Manual

RS232 Universal Serial Buffer, 4 MByte

Release 1.6
Model 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 convering 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 by any potential-free 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 Buffer 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.

Life expectancy of the flash memory

The RS232 Universal Serial 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.

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 expectance 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 expectance 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.

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 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.

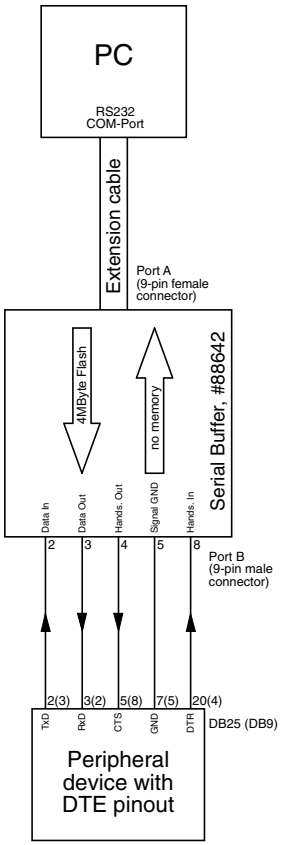
Setting the operating mode

The *Standard Serial Buffer* operating mode is selected using the DIL switch bank SW4:

Operating mode	S1	S2	S3	S4	S5	S6	S7	S8
Standard Serial Buffer	off	off	x	x	x	x	x	x

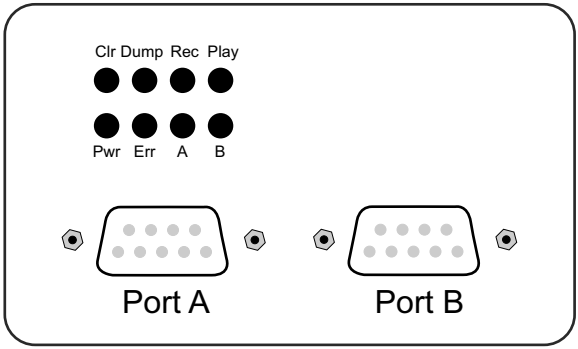
Connection example for Serial Buffer mode

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



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	handshake out	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 elements of the buffer

The Buffer has four LEDs, with the green „Power“ LED indicating the presence of correct supply voltage. 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 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.

Control elements of the buffer

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.

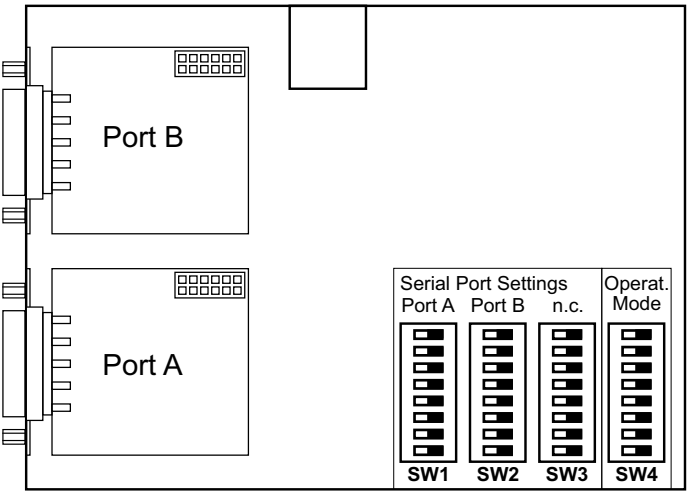
Pressing the „Dump“ key when the device is turned on outputs the current setting of the Buffer on whichever serial port has been selected using the DIL switches. Additional information about this function can be found in the section Diagnostic functions > Setting-dump.

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

Both 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.

Whe 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 and SW2 have the same scope of functions for both 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

