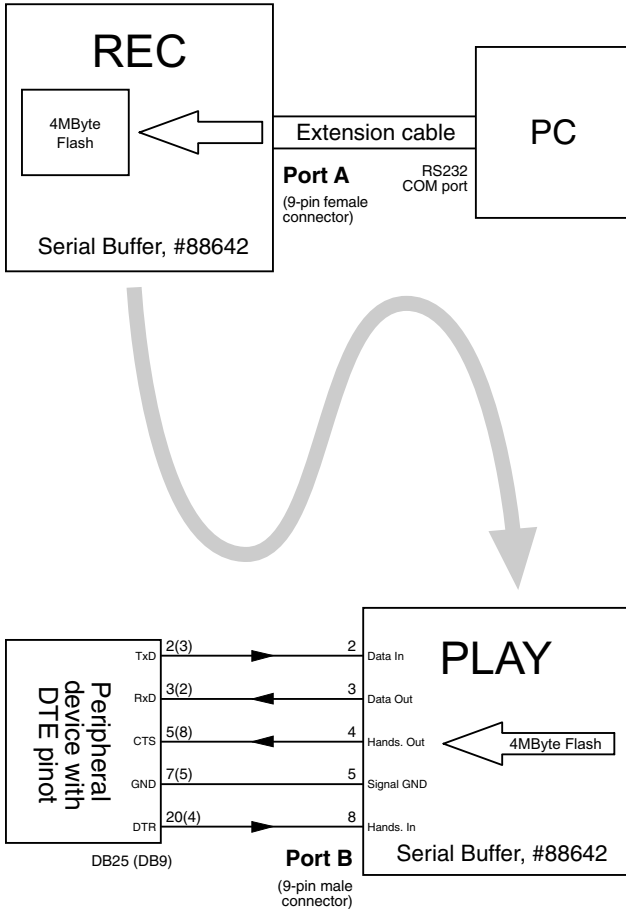
Play Mode

Pressing the *Play* button places the Buffer in Play mode, in which all previously stored data are output on *Port B*. Output of the data can be repeated as often as desired.

Active Play mode is indicated by illumination of *LED B*; data output is indicated by flashing of the LED. Once all the data have been output, *LED B* automatically turns off and the Buffer goes onto the idle state. Once data output has been activated, it can be cancelled at any time by pressing the *Play* button again.

Connection example for *Portable Buffer Mode*

Transport serial data from a PC to a peripheral device with DTE configuration. Record the data from the PC in *Rec* mode, send the data to the terminal device with *Play*.



Setting the modes

The four modes described above for the Buffer are selected using the DIL switch bank SW4.

The function of the individual DIL switches can be seen in the following table:

Operating mode	S1	S2	S3	S4	S5	S6	S7	S8
Standard Buffer Mode	off	off	X	X	X	X	X	X
Portable Buffer Mode	ON	off	X	X	X	X	X	X
TC Buffer Mode	X	ON	X	X	X	X	X	X

Selecting the ports for the settings dump

Switches SW4.3 and SW4.4 can be used to select the port(s) on which you want to perform the settings dump:

Dump Output	S3	S4
Port A	off	off
Port B	ON	off
Port C	off	ON
All ports	ON	ON

Diagnostic functions

Starting up an RS232 port is often accompanied by difficulties, since both the pin assignments as well as the transmission parameters need to agree in order to enable errorless data transmission.

The RS232 Universal Serial Buffer 88642 has a settings dump function integrated that allows you to check the configuration, which can be quite useful during installation.

Settings dump

As a first test the settings dump integrated in the Buffer can be used to automatically generate a text which shows all the programmed settings in the 88642.

The settings dump has multiple functions:

- Testing the data and ground line connection
- Testing the transmission parameters
- Concise output of all settings
- Handshake test for data output from the 88642

To be able to generate the settings dump even under improper handshake conditions, the dump is even output if the port is blocked, though at a very slow speed. This means:

- Handshake enabled → Fast dump output
- Handshake blocked → Slow dump output

Hold down the „Dump“ key and then connect the Buffer to its power supply. After releasing the key the port set on the DIL switches SW4.3 and SW4.4 generates the following output:

```
PU 40,6000;;SI 0.2,0.3;DT
LB
LB RS232 Universal Serial Buffer, 4MBYTE
LB VERSION 1.0
LB          PORTABLE BUFFER MODE
LB
LB PORT A:  BAUD          9600
LB          DATA        8
LB          PARITY       NO
LB
LB          HANDSHAKE    HARD
LB
LB PORT B:  BAUD          9600
LB          DATA        8
LB          PARITY       NO
LB
LB          HANDSHAKE    HARD
```

Technical Data

Serial ports:	2x RS232, both ports independently configurable
RS232 inputs Port A:	9-pin SUB-D female connector with DCE pin functions
RS232 output Port B:	9-pin SUB-D male connector with DTE pin functions
ESD compatibility:	up to 15kV per IEC 801-2, Level 4
Baud rate:	150 .. 115.200 baud
Data format:	7, 8 data bits, No, Even, Odd Parity
Handshake:	Optional hardware or XON-/XOFF handshake
Supported signals:	RxD, TxD, CTS, DTR
Buffer size:	4 MByte Flash memory
Operating modes:	Standard Serial Buffer Charge Data Buffer Portable Buffer
Supply voltage:	AC adapter included or potential-free 12-24V AC/DC
No-load current:	typ. 30 mA @24V DC
Ambient temperature:	Storage: -40..+70°C Operating: 0..+60°C with external 24V supply
Housing / Dimensions:	Plastic housing for standard rail mount per DIN EN 50022-35, 105 x 75 x 45mm
Weight:	approx. 500g incl. power supply
Scope of delivery:	RS232 Universal Serial Buffer AC adapter for office use

Declaration of Conformity



W&T interfaces für TCP/IP, Ethernet, RS-232, RS-485, USB, 20mA, Glas- und Kunststoff-LWL,ftp, SNMP, OPC, IO digital, IO analog, ISA, PCI

**Declaration of conformity
according to paragraph 10.1 of directive 89/336/EWG**


Wiesemann & Theis GmbH hereby confirms that the products

RS232 Multi Computer Adapter, 0 MByte	Model 85603
RS232 Universal Serial T-Switch, 4 MByte	Model 85643
RS232 Universal Serial Buffer, 4 MByte	Model 88642

fulfill the requirements of the directives / regulations specified below:

1. Emission according to
 - 1.1. EN 55022 Cl. B (1998) +A1 +A2
 - 1.2. EN 61000-3-2 (2000)
 - 1.3. EN 61000-3-3 (1995) + A1
2. Noise Immunity according to EN 61000-6-2 (2001):
 - 2.1. EN 61000-4-2 ESD
 - 2.2. EN 61000-4-3 Radiated Immunity
 - 2.3. EN 61000-4-4 Burst
 - 2.4. EN 61000-4-5 Surge
 - 2.5. EN 61000-4-6 Conducted Immunity
 - 2.6. EN 61000-4-8 H-Field
 - 2.7. EN 61000-4-11 Supply Voltage Dips and Interruptions
3. Product-specific Low-Voltage Directive for communications technology
 - 3.1. EN 60950 (2003)

Wuppertal, 06/16/2006


Klaus Meyer, EMC Representative


Dipl.-Ing. Rüdiger Theis, Managing Director