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

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

Creating the settings dump

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.x
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
```

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. 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.

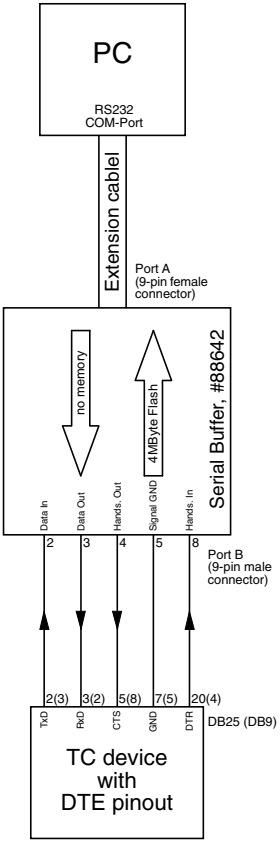
Setting the operating mode

The *Fee Data Buffer* operating mode is selected using the DIL switch bank SW4:

Operating mode	S1	S2	S3	S4	S5	S6	S7	S8
Fee Data Buffer	x	ON	x	x	x	x	x	x

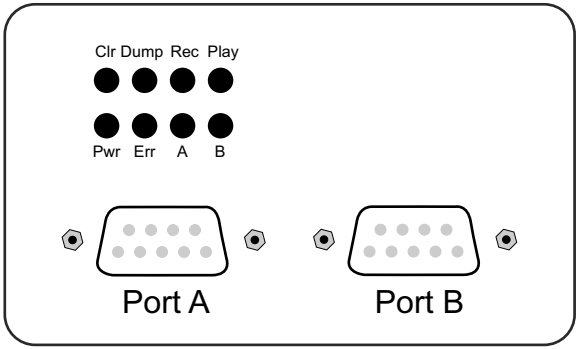
Wiring example

PC <> telephone system with hardware handshake



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	handshake out	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 elements of the buffer

The Buffer has four LEDs, with the green „Power“ LED indicating the presence of correct supply voltage. 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 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 elements of the buffer

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.

Control sequences

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

Start: Begin data transmission

The *Start* command 1Bh 02h 0Dh enables the output Port A on the Buffer and causes all data stored since the last read point through the port. Flow control of the data is handled using the set handshake procedure.

Stop: End data transmission

The *Stop* command 1Bh 03h 0Dh blocks the output Port A on the Buffer. All data arriving after that point are stored in the Buffer flash memory. After turning on the Buffer or after a device reset, the port to the PC is blocked.

Statistics: Memory use

When the output port is blocked, the *Statistics* command 1Bh 07h 0Dh can be used to call up the percentage of total memory used for call data. The Buffer responds with a 2-byte ASCII string plus a Carriage Return.

Reset: Reset all pointers

The *Reset* command 1Bh 08h 0DH can be used to reset all pointers to the beginning of the flash memory. This function is like a *clear* memory command, except that the memory cells are not explicitly overwritten. This command has the same effect as a short key press on the „Clear“ key of the Buffer. The *Reset* command is significantly faster than the *Clear* command of the Buffer, and still makes it possible to read out the entire contents of the Buffer after the face using the *Read All* command.

Nevertheless this command should be used with caution in terms of life expectancy of the Buffer-internal flash memory. Overly frequent resetting of the write pointer causes the same memory locations at the beginning of the flash area to be written.

This can result in a reduction of the memory life expectancy if the function is used too often. Daily resetting of the pointers in order to have to read out only the current values from the Buffer is not harmful. At one reset operation per minute the life expectancy of the memory would however be limited to just under two years, and so in such applications a different memory solution should be considered.

More information can be found in the section „Flash memory life expectancy considerations".

Clear: Clearing the Buffer

The *Clear* command 1Bh 09h 0Dh clears the memory contents by overwriting the stored data and sets all pointers to the start values. This command has the same effect as holding down the „Clear" key on the Buffer. This command as well should be used with caution, since the memory contents is irretrievable after the command has been executed. Whereas a reset of the write pointer has no effect on the contents of the memory and reading out the entire Buffer for data restoration is still possible after the fact, the *Clear* command overwrites the entire contents of all memory locations with 0FFh. The same warning as given for the *Reset* command applies to the *Clear* command, namely that excessive use of the *Clear* command can result in a reduction of the Buffer life expectancy.

Please note that the clear procedure for the entire memory typically takes 30 seconds. During this time you can neither read nor write to the memory.

Read: Read out the memory up to the position of the write pointer

The *Read* command 1Bh 0Ch 0Dh allows you to read out the memory contents as often as desired while the output port is open. The contents is output on Port A starting at the beginning of the flash memory up to the current position of the write pointer.

Read All: Read out the entire memory contents

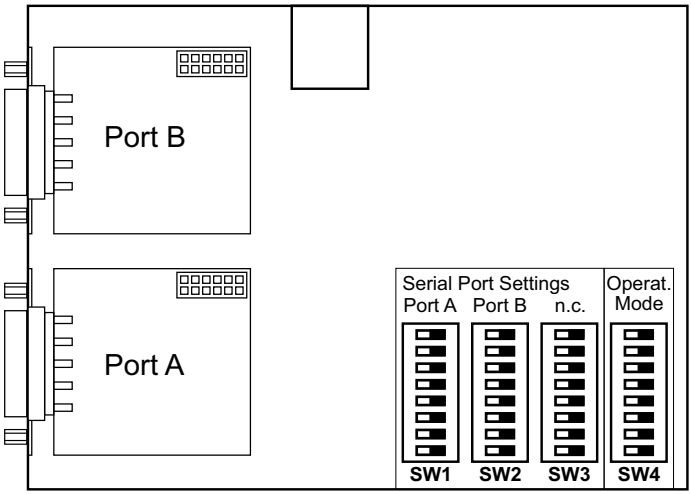
The *Read All* command 1Bh 0Fh 0Dh allows you to read out the entire memory contents as often as desired while the output port is open. This command is intended only as an emergency command for data recovery purposes. The entire memory contents of 4 MB of data are output through the serial port. It makes no difference whether user data or cleared memory locations are involved – the entire available memory block is always output.

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
Both 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.

Whe 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 and SW2 have the same scope of functions for both 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

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

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

Creating the settings dump

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.x
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
```

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. For more detailed information, see section *Configuring the serial ports*.

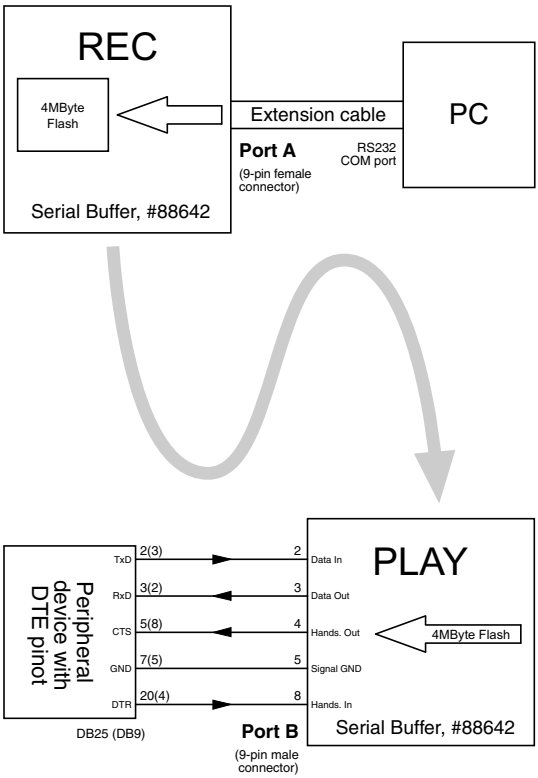
Setting the operating mode

The *Portable Buffer* operating mode is selected using the DIL switch bank SW4:

Operating mode	S1	S2	S3	S4	S5	S6	S7	S8
Portable Buffer	ON	off	x	x	x	x	x	x

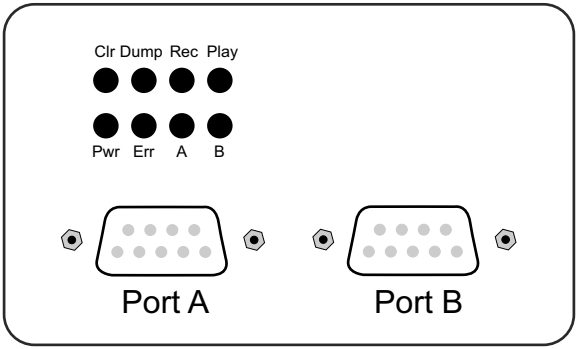
Connection example for *Portable Buffer* Mode

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*.



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	handshake out	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 elements of the buffer

The Buffer has four LEDs, with the green „Power“ LED indicating the presence of correct supply voltage. 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 red LED marked „A“ shows the state of the memory and indicates any of the following three conditions:

Control elements of the buffer

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.

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 configured handshake protocol. Reaching of the maximum capacity is indicated additionally 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 secolnds), 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.

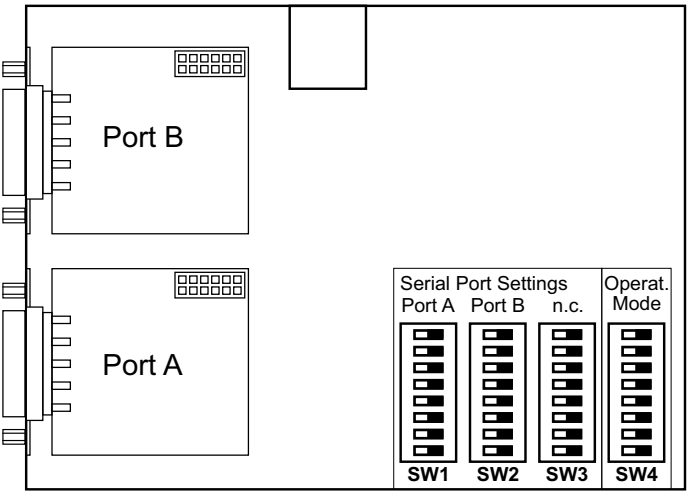
Active Play mode is indicated by illumination of *LED B*; data output is indicated by flashing of the LED. Once all the data have been output, *LED B* automatically turns off and the Buffer goes onto the idle state. Once data output has been activated, it can be cancelled at any time by pressing the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

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

Both 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.

Whe 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 and SW2 have the same scope of functions for both 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

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

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

Creating the settings dump

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.x
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:	potential-free voltage 12-24V AC/DC
No-load current:	typ. 30 mA @24V DC
Ambient temperature:	Storage: -40..+70°C Operating: 0..+60°C
Housing / Dimensions:	Plastic housing for standard rail mount per DIN EN 50022-35, 105 x 75 x 45mm
Weight:	approx. 150g
Scope of delivery:	RS232 Universal Serial Buffer